

**O CADASTRO RÚSTICO E  
URBANO**

**MULTI FUNCIONAL**



Comissão Organizadora do SICRUM  
Comissão de Coordenação da Região Centro

1991



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# **O CADASTRO RÚSTICO E URBANO MULTIFUNCIONAL**

**THE MULTIPORPOSE RURAL AND URBAN CADASTRE**

**Actas do  
Seminário Internacional  
sobre o Cadastro  
Rústico e Urbano  
Multifuncional**

**Proceedings of the  
International Seminar  
on the Multipurpose  
Cadastre  
Rural and Urban**

**- SICRUM -**

Portugal  
1991



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## NOTA PRÉVIA

Não constituirá facto inovador a afirmação de que é enorme e tende a aumentar vertiginosamente o volume de informação que se vai progressivamente disponibilizando e que é subproduto das acções de planeamento e monitorização no âmbito do Desenvolvimento Regional.

Tão pouco será original sublinhar o mundo de potencialidades, na obtenção de ganhos de eficiência de processos, de economias de recursos e de promoção de bem-estar, que decorrem da simples existência dessa informação.

Mas, para que essas potencialidades se possam traduzir em efectivo progresso, haverá que dar passos importantes no sentido de se assegurar a posse dos meios de armazenamento, tratamento e acesso à informação, compatíveis com as exigências de viabilidade de utilização que se adequam às aplicações previsíveis.

Da constatação destas evidências e das circunstâncias de se fazerem sentir nas Regiões Norte e Centro, no início de 1988, carências na área do Cadastro Geométrico, nasceu a iniciativa da promoção do SICRUM (Seminário Internacional sobre Cadastro Rústico e Urbano Multifuncional), envolvendo na sua organização instituições como o Instituto Geográfico e Cadastral, a Direcção-Geral de Planeamento e Agricultura e a Direcção-Geral das Contribuições e Impostos.

Abordando técnicas cujo impacto excede em muito a problemática do cadastro, e envolve áreas de interesse de múltiplas entidades da Administração Pública Central, Regional e Local, o Seminário veio a revestir-se do maior interesse como sede de reflexão e debate incidentes



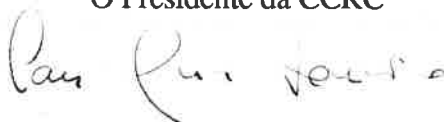
em experiências internacionais mais avançadas no tempo e nas diferentes fases previsíveis para o processo, desde a formação profissional, à estruturação organizacional das actividades, ou à articulação interinstitucional.

Será dispiciendo dizer do alcance dos temas que basearam a realização deste Seminário.

É essa a razão dominante desta publicação.

A actualidade dos problemas abordados é suficiente para nos dissipar qualquer dúvida sobre a sua utilidade.

O Presidente da CCRC

A handwritten signature in black ink, appearing to read 'Carlos Almeida Loureiro', written in a cursive style.

(Eng<sup>o</sup> Carlos Almeida Loureiro)

SEMINARIO INTERNACIONAL SOBRE CADASTRO RÚSTICO E URBANO  
MULTIFUNCIONAL

SICRUM

1ª PARTE

INFORMAÇÃO GERAL E RECOMENDAÇÕES

I - ANTECEDENTES E COMISSÃO ORGANIZADORA

- 1 - O SICRUM foi lançado em 29/02/1988, tendo merecido a concordância do malogrado Director Geral do IGC, Engº Rui Galiano Barata Pinto, em 01/03/1988 e, subsequentemente, a competente autorização de Sua Excelência o Secretário de Estado da Administração Local e do Ordenamento do Território, por despacho de 03/05/1988.
- 2 - Face a interdisciplinaridade da temática em debate a proposta de constituição da Comissão Organizadora apontou desde logo para a inclusão de elementos do IGC, como entidade produtora e de representantes dos grandes utentes da informação cadastral.
- 3 - Por despacho do então Director Geral vieram a ser nomeados para integrar a Comissão Organizadora por parte do IGC, o Engº Elvino Duarte, Director dos Serviços de Fotogrametria, e o Engº Fernando Silva da Glória, da Direcção dos Serviços Geométricos de Cadastro, tendo em atenção a sua recente especialização em Cadastro, na Alemanha. Subsequentemente, com a concordância das respectivas entidades e dos membros do Governo da Tutela, vieram a ser nomeados os restantes membros da Comissão Organizadora, que ficou assim constituída:

Engº Elvino Dias Duarte - IGC (Instituto Geográfico e Cadastral)

Engº Fernando Silva da Glória - IGC (Instituto Geográfico e Cadastral)

Engº Carlos Alexandre Costa - DGPA (D.G. Planeamento e Agricultura)

Engº João Lavadinho Leitão - DGCI (D.G. das Contribuições e Impostos)

Arq. Rui Ramos Loza - CCRN (Comissão de Coordenação da Região Norte)

tendo o último, por razões impeditivas de última hora, acabado por não participar no Seminário.

Deu ainda apoio muito activo à Comissão Organizadora, o Engº Artur da Costa Seara, da Direcção de Serviços de Fotogrametria do IGC, quer na 1ª parte em Lisboa, quer na 2ª parte no Funchal, onde se deslocou por convite específico.

- 4 = Face a impossibilidade de conseguir atempadamente o necessário suporte financeiro, em virtude das restrições orçamentais impostas a todos os Serviços Públicos, a realização do SICRUM inicialmente prevista para a Primavera de 1989, foi adiada, por proposta do então Director Geral do IGC, sancionada por despacho de 23/12/88, de Sua Excelência o Secretário de Estado da Administração Local e do Ordenamento do Território.
- 5 = Finalmente, na sequência das diligências promovidas pela Comissão Organizadora e tendo em atenção a receptividade que a iniciativa começou a merecer de muitas entidades públicas e privadas, foi superiormente autorizada a realização do SICRUM no período de 20 a 25 de Novembro de 1989.

## II - RAZÕES DE SER DO SEMINARIO

- 1 = A importância do cadastro geométrico é reconhecida a nível mundial, em virtude de constituir não só o garante do direito de posse da propriedade e o instrumento para uma correcta e justa tributação fiscal, mas também e relevantemente, por ser um dos suportes da política de ordenamento e planeamento territorial - desde a estruturação fundiária em termos da modernização da agricultura, aos Planos de Desenvolvimento Regional (com realce para os projectos urbanísticos e de infra-estruturas colectivas, etc.) - isto é, o cadastro geométrico é indispensável à política de gestão do solo e dos recursos naturais e socio-económicos, em termos do desenvolvimento integrado e harmónico do espaço geográfico nacional. Por isso é fomentado por todos os Países em que é reconhecido aos cidadãos o direito à posse da terra e é apoiado activamente pelas agências internacionais de desenvolvimento, desde a ONU, a FAO, ao Banco Mundial, às Agências de Desenvolvimento dos principais países industrializados, como acontece, por exemplo, com Projectos em curso no Brasil e Tailândia.
- 2 = Em Portugal pouco ou nada foi ainda feito na área do cadastro urbano.  
No tocante ao cadastro geométrico da propriedade rústica a área cadastrada representa cerca de 52% do território nacional, mas apenas aproximadamente 16% em termos de prédios.  
Por outro lado, a área rústica cadastrada localiza-se fundamentalmente no Sul do País e em parte da Região Centro, o que significa que algumas áreas de grande potencialidade em termos de recursos naturais e de maior densidade demográfica não estão ainda cobertas.  
Nas Regiões Autónomas dos Açores e Madeira a situação é semelhante.

- 3 - O Cadastro é uma actividade dinâmica, em virtude de estar em constante mutação, como consequência dos direitos de transmissão por sucessão, da sua alienação a terceiros e da facilidade de expropriação para toda a gama de empreendimentos de interesse social e colectivo, tais como habitação, vias de comunicação e infraestruturas urbanas e rurais. Daí que, para além da situação estrutural em determinada data, persista desde logo a necessidade da sua actualização e conservação, sob pena de perder gradualmente grande parte do seu valor informativo.
- 4 - Portugal enfrenta actualmente um autêntico desafio na área do desenvolvimento integrado do seu espaço geográfico, quer no âmbito da política governamental, quer no contexto comunitário, os quais requerem grandes volumes de informação actualizada sobre os recursos naturais; o que passa sistematicamente pela existência e/ou execução do cadastro geométrico, pois a informação tem de ser geo-referenciada e assentar em suporte cartográfico de pormenor. Por isso vários projectos de modernização e a estruturação da agricultura portuguesa, que estão a ser apoiados financeira e tecnicamente por agências internacionais de desenvolvimento e cooperação, estão a sofrer grandes atrasos pela falta de informação cadastral.
- 5 - Efectivamente, a situação actual começa a ser verdadeiramente dramática e preocupante, porquanto:
- 5.1 - No âmbito da política comunitária, o País tem de fornecer, a muito curto prazo, volumosa informação sobre cadastros temáticos de espécies frutícolas diversas (olivicultura e viticultura, por exemplo).
- 5.2 - A modernização da agricultura passa pelo emparcelamento em muitas das regiões de maior potencialidade, isto é, pelo redimensionamento da propriedade em explorações agrícolas competitivas em áreas de minifúndio e pelo levantamento da situação cadastral actualizada.
- 5.3 - A expansão das zonas a afectar à habitação e a equipamentos industriais e colectivos e a construção de infraestruturas, entre as quais avultam as vias de comunicação - em que o governo vem efectuando um notável e persistente esforço de investimento - passam obrigatória e invariavelmente, pelo ordenamento territorial, pela expropriação de terras e, consequentemente, pelo levantamento da situação cadastral da propriedade.

- 6 - Foi precisamente para colmatar algumas carências mais urgentes, nas Regiões do Centro e Norte, que foi lançado, pelo Conselho Coordenador de Cartografia do IGC, um Projecto de Cartografia e Cadastro, orientado para a candidatura a fundos comunitários. Este Projecto, se vier a concretizar-se, permitirá concluir a cartografia 1/10 000 daquele espaço geográfico para fins de ordenamento territorial, cartografar cerca de 1.730.000 ha em escalas grandes (1/1 000 e 1/2 000) e cadastrar cerca de 400.000 ha, com intervenções distribuídas pelos vários concelhos, em áreas consideradas prioritárias.
- 7 - A esta actividade têm sido consignados meios de todo insuficientes para o gigantismo que a tarefa implica e, por outro lado, as novas tecnologias colocam um desafio constante de adaptação organizacional das estruturas existentes e de metodologias de trabalho, implicando, cada vez mais, soluções integradas e novas formas de aquisição e tratamento da informação.
- 8 - Essa re-estruturação passa por múltiplas vertentes, desde a integração dos recursos e esforços dos sectores público e privado, pelo envolvimento de estruturas regionais, com relevância para as autarquias, por acções de formação profissional nas várias áreas, em suma, há que procurar uma nova estratégia de actualização globalizante e integrada, que imponha uma criteriosa gestão dos meios disponíveis, orientada e programada para dar resposta eficaz e atempada às carências e demanda da informação.
- 9 - O País não pode duplicar acções, sob pena de esbanjamento de tempo e recursos. A todos incumbe o dever de integrar, coordenar e harmonizar actividades de índole interdisciplinar. Assim sendo, o suporte cartográfico do cadastro (levantamento em escalas grandes com resolução (ou precisão) que possibilite a representação gráfica individualizada da propriedade) deve ser executado com características adequadas a todas as acções de estudo e projectos inerentes a esse nível de escalas, na área do desenvolvimento. Tal como os levantamentos urbanos devem ser executados com características que permitam a sua utilização eficiente, como suporte de cadastro urbano.
- 10 - As operações de intervenção cartográfica e o investimento e exploração de novas tecnologias só podem ser optimizadas em termos de custos e normalização da informação, se passarem por uma planificação e programação adequadas.
- 11 - A comunidade dispõe hoje de três tipos de cartografia - analógica ou de traço, digital e ortofotocartografia - que tem de saber utilizar, consoante os objectivos fundamentais a atingir, tendo em atenção a especificidade da problemática a que deve dar resposta, as características fisiográficas e arbóreas da região, o potencial do solo em termos de recursos, o prazo e o custo de execução.

- 12 - O cadastro geométrico, que começou por ser orientado para a tributação fiscal, tem hoje vastíssimas e mais relevantes aplicações na área do desenvolvimento. Há, por isso, que reflectir se deve continuar a ser de natureza gráfica (embora susceptível de ser digitalizado, mas com a consequente redução de precisão) ou se deve passar a ser de natureza numérica, para que estão cada vez mais vocacionadas as metodologias de aquisição e tratamento da informação, com o concomitante aumento da precisão - da maior importância na área jurídica, mesmo em áreas rurais, e vital em zonas urbanas, face à valia do solo e às exigências da gestão urbanística. Há também que reflectir e ter em conta a interacção do cadastro, sob o ponto de vista agronómico, com a cartografia temática de uso e capacidade dos solos.
- 13 - Nos últimos anos tem vindo a ser utilizada a ortofotocartografia em escalas grandes nas operações cadastrais, o que se tem traduzido em significativo aumento da produtividade, quer na fase geométrica (visto que muitas estremas são perfeitamente identificáveis na imagem foto-cartográfica), quer na avaliação agronómica (pela possibilidade de efectuar algumas fases do trabalho em gabinete por foto-interpretção). Todavia têm-se estado a trabalhar na zona Sul do País. Será que nalgumas áreas do Norte, com forte arborização e onde predomina o minifúndio, esta metodologia será a mais aconselhável, face ao volume de trabalhos fotográficos e consequentemente de campo que implica?  
Será de manter o cadastro gráfico?  
Há que não esquecer que dum processo cartográfico com alguma intervenção digital, se passa a um documento gráfico, seguidamente digitalizado.  
Isto é, ao digitalizar-se a informação cadastral está a perder-se uma grande parte dos benefícios da cartografia digital - a sua elevada precisão - quando adquirida directamente a partir do modelo estereoscópico.
- 14 - Assiste-se, por outro lado, ao arranque de vários projectos de cartografia digital, a nível de algumas autarquias e bem assim de empresas prestadoras de serviços. Ora sendo este tipo de cartografia o ideal para a execução do cadastro geométrico urbano, importa estabelecer desde já metodologias de trabalho normalizadas, que possibilitem a integração dos dados em sistemas urbanos de informação capazes de assegurar a sua plena exploração em termos de planeamento e gestão das infraestruturas urbanas; colocando-a ao serviço de toda a comunidade de utentes.

- 15 - Há pois que reflectir sobre a cartografia de suporte, que deve servir simultaneamente a fins de planeamento e projecto, através de padrões e normas de trabalho, que evitem duplicações futuras, eliminando-se a sub-utilização da informação e a baixa rendibilidade dos investimentos.
- 16 - Finalmente é ainda de referir que a evolução tecnológica do País, nesta área, quer a nível estatal, quer privado, só pode realizar-se se assentar numa estratégia globalizante e numa desejável programação de planos de trabalho por objectivos, rigidamente definidos e cumpridos.  
E essa evolução terá ainda efeitos benéficos extremamente frutuosa, em termos da elevação do nível profissional e tecnológico em Portugal, indispensável para viabilizar e despoletar accões de cooperação internacional, mormente nos PALOP's para que o País está excepcionalmente posicionado e vocacionado, numa área que é motora de desenvolvimento, mas em que a concorrência é agressiva.
- 17 - Foi precisamente pela multiplicidade dos temas envolvidos, que a uma C.O. integrou membros de vários Ministérios, quer da área de produção, quer de utilização.

### III - OBJECTIVOS

- 1 - O SICRUM procurou, por consequência, proporcionar um debate e uma reflexão profunda sobre toda esta problemática, balizada por experiências internacionais, em busca de propostas de estratégias integradas e globais, tendo em conta as realidades socio-económicas do País e orientadas para respostas atempadas e adequadas às exigências da comunidade, em termos da informação requerida pelo desenvolvimento socio-económico.  
Daí que essa reflexão se tenha debruçado sobre todas as fases do processo, desde a formação profissional, à estruturação organizacional das actividades, tendo em conta a integração de recursos e potencialidades dos sectores público e privado da especialidade, e o papel a desempenhar pelas Autarquias e outros órgãos regionais.  
A experiência profissional dos muitos especialistas estrangeiros, convidados e participantes, dos principais Países Europeus e a grande receptividade que o SICRUM mereceu por parte da comunidade nacional, quer da área de produção, quer da utilização, permitiu o êxito que pensamos foi alcançado em termos dos objectivos programados.

2 - Pretendeu-se especificamente:

- Proporcionar um debate sobre as estruturas organizacional e metodológica mais adequadas às necessidades do País, à evolução tecnológica e à forte dinamização das actividades.
- Contribuir para a modernização tecnológica do País numa área que é motora de desenvolvimento, quer a nível do sector estatal, quer privado, através de planos de acção plurianuais, dotando o País com os instrumentos concorrenciais de cooperação relativamente aos Países lusófonos.
- Reflectir sobre a formação profissional em Portugal, aos vários níveis - universitário, politécnico e técnico-profissional.
- Proporcionar um debate entre técnicos e responsáveis das principais áreas de aplicação (planeamento, tributação fiscal e registo predial) por forma a encontrar soluções integradas e harmonizantes.
- Fomentar a aquisição da informação cadastral por via digital, por forma a alimentar verdadeiros sistemas de informação geográfica, como instrumentos de planeamento ao serviço dos grandes utentes.

Refere-se seguidamente, alguma informação relevante sobre o SICRUM:

#### IV - ESTRUTURA ORGANIZACIONAL

O SICRUM foi estruturado em dois períodos, sendo o primeiro de Sessões Públicas, para apresentação e discussão de Comunicações Técnicas, realizado no LNEC, em Lisboa, nos dias 20 e 21/11/89; e o segundo, de Sessões por Grupos de Trabalho, realizado no Funchal, no período de 22 a 25/11/89.

- Este segundo período incluiu os seguintes Grupos de Trabalho:
- G.T. I - Organização. Gestão. Produção. Cadastro Rústico e Urbano
  - G.T. II - Metodologias de trabalho. Aquisição e processamento da informação
  - G.T. III - Avaliação predial para fins de planeamento e tributação. Sistemas de informação geográfica (LIS/GIS)
  - G.T. IV - Normas e Especificações Técnicas. Controlo de Qualidade. Gestão Multifuncional da Informação.
  - G.T. V - Cadastro e Registo Predial. Aspectos Técnicos e Legais.
  - G.T. VI - Formação Profissional aos vários níveis (universitário, politécnico e técnico profissional).

Esta estratégia teve por finalidade possibilitar não só a necessária divulgação e sensibilização de actividades que estão directa ou indirectamente correlacionadas com o cadastro, como ainda, complementadamente, tirar partido da presença em Portugal de muitos especialistas e dirigentes internacionais oriundos quer da Europa, quer de cinco Países da nossa Comunidade Linguística, para proporcionar um debate aprofundado sobre vários temas sectoriais, conducentes à elaboração de propostas concretas para a modernização e dinamização do Cadastro em Portugal.



EXPOSIÇÃO TÉCNICA - Durante a I Parte do SICRUM teve lugar no LNEC uma Exposição Técnica e Comercial, em que tomaram parte várias entidades e empresas comerciais.

#### ENTIDADES APOIANTES:

Não tendo, à partida, havido qualquer dotação consignada para o efeito, a realização do SICRUM só foi viabilizada graças ao apoio que a Comissão Organizadora recebeu das entidades públicas e privadas, seguida e merecidamente referenciadas:

#### V - ENTIDADES QUE, COM OS SEUS APOIOS, VIABILIZARAM A REALIZAÇÃO DO SICRUM

##### I - ENTIDADES COMPARTICIPANTES DOS ENCARGOS FINANCEIROS

- Junta Nacional de Investigação Científica e Tecnológica (JNICT)
- Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ - RFA)
- Direcção Geral de Hidráulica e Engenharia Agrícola (DGHEA)
- Direcção Geral de Contribuições e Impostos (DGCI)
- Instituto para a Cooperação Económica (ICE)
- Fundação Luso Americana para o Desenvolvimento (FLAD)
- Electricidade de Portugal (EDP)
- Centro Nacional de Informação Geográfica (CNIG/SNIG)
- Universidade de Aveiro
- Instituto do Vinho do Porto (IVP)
- Instituto da Vinha e do Vinho (IVV)
- Portucel - Empresa de Celulose e Papel de Portugal E.P.
- Instituto de Informática do Ministério das Finanças (IIMF)
- Agfa Gevaert (Portugal)
- Wild + Leitz Portugal
- ICL (Portugal)
- Emporsil
- Topsistema
- Estereofoto
- Socarto
- Geometral

Graças a estes apoios financeiros pôde a Comissão Organizadora convidar alguns dos especialistas dos principais Países Europeus e, simultaneamente, conceder algum apoio aos participantes dos PALOP's.

##### 2 - ENTIDADES QUE DISPENSARAM APOIO LOGÍSTICO A COMISSÃO ORGANIZADORA

- Instituto Geográfico e Cadastral (IGC)
- Direcção Geral de Planeamento e Agricultura (DGPA)
- Direcção Geral de Contribuições e Impostos (DGCI)
- Secretaria Regional do Equipamento Social da R.A. da Madeira (SRES)
- Secretaria Regional da Agricultura da R.A. Madeira (SRA)
- Câmara Municipal do Funchal

- Delegação Regional do IGC na Madeira
- Caixa Geral de Depósitos (CGD)
- Comissão de Coordenação da Região Centro (CCRC)
- Câmara Municipal de Lisboa (CML)
- DG Administração Autárquica (DGAA)
- DG de Portos (DGP)
- Instituto Hidrográfico (IH)
- Centro Nacional de Informação Geográfica (CNIG)
- DG de Desenvolvimento Regional (DGDR)
- DG do Ordenamento do Território (DGOT)
- Portucel
- Laboratório Nacional de Engenharia Civil (LNEC)
- Wild + Leitz Portugal
- Serviço Nacional de Parques, Reservas e Conservação Natureza (SNPRCN)
- Instituto Vinha e do Vinho
- Instituto do Vinho do Porto
- Dir. Reg. Turismo da Madeira
- Direcção Regional de Planeamento da Madeira
- Direcção Regional de Saúde Pública da Madeira

O apoio financeiro concedido pelo Instituto para a Cooperação Económica destinou-se a suportar, total ou parcialmente, as participações dos representantes de Moçambique, Guiné, S. Tomé e Príncipe e Cabo Verde.

Aqui se expressa a todas estas entidades o mais vivo reconhecimento e agradecimento da Comissão Organizadora pelo valiosíssimo e eficaz apoio dispensado a todos os níveis, sem o qual a realização do SICRUM jamais teria sido possível. Permitimo-nos salientar a extrema hospitalidade e vivo apoio, a todos os níveis, das entidades da RA da Madeira anteriormente referidas, com um justo destaque para a SRES, SRA e C.M. do Funchal, que apesar do escasso tempo disponível durante a II Parte do SICRUM, no Funchal, permitiram não só a maior eficácia organizacional, mas dar ainda a conhecer um pouco das belezas naturais da Madeira e da singular simpatia das suas gentes, que cativaram sobremodo todos os participantes nacionais e estrangeiros. Lamentamos que o apertado programa dos trabalhos e a especificidade dos temas em debate, não tenha permitido um diálogo mais alargado e aprofundado com muitos dirigentes e técnicos das áreas do desenvolvimento regional.

## VI - CERIMÓNIAS DE ABERTURA E ENCERRAMENTO

### 1 - CERIMÓNIA DE ABERTURA

Teve lugar no Anfiteatro do LNEC, no dia 20, pelas 9H30m, tendo sido presidida por Sua Excelência o Secretário de Estado da Administração Local e do Ordenamento do Território e contado com a presença de Sua Excelência o Secretário de Estado da Justiça e diversas individualidades convidadas. Seguem os discursos de Sua Excelência o Secretário de Estado da Administração Local e Ordenamento do Território e da Comissão Organizadora.



INTERVENÇÃO DO SECRETARIO DE ESTADO DA  
ADMINISTRAÇÃO LOCAL E ORDENAMENTO DO TERRITÓRIO,  
DR. NUNES LIBERATO, NA ABERTURA DO  
"SEMINARIO INTERNACIONAL SOBRE CADASTRO RUSTICO  
E URBANO MULTIFUNCIONAL"

A cartografia cadastral, implantada em levantamentos cartográficos de grandes escalas, ao proporcionar a descrição pormenorizada do território e da propriedade (rústica ou urbana), foi e continua a ser considerada como o referencial desejável para a caracterização da posse jurídica da propriedade. Simultaneamente é um instrumento de apoio fundamental para a avaliação fiscal, como base objectiva e rigorosa para uma efectiva equidade na tributação, importância que a recente reforma fiscal realizada no nosso País fez crescer, com a introdução da contribuição autárquica.

Mas, para além de referencial da posse jurídica da propriedade, e de suporte de apoio à avaliação fiscal que desde sempre o caracterizaram, **o cadastro tornou-se nas últimas décadas um instrumento fundamental para a actividade do planeamento regional e urbano e para o ordenamento do território.** Em Portugal, apresenta-se ainda como elemento indispensável ao esforço de adaptação da agricultura e dos restantes sectores ao mercado comum europeu.

Contudo, entre nós, são unânimemente reconhecidas as insuficiências do cadastro nacional, havendo consenso generalizado sobre as gravosas implicações de tais insuficiências no desenvolvimento do País.

O Instituto Geográfico e Cadastral, formalmente criado em 1926 em resultado da transformação da Administração Geral dos Serviços Geodésicos, Topográficos e Cadastrais (a quem já competia a realização do Cadastro Geométrico da Propriedade Rústica) acabou por ver encerrar-se definitivamente a época em que era dada a possibilidade de dispôr dos meios necessários para a mobilização dos consideráveis recursos humanos que impunha a realização das operações de levantamento de campo por processos tradicionais. Entretanto, apenas se tinha conseguido completar o cadastro de cerca de 15 % dos prédios rústicos do Continente.

São conhecidos os esforços realizados pelo Instituto desde meados da década passada, tendo em vista a substituição dos processos anteriormente utilizados, com recurso a novas técnicas de produção cadastral. No entanto, é forçoso constatar que não foram ainda ultrapassadas as insuficiências do ritmo da produção cadastral, que se

mantem orientada para o cadastro da propriedade rústica, apesar da importância do cadastro urbano.

Neste contexto, entendeu o Governo, através de Resolução de Conselho de Ministros, ser altura de reequacionar a actividade do Instituto Geográfico e Cadastral, e de proceder a uma reestruturação profunda dos respectivos serviços, tarefa que será iniciada em breve, e da qual se espera possa resultar a reorientação da actividade do IGC com vista à superação das carências ainda existentes em matéria de cadastro e de cartografia.

Há pois que reflectir em todo o processo de produção do cadastro em Portugal. Considerar não só as soluções de natureza técnica que poderão permitir viabilizar essa produção, através da modernização de procedimentos e com o recurso a novas técnicas de trabalho tendentes a reduzir e a acelerar de forma significativa os custos da produção, mas também as formas de organização mais apropriadas à execução de tal tarefa. Tais soluções passarão necessariamente pela reformulação do papel que ao IGC tem cabido de produtor central e exclusivo do cadastro nacional, que a experiência passada permite concluir ser incompatível com a realização do cadastro nacional.

A recente criação da contribuição autárquica veio aliás conferir maior urgência à reformulação dos processos e das formas de organização da produção cadastral, já que as necessidades de obtenção da informação relativa ao cadastro predial urbano, vão previsivelmente originar a multiplicação das iniciativas de realização do cadastro urbano por parte de autarquias locais. Os Municípios, para além de serem directamente beneficiários das receitas provenientes da contribuição autárquica, necessitam imperiosamente do cadastro para o planeamento do desenvolvimento urbanístico, bem como para a gestão urbana.

Neste contexto, para que possa vir a existir no País uma verdadeira base de dados geo-cadastral é condição indispensável que o IGC possa desempenhar com eficiência as funções de agente normalizador e fiscalizador da produção do cadastro geométrico da propriedade urbana, zelando pelo cumprimento de critérios de rigor, sem os quais o cadastro carecerá de sentido, e resultarão inúteis os investimentos que vierem a ser realizados.

O carácter multi-objectivos que as utilizações do cadastro vieram progressivamente a assumir nas sociedades modernas, além de ter arredado definitivamente o conceito de cadastro como mero instrumento da tributação fiscal, ou da referência da posse jurídica da propriedade, veio simultaneamente abrir novas perspectivas para a utilização e a rentabilização dos investimentos associados à aquisição e à conservação da informação cadastral.

Ao mesmo tempo, colocou novos desafios às comunidades técnicas e científicas dos diversos países, uma vez que veio tornar imperativa a necessidade de promover a articulação entre si das diversas bases sectoriais de dados associadas ao cadastro.

Por outro lado, os próprios levantamentos topográficos de grandes escalas necessários à implantação do cadastro, passaram a ter de obedecer a novas exigências. Interessa que possam servir o leque mais abrangente possível das utilizações previsíveis da informação topográfica levantada, incluindo, nomeadamente, as necessidades das entidades responsáveis pela distribuição pública de serviços. Hoje em dia é imprescindível que tais entidades possam gerir de forma racional e eficaz o cadastro das respectivas redes de distribuição de serviços, com o apoio dos novos e sofisticados meios informáticos que a evolução tecnológica tornou recentemente operacionais, no domínio da organização, da manipulação e da exploração de informação geográfica.

Para responder a estes dois novos tipos de desafios, com que a generalidade dos países se vem debatendo, (a articulação das bases de dados sectoriais geo-referenciadas e a normalização da produção da informação cartográfica), o Governo tomou recentemente duas medidas de grande alcance, de que se espera possam resultar a curto prazo importantes benefícios. Foram essas medidas, a criação do Sistema Nacional de Informação Geográfica, e do Conselho Nacional de Cartografia.

Com a criação do Sistema Nacional de Informação Geográfica, pretende o Governo assegurar a adequação da capacidade de resposta da Administração Pública aos novos desenvolvimentos tecnológicos nos

domínios ligados à informação geográfica. Terá, nomeadamente, competência para promover a coordenação das iniciativas de constituição de bases de dados sectoriais geo-referenciadas. No contexto particular do cadastro da propriedade rústica e urbana, tal actividade incidirá sobre as iniciativas de constituição das bases de dados que virão a estar associadas ao cadastro geométrico da propriedade, com salvaguarda dos critérios de segurança e de confidencialidade impostos por cada serviço sectorial.

Da possibilidade de vir a ser garantida a coordenação entre tais bases de dados sectorialmente distintas, e destinadas a finalidades próprias, cuja atribuição competirá ao órgão coordenador do SNIG, vai depender afinal a capacidade de actualização sistemática da informação cadastral.

Simultaneamente, com a criação do Nível Local do Sistema Nacional de Informação Geográfica, procura-se promover o enquadramento necessário à constituição de sistemas integrados de informação geográfica de âmbito municipal ou inter-municipal, necessários ao planeamento e à gestão urbana.

Com a criação do Conselho Nacional de Cartografia pretende-se dar um passo significativo tendo em vista a racionalização do sistema cartográfico nacional. Efectivamente, e no domínio da produção cadastral, é indispensável ponderar que o cadastro geométrico pressupõe a prévia realização de cartografia de grandes escalas. Esta terá tendência, cada vez mais, para ser realizada em formato digital, o que vem colocar na ordem do dia, também para o nosso País, a necessidade de, urgentemente, estabelecer o normativo básico para a realização do cadastro geométrico.

A introdução já consumada em Portugal das técnicas de produção de cartografia digitalizada, e a generalização da sua utilização ao sector privado, veio assim tornar urgente e inadiável o estabelecimento dos padrões a que se deve subordinar a produção cartográfica nacional, sem o que muitos dos investimentos realizados na produção cartográfica digital ficarão aquém dos objectivos.

Acresce, ainda, que a possibilidade de manipulação em computador da cartografia digital torna indispensável que sejam estabelecidos com rigor os direitos de autor que salvaguardem as entidades produtoras, bem como as condições em que a cartografia digitalizada produzida pela Administração Pública poderá ser vendida a terceiros.

No contexto que acabo de descrever, a realização do Seminário Internacional sobre Cadastro Rústico e Urbano Multifuncional constitui uma iniciativa oportuna, e muito meritória, que em muito poderá vir a ajudar a superação das carências e é urge ultrapassar de vez no domínio do cadastro.

De entre as diversas virtudes da realização deste Seminário, e que permitem antever que dele se possam justificadamente esperar contributos importantes para o trabalho de análise e reestruturação que se pretende levar a cabo, salientaria os seguintes aspectos:

Em primeiro lugar, constitui uma excelente e oportuna ocasião para a realização de um debate alargado e aprofundado sobre o cadastro em Portugal, que contará com as opiniões dos utilizadores actuais e potenciais da informação cadastral, nomeadamente em matéria de identificação das necessidades de informação cadastral na óptica do utilizador.

Com efeito, já aconteceu na Administração Pública, o dispêndio de consideráveis recursos financeiros em iniciativas sectoriais de recolha de informação, que raramente acaba por ser utilizada em todo o seu potencial, porque não houve à partida o diálogo necessário com os restantes sectores potencialmente beneficiários da informação recolhida.

Assim, sublinharia, de entre os utilizadores da informação cadastral, os contributos especializados que se esperam dos sectores da Agricultura, das Finanças, da Justiça, das Comissões de Coordenação Regional, das Autarquias Locais e das empresas distribuidoras de serviços públicos, que certamente muito irão enriquecer este Seminário.



**Em segundo lugar,** estão presentes neste Seminário consagrados especialistas de muitos países europeus, bem como representantes de conceituadas associações internacionais e nacionais de índole técnico - científica e profissional; não deixarão seguramente de dar um contributo muito importante para a análise que queremos levar a cabo, ao transmitirem as diferentes experiências nacionais em matéria de produção, de organização e de actualização da informação cadastral.

Tal contributo, ajudar-nos-á também a avaliar as implicações dos progressos tecnológicos associados simultâneamente à generalização da informática e à constituição de bases de dados, no domínio da organização da informação cadastral.

**Em terceiro lugar,** destaco a participação de representantes da especialidade oriundos dos Países de Língua Oficial Portuguesa, cuja presença viabilizará, simultâneamente, a realização em Portugal, nos dias 27 e 28, da II Reunião da Associação Cartográfica dos Países de Expressão Portuguesa.

Resta-me formular a todos os participantes votos de um trabalho profícuo e assegurar-vos que o Governo estudará com atenção as vossas conclusões.

## MENSAGEM DA COMISSÃO ORGANIZADORA

Senhor Ministro do Planeamento e da Administração  
do Território

Excelência

Senhor Secretário de Estado da Administração Local  
e do Ordenamento do Território  
Senhor Secretário de Estado dos Assuntos Fiscais  
Senhor Secretário de Estado da Ciência e Tecnologia  
Senhor Secretário de Estado Adjunto do Ministro  
da Justiça  
Senhor Secretário de Estado Adjunto do Ministro  
da Agricultura

Excelências

Exm<sup>o</sup> Senhor Presidente da Câmara Municipal de Lisboa

Senhor Ministro, Excelências, Exm<sup>os</sup> Convidados, Minhas Senhoras e Meus Senhores,  
Dear Colleagues, Distinguished Guests,

Cabe-me, neste momento, em nome da Comissão Organizadora, o grato privilégio de pronunciar algumas palavras acerca do "Seminário Internacional sobre Cadastro Rústico e Urbano Multifuncional" e dizer dos motivos porque tomamos a liberdade de convidar os Ilustres Membros do Governo e Exm<sup>as</sup> Entidades aqui presentes ou representadas, a participar nesta cerimónia inaugural, cumprindo-nos desde já agradecer, a honrosa presença de Vossas Excelências, que confere a este acto a maior dignidade e constitui um estímulo e motivação para o melhor desenvolvimento do intenso programa de trabalhos agendados.

Atravessamos uma época de profundas mutações tecnológicas, que afectam todas as áreas de índole técnico-científica e, consequentemente também, e de um modo particularmente intenso, as actividades cartográficas e cadastrais.

O moderno planeamento integrado requer o conhecimento científico do espaço nacional, em termos de informação geo-referenciada a vários níveis de pormenor, abrangendo uma multiplicidade de temas.

Ora o cadastro é certamente um dos temas relevantes, na medida em que a pulverização da propriedade em Portugal implica a prévia execução de uma cartografia de suporte, em escala grande e extremamente rigorosa, isto é, ao nível de projecto de obras e empreendimentos de toda a índole - sejam urbanísticos, de hidráulica e infraestruturização agrícola, vias de comunicação, etc. etc..

É por isso pacífico considerar que sem o conhecimento dinâmico da estrutura predial, rústica e urbana do território, englobando operações de registo predial se compromete, à partida, não só toda a política de gestão dos solos - nomeadamente no âmbito agrícola - e do rápido desenvolvimento integrado do País, como também a execução de uma equitativa tributação fiscal.

Não resistimos à tentação de referir que um dos instrumentos principais em que hoje ainda assenta a política de desenvolvimento integrado da Alemanha é uma carta da capacidade e uso dos solos e dos recursos naturais, em escala grande, executada na década de 30, e que serviu de suporte ao cadastro.

A reflexão que vai iniciar-se, está objectivamente orientada para a busca de uma estratégia globalizante capaz de dar resposta dinâmica às carências do País na área cadastral e inerente suporte cartográfico.

A viaabilização dessa estratégia terá, por certo, um forte impacto em muitas áreas. Daí a presença dos ilustres responsáveis e gestores de múltiplas actividades.

Desde:

**A área de investigação e formação** aos vários níveis - sem investigação aplicada e formação profissional adequada não pode haver evolução tecnológica e os investimentos fenecerão.

E essa formação vai desde o nível universitário, ao politécnico e técnico-profissional, extravasando mesmo para cursos de especialização no estrangeiro e apoio aos PALOP's.

**A autárquica** - As Autarquias terão, efectivamente, de assumir um papel muito activo nesta problemática, não só porque o cadastro e a cartografia de suporte lhes são indispensáveis em termos tributários, urbanísticos e de ordenamento, mas porque se trata de uma actividade que implica o varrimento contínuo dos seus espaços concelhios. Nesta área, a gestão autárquica está extremamente dependente da informação cadastral, mormente para a implementação de sistemas de informação geográfica e planeamento apoiado por soluções computadorizadas.

**A área da agricultura** - sem cadastro da propriedade não só se compromete toda a política de estruturação agrícola, nomeadamente na área do emparcelamento, como ainda o País fica impedido de dar cumprimento a directivas comunitárias (ex. cadastro vitícola e olivícola, terras aráveis, etc.). A satisfação de carências deste tipo não deve passar por acções e iniciativas isoladas, desinseridas dum contexto global.

**A área do ordenamento e urbanismo** - não se pode efectuar um verdadeiro ordenamento sem o conhecimento da estrutura cadastral e, no tocante ao urbanismo, este passa obrigatoriamente pelo cadastro. Não pode mesmo haver dúvidas de que sem um cadastro adequado não é possível solucionar pela positiva, esse grave problema nacional das construções clandestinas na periferia de grandes centros urbanos, comprometendo toda a política de gestão dos solos municipais, com consequências terríveis em termos futuros.

**A área de infraestruturas** - se tomarmos por exemplo o caso das vias de comunicação, as entidades responsáveis não podem efectivamente concretizar rapidamente os seus projectos, nem adoptar

a filosofia seguida por exemplo na RFA, onde a entidade responsável pelas vias de comunicação vai adquirindo parcelas nas zonas onde planeia construir e depois permuta e deixa o tecido predial ordenado, assegurando a melhor acessibilidade das áreas adjacentes, sem subdivisão de prédios, que por vezes anulam totalmente o seu valor económico em termos de exploração.

Também o sucesso do emparcelamento agrário acenta em informação cadastral rigorosa e actualizada.

**A estatística e recursos naturais** - Muitos dados estatísticos e ocupação só têm valor real se georeferenciados - não interessa só saber o que existe, mas onde existe.

**A área fiscal** - Sem um eficiente sistema de cadastro rustico e urbano não pode ser implementada uma justa e desejada política de equidade fiscal.

**O Registo Predial** - na época da gestão dinâmica, não pode conceber-se que as operações de cadastro geométrico não estejam perfeitamente sintonizadas com o registo predial.

É disso testemunho a extraordinária sensibilidade da DG dos Registos e do Notariado, das Conservatórias do Registo Predial, para esta problemática, traduzida por um significativo número de participantes neste Seminário.

**Na área técnica** - torna-se imperativa a adopção de normas e especificações técnicas nas várias fases do processo e adaptar as estruturas existentes às exigências das novas tecnologias, que impõem a integração de esforços e recursos.

**Na área da coordenação** - A cartografia de suporte tem de ser executada com características normalizadas por forma a assegurar a sua aplicabilidade em todas as acções ao nível de pormenor.

**Ao sector privado** - que obrigatoriamente terá de ser chamado a desenvolver uma intensa actividade, em estreita coordenação com os organismos estatais e autarquias. Ora, sem a calendarização e a programação de trabalhos não é possível assegurar, nem os investimentos inerentes à implementação de novas tecnologias, nem obterem-se custos favoráveis de produção.

**Enfim:**

As múltiplas áreas de actividade- mesmo as aqui não representadas- quer directa ou indirectamente correlacionadas com esta problemática, desde a fase de formação, à de organização, aquisição, processamento, gestão, actualização e utilização de informação, terão de dar as mãos, harmonizando recursos, compatibilizando interesses, por forma a rentabilizar custos/benefícios.

É seguramente chegada a hora de saber adaptar-nos a um mundo em constante mutação tecnológica, abandonando imobilismos e individualismos, para conjuntamente se encontrar a melhor solução para este problema de expressão nacional.

A estrutura existente está seguramente desadaptada das actuais realidades do País e a sua solução não passa minimamente por empolamentos de quadros e investimentos do sector estatal em contextos desarticulados. A hora é de comunicação e interacção, sem estanquididades.

Há que definir objectivos e encontrar as melhores soluções.

Para dar resposta a esta problemática o SICRUM foi subdividido em duas partes distintas, uma pública, que agora vai iniciar-se, destinada a proporcionar não só um debate público alargado sobre os principais temas e etapas do processo cadastral, e uma desejada sensibilização e convergência profissional de todos quantos a nível nacional intervem ou devem intervir directa ou indirectamente na cadeia gestão/utilização de informação, e, simultaneamente, um indispensável contacto dos especialistas estrangeiros que nos honraram com o contributo de sua experiência e saber, com a complexa problemática em reflexão, à luz das últimas evoluções tecnológicas. E, seguramente, que não será só Portugal a lucrar com o seu contributo, na medida em que a permuta de experiências, a nível internacional é hoje imperativa. Aprende-se tanto dos êxitos como dos fracassos de outros, se porventura pretendemos evitar os últimos e quisermos recuperar tempo perdido.

Melhor justificativo não haverá para a acuidade desta problemática do que o próprio processo que conduziu à viabilização financeira do SICRUM.

Nomeada a Comissão Organizadora, integrando membros da DGPA, DGCI, IGC e CCRN, sem que lhe fosse atribuído qualquer meio financeiro, a receptividade e sensibilização de múltiplas entidades nacionais, públicas e privadas, - apesar da política de contenção de despesas públicas - e até estrangeiras, foi duma maneira geral notável e deu alento à C.O. para prosseguir, pois os encargos organizacionais, com os convites a vários especialistas europeus, eram avultados.

Entre todas essas entidades, que muito justamente figuram na documentação divulgadora do SICRUM, é dever da Comissão Organizadora salientar quatro:

A JNICT que imediatamente reconheceu a importância do SICRUM em termos de uma desejável evolução tecnológica na área das ciências geográficas.

O GTZ da RFA, que além de assumir uma fatia significativa, em termos dos encargos financeiros, cobriu ainda as despesas com a participação de três especialistas da RFA, e inclusivamente, apoiou logisticamente a Comissão Organizadora. E, tudo isso, em virtude da enorme sensibilização adquirida pelo Engº Willi Zimmermann, du-

rante 4 anos de estadia entre nós, em missão de apoio técnico ao ex-IGEF-DGHEA na área do Emparcelamento (e que extravasou para o IGC), que viu o avanço e êxito de muitos projectos comprometidos e/ou protelados pela inexistência de cadastro geométrico.

A DGHEA - que tal como o GTZ, também desde logo reconheceu, que os seus múltiplos Projectos de Emparcelamento e da modernização de estrutura agrícola, de Sul a Norte do País, não podiam avançar pela ausência de cadastro e/ou de cadastro actualizado, situação esta que tem comprometido vultuosos investimentos programados.

A DGCI - que sem cadastro actualizado e dinâmico da propriedade urbana e rústica não pode obviamente estabelecer uma desejada política tributária.

Não podem, naturalmente, deixar também de referir-se os apoios concedidos pela EDP, SNIG, FLAD, IVV, IVP, Portucel, Universidade de Aveiro, Agfa-Gevaert, Wild + Leitz (Portugal), Emporsil, Top-sistema, Estereofoto, Geometral, Socarto, ICL (Portugal), etc., e os valiosos suportes logísticos concedidos pelo IGC, DGPA e DGCI, na qualidade de organismos representados na Comissão Organizadora.

Seja-me consentido dirigir uma palavra especial de boas vindas aos nossos Colegas e Amigos de Angola, Brasil, Cabo Verde, Guiné Bissau, Moçambique e São Tomé e Príncipe e dizer-lhes nesta língua que nos irmana, do grande prazer que todos temos em vê-los entre nós, participando activamente neste Seminário.

Sendo a Cartografia um instrumento propulsor de desenvolvimento dos nossos Países, este Seminário permitirá a todos partilhar experiências profissionais, permutar conhecimentos e perfilar soluções, que nos possibilitem servir cada vez mais e melhor as nossas comunidades, fornecendo-lhes atempadamente a informação indispensável a uma correcta política de fomento harmónico e integrado.

A vossa presença permitirá ainda, com o apoio financeiro prontamente concedido pelo Instituto Português para a Cooperação Económica, por despacho de Sua Excelência Senhor Secretário de Estado dos Negócios Estrangeiros e Cooperação e a autorização de Sua Excelência o Senhor Secretário de Estado da Administração Local e do Ordenamento do Território, realizar entre nós, nos próximos dias 27 e 28, a II Reunião da Associação Cartográfica dos Países de Expressão Portuguesa - ACAPEP - criada no Brasil na Primavera de 1987, com o objectivo de fomentar uma cooperação activa, na área das ciências geográficas, cooperação essa tão facilitada pelo idioma que nos une, com benefícios recíprocos, e onde todos temos algo a receber e também para dar.

Esta reunião, que será presidida, pelo distinto representante da COCAR (Comissão de Cartografia Brasileira), Eng.º Jairo Capistrano Silva e contará com a representação oficial da reputada Sociedade Brasileira de Cartografia, na pessoa do seu ex-Presidente e actual delegado, o Dr. Paulo César T. Trino e ainda com um representante do Instituto Brasileiro de Geografia e Estatística (IBGE), Dr. Mauro Pereira de Mello, será naturalmente alargada a todas as entidades nacionais civis e militares, estatais e privadas e instituições correlacionadas com a cartografia.

Trata-se de uma área onde o labor desenvolvido ao longo de séculos contribuiu fortemente para o conhecimento dos Países da comunidade em que nos inserimos e que, em boa medida, foi responsável por muitos dos nossos actuais contornos geográficos.

Muito obrigados pela vossa presença.

Temos o prazer de ter entre nós os maiores especialistas europeus nas várias áreas do processo cadastral, vindos de 12 Países, desde a Finlândia à Espanha, da Irlanda à Turquia, da Suécia à Itália, encontrando-se entre nós, representantes de prestigiadas associações e instituições técnico científicas internacionais, tais como a FIG "(Fédération Internationale des Géomètres)" e do seu "Office Internationale du Cadastre et du Régime Foncier", do CERCO ("Comité Européen des Responsables de la Cartographie Officielle"), da AM/FM "(Automated Mapping/Facilities Management)", e do ITC (International Institute for Aerial Surveys and Earth Sciences) e de conceituadas associações profissionais - da "Ordre des Géomètres Experts" de França, do "Royal Institute of Chartered Surveyors" de Inglaterra, da "Society of Chartered Surveyors" da Irlanda, da Associação Profissional da RFA, etc. que vêm até nós para permuta de experiências e saber, enriquecendo este debate, que se do maior interesse a nível de Portugal, será por certo igualmente útil para muitos outros, na medida em que hoje em dia estas permutas são um imperativo das actividades tecnológicas.

E também gestores e técnicos altamente qualificados do sector privado nacional e estrangeiro.

Let me express now, in English, a most sincere word of thanks to our distinguished guests, colleagues and friends, from the four corners of the Old European Continent, for their presence, valuable contribution and active engagement in the quite heavy work and, if I may say, duties ahead.

And knowing how busy you all are at home, we sincerely appreciate the efforts made to attend this International meeting.

We indeed welcome everybody and wish you a pleasant stay. Unfortunately what is waiting for you, is almost nothing but hard work. We also regret that, this time, due to restricted funds, we could not benefit as many of you as we would like, within our traditional hospitality. For those who fully support all expenses, we are indeed most obliged for their presence. As to those that will contribute with technical papers, although unable to participate.

We sincerely hope that the glimpse you will catch of the most Western European Country, facing and spread in the Atlantic, will be an invitation and an appeal for a leisure visit in the near future. Visit which will be rather safe, once everybody will by then know our precise geographical coordinates.

Please find enclosed in your bags a small written message of the Organizing Committee, with specific details and information.

We shall keep always in close touch, but in case you require assistance or informations, please don't hesitate to contact us.

Many thanks, Merci bien, Danke Schön, Gracias, Gratias,  
Obrigado.

Bem haja Senhor Presidente da Câmara Municipal de Lisboa, por se ter dignado receber pessoalmente os participantes nesta bonita cidade e por nos ir proporcionar, no fim da tarde, uns agradáveis e úteis momentos de convívio profissional. Muito obrigado à edilidade Lisboeta, cujos técnicos por certo beneficiarão de contactos com excelentes profissionais da área de Sistemas de Informação para a gestão informatizada de infraestruturas e da problemática urbana.

Daqui enviamos também e desde já uma justa mensagem de muito reconhecimento por todo o apoio que nos vem sendo dispensado pelo Governo Regional da Madeira, pelo Senhor Presidente da Câmara Municipal do Funchal e inúmeros dirigentes e responsáveis da administração regional.

E a Madeira que espera por todos nós, participantes na 2ª parte, oferecer-nos-á um período de árduo trabalho, e, muito de fugida, a simpatia das suas gentes e a beleza da sua paisagem natural.

Ainda uma palavra de agradecimento ao LNEC, na pessoa do seu ilustre Director, por ter-nos franqueado as portas da sua reputada instituição, que tem dado um contributo notável para o prestígio do País a nível internacional no domínio técnico-científico da engenharia civil, que afinal também reclama e carece, em muitas acções, da informação cadastral geo-referenciada.

Obrigado a todos quantos, de uma maneira ou outra apoiaram, deram e darão o melhor do seu contributo e esforço para o êxito do SICRUM, sem esquecer as entidades que amavelmente colaboraram na reprografia das Comunicações Técnicas.

Senhor Ministro do Planeamento e da Administração do Território, Excelência, Bem haja por se ter dignado presidir a este acto

Senhores Secretários de Estado, muito obrigado pela distinção conferida pela presença de Vossas Excelências.

## 2 - CERIMONA DE ENCERRAMENTO

Realizou-se no Salão Nobre dos Paços do Concelho da Câmara Municipal do Funchal, no dia 25, pelas 10H30m, sob a presidência de Sua Excelência o Secretário Regional do Equipamento Social, com a presença de diversas individualidades da Região.

Após algumas palavras de apresentação pela Comissão Organizadora sobre o SICRUM e os resultados alcançados, e de agradecimento pelo caloroso acolhimento e apoio de todas as entidades da Região Autónoma da Madeira, com ênfase para as Secretarias Regionais do Equipamento Social e da Agricultura e para a Câmara Municipal do Funchal, Sua Excelência o Secretário Regional do Equipamento Social, pronunciou o seguinte discurso.





DISCURSO DE ENCERRAMENTO DO  
SECRETARIO REGIONAL DO EQUIPAMENTO SOCIAL  
DA R.A. MADEIRA, ENGO JOSÉ JARDIM FERNANDES

É uma grande honra para mim presidir, em nome de Sua Excelência o Senhor Presidente do Governo, a esta cerimónia de encerramento do Seminário Internacional de Cadastro Rústico e Urbano Multifuncional. A todos os seus participantes apresento as saudações do Governo Regional e expresso o nosso desejo de que os trabalhos tenham decorrido com o maior êxito e correspondido às expectativas de cada um e aos grandes objectivos que ditaram a sua realização, tanto mais que poderão revestir-se do maior interesse e oportunidade para a melhor dinamização das actividades cadastrais a nível nacional, conforme é desejável nesta época de profundas mutações tecnológicas, que afectam todas as áreas de natureza tecnico-científica.

Foi com grande satisfação que o Governo Regional da Madeira acolheu a proposta da Comissão Organizadora de realizar no Funchal o segundo período de sessões deste Seminário, pois o interesse e actualidade da problemática aqui debatida são inequívocos, assumindo para esta Região Autónoma particular relevância.

Daí o gosto com que, na medida das nossas possibilidades, apoiámos esta realização.

Efectivamente, importando garantir a esta Região Autónoma os necessários meios para o seu desenvolvimento económico e social, há que implementar, de forma integrada e com base em dados geo-referenciáveis, as actividades de ordenamento territorial, de estruturação fundiária, do registo predial, de formação, de conservação do ambiente e de planeamento e gestão dos recursos naturais aos níveis autárquico e regional. Todo o progresso e melhoria que possa introduzir-se nos sistemas de informação geográfica, envolvendo a cartografia de suporte e, entre outros temas, o cadastro geométrico da propriedade, constituirá instrumento da maior utilidade na elaboração de soluções harmónicas e

sustentáveis de ocupação do território pelas actividades humanas,— suporte de todo o desenvolvimento integrado.

Cientes das dificuldades acrescidas que neste âmbito se colocam à Região Autónoma, pelas suas específicas características fisiográficas e pela insuficiência de recursos disponíveis, temos perfeita consciência de que a tarefa gigantesca que constitui a elaboração e execução do nosso Plano de Desenvolvimento Regional passa, necessariamente, pela articulação das acções de nível regional com os programas nacionais ou europeus no campo da informação geo-referenciada.

Assim, o debate e reflexão proporcionados por este Seminário, enriquecidos pela participação de tantos especialistas estrangeiros, têm de ser perspectivados como um contributo ao progresso desta Região Autónoma.

Não posso deixar de congratular-me com a presença entre nós dos distintos representantes dos países da comunidade linguística que nos irmana, na medida em que certamente contribuirá para um desejável fortalecimento dos laços de amizade e cooperação.

Formulo igualmente votos de que todos os participantes possam encontrar as condições óptimas para implementar as orientações aqui preconizadas, expressas nas conclusões deste Seminário, na certeza de que a actuação de todos corresponderá a uma nova estratégia nacional de aquisição e gestão da informação cadastral, tão indispensável ao desenvolvimento do nosso País.

## VII - PARTICIPANTES

O número total de participantes na I Parte do SICRUM, realizada em Lisboa, foi de 299, sendo 256 nacionais e 43 estrangeiros.

Na II Parte no Funchal, com reuniões por Grupos de Trabalho o número total de participantes foi de 97, sendo 70 nacionais e 27 estrangeiros.

Os participantes nacionais eram oriundos das seguintes áreas profissionais:

	I PARTE	II PARTE
Produção	78	35
Sector Privado	39	11
Municípios	45	10
Empresas Públicas	31	9
Contribuições e Impostos	18	4
Registo e Notariado	19	8
Agricultura/Florestas	22	3
Planeamento/Ordenamento/Des.	25	6
Ensino	10	5
Organização	12	6

Quanto aos participantes estrangeiros aprez-nos registar a muito significativa presença de especialistas e dirigentes Europeus e de cinco dos seis Países da nossa Comunidade Linguística.

Efectivamente estiveram representados 19 Países, sendo 14 Europeus, a saber:

CH(1), D(6), DK(3), E(4), F(3), I(3), IRL(1), NIRL(1), NL(3), UK(3), S(1), SF(1), TK(2) e ainda o Brasil (4), Cabo Verde(1), Guiné Bissau(1), Moçambique(3), e S.Tomé e Príncipe(1). Segue-se a lista geral nominativa dos participantes.

NOME	PAIS	ENTIDADE
Carlos A. Costa	Portugal	D.G. Plan. Agricultura
Elvino D. Duarte	"	Inst. Geográfico Cad.
Fernando S. Glória	"	" " "
João L. Leitão	Portugal	D.G. Contrib. Impostos
Rui R. Loza	"	C. C. Região Norte
M. Luciana Calinaç	"	Inst. Geográfico Cad.
José P.M.e Castro	"	Inst. Geog. Cad.(RAM)
M. João Leitão	"	Particular
M. Helena Preto	"	D.G. Plan. Agricultura
Artur C. Seara	"	Inst. Geográfico Cad.
A. Cristina Soares	"	" " "
João Sá e Sousa	"	S. R. Equip. Soc. (RAM)
Artur Tomé	"	Inst. Geog. Cad. (RAM)
Carlos R. Pereira	"	Inst. Geográfico Cad.
Luís F. Soares	"	" " "
Arildsen, Inger M.	Denmark	Boligminist. Departem.
Baer, Klaus	F.R.G.	Private sector
Barwinski, Klaus	"	Landesver. Nordrh.-West.
Bottaro, António	Italy	Società Gener. Inform.
Brand, Michael	N. Ireland	Ordnance Survey N. Ir.
Bregenzler, Walter	Switzerland	Dir. Mensurations Cad.
Brioli, Roberto	Italy	Uff. Tecnico Erariale
Case, Christopher	Port./U.K.	Aerocad
Conia, Giancarlo	Italy	Società Gener. Inform.
Coudert, Georges	France	Ordre Géomètres-Exper.
Fenet, Jean-Marc	"	Dir. Générale Impôts
Haberlin, Michael	R. Ireland	Soc. Chartered Surv.
Hemert, J. van	Holland	Het Kadaster Op. Reg.
Hojkaer, Helge	Denmark	Kort-Og Matrikelstyr.
Lindskog, Torsten	Sweden	Lantmateriet
Mavoral, Sebastián	Spain	C. Gest. Cat. Coop. T.
Morch-Lassen, Greg.	Denmark	Statsskattedirektorat.
Nielsen, Niels R.	"	Kort-Og Matrikelstyr.
Peralo, Miguel M.	Spain	C. Gest. Cat. Coop. T.
Pereña, Jordi G.	"	" " " " "
Rives, Inmaculada C.	"	" " " " "
Rodriguez, Manuel M.	"	" " " " "
Sheath, Nigel	U. K.	I.C.L. Computer House
Syrett, Keith	Holland/USA	KLM Aerocarto/STS
Vahala, Matti	Finland	Lantmäteristyrelsen
Wiesel, Joachim	F.R.G.	Inst. Phot. Karlsruhe
Zimmermann, Willi	"	G.T.Z. - Frankfurt
Arnu, Manfred	"	Private Sector
Haumann, Dieter	"	Maps Geosystems
Aguar, Luiz F.	Brasil	Esteio-Eng. Aerolevan.
Alves, Júlio	Guiné-Biss.	Diréc. Top. e Cadastro
Campaco, Simeão V.	Moçambique	Dinageca
Fernandes, Celso M.	Cabo Verde	Serv. Nac. Cart. e Cad.
Lima, António A.	S. Tomé P.	Dir. Planific. Física

NOME	PAIS	ENTIDADE
Manhique, António M.	Moçambique	Dir. Const. Urbanização
Mello, Mauro P. de	Brasil	Inst. Bras. Geog. Est.
Paulo, Bartolomeu S.	Moçambique	Dinageca
Silva, Jairo C.	Brasil	Cocar
Trino, Paulo César	"	Aerodata-Eng. Aerolev.
Wolter, Arnio	"	Esteio-Eng. Aerolevan.
Cetintas, Servet	Turquia	T.V.G.M.
Ozcbukcu, Kadir	"	"
Alberto Baptista	Portugal	Univ. Trás-os-Montes
Alberto Cunha	"	T.L.P.
Alberto Estevão	"	C.M.Portimão
Alexandra Menezes	"	Despodata
Alfredo Fuínhas	"	D.R. Agric. B. Litoral
Alfredo Mendes	"	Inst. Geográfico Cad.
Alípio Gomes	"	" " "
Ana Adelino	"	Geometral
Ana Antunes	"	Inst. Geográfico Cad.
Ana Castro	"	Emporsil
Ana Ferreira	"	C. M. Loulé
Ana Moura	"	Inst. Informática
António Calado	"	Inst. Geográfico Cad.
António Cardoso	"	Co. Coord. Reg. Centro
António Castro	"	Geometral
António Cesteiro	"	C. M. Montijo
António Fernandes	"	C. M. Oeiras
António Ferreira	"	Inst. Geográfico Cad.
António Fonseca	"	E.D.P.
António Igreja	"	Inst. Geográfico Cad.
António Luís	"	C. Reg. Predial Aveiro
António Macedo	"	Emporsil
António Marcelino	"	Inst. Geográfico Cad.
António Martins	"	" " "
António Ornelas	"	E.D.P. (próprio)
António Pinho	"	Emporsil
António Plácido	"	D. G. Adm. Autárquica
António Saldanha	"	T. L. P.
António Silva	"	Emporsil
Armando Pereira	"	Inst. Geográfico Cad.
Artur Carvalho	"	" " "
Beatriz Pinto	"	" " "
Benvindo Duarte	"	" " "
Carlos Alves	"	" " "
Carlos Correia	"	" " "
Carlos Faustino	"	T. L. P.
Carlos Gonçalves	"	Inst. Geográfico Cad.
Carlos Matos	"	C. M. V. Franca Xira
Carlos Melo	"	Inst. Geográfico Cad.
Carlos Nunes	"	Serv. Cart. Exército
Carlos Rodrigues	"	Inst. Geográfico Cad.
Carlos Simões	"	" " "
Carlos Taveira	"	D.G. Contrib. Impostos

NOME	PAIS	ENTIDADE
Celeste Silva	Portugal	Inst. Geográfico Cad.
Diamantino Ferreira	"	Geometral
Dimas Veigas	"	Inst. Geográfico Cad.
Diva Matos	"	" " "
Eduardo Campelo	"	C. M. Almada
Eduardo Pechorro	"	C. M. V. Franca Xira
Eliseu Baena	"	Silvicaima
Ermelinda Almeida	"	D. Reg. Agric., Algarve
Euclides Alvoeiro	"	Inst. Geográfico Cad.
Eugénio Costa	"	C. M. Montijo
Felício Duarte	"	Satopel
Fernando Andrade	"	Inst. Geográfico Cad.
Fernando Coucelo	"	Portucel
Fernando Domingues	"	Inst. Geográfico Cad.
Fernando Lopes	"	C. R. Predial Trancoso
Fernando Mata	"	C. M. Lisboa
Fernando Murça	"	Siemens
Fernando Pereira	"	C. M. Sintra
Fernando Trindade	"	C. M. Santarém
Francisco Marvão	"	E. D. P. (próprio)
Francisco Pinheiro	"	C. T. T.
Francisco Pires	"	Inst. Geográfico Cad.
Francisco Salgado	"	Estereofoto
Francisco Silva	"	Emporsil
Gilberto Andrade	"	Inst. Geográfico Cad.
Gonçalo Cabral	"	D.Reg. Agric. Alentejo
Guilherme Santos	"	Inst. Geográfico Cad.
Henrique Pedro	"	Topsistema
Inês Beira	"	C. M. Almada
Isabel Toste	"	Emporsil
Isidro Tanganho	"	Inst. Geográfico Cad.
J. Soares	"	Co. Coord. Reg. Centro
João Abecassis	"	D.G. Contrib. Impostos
João Adão	"	Inst. Geográfico Cad.
João Araújo	"	C. M. Coimbra
João Cruz	"	Topométrica
João Fernandes	"	Geometral
João Machado	"	S.N.I.G.
João P. Ribeiro	"	I.S.E.L.
João Ribeiro	"	D.R. Agr. Ribatejo Oeste
João Salsinha	"	Hidroprojecto
João Silva	"	D.G. Orden. Território
João Torres	"	Inst. Geográfico Cad.
João Tremoceiro	"	C. M. Lisboa
Joaquim Simplício	"	Silvicaima
Jorge Barata	"	Inst. Geográfico Cad.
Jorge Gomes	"	Geometral
Jorge Pires	"	Inst. Geográfico Cad.
Jorge Reis	"	Serv. Nac. Parques
José Almeida	"	C. M. Viseu

Nome	País	Entidade
José Amaral	Portugal	D.G.Contrib. Impostos
José M. Amaral	"	Act. Privada
José Amaro	"	T. L. P.
José Antunes	"	D.R. Agric. B. Litoral
José Bouça	"	Geometral
José Carvalho	"	Portucel
José Costa	"	C. M. Oeiras
José Dias	"	Geometral
José Fernandes	"	C. Coord.Reg. Alentejo
José A. Ferreira	"	Inst. Informática
José S. Ferreira	"	C. Reg. Predial Tavira
José Freire	"	Inst. Geográfico Cad.
José Gama	"	C.R.Predial S.B.Alportel
José Gomes	"	C. Reg. Predial Faro
José Guerreiro	"	C. R. Predial Esposende
José Gulomar	"	C. M. Cascais
José Machado	"	C. M. Faro
José Martins	"	C. Reg. Predial Évora
José Neto	"	Socarto
José Paquito	"	Planidesenvolve
José Peralta	"	E.D.P.
José C. Pinto	"	S.N.I.G.
José Pinto	"	C. M. Setúbal
José Portela	"	Univ. Trás-os-Montes
José Saraiva	"	Inst. Geográfico Cad.
José Silvestre	"	E. P. A. L.
José Simão	"	Inst. Geográfico Cad.
José Sousa	"	C. M. Viseu
José Valente	"	D. Reg. Agric. Alentejo
José Vilarinho	"	C. Coord. Reg. Algarve
Júlio Ribeiro	"	D. Reg. Agric. Algarve
Liduíno Borges	"	Planidesenvolve
Luís Barroso	"	D.G. Contrib. Impostos
Luís Freitas	"	D. Reg. Agric. Algarve
Luís Godinho	"	Estereofoto
Luís Gonçalves	"	Universidade Aveiro
Luís Lopes	"	Geometral
Luís Martins	"	C. M. Matosinhos
Luísa Bastos	"	Geometral
Luísa Gonçalves	"	Geometral
Manuel Barata	"	T. L. P.
Manuel Fonseca	"	E. D. P.
Manuel Rafael	"	E.D.P.
Manuel Reis	"	D.G. Portos
Mã. Adelaide Pires	"	E. P. A. L.
Mã. Alice Martins	"	C.R.Predial Vale Cambra
Mã. Alice Ramos	"	Inst. Geográfico Cad.
Mã. Amália Antão	"	C. M. Castelo Branco
Mã. do Céu Sousa	"	C. M. Seixal
Mã. Conceição Loureiro	"	D.G. Contrib. Impostos
Mã. Dulce Fernandes	"	D.R. Agric. Douro Minho



NGME	PAIS	ENTIDADE
Mã. Emilia Amorim	Portugal	C. Coord. Reg. Centro
Mã. de Fátima Bacharel	"	C. Coord. Reg. Alentejo
Mã. de Fátima Carrelo	"	C. M. Sintra
Mã. de Fátima Mendes	"	Inst. Geográfico Cad.
Mã. Fernanda Fernandes	"	C.R.Predial Oliv.Bairro
Mã. Helena Rodrigues	"	Inst. Geográfico Cad.
Mã. Luisa Fina	"	" "
Mã. Lurdes Silva	"	Hidroprojecto
Mã. Margarida Carvalho	"	C. M. Lisboa
Mã. Micaela Carvalho	"	Inst. Geográfico Cad.
Mã. Natália Lopes	"	C. M. Seixal
Mã. Otília Pereira	"	D.R. Agr.Ribatejo Oeste
Mã. Raquel Alexandre	"	C. Reg. Predial Loures
Mã. Ressurreição Ribeiro	"	C. M. V. N. Famalicão
Mã. do Rosário Landeiro	"	Socarto
Mã.Teresa Castel-Branco	"	Inst. Geográfico Cad.
Mã. Violante Moreira	"	C. M. Lisboa
Mário Andrade	"	E.D.P.
Mário Brasileiro	"	C. R. Predial Sesimbra
Mário Falcão	"	Inst. Geográfico Cad.
Mário Roque	"	C. M. V. N. Famalicão
Narciso Felix	"	C. M. Abrantes
Natália de Sá	"	E.D.P. (própria)
Natércia Godinho	"	C. M. Palmela
Nuno Almeida	"	Inst. Geográfico Cad.
Nuno Reis	"	C. T. T.
Orlando Borrás	"	Inst. Geográfico Cad.
Pedro Cera	"	Emporsil
Raul Coelho	"	D. G. Reg. Notariado
Renato Homem	"	D.G.Desenvolv. Regional
Renato Pereira	"	E.D.P.
Ricardo Guerreiro	"	Serv. Nac. Parques
Rita Sequeira	"	Inst. Geográfico Cad.
Rogério Leitão	"	Inst. Geográfico Cad.
Rui Henriques	"	S.N.I.G.
Rui Merino	"	C. M. Cascais
Rui Pires	"	GATTOP Gab. Topografia
Rui Sousa	"	C. M. Ponta Delgada
Rui Tavares	"	Fac. Arquitec. Porto
Silvério Silvestre	"	Inst. Geográfico Cad.
Vasco Neto	"	T. L. P.
Vasco Vilas-Boas	"	E.D.P.
Ventura Gomes	"	D. G. Reg. Notariado
Víctor Campos	"	L.N.E.C.
Vitor Garrido	"	C. T. T.
Víctor Vaz	"	Inst. Geográfico Cad.
Zaida Chora	"	" "
Mã.Margarida Botelho	"	Particular
Helga Tipold	F.R.G.	G.T.Z.
Adalberto Resende	Portugal	D.G.Rec. Naturais

NOME	PAIS	ENTIDADE
Alvaro Alexandrino	Portugal	E.D.P.
Ana Fontes	"	D.G. Florestas
António Gonçalves	"	Serv.Cart.Exército
António Leitão	"	Brisa
António Silva	"	E.D.P.
Carlos Gomes	"	Inst.Geográfico Cad.
Carlos Rodrigues	"	D.G.R. Naturais
Carlos Serrano	"	Univ. de Aveiro
Célia Campos	"	C.M. de Lisboa
Fernando Nogueira	"	Inst. Geográfico Cad.
Francisco Sá	"	C.M. de Lisboa
Humberto Mendes	"	Activ. Privada
Jaime Ramos	"	Socarto
João Oliveira	"	Univ. de Aveiro
João Pinto	"	Inst. Geográfico Cad.
Joaquim Batista	"	D.G.Recursos Naturais
José Lagarto	"	Esc.S.Agrária Santarém
José Monteiro	"	Socarto
José Moreira	"	E.D.P.
Luis Gonçalves	"	Univ. de Aveiro
Mã. Alice Antão	"	Inst. Geográfico Cad.
Mã. Dolores Ferreira	"	D.G.R. Naturais
Mã. de Lurdes Dionísio	"	C.Reg. Pred. Bombarral
Mã. Odete Santos	"	C.R.Pred.Sobral M.Agraço
Mã. Teresa Guerra	"	Inst. Geográfico Cad.
Martim Vilas-Boas	"	E.D.P.
Maurício Fonseca	"	C.N.R.O.A.
Paulo Dorés	"	D.G. Florestas
Paulo Monteiro	"	Socarto
Timóteo Monteiro	"	E.D.P.
Wenceslau Nunes	"	C.T.T.
João França	"	Inst. Geográfico Cad.
Elias Mendes	"	" " "
Óscar Teixeira	"	Sec. Reg. Equip.Soc.(R.A.M)
Isabel Osório	"	Fac. Ciências Porto
António Arnaud	"	Fac. Ciênc. Tecnologia Univ.Nova
Jaime Paz	"	C.N.R.O.A.
Rui Rodrigues	"	Fac. Engenharia Porto
Duarte Caldeira	"	Inst. Geográfico Cad.
Peter Franssen	Holanda	
João Fernandes	Portugal	Inst. Geográfico Cad.
José Guedes	"	" " "
José Chaves	"	" " "
Mã Odete Baptista	"	" " "

### VIII - GRUPOS DE TRABALHO

Após reunião preliminar no Funchal em que se explanaram os objectivos do SICRUM e o Programa de Actividades para os seis Grupos de Trabalho em que estava estruturada a II Parte do Seminário, foi aberta a inscrição aos participantes, e seguidamente eleitos os Presidentes e Secretários dos vários Grupos de Trabalho, que ficaram com a seguinte constituição:

G.T.	DESIGNAÇÃO	Nº PART.	PRESIDENTE	SECRETARIO
1	Organização, Gestão e Produção	20	Keith Syrett (UK)	Engã Margarida Teixeira
2	Metodologias de trabalho. Aquisição e processamento da informação	16	Arq. Francisco Pinheiro	Drã Maria Emília Amorim
3	Avaliação predial para fins de tributação e planeamento. Sistemas de informação geográfica (LIS/GIS)	21	Engo Dimas Veigas	Arq. Maria Fátima Bacharel
4	Normas e especificações técnicas. Controle de qualidade. Gestão multifuncional da informação	8	Engo Matti Vahala (SF)	Engo Fernando Glória
5	Cadastro e registo predial. Aspectos técnicos e legais	20	Engo Walter Bregenzer (CH)	Dr. José M. S. Ferreira
6	Formação profissional aos vários níveis (universitário, politécnico e técnico profissional)	7	Dr. Joachim Wiesel (D)	Dr. Rui Tavares

O Grupo Coordenador responsável pela articulação das actividades dos diferentes Grupos de trabalho foi constituído pelos seguintes participantes:

- Eng<sup>o</sup> Klaus Barwinski (RFA)
- Eng<sup>o</sup> Michael Brand (Irlanda do Norte)
- Eng<sup>o</sup> Carlos Alexandre Costa (DGPA)
- Eng<sup>o</sup> Elvino Dias Duarte (IGC)

Os restantes membros da Comissão Organizadora, com a colaboração de funcionários das Secretarias Regionais do Equipamento Social e Agricultura e da Delegação Regional do IGC na RA Madeira, foram responsáveis pela parte organizacional e apoio logístico, sendo credores de reconhecimento pelo excelente trabalho desenvolvido.

Seguem-se os quadros com a distribuição dos participantes pelos seis Grupos de Trabalho.

Presidente: Mr. Keith Syrett  
 Secretário: Eng.<sup>a</sup> Margarida Telxreira

GRUPO I

NOME	ENTIDADE (ORGANISMO)	ÁREA DE ESPECIALIZAÇÃO
Maria Dulce Fernandes	D.R.A. Entre Douro e Minho	Emparelamento
Luís Alberto Ferreira Martins	C.M.Matosinhos	Topografia
José Dias Neto	Socarto Lda.	Topografia, Fotogrametria e Cartografia
Sebastian Mas Mayoral	Centro de Gestion Catastral (Spain)	Management, Computer, Cartography
António Augusto Santos Lima	Direc. de Planificação Física - - S. Tomé	Cartografia
Júlio Alves	Direc. de Topografia e Cadastro de MES de Guliné Bissau	Técnico Topógrafo e Cartógrafo
António M. Manhique	Direc. de Construção e Urbanização	Engenheiro Técnico Civil
José Luís Carvalho	Portucel	Planeamento Florestal - GIS
António Sousa de Macedo	Soporcei	Planeamento Florestal - GIS
Haumann, Dieter	Maps Geosystems Private Company in Germany	Photogrammetrist and liaison officer to the German Cadastral Surveys
Arildsen, Inger Marie	Ministry of housing and building Department of technology and coordination	Economist, working within the body of coordination of land related data
Fenet, Jean Marc	Direction General des Impots Ministere des Finances, Paris	Administration General du Cadastre, fiscal et géographique

Perdigoto, Manuel Esteves	Director Geral do IGC (Portugal)	Cadastro (Rústico e Urbano), Geodesia Fotogrametria, Cartografia, Informática, Fotografia Aérea, etc.
Falcão, Mário M. Silva	Director dos Serviços de Apolo Técnico e Científico do IGC	Cadastro
Celso Fernandes	Serviço Nacional de Cartografia e Cadastro	Director Geral
Keith Syrett	Director International Operations - KIM Aerocarto - Holland - Stewart Tech Services - USA	Management of Cadastral; Large Mapping, Aerial Photography and Surveying Pro- jects Land Registration Specialist, Management Consultant
Margarida Teixeira	D.G.H.E.A.	Emparcelamento Rural
Inês Maria Moutinho Beira	Câmara Municipal de Almada	Chefe de Divisão de Organização e Informática Análise Sistemas Licenciada em Organização e Gestão de Empresas
Manuel Rodrigues Teixeira	Direcção Regional de Habitação, Urba- nismo e Ambiente	Topógrafo
José Augusto Sã e Melo Albuquerque	Junta Autónoma de Estradas	Técnico Assessor Principal

GRUPO II

NOME	ENTIDADE (ORGANISMO)	ÁREA DE ESPECIALIZAÇÃO
José Baltazar Pessanha	Instituto Geográfico e Cadastral	Avaliação da Propriedade Rústica e Chefe da Delegação Regional da Madeira
Luís Fernando Aguiar	Estelo Engº S/A Curitiba - Brasil	Cartografia/Fotogrametria/Cadaastro
José Luís Oliveira S. Bouça	Geometral, SA	Produtor de Cartografia Digital
Fernando António Coucelo	Portuocel E.P.	Engº Silvicultor - GIS
Isabel Toste	Soporocel / Emporsil	Gab. Planeamento Florestal - GIS
Alexandra Higgs Menezes	Despodata	Eng.ª Geógrafa - Informática
Manuel Augusto de Freitas Reis	Direcção Geral de Portos	Engº Geógrafo - Cartografia e Hidrografia
Fernando Gonçalves R. Trindade	Câmara Municipal de Santarém	Engº Civil - Planeamento
Elias de A. Mendes	Instituto Geográfico e Cadastral	Topógrafo Especialista
João Brandão Soares	C.C. Região Centro	Informática
João Ferreira de Araújo	Câmara Municipal de Coimbra	Vereador
Miguel Martin Peralo	Centro de Gestion Catastral	GIS
Coudert, Georges	Ordre des Géomètres-Experts - France	Cartografia
Maria Emília Canceala Amorim	C.C. da Região Centro	Engº Geógrafo
João Virgílio França	Instituto Geográfico e Cadastral	Arquitecto / Informática
Francisco Pinheiro	CIT	Gestão de Património Imobiliário

Presidente: Engº Dimas Veigas

Secretário: Arqt.ª M.ª Fátima Bacharel

GRUPO III

NOME	ENTIDADE (ORGANISMO)	ÁREA DE ESPECIALIZAÇÃO
Dimas Veigas	Instituto Geográfico e Cadastral	Avaliação - Cadastro Rústico
M.ª Fátima Bacharel	C.C.Região do Alentejo :	Arquitectura Paisagística
José Fernandes	C.C.Região do Alentejo	Sistema de Informação Geográfica
António Fernandes	Câmara Municipal de Oeiras	Sistema de Informação Geográfica
Rui Sousa	Câmara M. Ponta Delgada	Desenhador Projectista
Kadir Ozcubukcu	General D.R. of Land Reg. of Cadastre	Information System Specialist
Natércia Godinho	Câmara Municipal Palmela	Geografia e Planeamento Regional
Eduardo Santiago Campelo	Câmara Municipal de Almada	Arquitecto
Heige Hoejkaer	National Survey and Cadastre. Denmark	
Jairo Capistrano Silva	Comissão de Cartografia	Planeamento Governamental
Ana Paula Ferreira	Câmara Municipal de Loulé	Gab. Plano Director Municipal
Inês Barroso	D.G. Contribuições e Impostos	Avaliação de Propriedade Rústica
Conceição Loureiro	D.G. Contribuições e Impostos	Avaliação de Propriedade Rústica
Ana Maria Moura	Instituto de Informática	Informática
José Alberto Sousa	Câmara Municipal de Viseu	Planeamento Urbano/Engº Civil



<p>         José Alves Ferreira          Alberto Moreira Baptista          G. Conia          José Manuel Carneiro Amarel          M<sup>te</sup> do Oáu Carvalho Sousa          Nuno Pereira dos Reis       </p>	<p>         Instituto de Informática          Universidade Trás-os-Montes          Sogei - Rome - Itália          D.G. Contribuições e Impostos          Câmara Municipal do Seixal          C.T.T.       </p>	<p>         Informática          Desenvolvimento Rural          Manager of Cadastre Cartographie Group          Avallações Urbanas          Geografia e Planeamento Regional          SGBD (Sistema de Gestão de Base de Dados)       </p>
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Presidente: Engº Matti Vahala  
 Secretário: Engº Fernando Glória

GRUPO IV

NOME	ENTIDADE (ORGANISMO)	ÁREA DE ESPECIALIZAÇÃO
Fernando Silva da Glória	Instituto Geográfico e Cadastral	Cadastro
José Manuel Correia Almeida	Câmara M. de Viseu	Planeamento (Cadastro e Registo aplicados ao Planeamento)
António Bottaro	Società Generale de Informàtica (SOGEI)	Ass. Manager (cartographic group) Cartographic Quality Control
Nesnoeslau Pinto	CIT	Serviços do Património Imobiliário
Nigel Sheath	ICL (UK) Ltd.	LIS/GIS System Implementation and product marketing
Matti Vahala	National Land Survey	Digital Map Production, GIS
Simeão Cambaco	Direção Nac. Geografia e Cadastro	Cadastro
Michael Haberlin	Hydrographic Surveys - Society of Chartered Surveyors (Ireland)	Land + Hydrographic Surveying

Presidente: Eng<sup>e</sup> Wálter Bregenzer  
 Secretário: Dr. José M. Santos Ferreira

GRUPO V

NOME	ENTIDADE (ORGANISMO)	ÁREA DE ESPECIALIZAÇÃO
José Manuel S.S. Ferreira	Cons.Reg. Predial de Tavira	Registo Predial
Maria Alice M.L.N.D. Martins	Cons.Reg. Predial de Vale Cambra	Registo Predial
Maria Raquel Sobral Alexandre	2.ª Cons. Reg. Pred. Loures	Registo Predial
José Justiniano T. Braz Pinto	Câmara M. de Setúbal	Análise Documental/Urbanismo
Ventura José R. Gomes	Cons.Reg. Predial de Faro	Registo Predial
Joaquim Manuel G.L. Simplício	Silvicaima	Utilizador, Registo Predial/Cadaastro
Raúl de L. Marques Coelho	Cons.Reg. Predial Oeiras	Registo Predial
N. Rohde Nielsen	National Survey and Cadastral. Denmark	Head of the Cadastral Division
Vítor Garrido	CTT	Jurista Direcção Recursos Imobiliários
Torsten Lindskog	National Land Survey. Sweden	Cadastral Service
José Augusto A.M. Guerreiro	Cons.Reg. Predial Esposende	Registo Predial
José Sebastião Maia Amaral	Activ. Privada	Avaliação
Diva Matos	Instituto Geográfico e Cadastral	Avaliação Cadastral
António Rodolfo Ferreira	Instituto Geográfico e Cadastral	Cadaastro Jurídico
Ana Paula de Castro	Emporsil	Utilizador, Cadaastro/Registo Predial
José V. Tolentino Gama	Cons.Reg. Predial S. Brás Alportel	Registo Predial
José Francisco G. Portela	Univ. Trás-os-Montes e Alto Douro	Sociologia Rural/Reestruturação Fundiária
Mário dos Santos Brasileiro	Cons.Reg. Predial Sesimbra	Registo Predial
Walter Bregenzer	Administration Fédérale Suisse	Direction des Mensurations Cadast.
Jan Van Hemert	Dutch. Cadaastre (International Div)	Geodesy, Cadastral and Land Registration

GRUPO VI

Presidente: Dr. Joachim Wiesel  
Secretário: Dr. Rui Tavares

NOME	ENTIDADE (ORGANISMO)	ÁREA DE ESPECIALIZAÇÃO
Joachim Wiesel Klaus Baer Artur Vaz Tluné Roberto Brioli Rui Tavares Artur Seara Luís Severo Gonçalves	Univ. Karlsruhe, FRG Chartered Surveyors Instituto Geográfico e Cadastral Direct. Gen. Cadastre Firenze - Italy Faculdade Arquitectura U.P. Instituto Geográfico e Cadastral Universidade de Aveiro	Photogrammetry, Remote Sensing Cadastre Cadastro Cadastro História de forma urbana e da arquitectura (vertente histórica do cadastro) Fotogrametria

## IX - CONCLUSÕES DOS GRUPOS DE TRABALHO

O resultados das actividades dos vários Grupos de Trabalho foi consubstanciado nas seguintes recomendações, de que se inserem os textos em Língua Portuguesa e Língua Inglesa.

## GRUPO DE TRABALHO I

### ORGANIZAÇÃO, GESTÃO E PRODUÇÃO

#### RESUMO:

O que temos não é um Cadastro simples, não é, sequer, Cadastro, em termos do que, habitualmente, se designa por tal.

Portanto, se Portugal precisa de estabelecer um verdadeiro Cadastro, deve reorganizar-se e pensar em linhas totalmente diferentes.

#### RECOMENDAÇÕES:

- 1 - Que seja estabelecido um Cadastro Jurídico e Geográfico onde o solo seja de interesse prioritário para o cadastro.
  - 1.a) Os prédios são as unidades constituintes do Cadastro. Cada prédio deve ser univocamente definido.
  - 1.b) Que a componente jurídica, compreendendo os direitos de propriedade, as hipotecas e outras restrições façam parte do registo do prédio como identificador.
- 2 - A organização desta tarefa para estabelecer um Cadastro Jurídico e Geográfico deve :
  - 2.a) Estar sob o controlo completo de uma única e nova entidade, que não será constituída por grupos consultores vindos de Departamentos Governamentais já existentes, mas, pelo contrário, constituirá um novo e único Departamento. Recorrerá a consultores privados, quando necessário.
  - 2.b) Possuir autonomia para definir, planear e dirigir as actividades necessárias para a execução rápida de um Cadastro "Simples" novo. Tal inclui a coordenação de todos os aspectos de produção de um cadastro simples. Deverá definir regras, normas e condições.
  - 2.c) Ser totalmente responsável pelo programa.

- 2.d) Ser-lhe atribuído um orçamento específico para financiar o programa na sua totalidade. Este orçamento deve ser actualizado anualmente, tendo em atenção o programa anual, taxa inflacionária, etc.. Este orçamento deve ser suficiente para cobrir as actividades definidas por este Novo Departamento e não estar sujeito ao que o Governo entender como apropriado. Em trabalhos especiais estabelecidos pelo Governo deve ser permitida a participação do sector privado na fase de produção.
- 2.e) Ser responsável e responder perante o Governo ao seu mais alto nível e não perante outros Departamentos do Governo.
- 2.f) Ter capacidade para organizar gabinetes regionais e sub-regionais para execução dos trabalhos e instruir as Autarquias no papel a desempenhar na produção e manutenção cadastrais.
- 2.g) Organizar e definir prioridades e calendarizar o desenvolvimento dos trabalhos para completar a tarefa. A urgência na necessidade do Cadastro implica a sua execução rápida.
- 3.a) O programa deverá ser sistemático e terá a participação compulsiva de organismos públicos, profissionais, individuais, corporativos e nacionais quer durante a elaboração, quer durante a subsequente manutenção. Complementarmente qualquer trabalho de entidades exteriores ao "Departamento Cadastral" deve obedecer às normas requeridas para inclusão no Cadastro.
- 3.b) O Registo Predial deve presentemente permanecer no Departamento do Cadastro devendo todavia, no futuro usar os números de prédio para a descrição jurídica do mesmo.
- 3.c) O Cadastro e o Registo Predial deverão ser interdependentes e a sua integração um tema a ter em consideração na sequência da experiência a adquirir futuramente.

## GRUPO DE TRABALHO II

### METODOLOGIAS DE TRABALHO. AQUISIÇÃO E PROCESSAMENTO DA INFORMAÇÃO

Os métodos já existem, são eficazes e têm de ser adoptados em função do tipo de terreno, em função da classificação adoptada: se Rústico, se Urbano, se especial. Também em função da informação existente - talvez se aproveite 20% - o que significa dinheiro e tempo.

Em função também do tipo de dados, atributos que se consigam enumerar, sendo estes, associados à precisão requerida e à frequência de mudança de dados, que irão determinar tempos e custos de execução, que dependem de uma decisão de organismo superior, que terá de receber o trabalho final digitalizado cartograficamente, efectuar um trabalho potente de validação e controlo do trabalho fornecido, e porá à disposição dos grandes utilizadores que têm por obrigação a sua actualização e reenvio ao Estado para actualização Central.

Finalmente, como não se poderá fugir da digitalização, como ferramenta de trabalho, terá de existir um Organismo que definirá:

1. Conceitos
2. Codificação
3. Caderno de Encargos global e particular
4. Produto final digital com portabilidade - desenho de registos informáticos perfeitamente adaptados aos equipamentos dos utilizadores
5. Definição dos atributos que se porão à disposição dos diferentes utilizadores, restritos ou globais

NOTA: Os municípios terão de obter os meios e formação para uma correcta participação no esquema.

**CADASTRO** - Descrição sistemática e exaustiva do território para ter o conhecimento dos limites físicos consignados nos direitos de propriedade.

#### QUE FUNÇÕES?

**FISCAL** - Encargo do Estado e dos Municípios

**JURÍDICA** - como será jurídica e servirá para delimitar eficazmente a propriedade privada, terá de ser emitida uma taxa especial sobre a venda dos imóveis como participação dos proprietários para pagamento do cadastro.



## O CADASTRO TEM DE SER NUMÉRICO E MULTIFUNCIONAL

O que está feito?

Devem ser recolhidas todas as informações já existentes (que não estão em forma numérica aproveitando integralmente toda a riqueza dos documentos.

O resultado digital tem de ter portabilidade.

O que é preciso fazer?

- 1º Diálogo entre produtor, gestor e utilizador da informação (privado e público)
- 2º Diálogo permanente e institucional
- 3º Escolher um modelo conceptual, moderno e aberto, de maneira a que os utilizadores continuem a trabalhar, aguardando o produto final que o Estado virá a fornecer.
- 4º Todos estes esforços iniciais são para encontrar uma linguagem numérica comum e estabelecimento dos seus instrumentos.  
Ex: A estrutura aberta permitirá acolher expeditamente os casos urgentes, que poderão, no futuro ser enriquecidos.
- 5º Este Sistema terá como atributo obrigatório uma permuta institucional.
- 6º Depois do diálogo entre o Estado, os Municípios e os utilizadores (que são da responsabilidade do Estado) deverão definir entretanto as especificações gerais.
- 7º Os Municípios em cooperação com os utilizadores irão definir o conteúdo suplementar (funções e atributos) das novas funções entretanto adoptadas para o Cadastro.

### GRUPO DE TRABALHO III

#### AVALIAÇÃO PREDIAL PARA FINS DE TRIBUTAÇÃO E PLANEAMENTO. SISTEMAS DE INFORMAÇÃO GEOGRÁFICA (LIS/GIS)

##### 1- CONCLUSÕES FINAIS

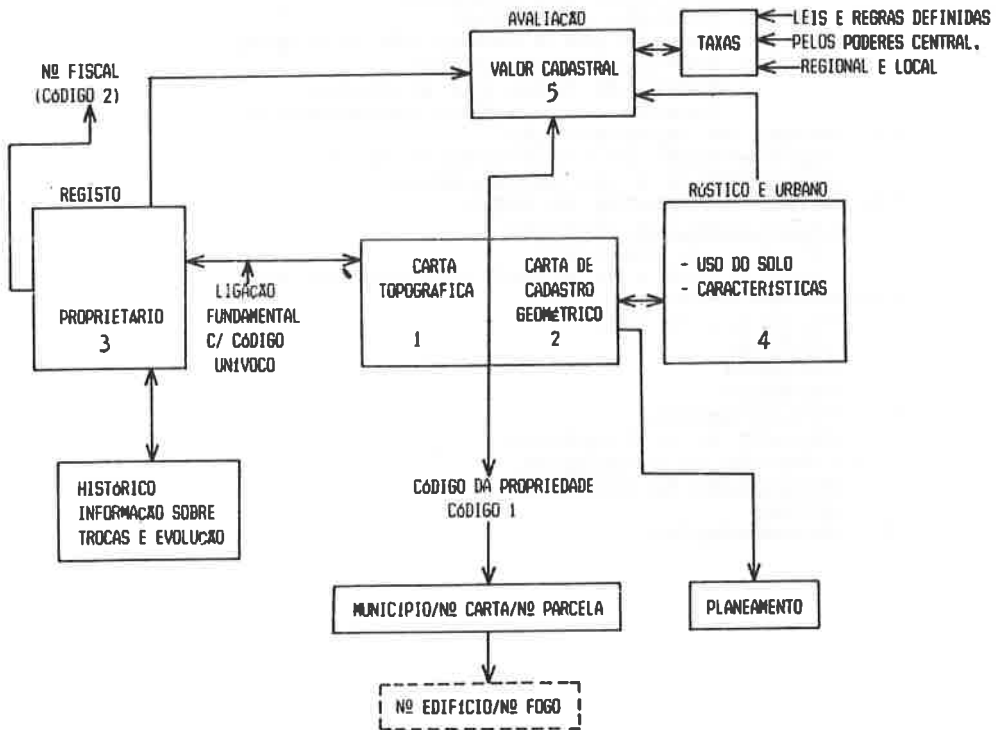
- 1.1 - O cadastro deve ser entendido, no âmbito da sua multifuncionalidade, como uma plataforma de entendimento entre utilizadores e produtores de informação, sobretudo ao nível da cartografia temática.
- 1.2 - Todos os utilizadores da informação devem ser integrados e responsabilizados no processo de criação das bases de dados, tendo os municípios um papel fundamental na qualidade de detentores de um conhecimento profundo do seu território.
- 1.3 - Independentemente de se considerar que é fundamental a criação da cartografia base, pensa-se que é possível a execução de outros estudos em simultâneo. São exemplos disso a cartografia temática e os estudos socio-económicos, com base na referenciação às secções estatísticas.
- 1.4 - De acordo com a recomendação da criação ou responsabilização urgente de um organismo pela coordenação do conteúdo da informação, bem como da sua circulação, considera-se que a actuação do referido organismo será necessariamente pragmática e com objectivos perfeitamente definidos, de modo a torná-lo eficaz.

##### 2 - RECOMENDAÇÕES FINAIS

- 2.1 - Considera-se fundamental a criação ou responsabilização de um órgão / organismo, com funções de coordenação, do conteúdo da informação assim como da sua circulação com vista a conseguir um pleno apoio às iniciativas de produção de informação, privilegiando o nível local.  
Pensa-se que o SNIG estaria actualmente em condições de desempenhar esse papel.
- 2.2 - Na sequência dos trabalhos deste Seminário e respectivas conclusões, considera-se fundamental, após equacionar a sua aplicabilidade à realidade nacional, um encontro para a discussão de medidas concretas no que respeita aos processos de produção de informação.
- 2.3 - Uma das soluções apontadas para atingir rapidamente os objectivos formulados neste Seminário é o estabelecimento de protocolos de colaboração entre os diferentes sectores.

2.4 - Um exemplo concreto será a realização de um inquérito do IGC dirigido às autarquias, com vista ao equacionamento das disponibilidades de colaboração (existência de informação e disponibilidade técnica/financeira) para a elaboração do cadastro. Este inquérito deverá ser objectivo e acompanhado de um documento explicativo de sensibilização para a necessidade de contribuição de todos os municípios para um trabalho comum, assente nas mesmas bases de referência.

COMPONENTES FUNCIONAIS BASICAS DE UM SISTEMA DE INFORMACAO GEOGRAFICA



## GRUPO DE TRABALHO IV

### NORMAS E ESPECIFICAÇÕES TÉCNICAS. CONTROLE DE QUALIDADE GESTÃO MULTIFUNCIONAL DA INFORMAÇÃO

- 1 - Objectivos
- 2 - Modelo de dados nacional
  - Referencial geográfico comum
  - Identificadores comuns
- 3 - Autoridade de controlo
  - Termos de referência
- 4.0- Definições de controlo
- 4.1- Normalização dos dados
  - 4.1.1 - Modelo cartográfico básico
    - Definições geométricas e topológicas
    - Definição dos objectos
    - Precisão posicional
    - Conexão com o modelo não cartográfico
  - 4.1.2 - Modelo não cartográfico
    - Modelo de dados dos atributos
    - Conexão com o modelo cartográfico
- 4.2- Normas de representação
  - Implementação da transferência de dados
  - Cartográfica e não cartográfica
- 4.3- Normas de recolha de dados
  - Especificações técnicas
  - Controlo de qualidade
  - Especificações de actualização/conservação
- 4.4- Normas técnicas
  - Estrutura de rede
  - Gráficas
  - Software
  - Hardware
- 4.5- Procedimentos
  - Registo de utilizadores
  - Controlo de alterações
  - Divulgação da informação
  - Acesso
- 5 - Recomendações

## 1 - OBJECTIVOS

Definir as partes constituintes de uma estrutura que irá proporcionar o controlo de todos os dados relacionados com o terreno e quaisquer sistemas de aplicação que recolham, modifiquem ou utilizem esses dados em Portugal.

A definição deverá conter as necessárias normas de qualidade, normas técnicas, normas de gestão e processos de regulamentação que terão que ser definidos, directrizes para a sua definição e quaisquer normas existentes que devam ser consideradas.

## 2 - MODELO DE DADOS NACIONAL

Considera-se importante que seja definido para Portugal, numa primeira fase, um modelo de dados de nível elevado.

Esta definição deveria incluir as necessidades de informação de cada Departamento do Governo cobrindo os dados considerados relevantes, a sua proveniência e quaisquer intercâmbios interdepartamentais que ocorram.

Não é necessário que seja um modelo muito pormenorizado, basta que defina apenas as principais áreas e fluxos de informação. Recomenda-se, contudo, que este processo seja continuado dentro de cada departamento para definir o modelo de dados pormenorizado subjacente ao modelo de nível elevado.

Seria então possível definir áreas de informação e, por exemplo, no contexto deste documento, toda a informação relacionada com o terreno. Um modelo mais avançado pode, então, ser desenvolvido para toda a informação relacionada com o terreno mostrando como esta informação se relaciona com outra informação. Este pode, então, ser usado como uma base para o desenvolvimento de um cadastro multifuncional computadorizado que, enquanto não contiver todos os dados relevantes, permitirá a integração e uso destes dados em muitas áreas e formará uma estrutura para desenvolvimento e uso de sistemas de aplicação de dados relacionados com o terreno.

Este modelo também pode ser utilizado para ajudar a definir um sistema de referência comum para informação relacionada com o terreno contendo itens tais como os identificadores normalizados para prédios e a estrutura geométrica a ser usada.

Uma vez definidos, estes modelos deverão ser colocados sob a supervisão de uma autoridade de controlo.

## 3 - AUTORIDADE DE CONTROLO

Deve ser estabelecida uma autoridade de controlo com uma estrutura definida sob a tutela de um único Ministério.

A estrutura será:

- Uma Comissão executiva constituída por elementos de diferentes ministérios e outras entidades tais como finanças, registo predial, agricultura, planeamento e administração regional.

- Um número de grupos de trabalho sob o controlo da Comissão Executiva que tenham a responsabilidade sobre todas as matérias técnicas e administrativas e a quem sejam atribuídas pela Comissão Executiva tarefas e objectivos a curto prazo.

Recomenda-se que:

- Sejam consignados fundos que viabilizem o funcionamento efectivo dos grupos de trabalho devendo a comissão executiva especificar e controlar esses fundos.
- Os grupos de trabalho serão constituídos por uma ampla variedade de peritos incluindo consultores do sector privado e representantes regionais que garantam o carácter nacional da autoridade.

Os termos de referência da Autoridade de Controlo são:

- Definir um Modelo de Dados Nacional que possa ser usado como uma base para a implementação de soluções tecnológicas relativas à informação relacionada com o terreno;
- Desenvolver, publicar e providenciar o controlo de alterações para todos os dados, normas técnicas e processuais na área da informação relacionada com o terreno;
- Desenvolver, publicar e providenciar o controlo de alterações de um Modelo Cartográfico Base, que possa ser usado como a base de todos os sistemas de informação relacionada com o terreno;
- Estabelecer um processo de aprovação e controlo para o desenvolvimento de sistemas de aplicação de toda a informação relacionada com o terreno e assegurar que estes sistemas obedeçam às normas especificadas.

#### 4.0 - DEFINIÇÕES DE CONTROLO

A Autoridade de Controlo deve estabelecer um número de definições de controlo ou normas na área da informação relacionada com o terreno. Contudo, recomenda-se que, devido a não haverem fronteiras definidas entre esta e outra informação nacional, estas definições sejam alargadas para proporcionar uma definição normativa global para toda a informação em Portugal.

#### 4.1 - NORMALIZAÇÃO DE DADOS

Sujeita a 4.0 a Autoridade de Controlo definirá o Modelo de Dados Nacional de acordo com 2.0.

Os dados cadastrais devem estar à disposição de muitos e diferentes utilizadores pelo que se sugere que isto seja realizado usando a posição e um identificador único como conexão com outra informação geográfica.

Para facilitar essa possibilidade deve ser estabelecido um catálogo de definições para uso comum.

#### 4.1.1 - MODELO CARTOGRÁFICO BÁSICO

Todos os dados que entram na esfera da informação geográfica e representados por coordenadas, devem usar uma referência geodésica comum - sistema de coordenadas nacional. Quando forem usados sistemas regionais eles devem ser previamente transformados para o sistema de coordenadas nacional.

Devem ser estabelecidas entidades geométricas capazes de definir os objectos.

A fim de satisfazer critérios básicos devem ser definidas identidades tipo para pontos, linhas e áreas pelo menos a duas dimensões; também para um uso eficiente de dados de teledetecção tem que ser definidas identidades tipo para dados matriciais.

A topologia é necessária para a definição dos objectos usados e para analisar os dados espaciais.

Cada sistema faz a descrição da topologia de maneiras diferentes.

Por isso não é recomendável normalizá-la no sistema de dados, mas apenas na troca de dados.

A incerteza posicional da informação geográfica é recolhida e representada em muitos sistemas.

As determinações de posição usadas têm sido feitas independentemente, com métodos únicos e precisão. A compatibilidade dos dados pode ser bem determinada se houver uma classificação da incerteza posicional métrica para pontos e linhas.

#### LIGAÇÃO COM O MODELO NÃO CARTOGRÁFICO

Deve ser usado um único identificador que estabeleça a conexão entre os modelos cartográfico e não-cartográfico. Devendo ser usados identificadores normalizados, se possível.

#### 4.1.2 - MODELO NÃO CARTOGRÁFICO

Os atributos dos dados deveriam ser normalizados, classificados e codificados, tanto quanto possível, em diferentes sectores, por exemplo, cadastro, agricultura, florestas, ambiente. Deve ser desenvolvido um método comum normalizado para descrever a classificação dos dados em sistemas diferentes.

A conexão com o modelo cartográfico é identificador do objecto, normalizado, se possível.



## 4.2 - NORMAS DE REPRESENTAÇÃO

É importante que sejam definidas normas para a representação dos dados cartográficos e não cartográficos. De grande importância é a definição de um formato de transferência de dados que, em conformidade com o Modelo Cartográfico Básico, permita a transferência de todos os dados não-cartográficos. É possível alargar este formato de modo a incluir outros dados tais como, dados administrativos, mas isso deve constituir um objectivo secundário. Este formato seria do domínio público e deveria ser actualizado por fases com alterações no Modelo Cartográfico Básico. Sugere-se que para obter a necessária flexibilidade se utilize um formato que contenha um dicionário de dados. Existem algumas dessas normas como a ISO 9735 ou mais especializadas como o Formato de Transferência Nacional (NTF) da Grã-Bretanha.

É também importante que sejam definidas normas para uma variedade de produtos cartográficos. Isto incluiria a amplitude das escalas e metodologias de generalização, simbologia, legendas etc. Produtos não-cartográficos tais como documentos normalizados e listas devem também ser incluídos.

## 4.3 - NORMAS DE RECOLHA DE DADOS

Não é demais acentuar a importância da recolha de dados e é essencial que sejam desenvolvidas normas que sejam estritamente respeitadas.

Estas normas devem cobrir o ciclo de recolha de dados completo e recomenda-se que sejam consideradas as seguintes áreas.

A definição do Modelo Cartográfico Básico deve ser completado antes do início da recolha de dados. Todos os dados adquiridos devem então estar em conformidade com o Modelo Cartográfico Básico e a aquisição deve estar de acordo com especificações técnicas pré-estabelecidas. Isto refere-se especificamente aos Dados Geométricos, mas podem ser desenvolvidas metodologias semelhantes para toda a aquisição de dados.

É importante que as Especificações Técnicas sejam produzidas para satisfazer todas as metodologias de aquisição de dados, tais como digitalização manual, rasterização, fotogrametria aérea, etc. Estas especificações devem ser do domínio público e devem ser incluídas como parte de todos os contratos de aquisição de dados adjudicados ao sector privado.

O controlo de qualidade dos dados adquiridos é de importância vital e deve cobrir as áreas da precisão geométrica e rigor topológico.

A qualidade da precisão geométrica pode ser controlada por muitos métodos tais como, verificação de pontos aleatoriamente seleccionados ou executando a aquisição de uma pequena percentagem de dados com comparação por processos automáticos. Recomenda-se que o rigor topológico seja testado por software normalizado para executar esta tarefa e permitir que seja do domínio público.

Este pode, então, ser utilizado pelos adjudicatários da recolha de dados para assegurar que os dados adquiridos estão em conformidade com a qualidade especificada, sendo elaborado um relatório antes da entrega dos dados.

É importante ter em atenção que as Especificações Técnicas, normas de controlo e software de verificação levam muitos anos/homem a desenvolver e são de vital importância para o sucesso da aquisição de dados.

Uma vez adquiridos, os dados devem ser actualizados usando metodologias semelhantes e devem continuar em conformidade com o Modelo Cartográfico Básico. Esta tarefa é, geralmente executada ao nível de um departamento distrital e por isso é importante que o processo de actualização seja claramente definido e sejam postos em prática procedimentos concretos para o seu controlo.

#### 4.4 - NORMAS TÉCNICAS

Se se pretender implementar com êxito sistemas computadorizados cobrindo uma tão vasta área de aplicação como a coberta por um cadastro multifuncional haverá que definir e respeitar normas técnicas. Há uma tendência dentro da própria indústria de computadores para definir muitas destas normas que são globalmente conhecidas como normas de Interligação de Sistemas Abertos (Open System Interconnecting - OSI). As normas de sistemas abertos proporcionam uma estrutura que pode ser usada por todos os fabricantes e utilizadores na implementação de soluções tecnológicas de informação integradas e em rede.

Estas normas abrangem ambientes do sistema e "interfaces", interacções homem - computador (human computer interactions - HCI), normas de linguagem e normas de funcionamento interactivo dos sistemas.

Recomenda-se que todos os sistemas considerados estejam em conformidade com estas normas.

Recomenda-se, igualmente, que nalgumas áreas seja feito um progressivo aperfeiçoamento e sejam adoptadas normas específicas dentro do (OSI).

Áreas particulares a considerar são:

- Protocolos de trabalho em rede quer para estruturas locais quer para áreas regionais mais vastas.
- Normas gráficas tais como GKS ou PHIGS e normas HCI tais como Gestor de Apresentação (Presentation Manager) e janela X (X - Windows).
- Normas de software tais como linguagens e sistemas de operação.

#### 4.5. - PROCEDIMENTOS

Deve ser desenvolvido um registo para estabelecer quem serão os utilizadores do Sistema Nacional. Isto é necessário para que a Autoridade de Controlo possa determinar quem tem acesso à informação no sistema, a que nível de acesso está disponível para um utilizador

em particular e onde é necessária interacção nos dois sentidos, e como tal deva ser conseguido.

O termo "utilizador" é ainda definido como um organismo ou entidade com a necessidade de contactar com o sistema para fins de obtenção de informação ou actualização ou renovação da informação existente.

A informação do domínio público deve estar disponível ao público em geral, sujeita à convenção do Conselho da Europa para a Protecção dos Indivíduos no que respeita ao processamento automático de dados pessoais.

É importante que sejam postos em prática procedimentos para a divulgação de actualização de dados, como definido no capítulo 4, aos utilizadores registados no sistema; tal deve incluir a revisão e actualização de normas técnicas e de protocolo, nacionais ou comunitárias, como referido anteriormente.

A Autoridade de Controlo ou a sua estrutura de gestão designada é responsável pela participação de todas as mudanças de procedimentos. Do mesmo modo, a Autoridade de Controlo ou seu agente deve introduzir um procedimento para o "feedback" da informação no que respeita a normas/protocolos onde sejam encontradas deficiências ou no caso em que sejam desenvolvidas novas normas/protocolos.

## 5 - RECOMENDAÇÕES

- Estabelecimento de uma estrutura nacional para dados relacionados com o terreno.
- Criação de uma Autoridade de Controlo para desenvolver essa estrutura.
- Definição de um conjunto de dados, normas técnicas e de procedimentos no âmbito desta estrutura.
- Dar prioridade à recolha de dados relacionados com o terreno.

## GRUPO DE TRABALHO 5

### CADASTRO E REGISTO PREDIAL. ASPECTOS TÉCNICOS E LEGAIS

#### RECOMENDAÇÕES

O objectivo principal do Cadastro é representar o terreno e as construções, para identificação da sua existência física.

O objectivo principal de um registo predial é uma representação jurídica da propriedade e direitos jurídicos sobre o solo, e a sua publicidade.

Como a introdução do cadastro em Portugal está atrasada propomos o seguinte:

O Cadastro é o único caminho para a identificação física do terreno nas áreas rurais e urbanas.

O Registo Predial e o Cadastro deveriam estar em ligação, para que a realidade física corresponda à realidade jurídica. Para a solução dos problemas actuais um objectivo prioritário e a curto prazo seria a adopção de medidas adequadas por parte das entidades competentes, tão breve quanto possível.

A identificação física do solo e das construções, uma vez estabelecida no Cadastro (no que respeita aos limites, à área e à situação), nos termos admitidos no registo predial, só podem ser modificados baseados num documento legal (jurídico).

O Registo Predial auxiliado por EDM (dados adquiridos e processados automaticamente seria a única instituição a definir os direitos jurídicos sobre o solo.

Para a aceleração da execução do Cadastro a Autoridade Cadastral deveria solicitar a colaboração de organismos locais e instituições privadas.

O Cadastro tem que ser estabelecido em todo o País o mais rapidamente possível.

O Cadastro tem que ser independente para que possa ser multifuncional.

A conservação cadastral tem que ser assegurada.

Os elementos do cadastro são:

- a) O Identificador (localizador) dos objectos
- b) Definição dos limites no sistema de coordenadas oficial
- c) Elementos descritivos (tipo de culturas, conteúdo)
- d) Superfície
- e) Nome do proprietário (se registado no livro de registos)  
Nome do usufrutuário (se o proprietário não está registado no livro de registos)

## GRUPO DE TRABALHO VI

### FORMAÇÃO PROFISSIONAL AOS VÁRIOS NÍVEIS (UNIVERSITÁRIO, POLITÉCNICO E TÉCNICO-PROFISSIONAL)

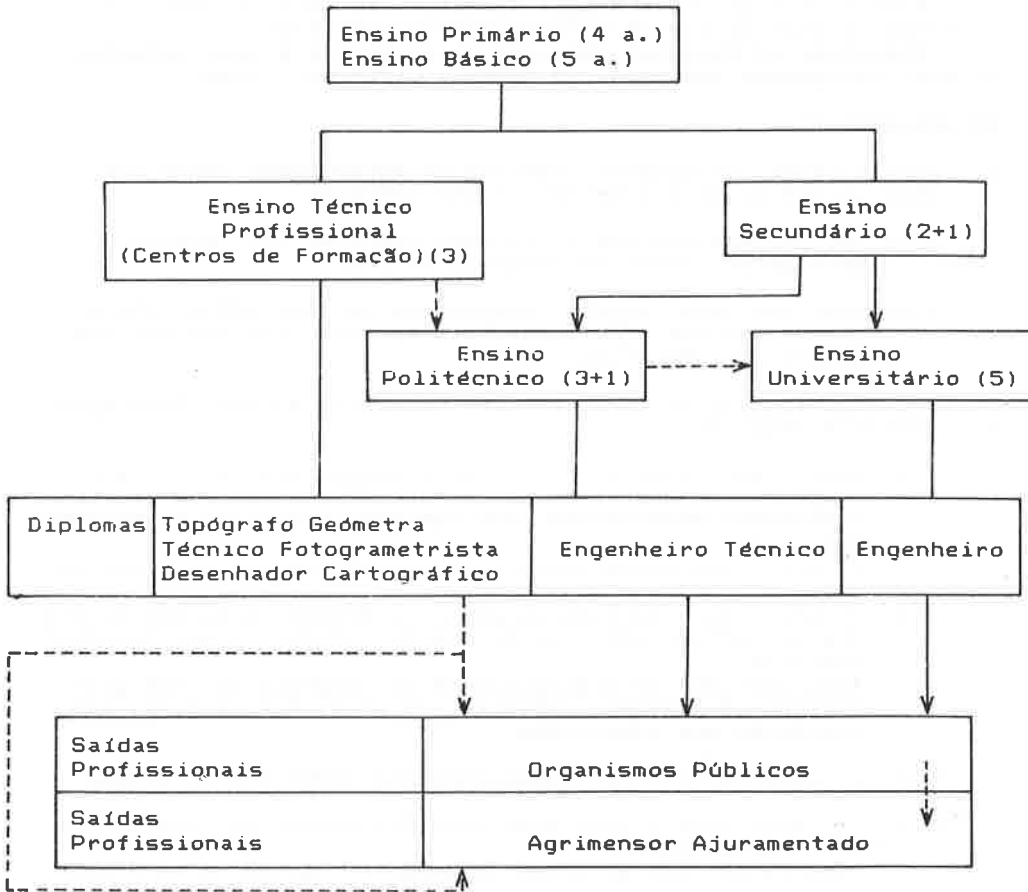
#### - INTRODUÇÃO

- 1 - Na situação actual do cadastro em Portugal torna-se indispensável, e unicamente no que respeita ao cadastro rural, a existência de 1 600 técnicos para execução e actualização num horizonte mínimo de 15 anos.  
Se se considerar o cadastro urbano, inexistente ou inteiramente descoordenado, a situação torna-se, obviamente, mais preocupante.
- 2 - É urgente a formação técnica de profissionais, de nível médio e superior, a médio e longo prazo, especificamente orientada para a execução e actualização do cadastro nacional.
- 3 - O sistema de ensino, não respondendo às necessidades do sector, requer uma reformulação imediata, quer pela adequação dos curricula existentes, quer pela criação de estruturas integradas no sistema, vocacionadas fundamentalmente para o sector profissionalizante nos domínios técnico e científico.

#### - PROPOSTAS

- 1 - Criação de 3 níveis de ensino no domínio da cartografia, sendo um nível técnico-profissional, um nível politécnico e um nível universitário.
- 2 - Formação a médio e longo prazo de 1 000 profissionais de nível técnico, 400 de nível politécnico e 200 do nível universitário.  
A manutenção destes quadros técnicos implica a formação anual, após estabilização de um mínimo de 35 profissionais do nível técnico, 15 do nível politécnico e 10 do nível superior.
- 3 - Para a consecução dos objectivos enunciados, propõe-se uma estrutura de mosaico, com curricula adequados, baseada no seguinte organigrama.

PROPOSTA DE ORGANIGRAMA DO  
SISTEMA DE FORMAÇÃO PROFISSIONAL  
EM CARTOGRAFIA (CADASTRO...)



—> percursos obrigatórios  
- - -> percursos opcionais

**WORKING GROUP I**  
**ORGANISATION, MANAGEMENT AND PRODUCTION**

**SUMMARY:**

What exists is not a simple cadastre, in fact no Cadastre in terms of what is the recognised meaning of Cadastre.

Therefore if Portugal requires to establish a real Cadastre it must reorganise and think on totally different lines.

**RECOMMENDATION:**

- 1 - That a Legal, Geographic Cadastre be established where the land is the primary interest of the Cadastre.
  - 1.a) The parcels are the units that comprise the Cadastre. Each parcel shall be uniquely defined
  - 1.b) That the legal aspect, comprising the ownership, the mortgages, and the other interests are recorded against the parcel as identifier.
- 2 - The Organisation of this task for establish a Legal Geographic Cadastre shall be:
  - 2.a) Under the complete control of a single new entity, which shall not be organized by consultant groups from existing Government Departments, but instead it must be a NEW UNIQUE DEPT.  
It shall use consultants from private sector as required.
  - 2.b) It shall have Autonomous power to define, plan and direct the activities required to rapidly produce a new "Simple" Cadastre.  
This includes co-ordination of all aspects for the production of a Simple Cadastre. It shall define rules and standards and conditions.
  - 2.c) It shall have total responsibility under the programme.
  - 2.d) It shall have a dedicated specific budget to finance the whole programme.  
This budget may be adjusted annually having in mind each year programme, escalation of costs, etc.  
The budget must be sufficient for the activities defined by the New Department and not what Government thinks is appropriate. In special jobs established by the Government it must be allowed private sector participation in production

- 2.e) This organization shall report and be responsible to the highest level of Government and NOT to another Department of the Government.
- 2.f) The Central Controlling entity shall be capable of organizing regional and sub regional offices for the execution of its tasks and shall instruct Municipalities in their role in the production and maintenance of the "Cadastre".
- 2.g) It shall organise and define priorities, and also the time to complete the task. There is an urgency in the need for Cadastre, therefore it should be quick.
- 3.a) The programme will be systematic and the participation of public, professional, individual, corporate and national bodies will be compulsory during both the establishment and subsequent maintenance. Additionally any work of any group outside the Cadastral Board (C.B.) shall be of the required standard for inclusion in the Cadastre.
- 3.b) The Land Registry shall for the present be outside the control of the "C.B." of the Cadastre, however, it shall in future use parcel numbers for the legal description of the parcel.
- 3.c) The Cadastre and the Land Registry shall be interdependent and following, experience and use, their integration should be an item for consideration.



## WORKING GROUP II

### WORKING METHODOLOGIES. ACQUISITION AND PROCESSING OF INFORMATION

New and efficient methodologies are already available, which must be used according to the land type and the classification criteria adopted having into account the typ-rural, urban and special cadastre. Also having in mind the existing information - probably 20% can be saved - what means time and money.

Also depending upon the type of data, attributes that can be established. These must be relate to the required accuracy and to the frequency of data alteration.

Which will become the factors for determination of the time and costs of execution. This will depend on the decision of the Controlling Body, which will receive the finnal work digitized in cartographic support, and procede to the validation, checking and controll of the supplied work. To be made, available to major users which will have the obligation for its updating and address of the data to the Central Department.

Finally, as digitizing will be a compulsory working tool it must exist a Department with the responsability of defining:

- 1 - Concepts
- 2 - Codification
- 3 - Terms of references for global and specific jobs
- 4 - Finnal digitized data with portability - data structure definition perfectly compatible with the hardware and software of the users.
- 5 - Definition of the atributes which will be made available to the different users, restricted or global.

**REMARK:** The Municipalities must be guaranted the resources and the professional education to enable a full participation in the scheme.

**CADASTRE** - Sistematic and exhaustive description of the land to provide a knowledge of the fisical boundaries in the land ownership.

#### WHAT FUNCTIONS?

**FISCAL** - Of the responsability of the Government and Municipalities.

**LEGAL** - As it will be legal and it shall define efficiently the private property a special tax must be applied on all Real State transaction as a contribution of the land owners for the Cadastre execution.

CADASTRE MUST BE NUMERIC AND MULTIPURPOSE.

What is done?

All existing information (graffical, that is not yet numeric) must be collected recovering fully all wealth data information of the documents.

The capture digital data must have portability.

What must be done?

- 1st - A dialogue amongst producer, manager and user of the data (private and public)
- 2nd - A permanent and institutional dialogue
- 3rd - To select a conceptual modern and open model in order to enable the users to carry on directives will waiting for the finnal work to be supplied by the Government.
- 4th - All this initial efforts are intended to find a common numerical language and establishment of all its means.  
example: An open structure will enable to solve on a provisional base the urgent requirements which will be enriched in the future.
- 5th - This system will have, as compulsory attribute an institutional exchange of data.
- 6th - After the dialogue amongst the State the Municipalities and the users (which are under the Government control) the general standards must be specified.
- 7th - The Municipalities in cooperation with the users will define the additional contents (functions and attributes) of new purposes adopted in the meanwhile for the Cadastre.

### WORKING GROUP III

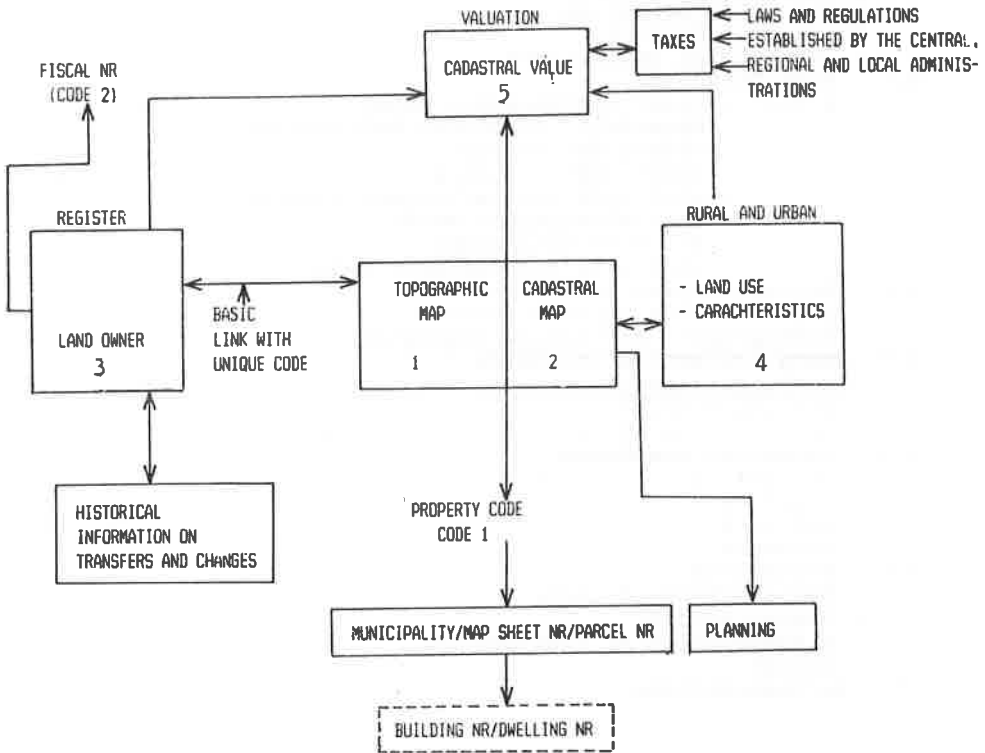
#### LAND EVALUATION FOR FISCAL AND PLANNING PURPOSES. LAND AND GEOGRAPHIC INFORMATION SYSTEMS (LIS/GIS)

- 1 - We think that the cadastre must be multipurposed like a platform of users and information producers specially in what concerns the thematic maps.
- 2 - All the users of information must be integrated to the process of creation of a data base. The municipalities have a fundamental role since they are the best knowers of their territory.
- 3 - Even without a cadastre cartography, that we know it's a fundamental instrument, we think that's possible the elaboration of other studies at the same time with other reference bases like, for example, the socio-economic studies.
- 4 - According to the recommendation of the creation of an organization responsible for the coordination and contents of the information, we think that this organization must be pragmatic, with objectives perfectly defined to be efficient.

#### FINAL RECOMMENDATIONS

- 1 - We think that's fundamental the creation or attribution of responsibilities to an organize with functions of coordination of the type and contents of the information as well as the circulation of that information. The objectif is to supply the initiatives of production of information, specially to the local level.  
The National Geographic Information System should play that role.
- 2 - Face to the conclusions of this Seminar we think it's fundamental that after verifying this applicability to the local reality of our country we meet again to the discussion of concrete actions in what concerns the processes of production of information.
- 3 - One of the ways is to establish protocoles of colaboration between the different sectors.  
So the IGC should make an inquiry to the municioalities to know about their ability to colaborate in the cadastre cartography.  
This inquiry must be extremely objectif and show the municipalities the advantage of the cooperation in a common with common bases.

BASIC FUNCTIONAL COMPONENTS  
GEOGRAPHIC INFORMATION SYSTEM



## WORKING GROUP IV

### REGULAMENTATION. TECHNICAL SPECIFICATIONS AND DATA MANAGEMENT. QUALITY CONTROL. MULTIPURPOSE APPLICATIONS

- 1 - Objectives
- 2 - National Data Model
  - Common reference grid
  - Common identifiers
- 3 - Controlling Authority
  - Terms of reference
- 4.0 - Controlling definitions
- 4.1 - Data standards
  - 4.1.1. - Basic Cartographic Model
    - Geometric, topologic definitions
    - Object definition
    - Positional accuracy
    - Link with non-cartographic model
  - 4.1.2. - Non-cartographic Model
    - Attribute data model
    - Link with cartographic model
- 4.2 - Representation standards
  - Data transfer implementation
  - Cartographic and non-cartographic
- 4.3 - Data collection standards
  - Technical specifications
  - Quality control
  - Updating specifications
- 4.4 - Technical standards
  - Networking
  - Graphics
  - Software
  - Hardware
- 4.5 - Procedures
  - Registration of users
  - Change control
  - Dissemination of information
  - Access
- 5 - Recommendations

## 1 - OBJECTIVES

To define the constituent parts of a framework that will provide control of all land related data and any application systems that collect, modify or utilise that data within Portugal.

The definition will contain the necessary quality standards, technical standards, management standards and regulatory procedures that must be defined, guidelines for their definition and any existing standards that should be considered.

## 2 - NATIONAL DATA MODEL

It is considered important that a high level data model is defined for Portugal at an early stage. This definition should include the information requirements for each Government Department covering what data is best, where it emanates from and any inter-departmental interactions that occur.

It is not necessary that this be a highly detailed model but define just the major information areas and flows. It is recommended though that this process is continued within each department to define the detailed data model that underlies the high level model.

It should then be possible to define information areas and, for instance, in the context of this document, all the land related information. A further model can then be produced for all land related information and showing how this interacts with other information. This can then be used as a basis for the development of a computerised multi-purpose cadastre that, whilst not containing all relevant data, will allow the integration and use of this data in many areas and produce a framework for developing and using land related application systems.

This model can also be utilised to help define a common reference system for land related information, containing such items as standard identifiers for land parcels and the geometric framework to be used.

Once these models have been defined they should be placed under the charge control process of a controlling authority.

## 3 - CONTROLLING AUTHORITY

A controlling authority must be established with a defined structure and reporting to a single Ministry.

The structure shall be:

- An executive commission constituted from different ministries and other entities, such as the financial and register offices, agricultural, planning and regional administration.
- A number of working groups beneath the executive commission, who have responsibility for all technical and administrative matters and which are given short term tasks and objectives by the executive commission.

It is recommended that:

- Funding must be provided to allow the effective functioning of the working groups and the executive commission must specify and control this funding.
- The working groups are made up of a wide variety of experts, including consultants from the private sector and that regional representation is specified to guarantee the national character of the authority.

The terms of reference of the Controlling Authority be:

- To define a National Data Model that can be used as a basis for the implementation of land related information technology solutions;
- To develop, publish and provide change control for all data, technical and procedural standards within the area of land related information;
- To develop, publish and provide change control of a Basic Cartographic Model that can be used as the basis of all land related information systems;
- To provide a controlling and approval process for the development of all land related information application systems and ensure that these systems meet the specified standards.

#### 4.0 - CONTROLLING DEFINITIONS

The Controlling Authority should establish a number of controlling definitions or standards within the area of land related information. However it is recommended that, because there are no defined boundaries between this and other national information, these definitions are extended to provide an overall standard definition for all information within Portugal.

#### 4.1. - DATA STANDARDS

Subject to 4.0 the Controlling Authority will define the National Data Model in accordance with 2.

The cadastral data must be available to many different users and it is suggested that this be achieved by using position and unique identifier as a link with other geo-information.

To further make this possible a catalogue of definitions must be established for common use.

#### 4.1.1. - BASIC CARTOGRAPHIC MODEL

All data coming into the sphere of geo-information and represented with coordinates, must use a common geodetic reference - national coordinate system. When regional systems are used they must first be transferred to the national coordinate system.

Geometric entities capable of defining objects must be established.

In order to satisfy basic criteria, entity types for points, lines and areas must be defined, at least in two dimensions; also for efficient use of remote sensing data, matrix data entity types have to be defined.

Topology is needed for definition of used objects and for analysing the spatial data.

Different systems make the description of topology in slightly different ways. That's why it's not recommended to standardize it in data systems, but only in data interchange.

Position uncertainty geo-information is collected and represented in many systems.

The used position determinations have been made independently with unique methods and accuracy. The compatibility of data can be determined best if there is a metric position uncertainty classification for points and lines.

#### LINK WITH NON-CARTOGRAPHIC MODEL

There must be a unique identifier used in cartographic and noncartographic model which connects these two models. Standard identifiers, if possible, should be used.

#### 4.1.2. - NON-CARTOGRAPHIC MODEL

Attribute data should be standardized, classification and coding as much as possible in different sectors e.g. cadastral, agriculture, forestry, environment sectors. A standard common method for describing data classification in different systems must be developed.

The link with the cartographic model is identifier of the object, standardized if possible.

#### 4.2 - REPRESENTATION STANDARDS

It is important that standards are defined for the representation of cartographic and non-cartographic data. Of great importance is the definition of a data transfer format that conforms to the Base Cartographic Model and allows the transfer of all non-cartographic data. It may be possible to extend this format to include other data, such as administrative data, but this should be a secondary objective. This format should be within the Public Domain and must be best updated in steps, with changes in the Base Cartographic Model. It is suggested that to achieve the necessary flexi-



bility a format that contains a data dictionary is utilised. A number of such standards exist such as ISO 9735 or more specialised ones such as the U.K. National Transfer Format (NTF).

It is also important that standards are defined for a range of standard cartographic map products. This should include scale ranges and generalisation methodologies, symbology, legends, etc. Non-cartographic products such as standard documents and lists should also be included.

#### 4.3. - DATA COLLECTION STANDARDS

The importance of data collection cannot be over emphasised and it is essential that standards are developed and strictly adhered to. These standards should cover the complete data collection cycle and it is recommended that the following areas are considered.

The definition of the Base Cartographic Model must be complete prior to data collection commencing. All data acquired must then conform to the Base Cartographic Model and the acquisition must be in accordance with pre-set technical specifications. This specifically refers to the geometric data, but similar methodologies can be developed for all data acquisition.

It is important that Technical Specifications are produced to cater for all data acquisition methodologies, such as manual digitising, scanning, aerial photogrammetry, etc. These specifications must be within the Public Domain and must be included as part of any data acquisition contracts awarded to the private sector.

Quality control of data acquired is of vital importance and must cover the areas of geometric accuracy and topological correctness.

Quality of geometric accuracy can be controlled by many methods, such as checking randomly selected points or carrying out the acquisition of a small percentage of data and comparing by automatic procedures.

It is recommended that topological correctness is checked by developing standard software to carry out this task and allowing this to be available in the Public Domain. This can then be utilised by data collection contractors to ensure that the data acquired conforms to the specified quality and a report is produced prior to returning the data.

It is important to realise that the Technical Specifications, quality standards and checking software take many man-years to develop and are of vital importance to successful data acquisition.

Once acquired the data must be updated, using similar methodologies and must continue to conform to the Base Cartographic Model. This will generally be carried out at a district office level and therefore it is important that the updating process is clearly defined and strict procedures put in place to control it.

#### 4.4. - TECHNICAL STANDARDS

If computer systems covering such a wide application area as those covered by a multipurpose cadastre are to be implemented successfully, then technical standards must be defined and adhered to. There is a move within the computer industry itself to define many of these standards which are globally known as Open System Interconnection (OSI) standards. Open system standards provide a framework that can be used by all manufacturers and users in building integrated networked information technology solutions.

These standards embrace system environments and interfaces, human computer interactions (HCI), language standards and systems interworking standards.

It is recommended that all systems considered are conform to these standards.

It is also recommended that in some areas a further refinement is made and specific standards within OSI are adopted.

Particular areas to consider are:

- Networking protocols for both local and wide area networks
- Graphic standards such as GKS or PHIGS and HCI standards, such as Presentation Manager and X - windows.
- Software standards such as languages and operating systems

#### 4.5 - PROCEDURES

A register should be developed to establish who the users will be in the National System. This is necessary to enable the Controlling Authority to determine who has access to information in the system, to what level access is available to a particular user and where two-way interaction is necessary and how this is to be achieved.

The term "user" is further defined as a body or entity with the need to interface with the system, for purposes of obtaining information or up-dating or renewing existing information.

Information in the public domain must be available to the general public, subject to the Council of Europe Convention for the Protection of Individuals with regard to automatic processing of personal data.

It is important that procedures are put in place for the dissemination of data updates, as defined in Section 4, to registered users within the system; this would include review an update of technical and protocol standards, National or EEC, as outlined earlier.

The Controlling Authority or it's designated management structure is responsible for notifying all change procedures. Likewise the Controlling Authority or it's agent must put in place a procedure for feedback of information concerning standards/protocols, where those are found to be deficient or in the case where new standards/protocols are developed.

## 5 - RECOMMENDATIONS

- A National framework is established for land related data.
- A Controlling Authority is established to develop the above framework.
- A set of data, technical and procedural standards are defined within this framework.
- Land related data collection must be addressed as a priority issue.

## WORKING GROUP V

### CADASTRE AND LAND REGISTRATION. TECHNICAL AND LEGAL ASPECTS

The main goal of a Cadastre is to represent land and houses for identifying their physical existence.

The main goal of a Land Register is a legal representation of property and legal rights on land, and their publicity.

As the introduction of the cadastre in Portugal is in delay, we propose as what follows:

Cadastre is the only way for physical identification of land in the rural and in the urban areas.

Land Registry and Cadastre should be in connection, so that the physical reality corresponds to the legal reality. For the solution of the actual problems a short time goal could be that the competent administrations will adopt, as soon as possible, the necessary measures.

The physical identification of land and buildings, once established in the cadastre (in what concerns the limits, the area, the situation), in those terms admitted in the Land Registry, can only be modified based on a legal document.

Land Registry, supported by EDM, should be the only institution for the definition of legal rights on land.

For an acceleration of the establishment of a cadastre, the authority of Cadastre should ask for the help of local councils and of private institutions.

Cadastre has to be established as soon as possible all over the country.

Cadastre has to be independent so that it can fulfill multi-functional purposes.

The updating of cadastre must be guaranteed.

The elements of cadastre are:

- a) Identifier (identifier) of the objects
- b) Definition of the limits in the official coordinate-system
- c) Describing elements (type of cultures, content)
- d) Surface
- e) Name of the owner (if introduced in the register-book)  
Name of the user (if owner not introduced in the register-book)

## WORKING GROUP VI

### PROFESSIONAL EDUCATION (UNIVERSITY AND POLITECHNIC LEVELS)

#### PROPOSALS

##### 1) INTRODUCTION:

In the present situation of cadastre (rural and urban) in Portugal, a technical education at medium and high levels, specifically oriented towards execution and updating, it is urgently required.

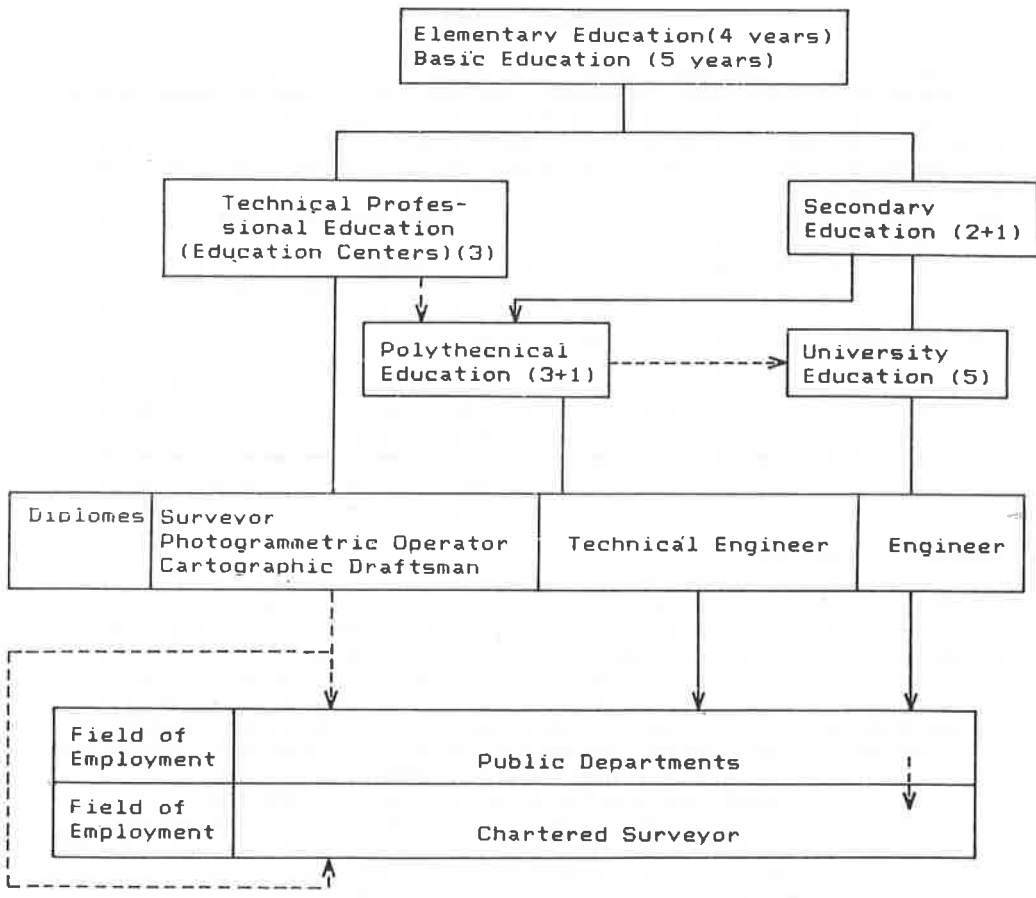
Approximately 1 600 technicians are needed to build up a Cadastre in about 15 years (rural only).

To train so many people, the current educational system is not adequate and therefore has to be restructured.

##### 2) EDUCATIONAL LEVELS:

- a) 1 000 at Technician level (IGC - School-type)
  - b) 400 at Polytechnical level
  - c) 200 at University level
- a) Curriculum similar to current course at IGC (Surveyor, Draftsman, Photogrammetrist) more cadastral topics, reducing non-profession oriented objectives
  - b) 3 years + 1 year practice - strongly oriented towards practical needs (Surveying, Cadastre, Photogrammetry, Cartography)
  - c) Improve quality of education by creating a center for cartographic engineering which has to provide technical resources (expensive equipment)
- 3) Education levels b) or c) can qualify for the title of "Chartered Surveyor" after a time of professional practice.
  - 4) Until enough people have been trained in the new system, experienced professionals could be trained in specific courses to fullfill level-b) positions.
  - 5) In order to maintain the necessary staff it is desirable that the following minimum number of professionals are prepared annually:  
Technician level: 35  
Polytechnical level: 15  
University level: 10  
The structure of the enclosed diagram is suggested to achieve the intended goals.

PROPOSED EDUCATION SYSTEM FOR SURVEYING/CADASTRAL PURPOSES



→ compulsory itineraries  
 - - - -> optional itineraries

## X - RECOMENDAÇÃO FINAL

Para apresentação na Cerimónia de Encerramento foi aprovada a seguinte Recomendação Final, de que igualmente se transcrevem os textos em Língua Portuguesa e em Língua Inglesa.

### RECOMENDAÇÃO FINAL

Os trabalhos do Seminário Internacional de Cadastro Rústico e Urbano Multifuncional (SICRUM), em que participaram especialistas de 13 Países Europeus e de 5 Países da nossa Comunidade linguística, estão já praticamente concluídos. Portugal fica-lhes extremamente reconhecido pelas suas valiosíssimas contribuições profissionais e pelo esforço dispendido, pelo que a Comissão Organizadora cumpre gostosamente o dever de lhes expressar o seu profundo reconhecimento.

O período de Sessões Públicas em Lisboa, nos dias 20 e 21 em que estiveram presentes cerca de 220 participantes nacionais e 50 estrangeiros, para apresentação e discussão de algumas dezenas das comunicações técnicas apresentadas, contribuiu indubitavelmente para criar, à partida, uma desejável sensibilização para esta problemática, não só de responsáveis e técnicos da comunidade nacional, oriundos de múltiplas áreas com intervenção directa ou indirecta no cadastro e inerente cartografia de suporte - desde a formação à produção, à utilização, com ênfase para o planeamento, agricultura, fiscalidade e registo predial - como ainda proporcionou aos especialistas estrangeiros o indispensável contacto com a situação actualmente prevalecente e as realidades do nosso País.

O intensivo programa de Trabalhos levado a cabo no Funchal, no período de 22 a 25, e desenvolvido por seis Grupos de Trabalho que cobriram todas as áreas do processo cadastral, conduziu à produção de informação extremamente valiosa, que será incluída num Relatório Final pormenorizado, a preparar pela Comissão Organizadora, com a colaboração de especialistas nacionais que presidiram ou participaram activamente nos diferentes Grupos de Trabalho.

Apresenta-se, porém, desde já, um sumário das conclusões com a explicitação de algumas das recomendações principais.

"O SICRUM confirma que Portugal necessita URGENTEMENTE um cadastro (rústico e urbano) simples, universal, independente, actualizado, compulsivo, de base legal, com padrões que satisfaçam os requisitos de um País Europeu moderno, que deverá ser concluído o mais rapidamente possível, com a utilização de tecnologias modernas.

Até se alcançar este objectivo serão necessárias medidas intermédias.

A informação no sistema deve ser modernizada e acessível a todos e deve permitir a possibilidade de ser posteriormente desenvolvida, com base num sistema de informação mais amplo.

A correspondente informação, quer geográfica, quer textual, deve ser única, sem ambiguidades, deve ser adquirida apenas uma vez, ser posta à disposição dos outros utilizadores, para eliminação de ineficiências e custos de duplicação.

Acima de tudo o sistema deve ser MANTIDO ACTUALIZADO, devendo ser introduzidos, à partida, mecanismos para facilitar este requisito, à medida que o cadastro se desenvolve.

A fim de que tais objectivos possam ser alcançados o Seminário recomenda:

- 1 - Que seja criado um único organismo de controlo e coordenação, que deve ser autónomo e ter o poder para estabelecer e fixar normas e prioridades.
- 2 - Que sejam identificadas e implementadas as necessárias alterações de legislação.
- 3 - Que com carácter de urgência, em consulta com a comunidade profissional e educacional, sejam introduzidas as necessárias alterações no sistema educacional, para formar os indispensáveis quantitativos de pessoal profissional, com experiência e especialização relevantes.

O rápido estabelecimento deste cadastro resultará num mais célere crescimento das receitas pelas entidades fiscais, procedimentos mais eficazes de planeamento e desenvolvimento e num serviço mais eficiente em termos de custos/benefícios para os cidadãos de Portugal, com gestão adequada.

A experiência em várias partes do Mundo, tem demonstrado que o cadastro pode gerar receitas para se auto-financiar".

#### FINAL RECOMMENDATIONS

The work of this International Seminar at which experts from 18 foreign countries participated is now largely complete. Portugal is indebted to them for their contributions. The presentations in Lisbon and the Working Groups in Madeira have produced a wealth of information and a full report with detailed recommendations is being produced by the Organizing Committee. However a general summary of the main conclusions and recommendations are set out below.

"The Seminar confirms that Portugal URGENTLY needs an universal (urban and rural), independent, up-to-date, compulsory, legally based, simple cadastre of a standard to meet the requirement of a modern European Country, which should be completed as soon as possible using modern digital technology.

Interim measures will be necessary until this is realized.

The information within the system must be standardized and available to all and must have the possibility of being developed further as the basis of wider information system. The information within it, both graphical and textual, should be unique, unambiguous and should be collected once and be available to other users, thus removing inefficiencies and costs of duplication.



Above all the system must be MAINTAINED UP-TO-DATE and mechanisms must be put in place at the outset to facilitate this as the cadastre grows.

In order that this should happen the Seminar recommends:

- 1 - That a unique Central Controlling and Coordinating body be established that should be autonomous and have the power to establish and enforce standards and priorities.
- 2 - That the necessary changes in legislation be identified and put in hand.
- 3 - That as a matter of urgency, with consultation with the professional and educational community the necessary changes are introduced to the educational system to supply the required numbers of personnel with the relevant skills and experience.

The early establishment of this cadastre will result in a more rapid attainment of financial revenues by the collecting authorities, more expeditious planning and development procedures and a more cost effective and efficient service to the citizens of Portugal. With proper management, experience elsewhere in the World has shown that it can become self financing.

## 2ª PARTE

### COMUNICAÇÕES TÉCNICAS

#### I - INTRODUÇÃO

Apesar do SICRUM ter atravessado alguns períodos de indefinição por falta de meio financeiro - tendo acabado por ser fixado o período de realização já muito em cima do acontecimento - foi ainda apresentado um total de 60 Comunicações Técnicas sobre os vários temas da problemática cadastral em debate, o que revela bem o interesse que despertou a nível nacional e internacional.

A oportunidade desta acção pode ser avaliada pela decisão governamental ao nomear uma Comissão de Reestruturação do IGC - que o mesmo é dizer das actividades cartográficas e cadastrais do país - à luz da situação nos principais países europeus, a qual iniciou os seus trabalhos dois meses após a realização do SICRUM.

A distribuição destas Comunicações Técnicas foi a seguinte, por nacionalidades:

Autores Portugueses.....	24
Autores estrangeiros.....	36
e por temas:	
Problemática cadastral.....	6
Situação em Países Europeus e Tendências evolutivas..	24
Avaliação Cadastral.....	1
Conservação Cadastral.....	1
Tributação Fiscal.....	3
Registo Predial.....	2
Cadastro Urbano.....	3
O Cadastro Multifuncional e o Desenvolvimento.....	5
Sistemas de Informação Geográfica.....	5
Aplicações Temáticas.....	4
O papel do sector privado.....	4
Profissões liberais.....	1
Formação Profissional.....	1

Salienta-se que houve autores estrangeiros que apresentaram Comunicações Técnicas apesar de não terem podido participar: são os casos do ITC (Holanda), Polónia, Noruega e do Prof. JLG Henssen da Holanda, Presidente do "Office International du Cadastre et du Régime Foncier".

Aqui lhes expressamos o nosso reconhecimento pelo seu valioso contributo.

**II - LISTA DE COMUNICAÇÕES TÉCNICAS DE AUTORES  
NACIONAIS E ESTRANGEIROS**

Nº	AUTOR	ORGANISMO	TÍTULO
1 01	Aguilar, Luís Fernando	Esteio - Brasil	"A participação de iniciativa privada no cadastro rural brasileiro"
1 02	Baer, Klaus	- R.F.A.	"La profesión liberal en el servicio catastral de la R.F. Alemania. Su contribución a la actualización del Catastro y al desarrollo territorial de zonas urbanas e industriales"
1 03	Barwinski, Klaus	Ländermessung Nordrhein Westfalen - R.F.A.	"Multipurpose cadastral systems in the F.R.G.- management and uses"
1 04			"International trends and tendencies Europe 1992"
1 05	Brand, Michael	Ordnance Survey of Northern Ireland - Irlanda	"From concept to reality"
1 06	Bregezer, Walter	Direction des Mensurations Cadastrales - Suíça	"La mensuration cadastrale de la Suisse"
1 07			"Reform of the Cadastral Survey in Switzerland"
1 08	Brioli, Roberto	Ufficio Tecnico Esziale - Itália	"Italian Cadastre"
1 09			"Digital Cadastral Map of Florence"
1 10	Camaco, Simeão	DINAGECA - Moçambique	"Os novos conceitos de Sistemas de Informação Geográfica (GIS/LIS) integrando informação topográfica, cadastral e temática"
1 11	Cass, Christopher	NEFCOPD - U.K., Portugal	"Past cadastral experience overseas"
1 12			"The role of the private sector in the execution and up-dating"
1 13	Coudert, Georges	Ordre des Géomètres-Experts - França	"Proposition pour un Plan numérique national"

№	AUTOR	ORGANISMO	TÍTULO
1 14	Renet, Jean-Marc	Direction Générale des Impôts - França	"Les différents aspects de la modernisation du Cadastre français"
1 15			"The French Cadastral System"
1 16	Remendas, Celso	D.G. Serv.Nac. Cart. e Cad. - Cabo Verde	"Criação e operacionalização de um Serviço Nacional de Cartografia e Cadastro"
1 18	Hansen, J.L.G.	International Office of Cadastre and Land Records - Holanda	"The Dutch Cadastre and Land Registration as an example of a multipurpose System"
1 19			"New legislation in the field of Cadastre and Land Registration in the Netherlands"
1 21	Højkeiser, Helge	KORT OG Matr.kælstyrelsen - Dinamarca	"Integrated information from administra- tive registers with digital maps for multipurpose use"
1 23	Lindskog, Toosten	Lantmäteriet (Land National Survey) - Suécia	"A summary of the present status of the Cadastral Activities in Sweden"
1 24			"New concepts on LIS in Sweden"
1 25	Mayoral, Sebastian Mes	Centro de Gestión Catastral y Cooperación Tributaria	"El Sistema de Información Territorial Catastral."
1 26	Reraña, Jordi Guimet	"	"El modelo de Informatización del Catastro Español."
1 27	Reraña, Miguel Martín	" - Espanha	"Sistema de Información Geográfica Catastral. Las bases de datos cartográficas catastrales"
1 28	Mørch-Lassen, Gregers	Danish Inland Revenue Direct. - Dinamarca	"Fiscal cadastre"
1 29	Osensen, Olaf	Norwegian Statens Kartverk - Noruega	"Towards a strategy for a National Geographic Information System"
1 30	Sheath, Nigel	ICL Limited - U.K.	"Land Information Management System - implementation issues"
1 31	Syrett, Reith	RLM/PERCORRID, SIS - HOLANDA, U.S.A.	"Private sector-management of large cadastral projects"
1 32	Vahala, Matti	F.I.G. - Finlândia	"Real Estate Information in the joint use of Geo-information. The finish approach"
1 34	Trollegård, Svend	Boligministeriet Departamentet - Dinamarca	"The GIS - Approach to Urban Management and L.I.S."

Nº	AUICR	ORGANISMO	TÍTULO
1 35	Haberlin, Michael	Society of Chartered Surveyors in the Republic of Ireland - Irlanda	"Cadastral Survey in Ireland"
1 36	Onia, Giancarlo	Soeci - Itália	"Lis and Gis - Working technologies and methodologies in Italian Cadastre"
1 37	Hopfer, Andrzej	University of Agriculture and Technology of Olszlyn - Polónia	"Polish Cadastre and its expected developments"
1 38	Haberlin, Michael	Society of Chartered Surveyors in the Republic of Ireland	"GIS development on Ireland"
1 39	Kure, J. Aner, F.	Intern. Inst. Aerospace Survey and Earth Sciences - Holanda	"TIC experience with Lis/Cadastre courses"
2 01	Beira, Inês Campos, Vítor Ferreira, Ana Campelo, Eduardo	C.M. Almada	"SIGMA - Sistema de Informação Geográ- fica do Município de Almada"
2 02	Amaral, J.S. Maria	Act. Privada	"Avaliação cadastral - custos - opções"
2 03	Adelino, A. Paula T.N. Lopes, Luís F. F.	Geometral	"Um sistema de informação geográfica aplicada à estruturação fundiária"
2 04	Castro, António S. e	Geometral	"A contribuição actual da Indústria Carto- gráfica Portuguesa nos âmbitos técnico e da capacidade de produção para a realização e renovação dos Cadastros Rústico e Urbano nacionais"
2 05	Gelho, Raúl L. M.	D. G. Reg. Notariado	"O cadastro e o registo predial: aspectos técnicos e jurídicos"
2 06	Cucelo, Fernando A. Carvalho, José L.	Portugal	"O cadastro e a cartografia na gestão da informação florestal"
2 07	Duarte, Elviro D.	I.G.C.	"The why's, what for's and how's of SICRUM"
2 08	Falção, Mário M. e S.	"	"A problemática do cadastro geométrico da propriedade rústica em Portugal: sua evolução, perspectivas e opções inadiáveis"
2 09	Gonçalves, Carlos M.T.F.	"	"Sistema de gestão das informações cadastrais"
2 10	Gonçalves, José A.G.M.	Cons. Reg. Pred. Esporade	"O cadastro e o registo predial: sua concordância"
2 11	Marcelino, António M.C. Veigas, Dina A. D.	I.G.C. "	"A situação do cadastro rústico em Portugal"

Nº	AUIOR	ORGANISMO	TÍTULO
2 12	Marcelino, António M.C. Veigas, Dina A. D.	I.G.C "	"O cadastro da propriedade rústica em Portugal organismos - relações institucionais"
2 14	Melo, Carlos F.	"	"Conservação de cadastro - Problemas e perspectivas"
2 15	Mendes, Alfredo S.	"	"Cadastro e tributação fiscal"
2 16	Pires, Jorge M. F.	"	"O cadastro, a tributação fiscal e o Instituto Geográfico e Cadastral"
2 18	Tavares, Rui	Fac. Arg. Porto	"A vertente histórica do cadastro urbano"
2 20	Ferreira, José A.	Instituto de Informática	"O embrião de um Cadastro Fiscal - uma experiência"
2 21	Silva, M. Lurdes V. da	Hidroprojecto	"Sistema de Informação Urbana em referência especial"
2 22	Carbo, António J. Sares, J. Branco	C.C.R.C.	"Um projecto piloto de Cadastro Urbano"
2 23	Glória, Fernando S.	I.G.C.	"Novos rumos para o Cadastro da Propriedade Rústica e Urbana"
2 24	Teixeira, Margarida Santos, Carlos M.	D.G.H.E.A. "	"O Cadastro como suporte do desenvolvimento da Agricultura"
2 25	Horta, Renato	D.G. Desen. Reg.	"Considerações sobre a necessidade de informação para o planeamento em Portugal, relativamente às actuais exigências nacionais e comunitárias nesse domínio"
2 26	Campos, José J.	Com. Domínio Marítimo	"O Domínio Público Marítimo, sua interação com o Cadastro e o Planeamento"



### III - TEXTOS DAS COMUNICAÇÕES

Seguem-se os textos das Comunicações Técnicas apresentadas os quais, embora apresentem por vezes algumas deficiências de impressão, se pensa que virão a constituir uma valiosa fonte de informação para os estudiosos e técnicos envolvidos na Temática Cadastral.







**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
**MULTIFUNCIONAL**

— SICRUM —

A PARTICIPAÇÃO DA INICIATIVA PRIVADA  
NO CADASTRO RURAL BRASILEIRO

LUÍS FERNANDO AGUIAR

BRASIL

LISBOA - PINHAL-20 a 25 Novembro de 1989

## A PARTICIPAÇÃO DA INICIATIVA PRIVADA NO CADASTRO RURAL BRASILEIRO

### SUMÁRIO

A matéria diz respeito a um programa plurianual em desenvolvimento no Brasil, conduzido pela SUDENE-Superintendência de Desenvolvimento do Nordeste (vinculada ao Ministério do Interior). Este programa, chamado Projeto Nordeste, dentre os seus diversos segmentos, possui, precedentemente, o segmento fundiário. Para colaborar no Projeto Nordeste, segmento fundiário, o Instituto Nacional de Colonização e Reforma Agrária (INCRA) contratou empresas privadas, que ficaram responsáveis pela execução da base cartográfica, levantamento cadastral, e preparo das peças técnicas necessárias à regularização de cada lote rural.

O Projeto Nordeste tem em seu programa o atendimento a uma extensão de 580.000 km<sup>2</sup> abrangendo cerca de 750.000 ocupações rurais.

Na elaboração dos serviços, as empresas privadas vem produzindo ortofotocartas, restituições aerofotogramétricas, cadastro em campo, com aplicação de laudos identificando imóvel e ocupante, reambulação, e os serviços de gabinete compreendendo cálculo da área, memorial descritivo, planta individual, planta de gleba, planta de uso do solo e documento definitivo do imóvel.

### SUMMARY

The subject refers to a program conducted by "SUDENE" (northeast developing agent). This program, called "Projeto Nordeste" (Northeast Project) among many topics, has the priority to a land tenure project.

Contributing with the Projeto Nordeste, the "INCRA" (National Land Tenure Institute) contracted private companies that became responsible by the construction of the cartographic base, the land owner cadaster, and the final documents of each parcel.

All the "Projeto Nordeste" goes up to 580.000 km<sup>2</sup>, holding about 750.000 rural parcels.

Private companies are producing ortophotomaps, stereoplotting, field cadaster, and office works including the area and descriptive memorial, individual and general plants.

**A PARTICIPAÇÃO DA INICIATIVA PRIVADA NO  
CADASTRO RURAL BRASILEIRO**

- I) O CONTRATANTE
  
- II) O PROGRAMA
  - II.1) O Projeto Nordeste
  - II.2) As Áreas Seleccionadas
  - II.3) As Atuações do Contratante e Contratado.
  
- III) OPERAÇÃO CADASTRAL
  - III.1) Base Cartográfica
    - III.1.a) Opção por Aerofotogrametria
    - III.1.b) Seleção das Escalas
    - III.1.c) Seleção do Tipo da Base
    - III.1.d) Processo de Construção
  - III.2) Levantamento Cadastral
    - III.2.a) Objetivos do Levantamento
    - III.2.b) Reconhecimento dos Limites das Ocupações
    - III.2.c) Identificação do Ocupante
  - III.3) Produção da Documentação
    - III.3.a) Medição
    - III.3.b) Produção dos Documentos
  
- IV) UMA APRECIACÃO SOBRE A CONTRIBUIÇÃO DAS EMPRESAS
  
- V) ANEXOS

## A PARTICIPAÇÃO DA INICIATIVA PRIVADA NO CADASTRO RURAL BRASILEIRO

### I) O CONTRATANTE

O INCRA-Instituto Nacional de Colonização e Reforma Agrária é uma Autarquia vinculada ao Ministério da Agricultura e tem sob sua responsabilidade a execução do programa de reforma agrária do Brasil, o qual tem como atividades principais: a seleção das áreas a serem reformadas, a desapropriação dos imóveis rurais e o assentamento de agricultores sem-terra.

Como programas complementares, o INCRA implementa a regularização das ocupações existentes em terras federais, que vêm a ser uma faixa de 150 quilômetros de largura ao longo das fronteiras nacionais e promove a colonização das terras desocupadas, controlando, inclusive, a colonização efetuada por empresas particulares.

Por outro lado, o INCRA é responsável pelo Sistema Nacional de Cadastro Rural através do qual empreende as ações de cadastramento e tributação de todas as propriedades rurais do território brasileiro, bem como recolhe os dados e informações básicos necessários ao planejamento e definição de estratégias do programa de reforma agrária.

O INCRA tem sua sede em Brasília, mantém delegacias em todas as capitais estaduais, possui unidades executoras em cidades com influência regional ao longo da zona de fronteira e, através de convênios com as municipalidades, possui agentes credenciados em cada um dos cerca de 5.000 municípios brasileiros.

### II) O PROGRAMA

#### II.1) O Projeto Nordeste

No ano de 1985, o Governo Federal, através da SUDENE-Superintendência de Desenvolvimento do Nordeste, agência de fomento de desenvolvimento regional, vinculada ao Ministério do Interior, criou o PROGRAMA DE DESENVOLVIMENTO DA REGIÃO NORDESTE - PROJETO NORDESTE que objetiva promover o desenvolvimento econômico e social da Região Nordeste.

Constituído de um conjunto de programas capazes de promover a melhoria geral das condições de vida da população rural nordestina, fundamentalmente a erradicação da pobreza absoluta e ampliação dos serviços sociais básicos no meio rural, o PROJETO NORDESTE prevê, como estratégia inicial para o enfrentamento da questão, a implementação do PROGRAMA DE APOIO AO PEQUENO PRODUTOR RURAL - PAPP, que abrange ações nos segmentos fundiário, dos recursos hídricos, crédito rural, pesquisa agrícola, etc.

Definido desde logo como precedente aos demais, o segmento fundiário tem sua estratégia calcada em duas diretrizes básicas: na primeira, se busca conhecer a realidade da situação fundiária, mediante um elenco de ações sintetizadas no que se convencionou chamar Operação Cadastral e, na segunda, se busca corrigir as distorções identificadas através da execução de um conjunto de ações agrupadas em um Projeto de Reestruturação Fundiária que inclui operações de redistribuição de terras, reorganização fundiária e regularização fundiária.

O PROJETO NORDESTE/PAPP foi concebido para ser empreendido diretamente pelos governos dos dez estados nordestinos. Todavia, apesar de se desenvolver totalmente em terras sob jurisdição estadual já que nenhum estado é alcançado pela faixa de fronteira, algumas condições fizeram com que o segmento fundiário viesse a ser coordenado pelo INCRA. Entre essas relacionam-se a falta de experiência das administrações estaduais no trato da questão agrária (alguns estados sequer possuíam órgãos específicos para tal), o fato de algumas ações previstas serem privativas da União (a desapropriação, por exemplo) e a clara e natural interseção de ações, notadamente no campo cadastral, com aquelas desenvolvidas pelo INCRA.

Notável esforço de integração inter-institucional, o PROJETO NORDESTE/PAPP/SEGMENTO FUNDIÁRIO é considerado internamente, pelo INCRA como primeira parte do Projeto de Desenvolvimento do Sistema Fundiário Nacional - PDSFN, o qual deverá ser estendido a todo o país, proximamente, de forma a integrar todas as unidades da federação em um sistema homogêneo e articulado.

## II.2) As Áreas Seleccionadas

A Região Nordeste do Brasil compreende 9 estados, quais sejam: Maranhão, Piauí, Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Alagoas, Sergipe e Bahia. O PROJETO NORDESTE/PAPP, contudo, inclui a porção norte do estado de Minas Gerais, por esta apresentar características idênticas às daqueles estados.

Como área prioritária para atuação do programa, entretanto, foi escolhida a região semi-árida nordestina que abrange a quase totalidade da porção interior da Região Nordeste, que é uma das mais pobres do país, apresentando elevado grau de expulsão da população rural para os grandes centros urbanos, ainda que seja de ocupação bastante antiga (séculos XVI a XVIII).

Cabe ressaltar que a região semi-árida apresenta clima quente e seco, com reduzido índice pluviométrico e irregular regime de chuvas, causador de inclementes secas que assolam a região.

Obedecida a prioridade estabelecida para a região semi-árida e a partir de condicionantes propostos por todos os segmentos que constituem o PROJETO NORDESTE/PAPP, foram seleccionadas áreas para intervenção imediata, as quais se constituirão na primeira parte do programa, prevista para ser concluída em 5 anos.

Características como a concentração de minifúndios; a ocorrência de latifúndios, a fragilidade da documentação das propriedades e o absentismo foram alguns dos condicionantes propostos pelo SEGMENTO FUNDIÁRIO.

Foram seleccionadas 75 subáreas, distribuídas pelos 10 estados, que totalizam cerca de 580.000 km<sup>2</sup> de área e cerca de 750.000 propriedades rurais.

## II.3) As Atuações do Contratante e Contratado

Das duas vertentes básicas propugnadas pelo Segmento Fundiário, Operação Cadastral e Reestruturação Fundiária, coube à iniciativa privada participar da primeira, onde têm contribuído ativamente para consecução dos objetivos propostos.

A Operação Cadastral foi planejada para ser executada em 4 etapas distintas, quais sejam: Construção da Base Cartográfica, Levantamento Cadastral, Esclarecimento da Situação Legal dos Imóveis e Produção da Documentação necessária à regularização da situação legal dos imóveis, das quais apenas na terceira (Esclarecimento da Situação Legal dos Imóveis), por ser de exclusiva competência dos órgãos fundiários estaduais, não há qualquer participação das empresas privadas.

### III) OPERAÇÃO CADASTRAL

#### III.1) Base Cartográfica

##### III.1.a) Opção por Aerofotogrametria

As dimensões continentais do país (8.500.000 km<sup>2</sup>), e, principalmente, o fato desta primeira etapa do Projeto Nordeste abranger 580.000 km<sup>2</sup> em diversas áreas não contínuas, conduziu naturalmente a que se estudasse a opção aerofotogramétrica.

As condições climáticas regionais, com estações do ano razoavelmente definidas, permitiram a indicação de épocas propícias à execução do voo, sendo possível avaliar o grau de dificuldade da missão, como satisfatório. Por outro lado, a rede geodésica básica, implantada e mantida pelo Instituto Brasileiro de Geografia e Estatística, faz-se presente na região nordeste Brasileira.

Adicionalmente, o parque privado das empresas de aerolevanteamento brasileiras, é pujante e atualizado. Hoje, somente as empresas filiadas à Associação Nacional de Empresas de Aerolevanteamento, contam com 25 aeronaves totalmente equipadas, inclusive com sistemas automáticos de navegação, 36 câmaras aéreas, 107 estereorestituidores, sendo 7 analíticos e cerca de 50 assistidos por computador, 9 ortoprojetores analógicos, 6 ortoprojetores analíticos, 2 monocomparadores, além de equipamentos complementares à cartografia automatizada, como sistemas interativos gráficos, mesas digitalizadoras, plotters de grande e pequeno porte, e ainda todo o instrumental necessário ao apoio de campo e composto de 219 teodolitos, 172 níveis, 105 distanciômetros eletrônicos, 20 posicionadores de satélite, etc.



Chamadas a participar, essas empresas puderam oferecer um pronto atendimento às necessidades do Projeto, chegando, na fase mais intensa, a alocar 18 aeronaves simultaneamente, aos serviços.

### III.1.b) Seleção das Escalas

A densidade ocupacional foi o fator determinante para que se elessem as escalas 1:20.000, 1:10.000 e 1:5.000 para a produção das cartas a serem utilizadas como base. Regiões com predominância de grandes propriedades, seriam mapeadas em 1:20.000. Regiões com parcelamento intenso, com imóveis em grande parte inferiores a 5 hectares, mapeadas em 1:5.000. A maior parte das áreas de interesse, cerca de 90% do total, possuindo lotes médios na casa de 25 hectares, foi contemplada com base cartográfica em 1:10.000.

### III.1.c) Seleção do Tipo da Base

As primeiras etapas do projeto foram contempladas com restituição aerofotogramétrica em algumas áreas, e ortofotocartas em outras. Durante a evolução do Projeto, a experiência determinou aos contratantes a opção por ortofotocarta como a mais adequada. Nesta data, o INCRA promove licitação para a contratação de empresas com vistas a elaboração de 220.000 km<sup>2</sup> de ortofotocartas, em áreas já fotografadas.

### III.1.d) Processo de Construção

A produção da base cartográfica, até o momento vem sendo inteiramente executada por empresas privadas brasileiras.

- VÔO. Para o vôo fotogramétrico, utilizam-se aeronaves equipadas com câmaras automáticas, e instrumentos de navegação que vão desde os telescópios, até sistemas de navegação inercial, Doppler e VLF Ômega. A cobertura é realizada nas escalas de 1:60.000, 1:30.000 e 1:15.000. Consoante às necessidades de escala, alocam-se desde monomotores, até aviões a reação, modelo Lear-jet.

APOIO TERRESTRE. A partir da rede geodésica básica, na determinação do apoio fotogramétrico são aplicadas desde as técnicas de topografia tradicional, até a determinação de coordenadas com auxílio de ISS e GPS.

- AEROTRIANGULAÇÃO. O concurso de aerotrianguladores semi-analíticos e analíticos, assistidos por programas computacionais modernos e eficientes, garantem a precisão desejada à carta.

- PRODUÇÃO DAS CARTAS. As cartas são produzidas utilizando-se os processos de restituição convencional, empregando-se aparelhos de primeira ordem, ou de ordem menor, conforme a escala da carta. A opção por ortofotocarta foi prontamente atendida com a utilização de ortoprojetores analíticos.

### III.2) Levantamento Cadastral

#### III.2.a) Objetivos do Levantamento

O cadastramento técnico rural reflete um esforço do Projeto no sentido de deter o conhecimento da realidade produtiva e social, que lhe possibilite empreender ações de redistribuição das terras, reorganização fundiária e ainda, subsidiar as ações complementares de desenvolvimento econômico que se seguem, dentro dos propósitos governamentais.

O cadastramento em execução, abrange o universo do imóvel, excetuando-se suas condições naturais como solo e recursos hídricos, procurando, inclusive, a caracterização do cumprimento da função social da terra e do enquadramento da situação do ocupante nas condições fundamentais para benefício da política de regularização e destinação de terras públicas e das devolutas.

Entre outras, são levantadas informações que levam ao conhecimento das reais divisas e área de cada imóvel, seu uso atual, produção, produtividade, geração de renda e emprego, dados pessoais do(s) ocupante(s), existência de litígios, características da ocupação e domínio, pessoas residentes e força de trabalho, áreas com exploração em regime de arrendamento, parceria, meação ou outros sistemas de concessão de uso, de informações sobre os contratos vigentes e características tecnológicas da exploração agropecuária.

### III.2.b) Reconhecimento dos Limites das Ocupações

A partir das ortofotocartas (ou ampliações fotográficas), na escala 1:5.000 (do recobrimento em 1:15.000) 1:10.000 (do recobrimento 1:30.000) e 1:20.000 (do recobrimento em 1:60.000), realizam-se os trabalhos de identificação dos imóveis, conforme procedimentos a seguir detalhados.

De posse da ortofotocarta (ou ampliação fotográfica), o cadastrador percorre a divisa dos imóveis, acompanhado do ocupante ou seu preposto de confiança, plotando sobre aquela, as linhas identificadoras dos perímetros dos imóveis. À medida em que percorre as divisas, vão sendo implantados também marcos de concreto em seus pontos de deflexão. A codificação dos marcos vai sendo lançada também sobre a ortofotocarta, ocasião em que, através de símbolos próprios são registrados os pontos de deflexão que não se mostram fotoidentificáveis e sua mais provável localização.

As áreas de exploração agrícola, pastoril ou extrativa, são devidamente identificadas e codificadas, para posterior digitalização.

### III.2.c) Identificação do Ocupante

Encerradas as atividades de identificação de divisas e uso atual, procede-se então ao preenchimento do Laudo Fundiário, o qual é assinado pelo ocupante após ter todas as informações registradas que assim manifestam sua concordância com a identificação realizada das suas divisas. O ocupante também recebe neste ato, as instruções sobre como deve proceder para se apresentar junto à Comissão do órgão de terras estadual incumbida do esclarecimento da situação legal dos imóveis.

Todas as atividades de campo, e também as posteriores passam por processos de controle de qualidade, onde equipes especialmente treinadas da empresa e dos órgãos de terra através de amostragem significativa, verificam a correção das informações recolhidas e registradas.

### III.3) Produção da Documentação

#### III.3.a) Medição

Realiza-se então, através das ortofotocartas (ou minutas de restituição ou ainda diretamente sobre os modelos em equipamentos restituidores) a digitalização dos pontos de deflexão que são fotoidentificáveis. Aqueles que, não são fotoidentificáveis tem coordenadas obtidas por levantamento topográfico.

No caso de ocorrerem pontos não fotoidentificáveis em grande número, podem as empresas optar pela realização de nova cobertura aerofotogramétrica, com pré-sinalização dos pontos de deflexão não visíveis nas fotografias.

Para o novo recobrimento, efetuado na escala 1:15.000, são também pré-sinalizados todos os pontos de apoio básico e suplementar.

Concluída então a sinalização de determinada gleba ou bloco, efetua-se o recobrimento aerofotogramétrico, com especificações similares ao recobrimento original.

Realiza-se então nova aerotriangulação, e a leitura de coordenadas dos pontos sinalizados é efetuada em aparelhos restituidores. Para tal, o operador tem em mãos a ampliação fotográfica ou a ortofotocarta utilizada em campo, através da qual localiza no diapositivo o ponto sinalizado e registra suas coordenadas, através de registradores de coordenadas, digitando o número do marco ou ponto identificado.

Os acidentes, como rios, estradas, divisores d'água, etc., também são digitalizados.

Através de formulários e códigos próprios, é elaborada e digitada a montagem individual do imóvel, estabelecida pela sequência do número dos marcos e pontos de deflexão que forma o perímetro do lote, indicando-se também os confrontantes e eventuais transposições ou alinhamentos da linha divisória com rios, estradas, divisas municipais, estaduais, etc.

### III.3.b) Produção dos Documentos

Criam-se assim, três arquivos básicos, os quais geram as plantas individuais, plantas de gleba e os memoriais descritivos:

- arquivo de pontos (marcos), cuja entrada de dados provém da digitalização dos pontos em mesa digitalizadora, da digitação das coordenadas obtidas em aparelhos restituidores e das coordenadas obtidas pelo levantamento topográfico, sendo o endereço o número do ponto;
- arquivo dos acidentes, gerado pela digitalização dos acidentes e cujo endereço é o número dos pontos que definem o contorno dos acidentes;
- arquivo da montagem dos imóveis, oriundo da digitação da sequência de montagem do perímetro do lote sendo o endereço o código definitivo do imóvel.

Paralelamente outro arquivo é criado, o arquivo do Laudo Fundiário, através de digitação dos laudos, onde o endereço também é o código definitivo do imóvel.

A partir dos arquivos formados e através de programas especiais obtém-se então, automaticamente, com o uso de computadores e "plotters", a documentação técnica individual a cada imóvel: planta individual, memorial descritivo e o Título Definitivo, além da planta de gleba e os relatórios compatibilizados com toda estatística das áreas trabalhadas.

Além da documentação técnica são entregues aos contratantes, fitas magnéticas contendo os arquivos gerados, possibilitando àqueles a utilização, manuseio e manutenção das informações geradas.

### IV) UMA APRECIACÃO SOBRE A CONTRIBUIÇÃO DAS EMPRESAS

Diferentemente da maioria das experiências em projetos cadastrais desta natureza, onde a participação da iniciativa privada é pouco expressiva, a presença das empresas Brasileiras no Projeto, tem contribuído decisivamente para o sucesso do mesmo.

A magnitude do Projeto, as limitações quanto a prazo de execução e capacidade de investimentos, constituíram-se em fatores determinantes da opção adotada.

Merece ser ressaltada a visão da Administração Pública Brasileira, na decisão de requisitar os serviços das empresas privadas para o seu Projeto. De imediato, o Projeto Nordeste dispôs de um amplo parque de produção cartográfica, tecnologicamente atualizado, e com pronta mobilização, sem investimento adicional em aquisição de equipamentos, contratação e treinamento de pessoal.

A resposta das empresas privadas ao chamamento do Projeto Nordeste, pode ser considerada altamente satisfatória, e determinante para a continuidade do processo.

Curitiba, 09 de novembro de 1989

ENGº LUIZ FERNANDO P. DE AGUIAR

ENGº ROSSINI BARBOSA LIMA

V) ANEXOS

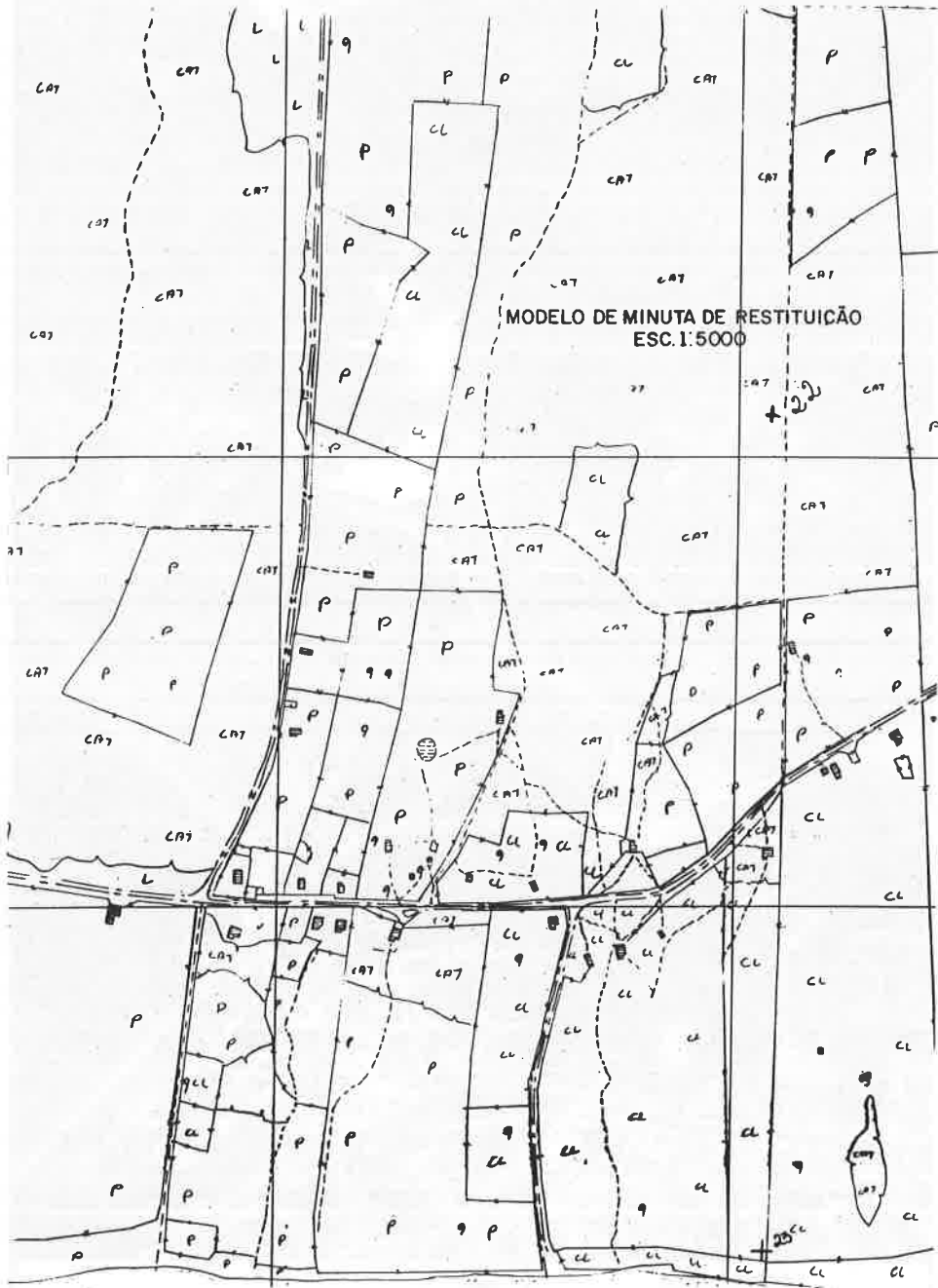
1. O Brasil e suas Regiões
2. Áreas de Mapeamento na Região Nordeste
3. Minuta de Restituição
4. Ortofoto
5. Laudo Fundiário
  - 5.1- Página 1
  - 5.2- Página 2
  - 5.3- Página 3
  - 5.4- Página 4
6. Memorial Descritivo
7. Planta Individual
8. Título de Propriedade
9. Planta Geral

## BRASIL E SUAS REGIÕES











**ORTOFOTO**  
**FASE IDENTIFICAÇÃO DA**  
**MALHA FUNDIÁRIA**



**ESTEIO ENGENHARIA E AEROLEVANTAMENTOS S.A.**



INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA - IBGE

# LAUDO FUNDIÁRIO - LF

DECLARAÇÃO PARA CADASTRO DE IMÓVEL RURAL E DOCUMENTO PARA HABILITAÇÃO DE DETENTOR

32 CONTROLE		03 TOTAL DE ANEXOS		04 TOTAL DE ÁREAS		05 CÍDULO FUNDAL	
33 PREENCHIMENTO		06 COMPLETO		07 SETOR CADASTRAL		08 CÓDIGO DEFINITIVO	
01 PROJETO FUNDIÁRIO		02 NOME		03 CÓDIGO		04 SETOR CADASTRAL	
05 NOME		06 CÓDIGO		07 SETOR CADASTRAL		08 CÓDIGO DEFINITIVO	
09 NOME		10 CÓDIGO		11 SETOR CADASTRAL		12 CÓDIGO DEFINITIVO	
13 NOME DO MUNICÍPIO		14 NOME DO MUNICÍPIO		15 NOME DO MUNICÍPIO		16 NOME DO MUNICÍPIO	
17 NOME DO MUNICÍPIO		18 NOME DO MUNICÍPIO		19 NOME DO MUNICÍPIO		20 NOME DO MUNICÍPIO	
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29 NOME DO MUNICÍPIO		30 NOME DO MUNICÍPIO		31 NOME DO MUNICÍPIO		32 NOME DO MUNICÍPIO	
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89 NOME DO MUNICÍPIO		90 NOME DO MUNICÍPIO		91 NOME DO MUNICÍPIO		92 NOME DO MUNICÍPIO	
93 NOME DO MUNICÍPIO		94 NOME DO MUNICÍPIO		95 NOME DO MUNICÍPIO		96 NOME DO MUNICÍPIO	
97 NOME DO MUNICÍPIO		98 NOME DO MUNICÍPIO		99 NOME DO MUNICÍPIO		100 NOME DO MUNICÍPIO	

FAZENDA BOA ESPERANÇA  
 ATIVIDADES NÃO AGRÍCOLAS DESENVOLVIDAS NO IMÓVEL  
 O IMÓVEL É ESPECIAL TIPO DE IMÓVEL ESPECIAL

01. PRINCIPAL ATIVIDADE NÃO AGRÍCOLA  
 02. ÁREA DAS ATIVIDADES NÃO AGRÍCOLAS  
 03. EXISTE PONTE DE ADELA PERENET  
 04. NÃO PERENET  
 05. DISTÂNCIA DO IMÓVEL AO CENTRO DE COMERCIALIZAÇÃO  
 26 Km

DADOS RELATIVOS À OCUPAÇÃO  
 06. O IMÓVEL ESTÁ Cedido EM USO PRÓPRIO  
 07. OCUPAÇÃO ESPECIAL  
 08. TIPO DE OCUPAÇÃO ESPECIAL  
 09. NÚMERO DE ARRENDATÁRIOS  
 10. NÚMERO DE FÂNCIOS  
 11. NÚMERO DE COMODATÁRIOS  
 12. NÚMERO DE RESERVAÇÕES DE FISSAÇÃO DE TERRENO  
 13. NÚMERO MÁXIMO DE FISSAÇÃO DE TERRENO  
 14. NÚMERO DE FISSAÇÕES DE TERRENO  
 15. NÚMERO DE FISSAÇÕES DE TERRENO  
 16. NÚMERO DE FISSAÇÕES DE TERRENO  
 17. NÚMERO DE FISSAÇÕES DE TERRENO  
 18. NÚMERO DE FISSAÇÕES DE TERRENO  
 19. NÚMERO DE FISSAÇÕES DE TERRENO  
 20. NÚMERO DE FISSAÇÕES DE TERRENO  
 21. NÚMERO DE FISSAÇÕES DE TERRENO  
 22. NÚMERO DE FISSAÇÕES DE TERRENO  
 23. NÚMERO DE FISSAÇÕES DE TERRENO  
 24. NÚMERO DE FISSAÇÕES DE TERRENO  
 25. NÚMERO DE FISSAÇÕES DE TERRENO

EXPLORAÇÃO PECUÁRIA		CULTURAS EM FORMAÇÃO						
TIPO	N. CABEÇAS	NOME DO PRODUTO	CODIGO DO PRODUTO	COD. PRODUTO CONSORCIADO	ÁREA PLANTADA (ha)	ÁREA COLHIDA (ha)	QUANTIDADE COLHIDA	UNIDADE
BOVINOS	04	FELJÃO	34	35	4.0	2.0	1.300	KG
ALMOZOS	-		38	39				
OVINOS	-		42	43				
AVES	-		46	47				
ANONOS	02		50	51				
OVOS	04		54	55				
LEIROS	-		58	59				
OUTROS	20		62	63				

CULTURAS EM PRODUÇÃO		CODIGO DO PRODUTO		ÁREA PLANTADA (ha)		ÁREA COLHIDA (ha)		QUANTIDADE COLHIDA		UNIDADE	
NOME DO PRODUTO	01	02	03	04	05	06	07	08	09	10	11
MANDIOCA	16.20			8.0	2.0	1.300					KG
	07	08	09	10	11	12	13	14	15	16	17
	13	14	15	16	17	18	19	20	21	22	23
	19	20	21	22	23	24	25	26	27	28	29
	25	26	27	28	29	30	31	32	33	34	35
	31	32	33	34	35	36	37	38	39	40	41
	37	38	39	40	41	42	43	44	45	46	47
	43	44	45	46	47	48	49	50	51	52	53

DISTRIBUIÇÃO DAS ÁREAS DO IMÓVEL (ha)		12 VALOR DO IMÓVEL MILHARES DE R\$	
ÁREAS EXPLORADAS	1.0	VALOR TOTAL DO IMÓVEL	20.000,00
CULTURAS PERMANENTES		VALOR TOTAL DAS BENEFITARIAS	4.000,00
REFLORESTADA COM ESPÉCIES NATIVAS		VALOR DAS ÁRVORES E FLORESTAS NATIVAS	1.000,00
CULTURAS TEMPORÁRIAS	12.0	VALOR DA TERRA BOM	15.000,00
AGRICULTURA		VALOR DOS ANIMAIS	3.000,00
PASTAGENS NATURAS	2.0	VALOR DOS EQUIPAMENTOS	1.000,00
PASTAGENS ARTIFICIAIS	5.0	13 CREDITO RURAL E INCENTIVOS FISCAIS	
PASTOREIO SEM OVINHO		69. OBTIVE CREDITO RURAL ALGUMA VEZ?	70. OBTIVE CREDITO RURAL ESTE ANO?
PRIVATOS GRANDEZOS		sim <input checked="" type="checkbox"/> não <input type="checkbox"/>	sim <input checked="" type="checkbox"/> não <input type="checkbox"/>
ETAÇÃO DE OVINHO E-POSTERIOR		71. OBTIVE CREDITO RURAL ALGUMA VEZ?	72. OBTIVE CREDITO RURAL ESTE ANO?
PREPARAÇÃO PERMANENTE		sim <input checked="" type="checkbox"/> não <input type="checkbox"/>	sim <input checked="" type="checkbox"/> não <input type="checkbox"/>
PR. SERV. LEGAL		73. INCENTIVO FISCAL LÍQUID. DE MANUTENÇÃO	
IMPROVEITAVEL		sim <input checked="" type="checkbox"/> não <input type="checkbox"/>	sim <input checked="" type="checkbox"/> não <input type="checkbox"/>
IMPROVEITAVEL MAS NÃO UTILIZADA			
ÁREA TOTAL (SOMA DOS ITENS 49-50-56-61)	20.0		

01 ÁREA SOB POSSE  
02 INÍCIO DA POSSE  
03 ANO DE TITULAR EM TERMO PARTICIPANT  
04 EXISTE LITÍGIO  
05 OBRIGADO DO LITÍGIO  
06 TOTAL DE TÍTULOS QUE COMPOEM O IMÓVEL  
07 TOTAL DE TÍTULOS REGISTRADOS  
08 SOMA DAS ÁREAS REGISTRADAS QUE COMPOEM O IMÓVEL

DISCRIMINAÇÃO DOS DOCUMENTOS DE TITULAÇÃO REGISTRADOS											
CÓDIGO DO MUNICÍPIO SEDE DA COMARCA		OFÍCIO	MATRÍCULA/ TRANSCRIÇÃO	REGISTRO	LIVRO	FOLHA/FICHA	DATA	ÁREA (m²)			
09 2.2.9.4.4.b		10 10	11 342	12 1	13 2-B	14 44	15 10/10/81	16 20,0			
17		18		20	21	22	23	24			
25		26		28	29	30	31	32			
33		34		36	37	38	39	40			
41		42		44	45	46	47	48			
49		50		52	53	54	55	56			
57		58		60	61	62	63	64			
65		66		68	69	70	71	72			

15 CONFRONTAÇÕES DO IMÓVEL

1.ª LINHA  
2.ª LINHA  
3.ª LINHA  
4.ª LINHA  
5.ª LINHA

\* AO FIM DE CADA LINHA OBSERVE AS REGRAS DE SEPARAÇÃO DE PALAVRAS

16 DADOS DA MEDIÇÃO

83 RESPONSÁVEL PELA MEDIÇÃO E DEMARCAÇÃO  
84 IDENTIFICAÇÃO DO CREA  
85 N.º DE REGISTRO  
86 UF ou REGIÃO

MEMORIAL DESCRITIVO  
86 NÚMERO  
87 DATA  
88 DEMARCAÇÃO CONTRATADA POR  
89 ÁREA MEDIDA DO IMÓVEL

17 OBSERVAÇÕES


8 VALORES DA PRODUÇÃO E COMERCIALIZAÇÃO

NOME DO PRODUTO	CODIGO DO PRODUTO	VALOR DA PRODUÇÃO TOTAL (MILHARES DE CR\$)	VALOR DA PROD. VENDIDA (MILHARES DE CR\$)
	01	02	03
	04	05	06
	07	08	09
	10	11	12
	13	14	15
	16	17	18
	19	20	21
	22	23	24
	25	26	27
	28	29	30
TOTAL	31		32

19 BOVINOS N.º CABECAS

REPRODUTORES	33
VALAS EM LACTAÇÃO	34
CARIÓTIPO, BORNHART	35
VALAS COTIDIANAS	36
RECORRER	37
TOTAL	37

20 DESPESAS DE CUSTEIO VALOR (MILHARES DE CR\$)

NATUREZA	VALOR
SALÁRIOS FIXOS E EMPREGADOS PERMANENTES	38
SALÁRIOS FIXOS TEMPORÁRIOS E SALÁRIOS EFETIVOS	39
DESPESAS COM MANUTENÇÃO DE IMOVEIS	40
DESPESAS COM MANUTENÇÃO DE EQUIPAMENTOS	41
OUTRAS DESPESAS DE CUSTEIO	42
TOTAL	42

21 EQUIPAMENTOS, MÁQUINAS E IMPLEMENTOS

TIPO	CODIGO DO EQUIPAMENTO	ESTADO DE CONSERVAÇÃO	QUANTIDADE	VALOR (MILHARES DE CR\$)
	43	44	45	46
	47	48	49	50
	51	52	53	54
	55	56	57	58
	59	60	61	62
	63	64	65	66
	67	68	69	70
	71	72	73	74
	75	76	77	78
	79	80	81	82
TOTAL				83

22 TERRAS

POTENCIALIDADE AFARENTE DO SOLO	ÁREA (ha)
A	84
B	85
C	86
D	87
E	88

89 DISTÂNCIA DO MOVEL A VIA DE ACESSO

3 BENFEITORIAS

TIPO	CODIGO DA BENFEITORIA	ESTADO DE CONSERVAÇÃO	EXTENSÃO em ÁREA em CAPACIDADE	UNIDADE	VALOR (MILHARES DE CR\$)
	01	02	03	04	05
	06	07	08	09	10
	11	12	13	14	15
	16	17	18	19	20
	21	22	23	24	25
	26	27	28	29	30
	31	32	33	34	35
	36	37	38	39	40
	41	42	43	44	45
	46	47	48	49	50
TOTAL					51

24 N.º TRABALHADORES EVENTUAIS

JURADO	52
FELETRADO	53
MANOE	54
ARMA	55
MAR	56
JORN	57
DETA	58
AGRO	59
DE MANOE	60
OUTRO	61
DE MANOE	62
DE MANOE	63

5 INFORMAÇÕES SOBRE NÍVEL TÉCNICO

4 USA IMPLEMENTOS A TRACÇÃO ANIMAL 5 USA IMPLEMENTOS A TRACÇÃO MOTORA 6 USA ENERGIA ELÉTRICA

7 RECEBE ASSISTÊNCIA TÉCNICA 8 FAZ CONSERVAÇÃO DE SOLOS 9 USA IRIGAÇÃO

10 USA SEGUROS DAS UNIDADES SELECIONADAS 11 USA NÁVEOS BALANÇADOS 12 FAZ CRUZAMENTO DE RAÇAS SELECIONADAS

13 REQUERIMENTO 14 MENÇÃO PARA ÁREAS REFLORESTADAS COM ESPÉCIES NATIVAS 15 MENÇÃO PARA ÁREAS DE PRESERVAÇÃO PERMANENTES

O ABAIXO ASSINADO, AFIRMANDO SEREM VERDADEIRAS AS PRESENTES INFORMAÇÕES, REQUER AO PRESIDENTE DA COMISSÃO ESPECIAL DE DISCRIMINAÇÃO DE TERRAS DEVOLUTAS DO ESTADO

AO PRESIDENTE DO INSTITUTO NACIONAL DE COLONIZAÇÃO E REFORMA AGRÁRIA

16 DATA 17 ASSINATURA DO DETENTOR DO MOVEL 18 ASSINATURA DO DETENTOR DO MOVEL

19 N.º DO VISITADOR 20 ASSINATURA DO VISITADOR - 1.ª TESTEMUNHA 21 ASSINATURA DO VISITADOR - 2.ª TESTEMUNHA

22 REVISOR DT DATA 23 ASSINATURA 24 PROJETO FUNDIÁRIO DATA 25 ASSINATURA

CONVENIO INCRA/ESTADO DE ALAGOAS/SUDENE  
CONTRATO GOVERNO FEDERAL/BIRD  
SECRETARIA DA AGRICULTURA DO ESTADO DE ALAGOAS  
INSTITUTO DE TERRAS DE ALAGOAS / ITERAL  
PROJETO FUNDIARIO DA REGIAO DE SANTANA DO IPANEMA


**MEMORIAL DESCRITIVO**

Lote(No):50/0208-1      Area(ha):      0.4124      Perimetro(m):      316.00  
Gleba:50/MARAVILHA      Municipio:MARAVILHA

**DESCRICAÇÃO DO PERIMETRO**

Partindo-se do marco 01768/50, com latitude 09 g 16 m 29 s sul e longitude 37 g 23 m 21 s oeste, com azimute 022 g 19 m 55 s e distancia de 30.29m, confrontando-se com o lote 50/0200-6, chega-se ao ponto P-01769/50. Deste, com azimute 109 g 13 m 50 s e distancia de 126.96m, confrontando-se com o lote 50/0207-3, chega-se ao ponto P-01799/50. Deste, com azimute 209 g 11 m 59 s e distancia de 36.31m, confrontando-se com o lote 50/0179-4, chega-se ao ponto P-01798/50. Deste, com azimute 291 g 48 m 52 s e distancia de 122.44m, confrontando-se com o lote 50/0181-6, chega-se ao marco 01768/50, ponto inicial da descrição deste perimetro.

Responsavel Técnico  
Wellington Cavalcanti de Rocha  
Engenheiro Civil  
CREA 1474-D/7 Região



MEMORIAL DESCRITIVO ELABORADO  
POR COMPUTADOR

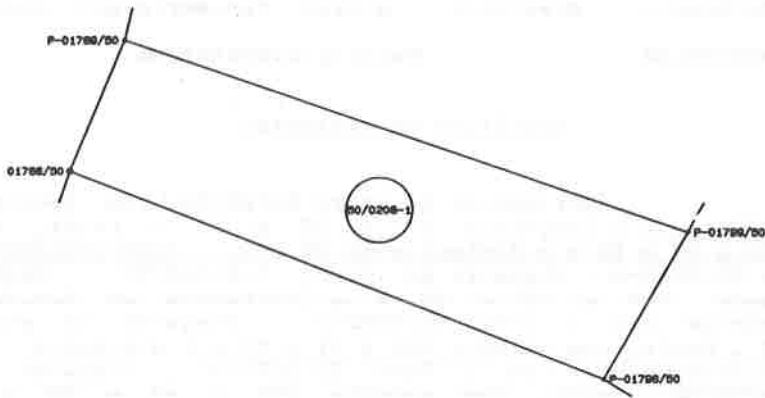
Data:15/04/1986

Confere:

Visto:



PLANTA INDIVIDUAL  
ESC. 1:1000



MARKOS	DIST 84	AZIMUTE	MARKOS	DIST 84	AZIMUTE	CONF
P-01788/80-P-01789/80	30.28	022°18'55" 80/8200-0	P-01789/80-P-01790/80	39.21	209°11'08" 80/8179-4	
P-01789/80-P-01786/80	138.08	128°13'59" 80/8207-3	P-01790/80-P-01786/80	122.44	281°48'52" 80/8181-0	

COORDENADAS DO MARCO 01788/80 = 80°16'28" SUL E 37°23'21" OESTE

AREA 848: 0.4284      AREA SE 84888 (84): . . .      AREA TERREMESENTE 848: 0.4284

**CONVENIO INCRA/ESTADO DE ALAGOAS / SUDENE**  
~~CONTRATO GOVERNO FEDERAL 0180~~  
 INSTITUTO DE TERRAS DE ALAGOAS - ITERAL  
 SECRETARIA DA AGRICULTURA DO ESTADO DE ALAGOAS  
 PROJETO FUNDIARIO DA REGIAO DE SANTANA DO IPAHEMA

LOTE: 80/0208-1	GLEBA: MARAVILHA	AREA (84): 0.4284
MUNICIPIO: MARAVILHA		PERIMETRO (84): 348.00
EMPRESA EXECUTORA: ESTEIO S.A.		ESCALA DA PLANTA: 1/ 1000
DATA ELABORACAO DO DESENHO: MAR/1988		FORTE PLANTA GERAL-FOLHA N.º 0-70 ESCALA: 1:2000

PROF. TECNICO - CPF: 472.907.71 REGISTRO

8



ESTADO DA PARAÍBA

TÍTULO DE POSSE ELABORADO  
POR COMPUTADOR

## 01 - CARACTERÍSTICAS DO TÍTULO

ESPECIE

## TÍTULO DE RECONHECIMENTO DE DOMÍNIO POR USUCAPIÃO ESPECIAL

Nº DO TÍTULO	DATA	LOCAL DE EMISSÃO	UF	PROCESSO ADMINISTRATIVO
160838	02/05/86	AGUA BRANCA	PB	1245/84
CARGO GESTOR				Nº DO MICROFILME
PF SUDESTE PARAIBANO / FUNDAP				000818/85

## 02 - OUTORGANTE

ESTADO DA PARAÍBA

## 03 - OUTORGADO

JOSE BATISTA GOMES

PROFISSÃO/ATIVIDADE PRINCIPAL	ESTADO CIVIL	Nº DO DOC. DE IDENTIFICAÇÃO	TIPO DO DOC. DE IDENTIFICAÇÃO	UF
AGRICULTOR	CASADO	10779	TIT.ELEITOR	PB
NACIONALIDADE / PAIS DE ORIGEM		DATA DE NASCIMENTO	CFF/CGC	Nº DE ICR
BRASIL FIRA		21/02/38		

## 04 - FUNDAMENTOS LEGAIS DA TITULAÇÃO

LEGISLAÇÃO ESTADUAL/FEDERAL

LEI EST. 4500/83 LEI FED. 4504/64 LEI FED. 6969/81

LEI FED. 4947/66 LEI FED. 6383/76 DEC. 87620/82

## 05 - CARACTERÍSTICAS DO IMÓVEL

DENOMINAÇÃO DO IMÓVEL

SÍTIO CARAPUCA

CÓDIGO DO IMÓVEL RURAL

212016012181-8

SITUAÇÃO DO IMÓVEL	MUNICÍPIO DA SEDE DO IMÓVEL	UF	ÁREA
ZONA RURAL	AGUA BRANCA	PB	2.8219

ÁREA POR ESTEND.

DOIS HECTARES, OITENTA E DOIS ARES E DEZENOVE CENTIARES

CONFRONTAÇÕES

LT 01507, LT 01550 E LT 01229

MEMORIAL DESCRITIVO, EM ANEXO, QUE INTEGRAR O PRESENTE TÍTULO E QUE DEVERÁ, IGUALMENTE, INTEGRAR O REGISTRO IMOBILIÁRIO CORRESPONDENTE

Nº DO MEMORIAL	DATA	RESPONSÁVEL PELA MEDIÇÃO / DEMARCAÇÃO	IDENTIFICAÇÃO NO CREA
16/01651	20/08/84	WELLINGTON CAVALCANTI DA ROCHA	1476-D 7A

REGISTROS IMOBILIÁRIOS:

PROPRIETÁRIO	SITIO / PRINC.	OFÍCIO	LIVRO	FOLHA	REGISTRO	COMARCA / MUNICÍPIO	UF
ESTADO	00771	7	02-M	0146	0001	PRINCESA ISABEL	PB

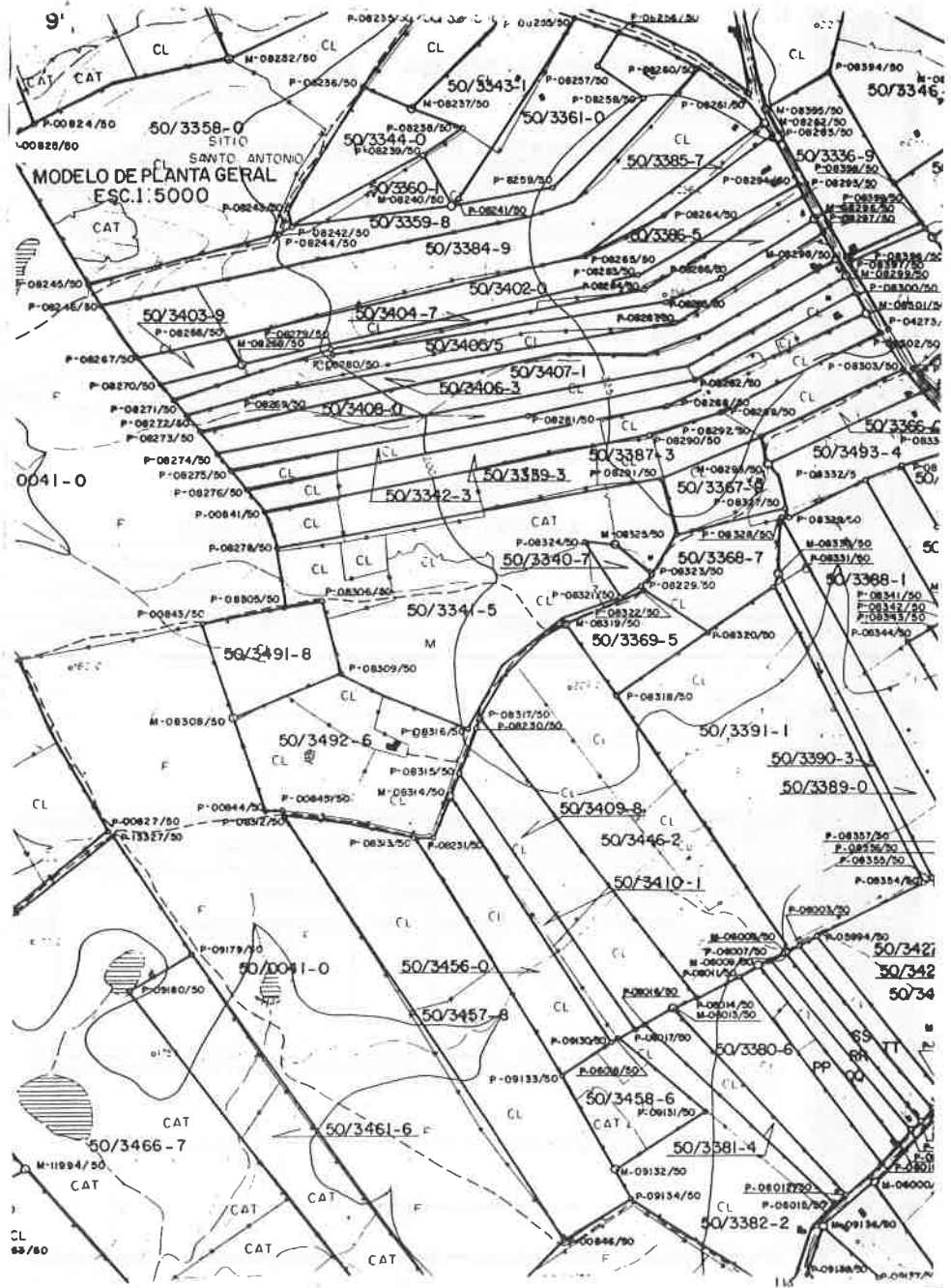
E para constar, foi expedido o presente Título que vai a seguir assinado pelo representante do Estado de Paraíba, pelo Outorgado e pelo representante do Instituto Nacional de Colonização e Reforma Agrária - INCRA.

ESTADO DA PARAÍBA

OUTORGADO

INCRA

A 2ª VIA DESTA TÍTULO, ACOMPANHADA DA PLANTA E MEMORIAL DESCRITIVO DA ÁREA, CONSTITUIRÁ FOLHA DE LIVRO FUNDIÁRIO DO ESTADO.





**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
**MULTIFUNCIONAL**

— SICRUM —

LA PROFESION LIBERAL EN EL SERVICIO CATASTRAL DE LA R.F.  
ALEMANIA. SU CONTRIBUCION A LA ACTUALIZACION DEL CADASTRO  
Y AL DESARROLO TERRITORIAL DE ZONAS URBANAS E INDUSTRIALES

KLAUS BAER

R.F.A.

LISBOA... ENCHAL-20 a 25 Novembro de 1989

LA PROFESION LIBERAL EN EL SERVICIO CATASTRAL DE LA  
REPUBLICA FEDERAL DE ALEMANIA. SU CONTRIBUCION A LA  
ACTUALIZACION DEL CATASTRO Y AL DESARROLLO TERRITORIAL  
DE ZONAS URBANAS E INDUSTRIALES.

Dipl.Ing. Klaus Baer  
Grillparzerstraße 9  
6200-Wiesbaden  
República Federal de Alemania

## S U M A R I O .

El trabajo trata de presentar una información comprimida sobre la profesión liberal en el sector del Catastro en la República Federal de Alemania. Se definen las normas generales que se han de cumplir como presuposición para el ejercicio de la profesión. Un capítulo se dedica al campo de actividades en general, en consideración especial de las tareas legítimas catastrales. La relación entre la Administración de Catastro y los Ingenieros Geodestas de Mensura Legal se manifiesta en los Artículos de la Ley de Catastro y del Reglamento sobre el ejercicio de la profesión. Se comentan las las tareas catastrales que tienen como objeto la actualización del Catastro y al mismo tiempo facilitan y provocan el desarrollo urbano. También las actividades de cooperación entre el sector privado y las Administraciones de Catastro, igual que las perspectivas para el futuro son objeto de la contribución.

## I N D I C E .

- o INTRODUCCION
- o EL INGENIERO GEODESTA DE MENSURA LEGAL
- o RESPONSABILIDADES Y RESTRICCIONES
- o EL CAMPO DE ACTIVIDADES
- o LA CONTRIBUCION AL DESARROLLO TERRITORIAL URBANO
- o Compilación y otorgamiento de planos de ordenación urbana.  
Tramitaciones para la aprobación y ejecución de un proyecto de construcción.  
El "Procedimiento de Ordenación Urbana" según la Ley de Desarrollo Urbano de la RFA.
- o CONCLUSION

## N O T A .

En la República Federal de Alemania (RFA) las relaciones del Catastro son de la incumbencia de los diferentes Estados y no del Gobierno Federal. Leyes, Reglamentos y Ordenanzas sobre el Catastro, la organización de las Administraciones de Catastro, etc, son similares, pero no idénticas en los diferentes Estados. En la presente contribución se mencionan normas otorgadas en el Estado Hessen.

Además de la abreviación RFA se ha utilizado la abreviación IGML : "Ingeniero Geodesta de Mensura Legal". El término es una traducción arbitraria del título alemán "Öffentlich bestellter Vermessungsingenieur".

## I N T R O D U C C I O N .

El Catastro en la República Federal de Alemania, igual que en otros países de Europa Central, tiene una historia de más de cien años. Sus orígenes se pueden seguir hasta el siglo XVIII. Instalado en un principio como *c a t a s t r o f i s c a l* con la finalidad de la recaudación del impuesto sobre la tierra, se ha transformado a principios del siglo XX con la introducción del Código Civil en *c a t a s t r o j u r í d i c o*. Al cabo de 30 a 40 años se inició la tercera etapa en la historia del Catastro en nuestro país: la transformación en un *c a t a s t r o m u l t i f i n a l i t a r i o*, que se adaptara a los requisitos de la economía, de la planificación y de la administración.

En el período de reedificación de las ciudades después de la Segunda Guerra Mundial surgió la necesidad de disponer de una mayor cantidad, de informaciones más detalladas y a más corto plazo para los propósitos de la planificación. Se pretendió entonces que el Catastro era estático y que debía transformarse en un *c a t a s t r o d i n á m i c o*.

Desde hace pocos años nos estamos dando cuenta que el Catastro en nuestro país no se ha desarrollado lo dinámico suficiente para satisfacer los requisitos cuyo cumplimiento en la actualidad de él se esperan. Nos encontramos nuevamente en el umbral de una nueva era.

En resumen, el Catastro en Alemania ha tenido un continuo desarrollo; pero a la vez una historia turbulenta; ha sido un permanente desafío para la entidad administrativa responsable.

Los que manejan y aplican este Catastro son los profesionales geodestas, funcionarios estatales en las Oficinas de Catastro, bajo el control de la Administración de Catastro y Geodesia Superior. La entidad administrativa suprema se encuentra en el Ministerio de Economía.



La Administración Catastral en la RFA siempre ha procurado disponer de profesionales lo mejor posible capacitados, por las siguientes razones:

- 1.- Los profesionales geodestas integrados al servicio catastral deben conocer a fondo métodos y claves catastrales desde los primeros periodos históricos hasta la actualidad con sus sistemas mecanizados. Con frecuencia la solución de tareas actuales exige la interpretación y evaluación de documentaciones históricas de diferentes épocas.
- 2.- El Catastro está muy estrictamente vinculado con el Registro de Inmuebles desde que se inició la era del catastro jurídico alrededor del año 1900. Desde ese tiempo se garantiza la seguridad de la propiedad inmueble. La garantía del Estado no para en los títulos de propiedad, sino incluye los límites de la parcela.  
  
La vinculación con el Registro de Inmuebles ha significado una revalorización. Sin embargo ha crecido al mismo tiempo la responsabilidad de mantener el Catastro -sobre todo en las partes gráfica y numérica- en coincidencia con la realidad legal.
- 3.- El Catastro y el Registro estan sometidos, especialmente en periodos de alta coyuntura, a una permanente fluctuación de datos, que exige una comunicación de informaciones bien organizada, es decir, libre de fallas.
- 4.- El valor y la eficiencia del Catastro dependen decisivamente de su actualidad. Si no se logra mantener la actualización del Catastro al día, la obra deteriora rápidamente. Por lo tanto la actualización del Catastro es uno de los requisitos más importantes de la Administración Catastral.

El Estado, como guardián del interés público, ha asumido una serie de responsabilidades que le obligan a disponer de personal adecuado y a limitar el ejercicio de la profesión a profesionales con la calificación requerida. Por eso, a primera vista parece un fenómeno, que el Estado, a pesar de las responsabilidades que él mismo se ha impuesto respecto a la seguridad de la propiedad inmueble, haya delegado actividades catastrales a una asociación de profesionales liberales, a los Ingenieros Geodestas de Mensura Legal.

El Artículo 8 de la Ley de Catastro (Estado Hessen) constituye una de las normas restrictivas. Define las entidades y personas con autorización a desempeñar tareas catstrales:

"La ejecución de mediciones destinadas a integrarse al Catastro, queda reservada a las siguientes entidades:

- 1.- Las mismas Oficinas de Catastro;
- 2.- Ingenieros geodestas autorizados a la ejecución de mensuras legales;
- 3.- Oficinas de medición de administraciones estatales o municipales, siempre que las personas responsables tengan la capacitación para las carreras administrativas superiores, y siempre que se trate del cumplimiento de propias legítimas tareas de dicha administración."

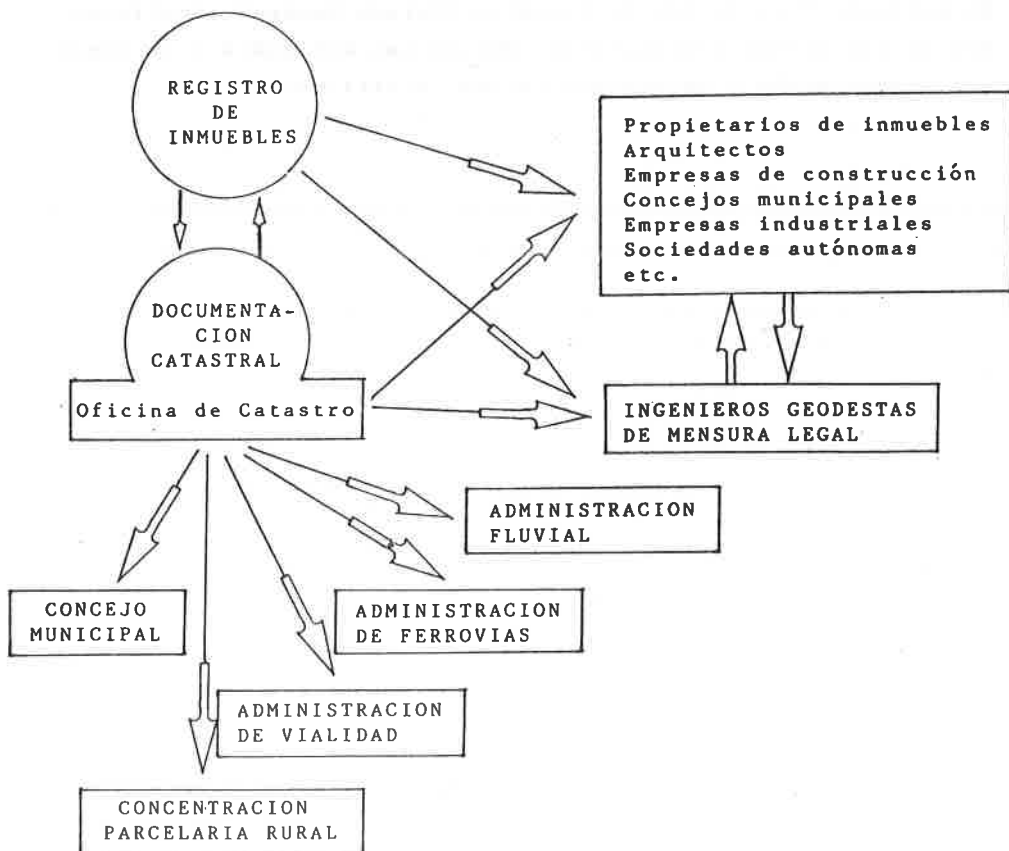


Gráfico No.1

## EL INGENIERO GEODESTA DE MENSURA LEGAL

La profesión del Ingeniero Geodesta de Mensura Legal en la RFA tiene tradición histórica. Respecto a las mediciones parcelarias con sus reglamentos y ordenanzas se puede seguir la línea genealógica hasta el año 1702. Aún en la actualidad se mantiene esta tradición en las tareas con documentaciones históricas de nuestros antepasados profesionales.

La profesión es popular también en otros países de Europa Central, como por ejemplo en Austria, en Suiza, en los Países Bajos, etc. Se trata de profesionales independientes, autorizados por el Estado al ejercicio de tareas y actividades que comunmente quedan reservadas a los propios funcionarios.

La iniciativa privada y el sentido de responsabilidad por el Estado y sus ciudadanos se han considerado a todo tiempo como la base de las actividades profesionales.

Un criterio adicional es que siempre se trata de ingenieros geodestas con la mayor posible calificación profesional. Después de haber concluido la carrera universitaria se debe absolver un servicio de aproximadamente tres años en las diferentes Administraciones Catastrales, Urbanas y Estatales, finalizando la carrera de formación profesional con un examen de asesorado. Antes de haber cumplido estos requisitos no se admite la solicitud de autorización para el ejercicio profesional.

Otro criterio son las obligaciones y los compromisos que se tiene frente al Estado. Se les dedicará un comentario más adelante.

Aparte de estos criterios deben mencionarse los rasgos característicos que corresponden al valor intrínseco de una profesión liberal. Siempre se trata de:

- o cumplimientos intelectuales
- o rendidos con responsabilidad personal
- o y realizados sin dependencia económica.

Estas señas características se encuentran materializadas en los correspondientes Reglamentos sobre el Ejercicio de la Profesión.

El Artículo 1 del Reglamento sobre el Ejercicio de la Profesión otorgado por ejemplo en el Estado Hessen de la RFA el 21.10,1975 define la posición:

"El Ingeniero Geodesta de Mensura Legal está incorporado al Servicio Catastral del Estado. En su ejercicio profesional es persona independiente.

Ingeniero Geodesta de Mensura Legal se titula el profesional geodesta que tiene la autorización explícita otorgada por parte de la Administración de Catastro y Geodesia Superior, de ejercer la profesión."

## R E S P O N S A B I L I D A D E S Y R E S T R I C C I O N E S .

La autorización de participar activamente en la formación y actualización del Catastro tiene como contrapeso una serie de requisitos indispensables en el cumplimiento de la vida profesional. En los artículos 3 á 8 del Reglamento se les dedica amplio espacio. A continuación se presentan en forma resumida algunos de los criterios que se consideran de interés general.

Art.3, párrafo (1): Formación profesional.

Los detalles sobre este tema se han mencionado en el aparte anterior. La formación profesional abarca generalmente un lapso

de 7 á 8 años contando desde la fecha del bachillerato.

Art.3, párrafo (2): Restricciones.

No se concederá la autorización al candidato

- o que ha cumplido los 60 años de edad;
- o que ejercita otras actividades profesionales diferentes;
- o que dispone de una autorización en otro Estado de la RFA;
- o que se niega a prestar el juramento prescrito;
- o que combate los derechos fundamentales democráticos del Estado;
- o que no posee idoneidad para el ejercicio de un cargo público, que se encuentra legalmente incapacitado o que ha sido sentenciado en un procedimiento legal a consecuencia del cual un funcionario público hubiera perdido sus derechos;
- o que en una anterior ocupación como funcionario público ha perdido su empleo a consecuencia de un procedimiento disciplinario;
- o que se ha declarado en quiebra, o para quien existe una limitación judicial de derecho de disposición sobre sus bienes.

Esta serie de restricciones se ha expuesto con el fin de subrayar la importancia que el Estado atribuye a la integridad personal de los IGML.

Art.8 : Obligaciones generales.

El IGML debe ejercitar la profesión de manera esmerada e imparcial. Debe asesorar a sus clientes en forma apropiada y pertinente.

Su conducta debe concordar con el respeto y la confianza que exige la profesión. No se permiten acciones de publicidad.

Está obligado a guardar el secreto profesional sobre todos los detalles y aspectos relacionados a la propiedad inmueble. Tiene obligación a comprometer a sus empleados a guardar igualmente el secreto profesional.

Art.9 : Cumplimiento de tareas.

El Ingeniero Geodesta de Mensura Legal está obligado:

- o a conocer a fondo las ordenanzas y reglamentos sobre el ejercicio profesional;
- o a cumplir con sus tareas en un lapso razonable de tiempo;
- o a ejecutar las tareas en la forma más económica posible en interés del cliente;
- o a certificar la exactitud y conformidad de los documentos que entrega a la Oficina de Catastro.

Además del Reglamento sobre el Ejercicio de la Profesión existe una serie de ordenanzas, la mayoría de índole técnica, y algunas que tienen como objeto las formalidades, como p.e. la organización de las empresas, el adiestramiento del personal, etc.

#### E L C A M P O D E A C T I V I D A D E S .

El Artículo 2 del Reglamento sobre el Ejercicio de la Profesión marca el campo de actividades:

(1) "Igual que las Oficinas de Catastro el Ingeniero Geodesta de Mensura Legal está autorizado:

- 1.- a efectuar y evaluar mensuras que tienen por finalidad la integración al Catastro;  
a proceder a la ejecución de deslindes;  
a participar en las tareas de completamiento de las redes trigonométricas y altimétricas del país;
- 2.- a otorgar certificaciones relacionadas a la tenencia de la tierra
- 3.- a actuar como perito jurado.

(2) El Ingeniero Geodesta de Mensura Legal puede además desempeñar actividades en cualquier otro sector de la ingeniería geodésica, siempre que tenga la capacitación precisa."

El párrafo (1) refleja la afinidad entre las tareas de las Oficinas de Catastro y de los IGML. Ambas instituciones ejercen actividades idénticas en lo que concierne los trabajos de campo y su evaluación numérica y gráfica. En cambio la labor de actualizar los registros del Catastro y de mantenerlos en coincidencia con los datos del Registro de Inmuebles, es de la incumbencia y responsabilidad exclusiva de la Administración de Catastro.

El párrafo (2) del Artículo 2 autoriza al IGML a ejecutar toda clase de mediciones de índole técnica, de actividades en el sector de la elaboración automática de datos, y de otras tareas más.

La recopilación que se presenta en las siguientes páginas distingue las actividades conforme a la versión del Artículo 2 del Reglamento.

La recopilación no pretende ser completa; sobre todo en el sector de la ingeniería geodésica y de mediciones técnicas se puede contar con una mayor variedad y especialización, que dependen de la región -ciudad o área rural- donde está ubicada la empresa, del avance y progresismo de la persona del IGML y de la situación coyuntural.

Por ejemplo las documentaciones sobre conductos subterráneos en el sector Catastro de Servicios, los levantamientos fotogramétricos terrestres de fachadas de edificios históricos con el sistema de Rolleimetric, igual que la digitalización de mapas catastrales, cuentan como actividades nuevas y específicas de los IGML. Como siempre, el éxito depende del criterio sano, de la agilidad y de la disposición al riesgo de mayores inversiones.

Mientras en este campo prevalecen las actividades de los IGML y de otras empresas técnicas en general, la Administración Catastral suele intervenir más en las actividades relacionadas a la tenencia de la tierra. Se trata de las tareas a las cuales se refiere el párrafo (1).



## ACTIVIDADES RELACIONADAS A LA TENENCIA DE LA TIERRA.

### Planificación, asesoramiento, dictámenes.

#### P l a n i f i c a c i ó n .

- o Documentación gráfica de las informaciones básicas para los planos de ordenamiento urbano.
- o Elaboración de planos de ordenamiento urbano.
- o Planificación de proyectos en los sectores de vialidad, de vías fluviales, de los conductos subterráneos, etc.

#### A s e s o r a m i e n t o .

- o Asesoramiento de particulares, de concejos municipales, de compañías industriales en asuntos de planificación y de actualización catastral.

#### D i c t á m e n e s .

- o Dictámenes periciales en litigios a causa de límites contradictorios.
- o Avalúo de bienes inmuebles.
- o Dictámenes en todo el sector catastral y de mediciones técnicas.
- o Cooperación como perito jurado en las comisiones de profesionales expertos en los concejos municipales.

### Actividades en los sectores de catastro y geodesia.

- o Participación en las tareas de la densificación de las redes trigonométricas y poligonales.
- o Participación en las tareas de la Concentración Parcelaria Rural.
- o Deslindes.
- o Subdivisión de parcelas.
- o Levantamientos catastrales.
- o Ejecución de Procedimientos de Ordenación Urbana.

Actividades en el sector de construcciones.

- o Otorgamiento de planos de situación.
- o Replanteo de proyectos aprobados.
- o Levantamiento de edificios recién construidos para la actualización catastral.
- o Otorgamiento de las certificaciones solicitadas por la administración municipal, sector de construcciones.

**MEDICIONES TOPOGRAFICAS, INGENIERÍA GEODÉSICA.**

- o Levantamientos topográficos.
- o Medición de perfiles, cálculo de masas.
- o Nivelaciones de precisión para el control de asentamientos.
- o Mediciones de precisión para el control vertical y de deformaciones.
- o Levantamientos fotogramétricos terrestres de fachadas históricas para fines de documentación o de saneamiento.
- o Levantamientos y documentación de edificios para fines de saneamiento.
- o Tareas complementarias terrestres para levantamientos fotogramétricos.
- o Levantamiento y documentación del Catastro de Servicios para entidades regionales, empresas industriales, etc.
- o Digitalización de mapas catastrales para la documentación del Catastro de Servicios.

Más adelante se dedicará un comentario especial a dos tareas importantes: a las actividades en el sector de construcciones y al Procedimiento de Ordenación Urbana según la Ley de Desarrollo Urbano de la RFA.

La diferencia entre ambos ramos de actividades, el sector técnico y el sector catastral, como los distingue la recopilción, se manifiesta también en el sistema de liquidación. Para las tareas catastrales existe una tarifa oficial obligatoria e idéntica para los IGML y las Oficinas de Catastro. Todas las liquidaciones están sujetas a un control estricto por parte de la Administración de Catastro y Geodesia Superior. Las actividades de índole técnica se pueden liquidar según otra tarifa. No existe control automático por parte de la administración

La cuota de las tareas catastrales que abarcan los IGML en relación al total de sus actividades puede variar considerablemente entre una y otra empresa. Las tareas catastrales pueden alcanzar de un 20 a un 80% según la estructura de la empresa, la ubicación, y también la coyuntura sobre todo en el campo del desarrollo urbanístico.

En este contexto también será de interés conocer qué porcentaje del total de las tareas catastrales de cada Estado es realizado por los IGML anualmente. El gráfico No.2 en la siguiente página establece la relación para los diferentes Estados de la RFA, indicando a la vez el número de IGML activos en cada Estado. Actualmente se cuenta con un total de 730 empresas aproximadamente.

Las informaciones del gráfico demuestran que hay variaciones considerables, ya sea en el número de empresas, como en el volumen de tareas. En Bavaria por ejemplo jamás se ha admitido la profesión del IGML. La actualización del Catastro se encuentra completamente en manos del Estado y de sus funcionarios. El Estado de NRW en cambio sostiene un concepto diferente. Los IGML participan activamente en la actualización efectuando aproximadamente un 75% del total de las tareas catastrales.

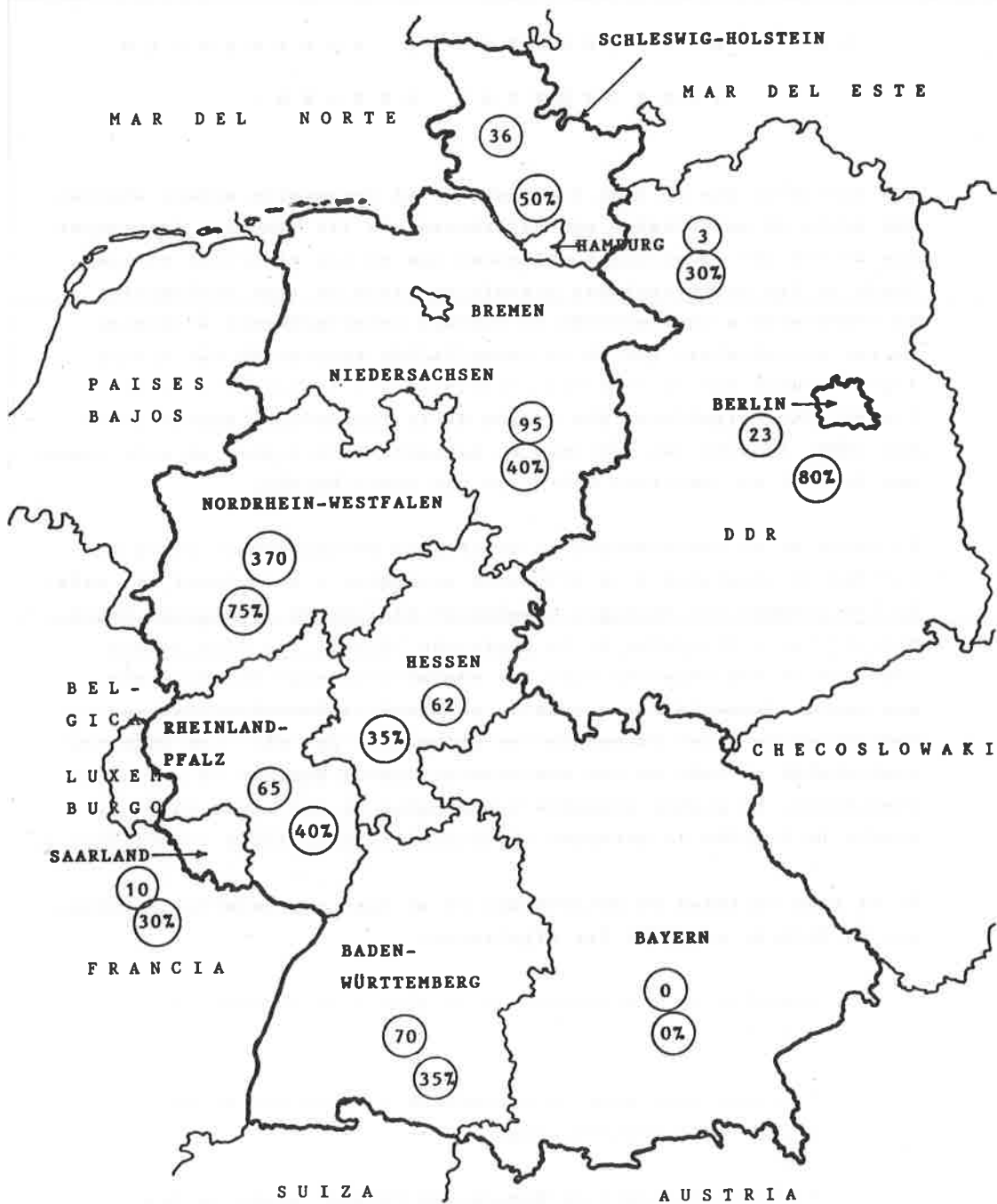


Gráfico No.2

○ Empresas de Ing. Geodestas de Mensura Legal  
 ○ Porcentaje de tareas catastrales

L A C O N T R I B U C I O N A L D E S A R R O L L O  
T E R R I T O R I A L U R B A N O .

Las funciones que el IGML desempeña en el desarrollo urbano abarcan una serie de actividades muy diferentes. En las ciudades las tareas suelen ser más complejas y delicadas que en los distritos rurales, donde en las urbanizaciones prevalecen casas de tipo unifamiliar. El comentario a continuación se refiere principalmente a ciertas tareas catastrales, que en la recopilación presentada más arriba figuran entre las actividades relacionadas a la tenencia de la tierra. Esto significa, que no son de la incumbencia exclusiva de los IGML. También las Oficinas de Catastro intervienen en este campo, por lo cual se justifica hablar de una contribución.

El valor de la contribución se manifiesta evidentemente en la habilidad de adaptarse a la situación económica y coyuntural del país. En los tiempos del "milagro económico" después de la Segunda Guerra Mundial las actividades de la profesión liberal han sido de una importancia muy especial para las Administraciones del Catastro, que con una capacidad limitada de personal tenían dificultad en cumplir en un plazo razonable las exigencias del día. Los IGML han contribuido al lado de las Administraciones a dominar la situación coyuntural. En muchos concejos municipales de las zonas rústicas asumen la función de asesores en asuntos catastrales e inmobiliarios.

De la gran variedad de actividades en el ramo del desarrollo urbano son de interés especial las siguientes:

- 1.- Compilación y otorgamiento de planos de ordenamiento urbano.
- 2.- Tramitaciones para la aprobación y ejecución de un proyecto de construcción.
- 3.- El "Procedimiento de Ordenación Urbana" según la Ley de Desarrollo Urbano en la RFA, del 23.6.1960

## COMPILACION Y OTORGAMIENTO DE LOS PLANOS DE ORDENAMIENTO URBANO.

Los planos de ordenación urbana son la presuposición para un desarrollo urbano controlado. Estos planos se elaboran en base a las informaciones del Catastro, sobre todo a la parte gráfica que refleja la situación parcelaria con los límites de los solares, la numeración y clasificación parcelarias, las construcciones, etc. Pero para los fines de la planificación estas informaciones no satisfacen. Los datos catastrales no incluyen automáticamente ni las curvas de nivel, ni una serie de informaciones topográficas adicionales, indispensables para la planificación. En resumen, la base de las informaciones catastrales se tiene que ampliar.

Los levantamientos topográficos, su evaluación y la compilación del plano básico para la integración de la planificación forman una de las tareas de los IGML. Entre ellos hay quienes disponen de una especialización en el sector de planificación urbanística y de suficiente experiencia y conocimientos en el sector de las tramitaciones legales. Estos ingenieros asumen la función de asesorar a los concejos municipales hasta la fecha de validez jurídica del plano de ordenamiento urbano.

## TRAMITACIONES PARA LA APROBACION Y EJECUCION DE UN PROYECTO DE CONSTRUCCION.

Las actividades del IGML relacionadas a proyectos de construcción, a primera vista parecen ser tareas técnicas. Sin embargo casi siempre los límites de la parcela juegan un papel importante. Las tareas más comunes y frecuentes, que se repiten en cada obra, son de carácter catastral:

- 1.- El otorgamiento del plano de situación en escala 1:500 con todos los detalles que la entidad municipal exige para la aprobación, p.e. los datos del plano de ordenamiento urbano respecto al grado de explotación admisible, la planta del proyecto, los edificios en los solares vecinos, cuotas de nivel, vegetación, y demás detalles topográficos;

2.- El replanteo del proyecto en coincidencia con las estipulaciones del plano de situación;

3.- Finalmente el levantamiento del edificio, que es también uno de los objetivos de la integración al Catastro.

Estas tareas tienen la finalidad de garantizar que la construcción se realice de acuerdo y en coincidencia con lo establecido en el plano de ordenación urbana. La garantía la asume el IGML. Antes de iniciarse la construcción certifica la coincidencia del replanteo con los datos del plano de situación. Luego, antes de concluirse la construcción procede al levantamiento catastral. El IGML certifica la coincidencia de la construcción con los datos del plano de situación.

Estas certificaciones son requisitos indispensables que el propietario o el constructor de el edificio tiene que presentar a la autoridad municipal competente. Su importancia se debe valorar debidamente en un sistema en el cual la violación de un derecho de vecindad puede causar litigios y ocasionar daños económicos considerables. Un criterio adicional son las consecuencias económicas. El desembolso de los créditos por parte de los bancos depende en última instancia de la disponibilidad de las certificaciones.

Más allá de estas tareas catastrales que tienen carácter rutinario, se encuentra -sobre todo en las capitales y ciudades grandes- un campo de actividades de los IGML más amplio y más vertiginoso: son las mediciones técnicas con las correspondientes evaluaciones en obras grandes:

- o toda clase de verificaciones en la construcción, como el control de asentamientos a largo plazo, las pruebas de carga, el control vertical durante la fase de construcción de edificios de tipo rascacielo,
- o la transferencia de cuotas de nivel a grandes alturas

- o replanteos de precisión para la colocación de maquinarias en complejos industriales

- o el replanteo de puentes, tuneles, conductos subterráneos, etc.

En este campo competitivo actúan además de los IGML solamente empresas consultoras especializadas, o dependencias de los Institutos Geodésicos de las Universidades.

#### EL PROCEDIMIENTO DE ORDENACION URBANA.

En el mismo período de reedificación de las ciudades después de la guerra, los concejos municipales se dieron cuenta que hacía falta un instrumento legal moderno, que facilitara el desarrollo territorial urbano. Finalmente el 23.6.1960 fué otorgada la Ley de Desarrollo Urbano. Uno de los temas de esta Ley es el mencionado "Procedimiento de Ordenación Urbana", que ha tenido en la RFA una divulgación amplia. Por ejemplo, solamente en el Estado Hessen de la RFA se formaron según los datos de la estadística en el transcurso de 12 años (entre 1961 y 1973) aproximadamente 95000 nuevos solares como resultado de los procedimientos realizados por las Administraciones Catastrales. Igualmente para los IGML han sido los procedimientos un campo amplio de actividades, sobre el cual actualmente no se dispone de valores estadísticos. Los procedimientos han disminuído porque el Estado en la actualidad tiende a limitar el uso de áreas adecuadas para formar nuevas urbanizaciones.

Respecto a las formalidades el Procedimiento de Ordenación Urbana es similar al procedimiento de una Concentración Parcelaria Rural. Se distingue de la Rural por la mayor importancia que se le atribuye al criterio del ordenamiento urbano ante el criterio de la concentración de la propiedad.

En rasgos ligeros se puede caracterizar por los siguientes criterios:



- 1.- Se trata de un procedimiento técnico y legal según las prescripciones de la Ley de Desarrollo Urbano del 23.6.1960
- 2.- La disponibilidad de un plano de ordenamiento urbano legalizado es presuposición para la realización del Procedimiento.
- 3.- Es iniciado mediante una resolución del parlamento urbano.
- 4.- La entidad responsable de la ejecución es el concejo municipal.
- 5.- Las actividades técnicas y catastrales, igual que las negociaciones con los propietarios, son realizadas o por la empresa de un IGML o por la Oficina de Catastro.
- 6.- En el Procedimiento participan obligatoriamente todas las personas que poseen fundos o parcelas, o tienen reclamaciones en el área designada.
- 7.- Cada participante tiene derecho garantizado a una asignación en relación a su reclamación.
- 8.- En caso de desacuerdos entre el participante y la entidad responsable queda justificada la interposición de recursos legales.
- 9.- Para resolver litigios se recurre a un tribunal especial que es parte de la jurisdicción general del Estado.
- 10.- Para abastecer las superficies necesarias para vías públicas, áreas de recreo, etc, previstas en el plano de ordenamiento, cada participante contribuye con un porcentaje de su fundo. Se trata de un valor fijo establecido por resolución del concejo municipal. No debe exceder el 30% de la superficie que posee cada participante.
- 11.- Después de finalizado el deslinde y amojonamiento de los solares, se procede a la toma de posesión.

12.- El Procedimiento termina con la declaración pública de la fuerza de Ley. Al cabo de 4 semanas transcurridas sin la interposición de recursos legales, el plano se declara inapelable. Desde esa fecha la documentación del Procedimiento -plano catastral, registro de propietarios, registro de parcelas, etc.- susitiuye al anterior Registro de Inmuebles y posee fuerza legal.

Los detalles del Procedimiento son demasiado extensos para ser incluidos en esta breve contribución. En resumen se pueden destacar los siguientes beneficios:

- 1.- La Ley de Desarrollo Urbano permite la transformación de un área rústica en una urbanización en conformidad con la mayoría o el total de los participantes. Los derechos de propiedad cambian en un solo acto en el momento en que el plano alcanza fuerza legal.
- 2.- Las tramitaciones legales garantizan los derechos de propiedad de cada participante.
- 3.- Las negociaciones con los propietarios son llevadas por personas independientes, ya sea por el IGML, o por un funcionario de la Oficina de Catastro. La posibilidad de tomar influencia en las negociaciones con el fin de obtener ventajas unilaterales, es muy reducida.
- 4.- No hay necesidad de hacer contratos ni de ratificar escrituras para transferir derechos de propiedad.
- 5.- El tiempo de ejecución de un Procedimiento es relativamente breve.
- 6.- La construcción de la vías de comunicación se puede iniciar antes de tener derechos de posesión.
- 7.- Finalmente, el resultado de la tarea catastral es un catastro nuevo, que sustituye al anterior.

## C O N C L U S I O N E S .

Las exposiciones al tema posiblemente han transmitido la impresión que en el ejercicio de la profesión debe haber una especie de competencia entre las empresas de los IGML y las Oficinas de Catastro. Aunque según los convenios y las ordenanzas pertinentes ésto no debía ser posible, hay períodos en los cuales se siente una especie de tensión y agitación atmosférica. Hace poco tiempo, p.e. en una gaceta provincial se denunciaron los IGML como los peores enemigos de la Administración Catastral. Manifestaciones de esta índole son raras y no se pueden tomar por serias. Más bien se deben considerar como preocupaciones en un campo competitivo donde no solo interfieren intereses personales, sino también ideologías políticas e intereses sindicales. También pueden ser reacciones a la actual tendencia en la RFA, de fortalecer la iniciativa privada a cuenta de las actividades estatales.

De todas maneras, manifestaciones como aquella no reflejan la realidad. Los IGML no actúan en contra del Estado, sino al contrario tratan de cumplir las tareas al lado y en cooperación con la Administración Catastral. Esta realidad no se puede pasar por alto. El Reglamento sobre el Ejercicio de la Profesión y las demás ordenanzas en este sector demuestran muy claramente, que el ejercicio de la profesión liberal no es posible sino en cooperación con la Administración Catastral.

La cooperación tiene ventajas para ambas partes:

- o En períodos de alta coyuntura el IGML contribuye al lado de la Administración Catastral a dominar la situación sin que ésta tenga que aumentar la propia capacidad de personal.
- o En períodos de coyuntura baja los IGML no gravan al contribuyente de impuestos. No son subvencionados. Para ellos cuenta la propia agilidad y el criterio sano que les permite enrumbarse con el progreso técnico en los diversos campos de actividad que se presenten.

En resumen se puede constatar que los Ingenieros Geodestas de Mensura Legal con su iniciativa privada y el sentido de responsabilidad se deben considerar como un beneficio para el Estado y sus ciudadanos.

En la introducción al tema me he permitido hacer la observación, que el Catastro en la RFA aparentemente se encuentra en el umbral de una nueva era. Posiblemente esta nota marginal suena como una exageración. No obstante, el desarrollo del Catastro en los últimos decenios hace resaltar los siguientes criterios:

- o Las tareas tradicionales de la actualización del Catastro -deslindes, desmembraciones, levantamientos, etc.- han disminuido considerablemente, igual que las tareas relacionadas a la construcción.
- o La tendencia actual en ciertas agrupaciones políticas, de conservar la naturaleza y limitar la extensión de áreas habitadas, tiene como consecuencia que se ha vuelto muy difícil lograr la aprobación de un nuevo Plano de Ordenamiento Urbano en todas las instancias competentes. Por consiguiente los Procedimientos de Ordenación Urbana han disminuido también.
- o La introducción de la Elaboración Automática de Datos en el Catastro ha originado una agitación y permanente actividad con el fin de elaborar nuevos conceptos para sistemas mecanizados. En este campo se han realizado progresos en todas las Administraciones Catastrales.
- o Al mismo tiempo de disminuir las actividades tradicionales han surgido nuevas tareas. Entre los temas comentados con la mayor frecuencia están los mapas catastrales digitalizados, la integración de los datos de la planificación al Catastro, la formación de un banco de datos con el Catastro como base. que abarcaría los diferentes ramos de la Administración. etc.

Nos encontramos en un proceso de transformación. Las necesidades y exigencias del Estado a fines del siglo XX provocan la precipitación del desarrollo catastral, que costará recursos inmensos. Se supone por parte de las instituciones competentes, que las tareas difícilmente se resolverán sin la cooperación de todas las Administraciones de Geodesia y Catastro, incluyendo las administraciones municipales y las empresas privadas, a nivel nacional e internacional.



**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
**MULTIFUNCIONAL**

— SICRUM —

MULTIPURPOSE CADASTRAL SYSTEMS IN THE FRG -  
MANAGEMENT AND USES

KLAUS BARWINSKI

REPÚBLICA FEDERAL ALEMÃ

LISBOA, PINHAL-20 a 25 Novembro de 1989

## MULTIPURPOSE CADASTRAL SYSTEMS IN THE FEDERAL REPUBLIC OF GERMANY - MANAGEMENT AND USES -

Dipl.-Ing. Klaus J. Barwinski

### The Significance of Surveying and Mapping

Generally the subject of surveying and mapping is not the centre of public interest. Nevertheless surveying- and mapping documents gain importance in many fields and activities of public administration or the private sector. The lacking of these documents is only noticed in case of need, in case that certain information on land and estate is incorrect or incomplete. The more the world population increases, the more the demands on surveying and mapping grow. The area of land as well as the resources of the earth available to mankind are limited and have to be handled economically. We know today that only information on resources and energy allows sensible and necessary planning; we further know that mankind depends more and more on products and resources of the sea; thus surveying activities will in future not be limited to the land only but will expand to the sea.

Surveying and mapping are indispensable means for a thorough and complete inventory of the earth. All information characterizing the land surface has to be stored and, updated for certain plannings, to be made available again. Therefore modern surveying and mapping has two important functions:

1. Determination of the shape of the earth, the recording of information of the earth's surface. This is the task of the national survey, topography and cartography.
2. Registration of parcels, real properties, and information concerning these units. This is a matter of the cadastre.

This lecture is centred on the way the cadastre is organized and how it can be used as a basis of a land information system. I also want to point out that the establishment of a modern surveying and mapping system is not a work carried out once, but that only a continuous, systematic updating and renewal guarantees its functioning. Comparing different countries, it is obvious, that the existence of a qualified surveying-system in these countries is generally accompanied by a high living-standard. Today more than ever modern technology offers all prerequisites to survey quickly, to collect all changes in the surface of the earth and to produce maps. Therefore modern technologies should be used as completely as necessary to create a new surveying and mapping system to guarantee the best possibilities for future planning.

### The Cadastre

After having pointed out the significance of surveying and mapping let me

introduce the cadastre. Its task consists of recording and describing all additional information on parcels.

### Legal Basis

In order to record all facts about parcels according to objective criteria the passing of a law is necessary, which defines the tasks of the State on one hand and duties of the private owner respectively. To the governmental tasks belong the maintenance of the cadastre for its territory as well as the definition of what is known about parcels and buildings to meet the requirements of law, administration and industry. On the other hand it is the duty of the owner to give the authorities any required information and to admit all locally authorized personnel to their parcels and buildings. Moreover the owners have to admit that the necessary number of surveying marks is fixed.

### Historical Development

In order to understand many aspects of the cadastre a short description of its historical development shall be given:

Only with the beginning of the 19. century the systematic surveying of European countries came into existence. Cadastres were established to guarantee a just distribution of land taxes. Therefore all parcels had to be surveyed, mapped, and recorded in registers. Since this work had to be done quickly, all kinds of elder documents and maps were used for completion besides the newly done surveys resulting in very heterogeneous cadastral maps. This can still be noticed today and thus should be mentioned in order to avoid these faults in future.

Very soon the sole land tax register was also used for other than fiscal purposes since throughout the period of industrialization the demand of maps was considerably high, just to mention their use in the planning of factories, railways and the growth of towns. The cadastre gained further specific importance when it became the official document of the property register (Grundbuch) thus the cadastre became indispensable as reference of ownership. The cadastre in its function as ownership-reference can be dated precisely to the beginning of this century. Later on another important functional change was achieved, when in 1934 - by way of law - the cadastre was assigned the task of recording the evaluations of land. From that time on the cadastre can really be called a multipurpose cadastre since it was the basis for taxation, registration of ownership, and reference of land evaluations.

In the following period, especially after World War II, reconstruction work in Germany made it necessary to use the cadastre as complete record of buildings as well as of topography in order to obtain documentation for regional- and urban planning, thus the cadastre changed to a planning cadastre.



## Organization and Contents of the Cadastre

The above mentioned tasks of the cadastre can only be met by a detailed classification of this register. Therefore it is necessary to number all parcels of an area in such a way that they can be clearly identified. According to this parcel identification parcels are recorded and described in a cadastral index (Buchnachweis) and depicted in cadastral maps (Katasterkarten). The field notes (Zahlennachweis) which are the mathematical basis for the production of cadastral maps are recorded in a separate register.

This classification in 3 parts has proved to be useful and I want to explain it in detail:

### Cadastral Index

This index contains all descriptive information on parcels. Using the cadastral index in data-processing the following informations are available:

In the parcel file (Flurstücksnachweis)

- a) Internal administration information (e.g. cadastral office, township, county)
- b) parcel identification  
classified according to: parts of a township generally within natural boundaries (Gemarkung); named localities (parts of the above mentioned Gemarkung), parcel number, Federal State
- c) parcel-coordinate, block of buildings
- d) location, nature of current use, square measure of parcels
- e) references related to property register / Office of Census and other administrative offices

In the ownership file (Bestandsnachweis)

- a) Internal administration information  
e.g. cadastral office, property register
- b) owner
- c) all parcels of a certain owner compiled together with their according parcel identification

### Cadastral Maps

These maps depict the following elements of parcels:

- a) property boundaries
- b) parcel identification (especially parcel number)
- c) place names
- d) buildings
- e) land uses and their boundaries
- f) topographical elements

Results of the land evaluation are mapped on a separate overlay.

## Field Notes

The cadastral maps are based on the data obtained in local surveys. These data are recorded in the field notes as well as in lists of coordinates and heights.

## The Character of the Cadastral Parts

Since the establishment of the cadastre the different registers developed gradually, i.e. that in the beginning these registers existed as paperbound lists and books. Today this traditional method is replaced by a more current method; thus the cadastral index is already readjusted for data-processing. Concerning the two remaining parts, the cadastral maps and the field notes, transformation work began only recently, since the necessary programs are difficult to develop and still today many technical obstacles have to be overcome. The aim of the computation is, however, to produce new digital cadastral maps which can be made available to private and official users via display.

This modern cadastral map will allow to produce planning material even without a close fixed scope:

It will allow an individual representation at different scales and it will be the basis of special data-editing occurring from time to time; e. g. to depict the age of buildings within an area.

## Updating

As we have seen up to now the cadastre contains basic data of parcels which are necessary for the different applications in law, administration and industry. The basic data have to be continuously updated since the cadastre is frequently used and referred to by other users. Thus updating means that:

- changes of ownership have to be registered and the cadastral map has to be corrected accordingly,
- changes of buildings and streets have to be surveyed and the documents of the cadastre have to be corrected as quickly as possible.

Therefore efficient program-systems for geodetic computations as well as for the necessary drawing are indispensable.

Experiences have hitherto shown, that the changes amount to about 15 %. Since this figure is relatively high updating work needs to be well organized. The aim should be the updating of all cadastral registers by a single updating procedure. To control the whole system to such an extent, requires a highly complex program-system, which we do not have yet. Consequently the updating has to be done separately for each of the cadastral registers by the operator. Beginning with the field notes the cadastral maps are changed and subsequently the effects of those changes on the cadastral index are recorded. Establishing a new control-program for these demands is a huge challenge for the future, which we unfortunately will not be able to manage within the following 10 years.

## Cooperation Between Administration and Private Sector

As it was said in the beginning the maintenance of a cadastre is a legally controlled task that has to be carried out by the cadastral offices. Because of the variety of activities, licensed surveyors are also entrusted with tasks of public surveying besides the cadastral offices, and since these private surveyors are licensed, they have the same authority in surveying as the cadastral offices. Only this cooperation guarantees the necessary capacity of keeping the cadastre up-to-date. This system works very well with only a few exceptions. In areas of high construction activity surveying can be protracted, thus further subsequent surveys are effected and delayed, e. g. the registration of a change of ownership or the production of construction documents.

To show you the extensive and various activities of the cadastre, I want to give you only one example: till today we did not succeed in surveying all buildings in a way necessary for the cadastre. Therefore - and especially for planning purposes - it was necessary to produce a photomap 1 : 5 000 providing systematic cover at least for North Rhine-Westfalia. This photomap exists in addition to the German basic map (Deutsche Grundkarte) 1 : 5 000. The production of the photomap took 6 years until 1983.

Let me give you only one further information which might interest you: in North Rhine-Westfalia about 80 % of the cadastral surveys are carried out by licensed surveyors, consequently the maintenance and updating of the cadastre is the basic task of the cadastral offices.

## The Cadastre in North Rhine-Westfalia

You came to know the general organization and contents of the cadastre. I tried also to point out certain problems like the surveying of buildings and an incomplete, heterogeneous cadastral map series. To describe the management of the cadastre more detailed, I want to show you the actual situation in one Federal State. It is obvious that I choose North Rhine-Westfalia since I am most familiar with the situation there.

## Description of North Rhine-Westfalia

I want to start with a description of this state. To gain some conclusions for the establishment of the cadastre in other states this description seems to me indispensable.

North Rhine-Westfalia is one of the 11 Federal States with an area of about 34 000 sq.km. It has about 17 mio. inhabitants and is the most densely populated state of the Federal Republic. Concerning the cadastre it implies that about 8 mio. parcels have to be registered, administered and mapped. The industrial area of the Ruhr with underground coal mining is characteristic for the central part of North Rhine-Westfalia. But the western part of North Rhine-Westfalia is characterized by soft coal surface mining and the recreation areas are very close to both industrial zones. Owing to these facts the surface of North

Rhine-Westfalia continuously changes and surveying never comes to an end.

### Fundamental Control Data

To record all facts concerning land and real estate and their changes fundamental control data, vertical and horizontal control data, are needed. These data are an unavoidable means to create a homogeneous system in which the daily local surveyings together with the results of all performed surveyings can be embodied without multiple recordings. This task is carried out at the cadastral office, which prepares the collected data and makes them available to users.

By way of the above mentioned fundamental control data each single survey can be embodied and become part of the cadastre. The following two sequences shall explain this procedure in detail.

### Horizontal Control Survey Net

The control points of the control survey net are scattered throughout the territory of North Rhine-Westfalia. The basis is the 1. order control point net, which has been densified in a 2., 3. and 4. order to such an extent that the horizontal control net reaches a densification of at least one control point per 2 sq.km. The control points are also called trig points owing to their way of definition. In total the territory of North Rhine-Westfalia has 25 000 control/trig points. A further densification up to 35 000 shall be carried out in the following years.

On this control net the minor control points of the cadastral surveys are based. The quantity of these minor control points varies in urban and rural regions. The main criteria for the designation of minor control points is the use of an electronic tachymetric instrument. Great importance is attached to the marking of these points in order to guarantee simple and efficient succeeding surveys.

### Vertical Control Survey Net

This net is the basis of all altimetric measurements. The 1. order control points are densified in two steps and their quantity is much higher than the quantity of the horizontal control points. It is our aim to designate about 70 000 vertical control points since this vertical control survey net is of fundamental importance for various kinds of activities. Owing to mining - surface as well as underground mining - levellings have to be repeated every 2 - 8 years. It is self-evident that these points have to be solidly marked.

## Cadastral Map Series - Automated Cadastral Map

At the moment two different kinds of maps do exist as cadastral maps:

1. a map showing only the selected isolated area of a named locality (part of a region within natural boundaries - Inselkarte)
2. a map on which the detail extends over the whole area enclosed by the net line - Rahmenkarte

After World War II the latter was produced to a great extent and it has the advantage to be suitable for sheet assemblies. Sheet assemblies of several cadastral maps were used as planning material especially during the reconstruction period after World War II. Nevertheless the application of the latter map is problematical, because every now and then it occurs that important parcels are placed and depicted only in the corners of up to four maps.

Another complication is the variety of scales. The scale is generally chosen according to the depicted region. Normally urban areas are mapped in scales between 1 : 250 to 1 : 500, rural areas in scales between 1 : 1 000 and 1 : 2 5 00. Since the normal method of optical enlargement leads to different symbol sizes and line widths the production of planning material consisting of several single maps is problematical.

Comparing the cadastral maps of all Federal States it can be noticed that they differ in sheet sizes, e.g. in some states you can find the size of 50 cm x 50 cm because it is easy to handle, in others you find sizes of 50 cm x 100 cm in order to cover a larger area. Since modern technologies are available yet, the wish grew stronger to improve the complete cadastral map series. Under the guidance of the North Rhine-Westfalian State Survey Office and with financial support of the government of the Federal Republic of Germany a new conception of a digital cadastral map was created, the so called "Automated Cadastral Map", which is meant to be established equally in all Federal States. In the course of this presentation I can only touch the subject of the development of the automated cadastral map. I only want to mention that it will change the whole cadastre extensively. The newly developed organization scheme tries to meet future demands, e.g. by developing programs which are compatible and applicable on all computers even those of different producers.

The automated cadastral map comprises three basic files:

- a) planimetric file
- b) point file
- c) file of measuring elements

The planimetric file consists of the geometric information necessary for the production of a cadastral map.

The point file contains the horizontal and vertical coordinates of the survey points as well as further details concerning these points, e.g. the way of monumentation and the significance of the referred survey points.

The file of measuring elements has to be described in detail:

It consists of the single measuring elements which are necessary for the computation of vertical and horizontal coordinates. This was important since we considered to compute surveying points anew in case of new findings or other changes. In these cases the insecurities of a coordinate transformation can be avoided and the computation can be carried out anew with the stored measuring elements. Starting from the files in the central data base the data can be conveyed to the decentral processing part where the necessary tasks of the cadastral office are carried out and where the new coordinates are computed. For the computation it is unimportant whether the used data are derived from polar surveys, offsets or photogrammetrical surveys. Of special importance is graphic processing that enables an interactive processing of the cadastral map. The advantages of this digital processing are the following parameters:

- a) scale
- b) map subject
- c) overall design of the map
- d) output of the map via plotter or display

Maps can be produced by cadastral offices according to the demands and wishes of the cadastral map users. Other users will have direct access to the cadastral maps via display. They cannot change the contents of the cadastral map but the cadastral map functions as base map for their plannings in dialog mode. The output of the resulting planning maps will happen via display, drum or high precision flatbed plotter. The size and form of the planning maps can be chosen according to the actual demands without a hinting mathematical limitation.

An automated cadastral map of this kind as we try to realize it will have influence on the data flow from the cadastral offices to the State Survey Office, since it is the task of the latter to record and map possible topographic changes in their topographic maps' scales 1 : 5 000, 1 : 25 000, 1 : 100 000. I believe that the further development of the graphic interactive work-station might provide a solution for the maintenance of the whole cadastre, not only of the cadastral maps and the field notes, but for the cadastral index, too. Thus all jobs concerning the updating and maintenance of the cadastre could be carried out at a single work station.

## Organization of the Cadastre In North Rhine-Westfalia

Up to now my explanations only concerned the cadastre itself. I still want to describe the administrative organization and the single tasks of each of the four administrative levels.

Supreme level: State Ministry:	Compiling and publishing of laws and general guidelines
Central level: State Survey Office:	Maintenance of the state survey; Developing of program-systems for the management of the cadastre.
District level: Central Authority: (District Government/ Bezirksregierung)	Technical and administrative supervision of the cadastral survey offices; Supervision of the licensed surveyors; Cooperation in certain tasks of the cadastre.
Communal level: Cadastral Survey Office	Maintenance of the cadastre. Performing of cadastral surveys. Cooperation in development planning, land organization and evaluation of landed property.

In North Rhine-Westfalia the cadastre belongs to the lower, the communal (township) level, which is also the administrative level of bigger towns and counties. We established the cadastre in this level, because it is continuously needed especially for development planning, which is performed on the communal level. In other Federal States the cadastre office respectively the cadastre does not belong to the communal level but sole State Cadastre Offices were established. The disadvantage of this organization is that the communal administration has to ask for the necessary cadastral document at the competent State Cadastral Office and thus the fast access to the cadastre is complicated. The organization of the North Rhine-Westfalian cadastre has certain advantages for the updating of the cadastre since the communal administrations are much interested that only current information is available. Above that the quantity of data on the communal level is still easy to handle with all computers available at present.

### Uses of the Cadastre

I want to give you only a few concrete examples for its application in order to make you understand the effect of the cadastre on the people, on the improvement of the organization of land and property as well as on the fact that citizens have to participate in financing community facilities.

### Preparation of Development Plans

Development plans are set up only for parts of a township. They consist of the

legal decisions of all urban planning concerning e.g.

- the quantity and the quality of zoning classification and built-up parcels
- the definition of areas reserved for transportation installations

In addition development plans have to define:

- the concentration of buildings on parcels,
  - the minimum size of parcels which are used for construction sites,
  - whether parcels for construction sites are limited to certain groups of people,
- and
- which areas should be used as parks, permanent gardens, cemeteries, sport fields etc.

Areas and facilities can be set up as protection areas in case of noxious environmental accidents (pollution), even the planting of trees and bushes can be recorded in detail within a development plan. During the preparation period of a development plan information about the ownership of parcels can be made available by the cadastral office. The cadastral maps function as base maps for development plans.

#### Procedures of the Official Approval of a Plan

The official approval of a plan is the prerequisite especially for large scale road-constructions as well as for the construction of railroads, since legal positions as well as the actual local situation have to be altered. It is the aim of the official approval of a plan to arrange the relationship between the representative juristic-person in charge of an official construction project (e.g. a township, private person etc.) and the private persons concerned by this project. The official approval of a plan replaces all necessary administrative procedures of former times.

Similar to the preparation of a development plan, information made available by the cadastral office is used during the preparation work concerning the official approval of a plan.

#### Urban Property Roll

The urban property roll, based on electronic data processing, contains all data on urban property, buildings as well as landed properties. All information and working material for offices concerned with the administration of property or the Office of Census is based on data of the urban property roll. A whole lot of data necessary for the urban property roll is originally recorded in the cadastral data base, such as:

- parcel coordinates
- street names and house numbers



- other place names
- informations on the current land use
- ownership as well as
- the reference numbers for the so called "Baulasten"-register, a register for the landowners' duties to comply with specified conditions.

The updating of these informations is performed in the cadastral index file. It is our aim to revise periodically the data of the cadastral index in order to provide the urban property roll with the revised data on magnetic tape.

#### Fee Definition for Owners of Parcels with Direct Access to a Public Right of Way

These fees are levied by townships in order to construct roads. The calculation of their amount is based on data of the cadastral index made available to the townships. Since sometimes the amount is considerably high, the landowners' term of payment might be extended. According to the parcel numbers these extensions are recorded by the townships administration. Additionally this information on the parcel concerned is registered in the cadastral index and has to be continuously updated according to administrative regulations.

#### Organization and Placing of Street Names and House Numbers

Street names and house numbers are also used as reference, or let us say address, for built-up parcels. Generally this address is more current and better known than the cadastral parcel identification and it is necessary for mail purposes. The cadastral maps are base maps for these tasks, too. Assembled lists recording the already used names and numbers can be made available.

#### Definition of Landowners' Duties to Comply with Specified Conditions

These duties (Baulasten) arise by the landowners' declaration to the concerned construction administration. The landowner accepts the legal duty to tolerate or omit certain administrative or private activities on his own parcel. Let me give you an example:

constructing a building on one's own parcel one has to observe certain fixed distances to the neighboring parcel. In case a landowner cannot provide the necessary distance on the own parcel, his neighbor may tolerate the definition of the necessary distance on his parcel. The landowners duties are recorded in a separate "duty register". The index numbers of the duty register are recorded in the cadastre in order to connect both registers; the duty register and the cadastre, with each other, especially since the maintenance of the duty register is based on data made available by the cadastre. This procedure enables the administration to find out which part of the earth's surface is concerned by

landowners' duties.

### Granting of Land Transactions

The granting of land transactions is to guarantee that only such land transactions can take place which allow the use of the parcel according to the development plan, e.g. If a partition of a parcel is planned the future boundary is mapped on the cadastral map which is sent to an approving authority afterwards.

### Definition of Flood Protection Areas

Flooded areas are defined as flood protection areas to guarantee the innocuous draining-off of the flood. Whoever wants to alter, deepen or elevate the land surface of these areas, erect, alter or tear down buildings or plant trees or bushes etc. needs a permission of an approving administration. If there is danger of neglecting the demands of flood protection this permission will not be granted. With the help of e.g. a digitizer it is possible to determine the traverse points' coordinates of the boundary of the area concerned, thus resulting in a loop traverse. A subprogram enables us to find out all parcels within the loop traverse. Thus it is also possible to define the owners concerned. By adding the information of "flood protection area" to the data record of the determined parcels special editing and data preparation will be possible in future.

### Establishing of a Green Space Register

Several town administrations have only recently started to establish green space registers, that means that all public urban properties are recorded, which are used as cemeteries, playgrounds, sport fields etc. Additionally the different kinds of plants on these areas are registered, too. The green space map functions as planning material for further urban green spaces and as basis for the definition of the costs of their maintenance up to a detailed personnel planning. In the cadastre where data are stored the areas concerned can be identified by the following criteria:

- ownership
- nature of current land use

Here again it is the cadastral map which is used as base map for the mapping of green spaces.

### Conclusions for the Establishment of a Land Information System

After the short description of the cadastre, its organization and contents, I gave you a concrete example of the cadastre in one of the Federal States, of its uses

and problems. Now I think it helpful to discuss the experiences we gained during the course of its application. We can imply that the experiences with the cadastre made by the administration and the industry were considered positive. But, however, we have to confess that the data made available by the cadastre do not always meet the demands of the users. Owing to this fact we wanted to establish a land information system. We therefore thought about a convenient and useful method of combining the data, which are already present in many fields of administration to a homogeneous system. By research it was found out that the best method to realize such a system would be to use the cadastre as basic data base. It contains all important information on landed property and since we already transformed it to data processing it enables us to store data of different fields within the same system. But we also came to know that it is even more complicated and difficult to handle the updating of such a highly complex system than the updating of the cadastre, especially since we thought the land information system to contain much more data than the cadastre. Therefore I want to point out the difference between the cadastre and the land information system. Separately, independent of the actual situation in certain states. In case a cadastre is already at hand it is advisable to expand the cadastre in order to create such a system. In other cases informations on landed properties are needed but an efficient cadastre does not exist.

In 1978 the FIG defined the land information system in such a way that its contents is to embody all data of landed properties which can form the basis for legal, administrative and economic procedures and which can be useful for planning and development in order to guarantee and improve the actual situation. Up to now we do not have an exact definition of the land information system although people tried to improve the above mentioned one from time to time. In those countries that want to establish an information system the situation varies to such an extent that any land information system ought to meet the demands resulting of the different local circumstances. In countries where the land information system has to be established rapidly and efficiently to create a basis for planning and development purposes time is an important criterion. Therefore it is necessary to concentrate on the most important data. Nevertheless such a rapidly established land information system has to be able to combine data of different files and to enable various kinds of data-selection. This leads to the following conclusions.

#### Geodetic Basis

For the establishment of a land information system a solid mathematical basis is necessary. Using parcel coordinates, the combination of all different data concerning informations on inhabitants, economy and other social factors should be guaranteed. The data of a land information system do not have to cover the whole territory of a country from the very beginning as it is the case for the cadastre, but the collection of data should be concentrated on different important parts of a country. In such a case it has to be guaranteed that the mathematical basis is the same throughout the whole territory.

### Ownership and Parcel File

Contrary to existing cadastres where the parcel file and the ownership file are two separate constituents, it is helpful for the maintenance of a land information system to store information on the ownership and information on the parcel itself in the same file. Otherwise homogeneous updating can only be ensured by a considerable amount of organization.

### Subdivision of Townships

A further simplification can be achieved by using the same units within the land information system and the local dimensions of a township, thus resulting in the concurrence of township area, that is the same as fiscal area and parcel index area; or another example: blocks of buildings should be identical in the land information system and in reality. They should be identical in their local dimensions as well as in their reference numbers. Owing to this simplification the collection of data and their selection can be easily handled.

### Current Data

The efficiency of any land information system depends to a high degree on the fact that the recorded data are up-to-date. Therefore comparatively simple methods have to be developed in order to revise and to renew the data-file. As far as legal aspects are concerned, surveying or collecting of data should be limited to specially authorized, licensed personnel. But as far as other minor informations are concerned, e.g. the land use, these informations can be collected by persons or institutions that are able to acknowledge these facts.

### Accuracy

In order to ensure the efficiency of surveys in the long run, and especially the definition of survey and boundary points, surveys should be carried out with the highest possible accuracy. Nevertheless it seems useful to vary in accuracy according to the area where data are collected. In conurbations the highest possible accuracy should be chosen, in outskirts and developing regions a medium accuracy seems useful and in rural areas and areas with a low land value a low accuracy is sufficient. In this context of defining the accuracy the method of monumentation and the quality of the survey point itself should be considered. Concerning the situation in the Federal Republic of Germany we have established a two level classification: the accuracy for ownership boundaries in conurbations is 3 cm, for ownership boundaries in outskirts it is 10 cm. The control net surveys should be carried out independently with a high accuracy to ensure a homogeneous integration of survey and boundary points. With regard to the application of satellite survey systems the establishing of a homogeneous control survey net will become more and more efficient.

### Photogrammetrical Method

Photogrammetry is an indispensable means for the establishment of a land information system. The aerial photo is a huge source of information on the depicted area. The photogrammetrical method enables us to efficiently produce maps that can easily assume the function of the former cadastral map. Especially in developing countries no other method seems useful, thus resulting in a combination of an automated property map and an orthophoto map.

### Cooperation of the Cadastre Offices and State Survey Office

Discussing the modern land information system we should not forget that besides large scale maps also small scale maps are necessary, especially to meet the demands of regional and urban planning. Therefore the production and revision of topographic maps need continuous data exchange between the cadastral offices and the state survey office. Even topographic maps have to be up-to-date to meet the required demands. To show you the importance of these small scale maps for planning purposes, I want to give you some examples of their use as base maps for:

- Inventories of recreation areas
- records of smog-areas
- Information on the function of forests
- records of geologic situations
- statements on local climates having influence on the health of people

I hope that I could show you the significance of the cadastre, that you came to know its various uses and the importance of a continuous data exchange between surveying and mapping and the cadastral offices. I also mentioned the function of the cadastre as useful link for combining the data of different fields, but I still have to point out, that a land information system, containing an enormous quantity of information might intervene with the right of privacy of the people concerned. Thus the persons in charge of defining the contents of a land information system have to handle their task extremely carefully, always considering the aspect of privacy. I do believe that only by leaving the right of privacy untouched, the people, especially those concerned by the establishment of such a land information system, will accept the new organization of their real estate and only then this new information system can be a useful means for everybody.



**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
**MULTIFUNCIONAL**

— SICRUM —

INTERNATIONAL TRENDS AND TENDENCIES —

EUROPE 1992

KLAUS BARWINSKI

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## International Trends and Tendencies Europe 1992

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### 1. The need for GIS

Decisions regarding politics, economy and administration must be viewed in light of their relevance to the environment. One can visualize the earth as an extra-ordinary system, providing mankind with living space and resources to maintain life. But as man requires more space on the earth to live, he must consider in each instance of his decision-making process the impact such a requirement has on man's environment. The laws of nature cannot be altered without paying a high price. In order to deal, in optimum fashion, with the living space available to mankind, and to analyze and plan its proper use, one must have a comprehensive knowledge of the land.

The need for data of the earth's surface is established by the fact that human activities, sooner or later, will impact the ground. Examples include: making land available for new human settlements, for the development of industrial facilities, or for the construction of a more economic transportation system to better link the residential, industrial and recreational centers.

All this has an impact upon the subdivision of the surface of the earth.

In order to guarantee, maintain and improve the use of all land within designated living and industrial areas, and to protect the land and its resources from misuse, land information systems today are an absolute necessity. Electronic data equipment has completely opened a new door for storing, maintaining and distributing information in a much more flexible way to many users for many more purposes.

### 2. Understanding of LIS - GIS

In the very beginning I want to line out my understanding of geographic information- and land information system. The land information system will be like a roof laid on pillars dedicated to special scales. Here you will find one pillar symbolizing the cadastral maps with the scales of 1 : 500 to 1 : 2 000. Another pillar symbolizes the scale of our basic map 1 : 5 000, another one the medium topographic-area of 1 : 25 000 to 1 : 100 000. And the last one represents the scales of 1 : 200 000 to 1 : 1 000 000. All the data are given to a data-bank representing a digital land model for a special scale and special purposes. The content of these pillars are data on land, but also of juridical, economical and sociological kind. All these important facts can be brought together on the basis of a solid homogeneous geometrical basis. Due to the fact that we are not able to bring all important data to one digital land model. We decided to create special digital land models, because of the big variety of land information data. You will find such systems realized at many places on various administration's levels.

Another important fact in realizing information systems of our earth's surface is the time for realization. For a large scale system we learned that you will need more or less 10 to 15 years. So these activities should be started, but to have the digital data base running it will be the year 2000. Nobody wants to wait such a long time, so that we decided to realize a digital land model based on the scale 1 : 25 000. This can be realized within a five-years-program. Both data bases are working on a vector based form and the results can be used really flexible for a lot of applications. Beside these activities and because of the demands of our users we brought our analogous topographic maps 1 : 50 000 and 1 : 100 000 to a raster form. This job is finished and whoever wants to use the raster background and who wants to combine this data base with thematic overlays is able to do so. This kind of information is fast and cheap and it will help to use hightech just now until the vector based systems will be realized.

Having this situation in mind I want to characterize our parcel related LIS, the Authoritative Topographic-Kartographic Information System (ATKIS), and to give you the scenery of applications using the raster background.

### 3. The Realizations

#### 3.1 Parcel related LIS West German Cadastre

The automated cadastre as basis of a LIS is a nation-wide project in the Federal Republic of Germany. The cadastre is closely connected with the Legal Property Register. There are two important parts: the describing part giving text information on the parcels and the graphical part. The Surveying and Mapping Agency of Northrhine-Westfalia is involved in the centralized development of programs for this system with working groups since 1976. For data capture and data storage the local officies are responsible.

The Digital Cadastral Map is a nation-wide project, too. The goal is to describe the relevant features (i.e. parcels, buildings, land use regions) and their geometry with high resolution related to a unique coordinate system (Gauß-Krüger). The information are stored in a centralized database with a standardized data structure and are close connected with information in the describing part. The ALK data are basic information for a wide range of applications on the local level. For the purpose of data exchange a Unified Database Interface has been defined. It is also used for the connection between Graphic Interactive Workstations and the centralized database. The local officies are responsible for data capture and data storage. The development is done by centralized groups assigned to the Surveying and Mapping Agencies of the States. The Surveying and Mapping Agency of Northrhine-Westfalia developed a portable Graphic Interactive Workstation for the cadastre using the ISO standard Graphical Kernel System (GKS). The system is also prepared for the integrated processing of both surveying data and application oriented data; a real project of Automated Mapping and Facilities Management. Working in the German standardization body we support



the development of a GKS which is able to fulfill cartographic requirements.

In order to record all facts about parcels according to objective criteria the passing of a law is necessary, which defines the tasks of the State on one hand and duties of the private owner respectively. To the governmental tasks belong the maintenance of the cadastre for its territory as well as the definition of what is known about parcels and buildings to meet the requirements of law, administration and industry.

These tasks can only be met by a detailed classification of this register. Therefore it is necessary to number all parcels of an area in such a way that they can be clearly identified. According to this parcel identification parcels are recorded and described in a cadastral index (Buchnachweis) and depicted in cadastral maps (Katasterkarten). The field notes (Zahlennachweis) which are the mathematical basis for the production of cadastral maps are recorded in a separate register.

So the cadastre contains all basic data of parcels which are necessary for the different applications in law, administration and industry. The basic data have to be continuously updated since the cadastre is frequently used and referred to by other users. Thus updating means that:

changes of ownership have to be registered and the cadastre has to be corrected accordingly,  
changes of buildings and streets have to be surveyed and the documents of the cadastre have to be corrected as quickly as possible.

Experiences have hitherto shown, that the changes amount to about 15 %. Since this figure is relatively high updating work needs to be well organized. The aim should be the updating of all cadastral registers by a single updating procedure. Only this can guarantee a well functioning data base

### 3.2 Authoritative Topographic-Kartographic Information System (ATKIS)

The development of graphical data processing and the increase of the associated range of digital information have caused the state analog topographic mapwork to become insufficient. A growing number of public and private users require the information in a digital form.

The Working Committee of the Survey Administrations of the Länder of the Federal Republic of Germany (AdV), in cooperation with the state surveying and mapping agencies decided to develop and construct the Authoritative Topographic-Kartographic Information System, ATKIS.

ATKIS is to be a national uniform digital topographic data base. It will run free of private interests in the form of a continuous state program, distributing to both public and private users. It is to be authentic and actual.

The project ATKIS is an expression of a new understanding of topographic collection and official cartography. This new understanding includes more than offering just the official topographic information in digital form or just automation. ATKIS must contain the concrete topographic information of the earth's surface.

The basis for ATKIS is the so-called model theory advocated in modern cartographic work. This ideal involves building a model of the original, supplemented by a greater-than-normal amount of topographic information. The primary landscape model is formed using data from topographic recording. The secondary cartographic model is then put together based on the primary landscape model plus cartographic components. By using additional, user-specified data, tertiary models may also be formed.

For better understanding it should be pointed out that the Digital Landscape Model (DLM) is object-oriented, and comprises the original information of the earth's surface, not the already deduced information of the map. The Digital Landscape Model can be divided in two components: a "Digital Situation Model (DSM)" documenting the two dimensional (X,Y) position and a "Digital Terrain Model (DTM)" documenting the elevation only. The DLM can be used to develop "Digital Kartographic Models (DKM)" which are the digital equivalent to our analog maps. The development of a DKM is necessary since a map cannot be produced automatically from the original DLM because of the DKM's use of complex map symbols.

ATKIS is to hold the primary and secondary digital landscape models. The primary model will be made using the entirety of the known objects and features of the earth's surface (topographic objects), specified as object ranges, groups and forms. From this entirety of real objects, the essential ones will be chosen, described through attributes, coded and stored. Through this process of topographic modelling the final Digital Landscape Model (DLM) will be formed. According to various accuracy levels and to different terrain structures, DLMs of varying quality may be constructed. In May of 1987, the Adv recommended that the formation of ATKIS began with the DLM 25, DLM 200 and DLM 1000 terrain models. The information depth and density of each could then be oriented with respect to established topographic map-works: Topographic Map 1 : 25 000 (TK 25), Topographic Overview Map 1 : 200 000 (TUK 200) and the International World Map (IWK) respectively. The positional and elevation accuracy of the DLM 25 was proposed to be the same as the accuracy of the German Base Map 1 : 5 000.

The building of the secondary model bases on the primary model, i.e. the DLM. The stored objects will be linked with distinct signatures and, at this time, scale dependent cartographic generalization processes will have to be carried out interactively. Combining these two actions into a topographic modelling process, the Digital Kartographic Model (DKM) will be formed. Depending on the accuracy and degree of generalization, different DKMs of the same or varying scales may be built.

In the interest of economical data storage, as well as due to unsolved generalization problems, the state surveying and mapping

agencies still have to make available the standardized analog official topographic mapwork derived from exactly defined DKMs. Concerning this, the Adv. has recommended that the initial construction should be concentrated in the scales 1 : 25 000 (DKM 25), 1 : 200 000 (DKM 200), and 1 : 1 Mio. (DKM 1000). Included with this recommendation was suggesting the redesign of the current TK 25 and TÜK 200.

The construction of separate digital and cartographic landscape models (DLM and DKM), requires a consistent separation of topographic-objects and cartographic symbols. This will involve placing the object describing signatures in a separate carrier than the objects themselves.

The ATKIS-feature-classification catalog will help with the establishment of the topographic landscape model and the addressing of the topographic objects. It is to be attribute-oriented. This means that objects first logically registered in a rough structure must be further sorted by their attributes. This catalog will have set requirements as to which topographic objects are to be stored.

The ATKIS signature catalog will help with the description of topographic objects in DKMs, as well as with the realization of current analog works. At the same time the object catalog will include object forms which, when combined with their attributes, will provide sortable, depictable elements.

The feature classification catalog will define the degree of fineness in a DLM. The signature catalog will define the appearance of the concurrent analog topographic works. Both catalogs are realized and the basis for our data collection activities.

The earth's surface, with its natural and artificial features and other original information (particularly statistical data), along with existing official information and geographical name registers will be the initial information sources of the digital topographic terrain models. The gathering of needed information from the actual terrain would mean a completely new land information collection that is not economically feasible or technically necessary. In 70 - 90 % of all cases the quasi-information that exists in the form of aerial photographs and large scale base maps could be used. Supplying the DLM with poorer information from quasi-originals would be costly and is impossible in view of the derivation of state topographic mapwork using generalization techniques. Therefore, the digitization of existing analog mapwork, for example the TK 25 or TÜK 200, will supply the DLM. Besides these sources, outside information systems will be consulted, provided that their contents are authentic.

### 3.3 Raster Background

Both activities to realize the cadastre and ATKIS are running in 15 and 5 years program. To be able to give our users the opportunity to work with digital data we transformed our topographic maps 1 : 50 000 and 1 : 100 000 into a raster form. This is already be done and for a lot of applications this raster background can be

used as a data base for activities in the field of environmental protection and in the field of facilities management. These information can be overlaid in vector form on the above mentioned raster background.

#### 4. Application

With the realization of information systems by the surveying administrations the users shall be given the possibility to employ the basic information in a manifold way.

With the establishment of ATKIS the basis has been made to place digital data of the surface of the earth at the users' disposal. Some experiences have already been made. In Northrhine-Westfalia there exists the above mentioned Digital Terrain Model. Completed with administration boundaries in digital form, a stock of basic data exists that makes it already possible to carry out some applications. Regarding the price fixing, some experiences will have to be made. At the moment one tries to find a marketable price the user is willing to pay.

In this connection shall be pointed out clearly that a commercialization of these data by third persons is not allowed without further ado. Therefore, contractual agreements are needed, arranged accordingly to the agreements that will be made today on the question, how to deal with analogous official-topographic map series that are used by third persons. In the last time it could be noticed frequently that firms tend to buy topographic maps which they change into digital form with the help of modern techniques and, finally, sell these data on the market professionally. This is not allowed. Indeed, today modern techniques make it possible for the first time to regain the results of national surveying fast and exactly, but this cannot be paid with a normal map price. As everybody knows, this map price does not cover by far the expense raised by the state in order to have a functioning national surveying. The cooperation between national surveying and user must become co-ordinated in future.

Regarding the use of the data that already exist today, let me give you some short characteristic examples.

##### 4.1 Administration

ATKIS surely will be used very intensively by the administration. On the one hand by the national surveying itself in order to fulfill its tasks; on the other hand also by the other classic departments that so far have intensively used the analogous results of the national surveying. Two examples shall be given to this.

###### 4.1.1 Land planning and regional policy

For large-area plannings and documentations in the field of land planning and regional policy the data of the middle-scale field are of great importance as they allow to recognize all the connections clearly without being narrowed by sheet lines and too specified contents. Moreover, the user has the possibility to represent certain areas according to individual mapping rules or to develop material in a way as it is used for developing plans and that is more intelligible to citizens.

#### 4.1.2 Environmental protection

In the field of environmental protection it is necessary to create large documentations, but also to record disturbances or to simulate special events in order to make a prognosis about their consequences. For example, by information about the place of accident it is possible to investigate the consequences for the environment caused by a chemical accident within a very short time. So the task forces have a wide spectrum of planning aids at their disposal in order, for example, to prepare and realize the evacuation of the population in case of an accident like that. With the completion of ATKIS these possibilities will increase naturally.

#### 4.2 Private sector

The legal charge of national surveying is not only to provide results for the administration, but also for the private sector. Here exists a variety of employment possibilities. Three of them will be presented briefly.

##### 4.2.1 Marketing enterprises

It has already become common that requests by marketing enterprises are submitted to the national surveying asking to provide digital data. For example, this applies to new building areas where marketing enterprises want to determine the locations of building markets. Other applications in this field intend to improve delivery areas of freight forwarding agencies or to determine favourable locations for food supply markets in settlements.

##### 4.2.2 Broadcasting stations

Recently the broadcasting stations have made more and more use of the Digital Terrain Model. This model enables them to perform a better service to the citizens concerning the reception power. The locations of the broadcasting stations can be determined in the way that the supply concerning the stereo reception, for example, will be installed in an optimal way for the broadcasting area. Here also the employment possibilities of ATKIS will increase, if more data than now will be made available. This finally will be case, if one day the stock will be completed to the single building

##### 4.2.3 Navigation and location

The car industry is working on the realization of navigation- and location systems intensively, e.g., on the one hand a vehicle shall be led on a planned route, but on the other hand the driver shall be able to recognize his immediate location. Technically these systems are widely ready for operation, but they compellingly need knowledge of digital road data. The geometric road course as well as the knowledge of further attributes like one-way streets and right-of-way streets are urgently requested. In future further information like public buildings, hotels etc., will be added. Here a field of information society is developing whose influence and consequences cannot be foreseen today. Here the national surveying can and must be partner of the industry in

order to place direct present data of the road net at the industry's disposal and in order to grant the permanent updating of these data. The national surveying must do a great step into the future to fulfill these tasks, for the results are needed in good quality, but also in a very short time.

## 5. Activities in European Countries and Tendencies

### - Development of GIS, CERCO-Inquiry Sommer '89 -

#### 5.1 Beginning of the Development, Momentary Level and Process

The first steps to the development of geographic information systems were already done in the seventies and even earlier. This is the case for the descriptive part of the cadastre, the so called 'ALB'. Therefore, till today europe-wide this part is the most improved in respect of data conversion. In countries like Denmark, Norway, Austria, West Germany, France, Luxemburg and Italy the percentage of the automated parts comprises already 70 - 100%. All questioned European countries (except Switzerland) want to complete this component until the year 1995.

The situation is different for the graphical part of the cadastre, the so called 'ALK'. Only in some countries this project has been started in the beginning of the eighties. In most other countries data capture has just begun, or only preparing works for programming and conceptions for the organization have yet been realized (e.g. Denmark, Sweden, Switzerland, Ireland, Greece, Portugal and Turkey). Data capture is done by manually digitizing or scanning of maps as well as by photogrammetrical means, remote sensing, by digital surveying methods, or the valuation of already captured measuring elements.

Data conversion for the graphical part of the cadastre needs a high expense of personnel, hardware and software because of the complex structure of map series and their contents. Thus, europe-wide the present level of automation is only 5 - 10%, the completion of the project cannot be expected before the year 2000 or even after.

Data conversion of the analogous topographical maps to digital information (the so called ATKIS-project) has just begun recently even though first activities in this field already date back till the middle of the seventies. Although in the very beginning this project only comprised special aspects or problems (e.g. the realization of a digital terrain model, data-capture of administration boundaries of small-scale maps) because of increasing and improving digital editing possibilities the results are considered as basic components of geographical information systems.

As for the graphical part of the cadastre (ALK) ATKIS also needs a high expenditure of personnel and hardware. In other respects we can fall back on software as well as technical or organizational experience developed for the graphical part of the cadastre. For this project the same already mentioned techniques (manual digitization, scanning, photogrammetry, remote sensing, digital surveying methods) are used for data-capture. In almost all countries mainly photogrammetric means and digital surveying methods are used for the updating of digital information.

Data-conversion for ATKIS-like projects differs widely in the whole of Europe because their realization depends mainly on the chosen scales and on the complexity of their contents. The concrete value for the small-scale maps is 30 - 40%, for large-scale maps only 10%. But concerning data-conversion of maps in scales smaller than 1:500 000 several countries already gave numbers of 100% (Denmark, Sweden, West Germany and France). In general this digital information derived from scanning and only needs to be further converted from its original raster form to final vector data. In many countries the private sector and the industry offered assistance for the realization of this conversion.

## 5.2 Basic Scales

The questionnaire also included questions for all basic scales used for the digital cadastre and topographic-cartographic projects. Except for Portugal and Turkey who did not yet decide this specific question, all other European countries chose scales from 1:1000 to 1:5000. But the more densely populated nations like West Germany, Great Britain, France and Switzerland also want to maintain information in scales larger than 1:1000. It is interesting to find out that some Scandinavian countries like Sweden and Finland also maintain a large scale cadastre parallel to a cadastre in scales 1:5000 - 1:50 000, although their population density is relatively low (18 respectively 14 people/ km ; Norway: 12 people/km ). These countries also include topographic information in their cadastre, thus they directly accumulate a basic stock of information for their ATKIS-like projects. Although the basic scales for topographic-cartographic projects show a relatively even distribution, two main features are noticeable: an almost complete circle for the middle scales 1:10 000 to 1:50 000 and for the smaller scales 1:200 000 to 1:1 mio. The decision to continue this range of scales was certainly based on the existence of equivalent analogous maps. But another equally important argument for this choice is the fact that these scales offer an optimal range to the various users of digital data and also guarantee an optimal link to other data-bases. Information provided in the middle scales are generally used for various issues of the communal level, e.g. town-planning, environment protection, and industry. In order to manage problems on the regional level (regional-planning, development-plans, defence, transportation, energy-supply etc.) data of the smaller scales are needed.

## 5.3 Organization of Data-Bases

In order to develop GIS-data-bases it is important to know which databank-management-systems (hierarchical, relational, network-oriented) are the most useful for the individual purposes. Our inquiry found out that the databank-management-systems used within Europe differ widely. The main reason for a centralized or distributed organization is based on the constitution of each country, i.e. on the constitutional competence of the surveying and cadastral administrations. In countries with a central surveying administration central databank-management-systems dominate for the descriptive part (ALB) and the graphic (ALK) part of the cadastre as well as for ATKIS-like projects. Besides the constitutional background also data-immanent criteria imply certain organizational structures: therefore, because of its

special structure the descriptive cadastral data (ALB) is organized centrally in all European countries.

Distributed organizations can be found for most graphic parts of the cadastre (ALK) and also for the ATKIS-like projects. Although for the latter mixed organization forms exist: distributed databank-organizations dominate for large scale data-files, for small scale data-files centralized organizations exist. For graphic-interactive workstations distributed organizations tend to dominate.

#### 5.4 Contents of Data-Bases

All digital cadastral data from the descriptive and geometrical basis of the GIS-data-bases. Naturally, data like parcel number and parcel area as identification means are generally included in the data-bases. But in order to make the data-base a useful instrument for data-valuation of different users, various other informations (e.g. buildings, land-use, ownership, planning encumbrances, utilities - only to name a few) are included in the data-bases, too. Although the completeness of the captured data normally varies in different countries, the trend to provide a comprehensive GIS-data-base to guarantee its manifold use is obvious.

The contents of the topographic-cartographic (ATKIS) data-bases corresponds to the feature catalogues provided by the different countries. These catalogues tend to be more specific than mere object-classifications or digitizing-rules for existing topographic maps. ATKIS-data-bases only satisfy demands of users, if they structure the topography of the earth according to certain objects, complete this information with additional attributes, and finally link all these comprehensive topographic data to data of other fields. The answers to our questionnaire showed that about half of the countries also use to include data of fields like administration, environment protection, utilities, defence, planning.

For the conversion of digital land models to digital cartographic models about 55% of all countries developed so called signature catalogues.

#### 5.5 Data-Provision and Data-Networks

Interesting results gave our inquiry concerning the use of GIS-data: already today almost all countries provide data from the descriptive part of the cadastre (ALB) to different official and private users such as fiscal or statistical administrations, registration offices, banks and notary offices. As soon as more geometrical data from cadastral maps can be made available digitally, the more demands of users of the planning sector and industry can be satisfied. In future data-provision is supposed to function by a direct data-connection, a kind of network from the surveying agency to the different users. But at the moment the surveying administrations mostly provide computer-lists, outputs as analogous maps, data on magnetic tapes and compact discs for their users.

The situation is identically for all ATKIS-like projects. But in this field we also found a strong demand for a uniform data-



exchange-format for all European countries, especially because many countries developed individual systems. But data of the small scale range should be made available supranationally (e.g. for a European Road Database). Therefore, it seems indispensable to develop a uniform data-exchange-format.

In Bern/Switzerland during the last CERCO-meeting all surveying agencies expressed their interests to slowly become service-administrations especially in the sales-sector, selling their data according to the users' demands. Some even want to become a private service company with their own (financially) independent marketing and sales department.



**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
**MULTIFUNCIONAL**

— SICRUM —

FROM CONCEPT TO REALITY

MICHAEL BRAND

IRLANDA

LISBOA, PINHAL-20 a 25 Novembro de 1989

## FROM CONCEPT TO REALITY

Michael J D Brand     Director, Ordnance Survey of Northern Ireland

### ABSTRACT

The Ordnance Survey of Northern Ireland Topographic Database (COMTOD) project produces a fully structured topographic database derived from its current Survey archive (including published and unpublished information). It is creating the foundation for a single integrated Geographic Information System for Northern Ireland, the ultimate goal, through which all major public utility and local authority type functions will be linked. The paper discusses the practical issues involved in managing the project from the initial installation of a skeleton system into a partially completed new headquarters building, through working it up to production mode, its reviewing and enhancing to meet expanding production and continuing development to meet user demands.

In practice digital techniques have had a major impact on policy, work flowlines and staff and with no recruitment of specialized I.T. resource, existing personnel have tailored a turnkey mapping system and adapted both themselves and their various flowlines, to exploit today's technology while leaving options open for tomorrow. The project is in full production mode and continues, in collaboration with its potential users, towards provision of digital coverage of Northern Ireland in the mid-1990's.

### INTRODUCTION

COMTOD produces a structured topographic database by digital conversion of the current large scale (1:1250 and 1:2500) survey archive. Thus the foundation for a single integrated Geographic Information System for Northern Ireland is being established while in parallel another database, derived from the 1:50,000 mapping of Northern Ireland is also being developed.

The GIS as envisaged, will be a distributed network of databases each maintained by the responsible authority/utility with suitable data communication links to COMTOD and others as appropriate.

The general concepts of COMTOD have previously been addressed at length elsewhere. (1-4) However this paper concentrates more on what has been achieved, the problems encountered, methods used to overcome them and lessons learnt from this experience.

## COMMENCEMENT OF COMTOD

The project was initiated in 1981 by establishing:

A high level Steering Group

A Working Party to investigate and recommend

A Liaison Committee of User representatives

While the former two have now disappeared the Liaison Committee has grown and its continued involvement is regarded as essential in moving towards the realisation of the G.I.S.

A Feasibility Report was produced in May 1983 which recommended that COMTOD proceed with a target date for data conversion of the mid-1990s. With acceptance of recommendations, and market appraisal during 1984, a contract was let, through CCTA, to SysScan (UK) Ltd as prime contractor for the supply of a "turnkey" mapping system for installation during 1984/85 and 1985/86.

This instigated diverse management issues and while some were unique to OSNI there are others which all may encounter in the course of development.

### (i) Accommodation

As the existing OSNI facility could not meet the accommodation requirements the major initial management task was to plan within the shell of a building already under construction, a new OSNI HQ. This meant a very tight schedule to allow acceptance of initial COMTOD equipment within 1984/85. One major difficulty encountered in this stage was unfamiliarity with the specialised requirements of a mini-computer/digital mapping system, and with limited expertise locally OSNI had to advise to a large degree. In doing this we relied heavily on the system supplier and other appropriate sources, tempered with a reasonable degree of commonsense. Typical issues involved were:

Computer suite controlled environment

"Clean" power

Delivery access for bulky equipment

Back-up power

Security of the computer suite and building generally

Cable routing for present and future

The above while far from exhaustive, illustrates the variety of tasks requiring careful management to ensure that relevant measures were taken at the appropriate time. A lot was learnt in the process, knowledge which while dearly acquired then has stood OSNI in good stead. Wrong decisions were of

course made, some of which we are still attempting to rectify. Typical of these was the location of the precision plotter's compressor and vacuum pump in a sound-proofed compartment within the room. While this succeeded admirably in reducing the sound level, the heat build-up within it during plotter operation meant opening it for cooling thereby defeating the object. With hindsight a remote location, such as the roof, should have been chosen for these units.

(ii) Acceptance Staff Training

While accommodation activity was underway in Belfast an acceptance team of six OSNI staff commenced initial training on 7 January 1985 on the Digital operating system, VAX/VMS, at Systime Computers in Leeds. While half of the team had some limited experience with micros none had any exposure to a system of the nature now presented. This seven day course constituted the formal training on the computer aspects for the present.

A SysScan Mapping System course, with the same participants, commenced in Kongsberg, Norway, on 28 January 1985 and provided an intensive three weeks training relating to the manual digitising, interactive editing and plotting sub-Systems.

The end result of both courses was a team, admittedly without experts, capable of carrying out acceptance testing at OSNI. It remains the case that while extensive expansion and development has occurred there has never been a need to recruit any specialised computer expertise into what is now a full production system.

(iii) Initial Acceptance Testing

With initial deliveries to the OSNI site commenced there was the usual end of financial year constraint to be met. Building work had not reached the stage where all equipment could be installed in its final location, but fortunately the computer suite was completed thereby allowing the processor, disks, scanner, etc, to be finally positioned. Six digitising stations, two interactive graphics work stations, a Calcomp 1077 and Versatec V80 plotters had to be located temporarily within a completed portion of the building. While this was inconvenient it allowed testing to CCTA requirements to begin.

This demanded a high degree of management. User accounts had to be set up, system quotas given, etc, and with no one having "booted up" a system before all involved were under pressure to meet the acceptance criteria.

The remainder of February and March 1985 imposed heavy demands regarding testing and further training the result being that all kit with the exception of graphic work stations and V80 plotters was accepted in time.

(iv) Completion of Contract

April-October 1985 saw the second (1985/86) phase of the contract. Acceptance was undertaken in stages as systems were worked up into an embryo flowline. In tandem with this the other equally important factor, staffing expansion to operate the growing system was planned and a substantial number of training courses by both supplier and OSNI instructors were undertaken. This presented operational problems for the management of the project, the main issues resolved being:

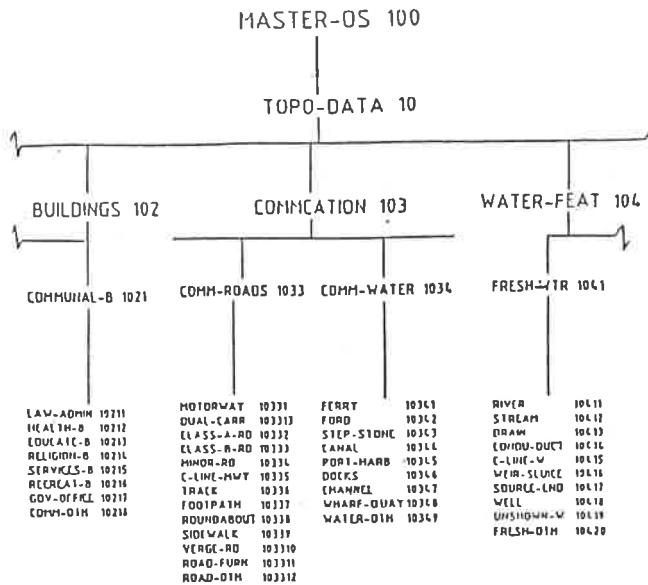
(a) Hardware/Software Completion

June 1985 saw a further two interactive graphics work stations, a precision plotter with photohead, four photogrammetric digital capture systems (added to existing Wild A8 and AMH equipment) along with additional terminals and further SysScan software installed. This completed the complement for the two year contract. Equipment previously located temporarily was now finally resited. The system configuration was finalised with the Systime 8750 well and truly stretched, all devices with the exception of the scanning sub-system being on-line. The first of 2 Kern DSR 11s was also acquired.

This period saw the digitising system being worked up in earnest and almost inevitably a number of software anomalies and system malfunctions occurred. These caused consternation at the time but viewed with hindsight were probably to have been expected whatever system of this complexity had been installed.

(b) Data Structure

The period saw design and setting up of the graphic data structure. This took account of input from potential users and required the necessary flexibility to meet the demands from the database in the visualised GIS. It was realised that a fully relational database would ultimately be required but no proven product capable of handling up to 30 gigabytes of complex data was identified.



Extract from Data Structure

The data structure devised by OSNI contains some 190 structure levels any of which can be accessed singly or in combination. The database is of a links and nodes nature capable of handling polygons, line strings and points. The associated alphanumeric database is linked to geometry through a system generated unique twelve figure geocode. The database uses SysScan map management software in combination with DEC DATATRIEVE to provide a simulated relational situation. All map sheets are fully edge matched and merged to ultimately provide a homogeneous data set for Northern Ireland.

(c) Further Staff and Training

Upon completion of acceptance in-house training to supplement the staff knowledge and complement was undertaken. This involved gradual build-up of numbers as the state of development demanded, to maximise on equipment usage and take advantage of a flexible working hours system. It rapidly became evident that there was a need for varying aptitudes and abilities within the system each having its own essential part to play in the flowline. An important principle established here was the necessity for proper formal training of staff to the degree appropriate to their role in the project.

#### (d) Digitising Programme

A policy of urban areas first, commencing in Belfast, followed by rural, but with an element of flexibility, was adopted.

#### WORKING UP OF PRODUCTION

The remainder of 1985 was devoted to getting the production system moving the major management task being to get flowlines designed utilising the full functionality available. It was soon evident that "turnkey" was not to be taken literally and while the system was capable of doing the job substantial tailoring was necessary by OSNI to fully exploit the potential.

A number of system problems occurred during development of these flowlines as increasing demands were placed on the software. A lot of these resulted from an upgrade of software. They were eventually resolved and lessons learnt by all parties concerned, but a lot of effort was needed to return to smooth operation. While necessary for any system such upgrades remain an aspect which can create problems particularly in a production mode.

Flowlines produced during this period were:

Manual digitising/structuring/output

Automatic digitising/manual digitising/structuring/output

Photogrammetric digital capture and output

Processing of EDM surveys

Databasing

In order to develop these flowlines a number of training courses were undertaken. Typical of these were system management and DATATRIEVE. At the same time further in-house training in established areas continued to increase the all-round versatility of production staff. VAX/VMS training was also given to some staff particularly where investigatory/development aspects formed part of their duties.

#### MANAGEMENT POLICY

Events had now reached a stage where a management reappraisal was desirable. As a result in February 1986 the main archival data conversion was transferred from the development side to the production Carto Division. Other production elements (eg, scanning and output plotting) along with the development/problem investigation, computer management, training and database management became the responsibility of Systems Division. Photogrammetric and field capture remained the duties of their respective areas. Close collaboration between Divisions remains vital.



## SYSTEM REVIEW

With increasing demands being placed on the system as production momentum built up the processor was as predicted for this stage, grossly overloaded. To plan for the future a Project Review, using a recognised project Management tool, was instigated in late 1985. This involved a Project team from existing COMTOD staff, the team being answerable to a Project Board. The Project was run in three stages:

Review Stage

Procurement Stage

Installation Stage

It was carried out alongside normal duties, with support from others as required, and represented a severe strain on staff resources. A policy for the third and subsequent years, and strategic plans for the longer term evolved.

In practical terms a further contract was placed with SysScan, in September 1986 for the following phased additions to the system.

Phases 1-3 A 2-VAX 8200 cluster - 1986/87.

Phase 4 Clustering of System 8750.

Phases 5 & 6 Increased storage with field upgrade to VAX 8300 cluster -.1987/88.

Phases 1-3 duly proceeded with its expected quota of working-up problems, to meet yet again an end of year constraint. A previous lesson, was reinforced yet again, namely that planning and introducing such upgrades inevitably takes longer than anticipated in spite of adequate lead-in time. The effect of associated setbacks on staff morale is also an important factor and while similar problems would probably be encountered with any comparable system, dedicated personnel are essential.

## CONSOLIDATION AND DEVELOPMENT

With the immediate future of COMTOD clear and Phases 1-3 implemented it was now possible to progress a number of aspects.

### (i) Investigatory Studies with Potential Users

A first tentative expansion towards the final GIS was taken with progress on exploratory Studies with proposed user utilities. These had been projected from the inception and to this end limited additional manual digitising, editing and plotting capacity was installed at the end of 1986/87. April 1987 saw the

first of a series of these with a fellow DOE (NI) body, Land Registry, commence using data for the small town of Comber. This occupied six months and was followed by two others, Water Service and Roads Service, with others planned. Experience with the first indicated the desirability of a two person team from the user and this was subsequently the case.

The studies have provided a cost-effective means of allowing a potential user to assess the benefits or otherwise from the availability of on-line data, from OSNI and other sources. All have established benefits in their final reports and plans are in hand to progress by testing data communications to a remote site.

While results achieved have vindicated the policy their conduct represented a substantial strain on scarce staff resources in the development and programming areas, certainly at some expense to COMTOD.

#### (ii) Remote Sensing

1986 saw the setting up of the NI Remote Sensing Centre. This was established from the National Remote Sensing Centre at Farnborough with responsibility for the acquisition of remotely sensed imagery relating to the Province falling to OSNI, along with the managing and staffing of the Centre.

An archive of satellite and airborne digital imagery is being established in spite of the difficulty in acquiring cloud-free coverage.

At present there is no direct link to the COMTOD project but there are plans to relate data acquired for remotely sensed (satellite and airborne) sources to topographic data when resources permit. The major present usage is for environmental investigations.

#### (iii) Continued System Development

Typical management issues addressed were:

##### (a) Staffing

Optimising the staffing/equipment ratio for maximum use of available equipment.

##### (b) Security Copying

Overtime working procedures were established for dealing with all data back-up including off-site storage and for regular disk-de-fragmentation. Agreement with Trade Union side was necessary in progressing the overtime issue and

local agreement was achieved once the full importance of this aspect was realised.

(c) Macros

With increasing flowline familiarity a number of commonly used combinations were identified by the production team. Macros were duly created by OSNI thus assisting the complex coding of the geometry. A number of other operations were similarly dealt with.

(d) Further Training

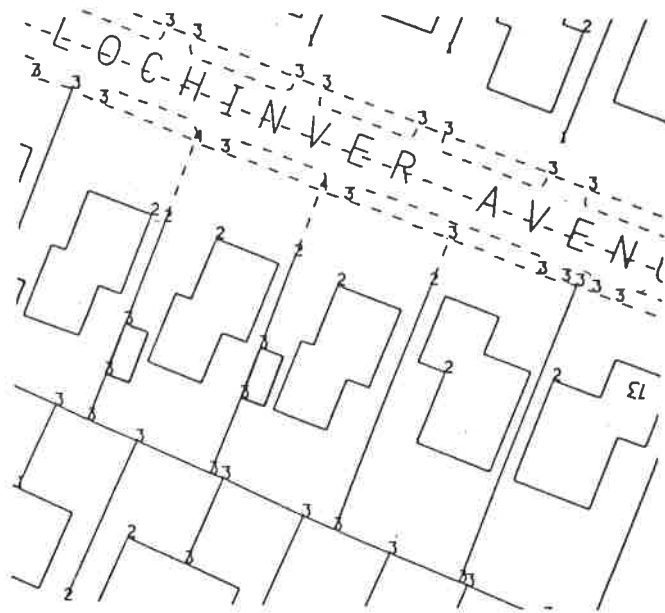
Courses in VAX cluster management and FORTRAN programming were undertaken, the latter providing the ability to streamline a number of other aspects of the operation.

(e) Problem Recording

As production developed intermittent problems with files occurred due to procedural errors and system or software related malfunctions. A formal reporting system was instigated with details logged for investigation by Systems Division or the supplier. Formalised recording is regarded as essential to keep a check on actions taken and by appropriate circulation to minimise the chance of reoccurrence.

(f) Data Validation

With the complex data structure validation was of considerable importance. Checking of geometry was a comparatively simple process but structure checking less so. To avoid costly interactive procedures structure levels were represented by various line types, symbols and area infills and verification carried out using a 2:1 plotter output. Node creation is similarly checked. Amendments to the map file are carried out by manual digitising or interactively, as appropriate.



Node Verification Plot

(g) Batch Queues

To effectively manage the system aspects were set up to run in batch during silent hours. Typical were verification plots, vectorisation of raster data, loading of digitising work files into final format, preparation of plot files, elements of Kongsberg output, etc.

(h) Menu Driven System

Accessing the software modules required was improved by developing a screen menu system which presents operators with a range of options appropriate to their flowline. This simplified and speeded up the task and allowed training of new operators on a "need to know" basis. An indirect benefit is the ease with which an outsider can understand what task is selected.

(i) Associated Data/Databasing

With the benefit of SysScan map management and DEC DATATRIEVE training staff set up all procedures in connection with database management. Extensive development

was necessary here in the holding and management of the data, its organisation being user definable.

Textual information attached to the graphic has been restricted at present to the data and nature/accuracy of the survey and the full postal address, complete with postcode for all addressable properties shown on the map sheet. The latter will provide system access for users holding data by postal address.

A lot more is possible in this area as the currency of the database is maintained.

(j) Project Visitors

The pioneering nature of the project and the interest generated meant a succession of visitors. While this was beneficial to the project and regarded as necessary it did impose at a time when other important factors required attention. An elementary point but one which others may wish to bear in mind.

(k) Beta Site Testing

1987 saw OSNI acting as a beta site for testing of a new SysScan software release. A comprehensive report was prepared outlining a number of anomalies for attention. While this imposed an additional and occasionally frustrating loading on OSNI it meant that we were better placed to influence company development direction and to quality assure for ourselves a release before actually implementing it on the production line. It is planned to follow this policy in future with SysScan's agreement. Such releases are usually associated with DEC software upgrades thereby compounding the potential problems.

FURTHER SYSTEM UPGRADE

The end of 1987 saw the addition of a second Kern DSR 11 and Phases 5 and 6 of the Review namely additional RAB1 disk capacity and field upgrade of the VAX 8200s. The latter created the major management problem due to changes in the DEC product line. This delayed the programme but negotiations between SysScan, OSNI and CCTA eventually agreed on upgrade to VAX 8350 standard as the most cost-effective alternative to meet and indeed surpass, the required performance. This was carried out within the 1987/88 financial year, but as before, in spite of lessons supposedly learnt, against the constraint of the end of financial year.

Phase 4, incorporation of the System 8750 in the cluster, was withheld at this stage mainly in view of software licensing costs out of proportion to the benefit. The software licensing area is one which must be regarded with increasing concern as the processing power of a system is built up. Similarly maintenance costs, particularly of software, escalate alarmingly. Both are aspects which in the enthusiasm of a new installation may not be given sufficient thought. Their significance for the future however must not be underestimated.

#### INCREASING PRODUCTION

With the April 1988 system coping with all work demands attention was given to further improving production rates. This had been gradually rising but with growing pressure for data (eg British Telecom (NI)) other options were explored. The main ones are outlined below:

##### (i) Raster Data Supply

An alternative flowline using scanned geometry, to be updated from latest continuous revision surveys using raster editing software, was examined as an interim provision. The updated raster data would be subsequently vectorised for input to the normal flowline for structuring. While extensive trials were carried out with suitable software digitising problems, combined with a slippage in user requirements, resulted in this being put on hold for the present at least.

##### (ii) Data Structure

An assessment of data structuring was undertaken with a view to a possible reduced specification containing a lesser number of structure levels. A discussion paper was prepared and while this is still under consideration at present, OSNI would be reluctant in light of GIS progress to change policy.

##### (iii) Re-Examination of Proven Procedures

Existing flowlines were re-examined and with reliable information available on costings and times for doing specific jobs various changes were made. Typical was suitability for scanning where the size relationship between the manuscript used for scanning and the master survey document used for manual completion are fundamental to a successful file, lack of sympathy here resulting in non-locking of data at subsequent loading.

(iv) Editing/Digitising Additions

In the production system a large number of map sheets are in the flowline at any given time, edge comparisons being a major contributory factor. This meant considerable data holdings and the necessity to "beef-up" the interactive editing facility to clear. As a result three further edit stations were added along with three manual digitising stations thus retaining an overall equipment ratio. The end of 1988 saw this in place and additional staff identified to operate same.

(v) Electrostatic Colour Plotter

The facility offered by this plotter was evaluated. A major cost-justification was identified for automated building infill stipple, presently a manual operation. Other obvious uses were structure checking and customised mapping. An Operational Requirement was issued and a 36", 400 dpi, colour plotter purchased from Precision Image Ltd.

(vi) Supplementary Flowline

Maximising the scanner potential and alternative methods of producing vector data based on scanning of up to date master survey documents were examined. The issue of an Operational Requirement resulted in a Laser-Scan VTRAK system. This provided interactive vectorising potential from raster data and included in interactive digitising capability. This equipment is presently being worked up and other data capture tasks have been identified. The VAX 3500 utilised may eventually be clustered, present connection being via the LAN.

(vii) Photogrammetry

Photogrammetric capability was supplemented with a Kern DSR 12. Those actions implemented to date have produced positive results with an increase in digital production in the order of 60% achieved. Further improvement will follow as other actions are completed but much still remains to be done.

PRESENT POSITION

The Project entered 1989 with acceptance testing of VTRAK and the colour plotter and a large number of areas lie before us for action during the present year.

(i) Technical

(a) Working up the VTRAK and electrostatic plotter into full production and adapting the flowlines to exploit the extra functionality.

(b) Continuation of investigatory studies with COMTOD users taking into account the recommendations of a consultancy study into data communications, presently in hand.

(c) To carry out a second COMTOD Review to assess processing power requirements for the anticipated build up of on-line demand. Information from the aforementioned communications study will be necessary input to this.

(d) Beta testing in June 1989 of a new SysScan software release. This will permit installation of VMS Version 5.0 instead of the present VMS Version 4.7 and allow 8350 performance to be maximised along with the extra functionality offered. The Systime 8750 will not be operable on VMS Version 5.0, a factor which will be taken into consideration in the 1989 COMTOD Review.

(e) Continued attention will be given to further developing and improving methods presently employed in the essential task of maintaining the currency of the database. This is a factor of major significance to the success of the whole G.I.S. concept.

(f) Supply of data requires a suitable transfer format. While OSNI data can be supplied in SysScan internal format or as ASCII files National Transfer Format (NTF) is planned as the supply format, each user system requiring an interface to this. A SysScan/NTF interface is presently under development.

(g) Continuation of the parallel build-up of 1:50,000 digital data on an as-required basis, in tandem with the main project.

(ii) Non-technical

(a) Completion of staff restructuring onto Mapping and Charting grades. This is essential to allow management to overcome staff resource constraints in a number of COMTOD areas and thus allow co-ordinated forward planning to meet the identified requirement.

(b) Financial aspects regarding IT Capital expenditure and COMTOD system maintenance need careful attention. As previously indicated upgrading of processors in a complex system like COMTOD can incur massive software licence increases. These can prove to be the major cost factor rather than the actual hardware. In the wake of these costs comes the all too easily forgotten, cost of contractual maintenance, a very essential aspect for the GIS.



(c) Developing further the present Liaison Committees is seen as essential in the movement towards the GIS. For success here it is imperative that all are fully aware, committed and contributing to progress.

#### LESSONS LEARNT

A number of major lessons have been learnt in the course of progress to date and while they have been mentioned earlier they are worth reiteration.

(i) The escalating costs of software licensing and maintenance as a system expands to meet a developing application.

(ii) The need for efficient system management of a highly utilized system.

(iii) The desirability of proper formalized training, appropriate to the specific job, if time-wasting data anomaly investigations are to be avoided.

(iv) For a production system dependant on reliability and consistency ensure cautious introduction of software upgrades.

(v) Allow more time than seems necessary for planning, ordering and implementation of enhancements.

(vi) Don't forget the staff aspect. Their dedication and co-operation is essential to the success of such a venture.

#### THE FUTURE

COMTOD is now a full production/development unit working towards the mid 1990s goal for digital completion of Northern Ireland. The original thinking from the early 1980s still holds good and indeed becomes increasingly vindicated by developments to date.

There are undoubtedly many problems still to be overcome by both OSNI and our co-partners in reaching the final GIS objective but all are convinced that the long term benefits from a joint, integrated approach far outweigh the initial costs and effort.

The potential from access to digital topographical data in fully structured form is beyond doubt for the future. Availability is the major constraint and OSNI feel they are addressing this by some of the best current technology. All possible will continue to be done to improve yet further production performance.

While our experiences have involved setbacks the overall trend has been progress and this will remain our unswerving policy.

Hopefully this will give encouragement to all others striving in this stimulating and rewarding field.

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**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
**MULTIFUNCIONAL**

— SICRUM —

LA MENSURATION CADASTRALE DE LA SUISSE

WALTER BREGENZER

SUIÇA

LISBOA - ANCHAL-20 a 25 Novembro de 1989

Walter Bregenzer  
Directeur Fédéral des Mensurations Cadastrales  
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1. La mensuration officielle actuelle

La Confédération a édicté les prescriptions sur la mensuration officielle qui proviennent en majeure partie des années 1920, en se basant sur l'article 950 du CCS et sur les articles 38 à 42 du titre final du CCS. A cette époque, le législateur voyait la mensuration surtout comme base d'immatriculation et de description de chaque immeuble au registre foncier, donc comme cadastre juridique; c'est pourquoi la mensuration officielle fut précisément désignée "mensuration cadastrale".

Tout le territoire de la Confédération est soumis à cette mensuration, à l'exception des lacs (d'une certaine importance) et des régions de haute montagne n'appartenant pas à des privés.

La Confédération a approuvé définitivement à peu près 60 % de la surface à mesurer et à peu près 16 % provisoirement.

La mensuration officielle comprend la triangulation de IVe ordre, la mensuration parcellaire, le plan d'ensemble et la mise à jour de ces documents.

La triangulation de IVe ordre représente la base géodésique indispensable à tous les travaux de mensuration. Elle se compose de points fixes stables matérialisés (bornes spéciales, clochers, pylônes etc.) dont les coordonnées ont été calculées au cm près à l'aide de mesures de précision. L'ancien observatoire à Berne forme le point zéro des coordonnées. La densité de ces quelque 70'000 points fixes varie à peu près entre 1 à 3 points par km<sup>2</sup>. L'établissement et l'entretien (très important) de ces points sont de la compétence des cantons, sous la haute surveillance technique de l'Office fédéral de topographie.

La mensuration parcellaire a pour tâche centrale de déterminer à haute précision la situation de propriété au sol et de la maintenir constamment à jour. Son produit le plus connu est le plan cadastral aux échelles

1:200 (régions urbaines), 500, 1000 jusqu'à 2000 (forêts et pâturages) et 1:5000 ou 1:10'000 dans des régions à exigences réduites de précision (régions de montagnes). Dans la plupart des cantons, l'établissement et la mise à jour de la mensuration parcellaire sont du ressort de l'un des quelque 270 bureaux privés de mensuration de la Suisse.

Le plan d'ensemble enfin existe sur presque toute la superficie de la Suisse. C'est aux cantons qu'il appartient de l'établir et de le mettre à jour dans les échelles 1:2500, 5000 ou 10'000. Son contenu est identique dans une large mesure à celui de la carte nationale 1:25'000, mais les courbes de niveau y sont représentées à 10 m d'équidistance (= écart vertical), voire à 5 m dans des régions peu accidentées.

Le catalogue "Plancato", édité par la Direction des mensurations cadastrales en collaboration avec les cantons, fournit de plus amples indications sur l'état de la mensuration parcellaire et du plan d'ensemble, sur l'organisation de la mise à jour et d'autres données intéressant les utilisateurs. Ce catalogue peut être commandé auprès de chaque service cantonal du cadastre ou de la centrale cantonale des plans. L'Office central fédéral des imprimés et du matériel, 3000 Berne, livre également le "Plancato", partie suisse, (sans les données cantonales) (form. 406.210).

#### Problèmes de la mensuration officielle actuelle

A l'heure actuelle, la mensuration parcellaire n'existe que sur environ 3/4 de la surface à mesurer de notre pays. Un achèvement accéléré est en cours, le Conseil fédéral ayant approuvé en 1981, en accord avec les cantons, un programme concret pour la mensuration officielle qui prévoit l'achèvement des premières mensurations d'ici l'an 2000. Toutefois, ce programme ne pourra pas être tenu par un petit nombre de cantons, car par ex. des remaniements parcellaires manquants retarderont la mise en oeuvre de la mensuration parcellaire.

Les plans existants, dessinés sur cartons, films ou plaques d'aluminium recouvertes de couches de papier, présentent des dommages de vieillissement dus à l'utilisation fréquente qui souvent ne peuvent être atténués ou éventuellement réparés qu'à très grands frais.

Depuis la 2ème guerre mondiale, la mise à contribution multiple de notre sol a rapidement augmenté au cours des années et le besoin d'un complément d'informations sur la situation réelle de notre sol et sur son utilisation s'est fait fortement sentir. Il apparaît toujours plus que la mensuration officielle représente l'organisation idéale pouvant répondre au mieux à un tel besoin.

Car les plans de la mensuration officielle sont aussi utilisés dans toujours plus de domaines extérieurs au registre foncier comme bases pour la représentation d'informations particulières: aménagement du territoire, bâtiment et génie civil, protection de l'environnement, protection civile, eaux et forêts, entreprises de distribution et d'évacuation etc. Tous ces services ont besoin de bases exactes mises à jour.

Très souvent aussi, les divers utilisateurs désirent des plans à d'autres échelles que celles des plans originaux existants. Une modification d'échelle conduit soit à une solution graphique insatisfaisante, soit à une solution trop onéreuse - si elle a lieu par nouveau report et nouveau dessin.

Le nombre d'utilisateurs des documents cadastraux extérieurs au registre foncier accroît aussi le travail fait à double pour la mise à jour de ces plans, si les utilisateurs sont tenus d'avoir une représentation actuelle de la situation.

Enfin, il ne faut pas taire que l'état de mise à jour des plans laisse à désirer: seuls les limites et les bâtiments sont le plus souvent mis à l'état actuel. Tous les autres contenus du plan (par ex. les lisières de forêts, les eaux naturelles, les constructions non soumises à autorisation etc.) présentent encore souvent la situation à l'époque de la première mensuration - à cause d'un système d'annonce déficient.

L'environnement modifié, avec ses exigences accrues quant à la mise à disposition d'informations à référence spatiale, d'une part, le développement technique, d'autre part, tout particulièrement dans le domaine du TEI, ont engagé le DFJP à désigner une organisation chargée d'élaborer des projets de réforme pour la mensuration officielle.



SEMINARIO INTERNACIONAL  
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REFORM OF THE CADASTRAL SURVEY IN SWITZERLAND

WALTER BREGENZER

SUIÇA

LISBOA./FUNCHAL-20 a 25 Novembro de 1989



## Reform of the Cadastral Survey in Switzerland

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### 1. Problems of the actual cadastral survey

Today the cadastral survey covers only about 2/3 of the country. New solutions must be found in order to terminate the survey over the whole country within the year 2000.

The actual survey consists of maps with distinct scales. However, more and more plans are needed in different scales with various information contents. The actual original plans furthermore suffer from physical ageing, and simply by wear and tear. Cultivable and building land is becoming scarce in our country, and thus asks for more information on its actual and legal conditions in order to ensure appropriate economic use and administration. This demand can no longer be satisfied by the actual cadastral survey.

### 2. The new concept

An important project committee has been established in order to solve these problems. This committee has delivered its final report in the spring 1987. This report has then been submitted to various interested parties for comments and on from 1988 it is planned to proceed to the adoption of the different laws and regulations. We hope to conclude this phase within 1990. The new conception must take the following precautions into account:

All existing and future surveys must be executed in a numerical way and the information contents should be extended to the following information levels:

1. control points
2. soil cover
3. single objects and line elements
4. local names
5. ground property
6. easements rights established by acts of men
7. legal rights established by law
8. utility services
9. altitudes
10. nature of use
11. administrative boundaries

All these data must be continuously kept up to date. The data-output must be very flexible; that is to say that the scale, size, figures and contents of the plans have to be easily adaptable to the user's need. The information levels can be combined in an arbitrary way. In this way levels 1 - 4 correspond to a general basemap, whereas levels 1 - 6 correspond to the cadastral survey, and all levels together will give a multipurpose cadastre.

- establishment of orthophotos (for different applications, but also for a simplified survey in extensively used mountainous areas)
- cadastral renovation

Up to now, our experience showed that the increasing application of photogrammetry as a method for data-acquisition can lead to very interesting solutions as from an economical point of view. It was possible to deflate the costs of about 30% in a recent application of that technique for 50 municipalities in the mountain areas of the Graubünden Canton.

## 6. Perspectives

The last decades have shown that users-requirements in cadastral plans and registers have increased enormously. The use of land has become much more intensive and land has become more and more a scarce commodity. This fact leads to an increase of public laws reducing property-rights. Up to the present, there is no information-system about this kind of property-restrictions. Moreover, plans of different scales, different contents, different sizes are in increasing demand by all kinds of users.

These facts made us found a working-group, assisted by professors of the Economic-University of St-Gallen. This group is charged on developing proposals for the following problems:

1. Distribution of the costs for future data-registration and data-management in Cadastral Survey
2. Organization and finance of local or regional Land-information-systems.

We expect the final report in summer 1990. It will be the base for the realization of the project which is timed for 1991.

We are convinced that the new cadastral survey will be able to fulfil the new requirements. In future the cadastral survey will increasingly assume a coordinative task as far as data of spatial references are concerned. We are convinced that the cadastral survey will fulfil in this way an economically important and useful task.

30.10.1989





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ITALIAN CADASTRE

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ITALIA

LISBOA... ENCHAL-20 a 25 Novembro de 1989

Seminario internacional sobre catastro  
rustico e urbano multifuncional  
S I C R U M

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ITALIAN CADASTRE

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Summary

In this paper the Rural Italian Cadastre created between 1886 and 1956 is presented. As from 1968 the updating for administrative census documents has been automated, and it is now extended to all the Nation. As from 1984 the digitizing of the cadastral map was carried out.

The New Urban Italian Cadastre created between 1939 and 1942 is also presented. The updating for administrative census documents has been automated from 1988, and it will be extended to all the Nation by the end of next year.

The more significant requirements and some of the programs for the automation are described herewith.

### 1. The Rural Cadastre

The Rural Cadastre was created between 1886 and 1956. It was carried out essentially for fiscal purposes by giving geometrical elements of the property (with no legal status) and surveyance elements necessary for the formation of taxable earnings. It was also carried out for civilian purposes, to enable the exact identification (boundaries, extension and shape) of land plots, the so called "parcels".

The documents concurring to the formation of the Rural Cadastre are available for each censused Municipality as follows:

- 1) parcel map;
- 2) list (or index) of parcels;
- 3) list (or file) of parcel's numerical references;
- 4) list (or file) of owners.

The automation of storage procedures, such as updating administrative census documents for land surveyance, started in 1968, and it was progressively extended to all the Nation. The organisation was initially of a centralized model and was built up around a DP center, linked to the periferal Cadastral Departments (about 100 for all the Nation). The updating was carried out by batch procedures. Errors were detected and reported to the periferal office, and corrections we-

re then made by teleprocessing.

The new data, plotted on paper sheets, were sent to the peripheral Cadastral Dept. that then carried out the updating of their own registers.

This kind of organisation has many drawbacks, such as the great number of manual and repetitive jobs, the amount of library space at the peripheral offices and, finally, the complexity of running teleprocessing network.

Due to this complexity, the Italian Cadastre has recently adopted a decentralized however controlled organisation. At present time every Cadastral Dept. has its own DP center, equipped by a mini computer (DEC VAX), and it is possible to update cadastral files in real time, by using appropriate applicative programs.

It is possible to eliminate progressively hard copy files at the peripheral offices and to produce visual and certified documentation for the users.

It is also possible to supply other offices with some terminals, especially in those towns where a Cadastral Dept. does not exist. The Cadastral Dept. of Forli has in such way supplied some terminals to the Municipality of Rimini, and it is foreseen to link some attorney offices to the computer of the Cadastral Department.

Another important achievement is the integration of the administrative files of the Cadastre with digitized maps, in those Departments (only fourteen at the present time) where a Nu-

merical Map exists.

Finally, it is foreseen to link the data of the Cadastral department with the Land Property Registrar's Offices ("Conservatorie dei Registri Immobiliari"). Infact, the legal status of the property cannot actually be certified by Cadastral Dept.. To ensure the appeal of third parties to judicial negotiations, it is necessary to apply to the Land Property Registrar's Offices. Such offices have a probatory character, as they ensure certitude of rights in the property field, whereas the Cadastral office ensures full knowledge of land, as far as identification of buildings and related owners are concerned.

#### 1.1. Cadastral mapping

Italian cadastral maps are available at the following scales:

- 1:1,000 for town areas;
- 1:2,000 for rural areas.

Moreover albeit in a minor quantity, 1:4,000 scale maps (for scarcely populated and particled areas) and 1:500 scale maps (for some archeological areas or having particular interest) are available.

As a whole, the geometric features for some 70 million particles are included on over 310,000 sheets, the "mean age" of map sheets being 50 years.

About three fourths of the whole national territory have an



acceptable mapping presentation; digitizing is therefore underway over such an extension.

Time foreseen for completing such process is 10 - 12 years approximately, according to financial availability.

For the remaining part of national territory, the drawing up of new maps is at present mostly made by aerial photogrammetry. The coordinates of vertexes of particled geometry and mapping references from stereoscopic model and integrating measurements on the ground are digitized and filed in a magnetic storage.

#### 1.2. Digitizing of cadastral map

Digitizing of cadastral map, formation and use of the consequent data base are carried out through the following stages:

- input of geometric data;
- input of administrative data;
- operation of data bank (updating of geometric and administrative data);
- use of the data bank (issuing of certificates, tax levying, ....)

The input of geometric data will only be considered herein, which can be made by means of a digitizer or a scanner.

In a most synthetic way the following items have been studied and normalized:

- methodologies, requests of resolution and accuracy for which a digitizer is used with at least 1/40 mm resolution and at least 1/10 mm accuracy through all working line;

- printing of checking lists to correct registration errors, if any;
- computing to transform instrumental coordinates into mapping coordinates, by the least squares method and utilizing not less than six orientation points;
- computing for checking particle areas, whose summing up must correspond to the total area as registered on cadastral books;
- computing for checking and compensation of sheet boundaries, because the vertexes of particles on such sheet boundaries must have mapping coordinates strictly even to those of corresponding vertexes of adjoining sheets;
- computing for compensation of the coordinates of particle vertexes, as each particle must have congruous coordinates of both common vertexes and adjoining particles;
- organization and system for data bank, to be achieved by hierarchical levels.

After carrying out various checking measurements, the maximum error affecting the planimetric position of well defined points on the original maps at 1:2,000 scale resulted to be 40 cm.

### 1.3. Updating process of the map

In each cadastral sheet, "fiducial points" have been defined to which any surveys entailing map variations must be tied, both if such surveys are carried out by the Cadastral Dept. staff or qualified independent consultants. All surveyed data must be made known to the Cadastral Dept..

On every "fiducial point" a hierarchical code is associated

with its "reliability" which is from 1 (maximum, for trigonometric vertexes of 1st order) to 12 (minimum, for border landmarks surveyed during revision and tested by the Cadastral Dept.).

Each cadastral technical office has been equipped with a computer exclusively used for the updating process of the map, i.e. for the storage filing and then computing of all main data made known to the Cadastral Dept..

In such a way, by means of subsequent updatings, it will be possible to modify the coordinates, increasing the reliability of "fiducial points" with those revising elements.

## 2. The "New" Urban Cadastre

The formation of the "New" Urban Cadastre started in 1939; the aim was to impose a property - tax based on the income of the building, and to constitute a general building survey.

The documents that constitute the Urban Cadastre for each censused Municipality are:

- 1) list (or file) of numerical references;
- 2) list (or file) of the owners;
- 3) numerical reference file pertaining to land maps.

There are also some other complementary documents, as maps, certification and classification indexes, and so on.

Furthermore, a planimetry is stored for each individual urban property unit (a living flat, a garage, a store, ....), but it is not considered a "legal document" of the Cadastral Dept.. Nevertheless, a copy of planimetry is often required for reference purposes.

All the modifications in each individual urban property must be made known to the Cadastral Dept.. In a medium - size Cadastral Dept. like Florence, about 40.000 transfers of property occur each year, and 10 - 20.000 variations or new buildings.

The procedures for storage and updating of files were very complex, as they were almost manually updated on hard copy.

Nowadays the automation of the ownership files and of the numerical listing has been implemented. A more thorough local management of the above documents by computer is now possible.

Furthermore, the revision of the urban register system is under study. Such study has defined an automated system of parameters for the attribution of land income for single declared new property units. The first test, in the Cadastral Dept. of Pesaro e Urbino, is encouraging.





**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
**MULTIFUNCIONAL**

— SICRUM —

DIGITAL CADASTRAL MAP OF FLORENCE

ROBERTO BRIOLI

ITALIA

LISBOA... NCHAL-20 a 25 Novembro de 1989

**Seminario internacional sobre catastro  
rustico e urbano multifuncional  
S I C R U M**

<sup>s</sup>  
LISBON, 20 -21 November 1989  
FUNCHAL, 22 - 25 November 1989

**Digital Cadastral Map of Florence**

R.M.Brioli, Ufficio Tecnico Erariale  
di  
FIRENZE

**0. SUMMARY**

An achievement by "Centro di Calcolo e Catasto Numerico dell'Ufficio Tecnico Erariale di Firenze" ("Digital Cadastral Center of the Cadastral Department of Florence") is presented herewith.

The work consists in the transformation of the traditional cadastral map (n°279 sheets, 80% at the scale of 1:1000 and 20% at the scale of 1:2000), previously digitalized and updated, into a different cartografic product, available both in the original "DST" format used by the Cadastral Dept. and in the "NTF" format, to allow exchange of information among various LIS.

This new product has been plotted in n° 79 map sheets, 60 x 80 cm, at the scale of 1:2.000 and it has been inserted in the so - called "Urbanistic Grid" utilized by the Municipality of Florence.

**1. INTRODUCTION**

The Municipalities have some difficulties to release the "town-planning certification", necessary by law for every transfer of property. This happens because the Urban map, on which town-planning is drawn, is often not correlated with the Cadastral map, by wich the identification of each

property is possible (with no legal status actually)

In order to overcome this difficulty, the Municipality and the Cadastral Dept. of Florence have reached an agreement. On this respect, the Cadastral Dept. has carried out a new map (both plotted and numeric) at the same scale of the urban map and in the same reference grid. Furthermore, the Cadastral Dept. shall update this numeric map, in order that the Municipality have the possibility to identify each property at all times, and may it control the property use in agreement with the land use laws.

In this paper the work's organisation is presented and the procedures followed to carry out this new cartographic product. To such purpose, however, a short presentation of the cadastral map of Florence has to be done.

### 1.1. CADASTRAL MAP OF THE COMMUNAL TERRITORY OF FLORENCE

The cadastral map of the communal territory of Florence consists in 279 sheets (and enclosures), besides 30 "expansions" for areas having particular interest; on the whole there are 97.000 parcels at present.

The cadastral map is available as follows: 80% for town areas, at scale of 1:1.000 and 20% for scarcely populated and rural areas, at scale of 1:2.000.

The maps are with "closed perimeter" (which means that every parcel has all its boundaries in the same sheet), according a CASSINI-SOLDNER system having its origin in Siena-Torre. The original maps were drawn on paper sheets of 65x95 cm (fig.1); now they are drawn in astralong sheets to permit reproduction.

Digitizing was carried out by the "Digital Cadastre Center of the Cadastral Dept. of Florence". Digitizing for the whole Nation is carried out by SOGEI, a private firma, at present time. A "hierarchical" data-base on logical levels was created. The data-base is on a "Sysscan" (ex "Konsberg") system, by means of DIGITAL/VAX-VMS computer. The data base is called "DST".

All informations related to single sheets are in



single file. Each file has graphic elements (points, lines, symbols, text...), logical elements and logical levels.

The logical elements identify surfaces having cadastral interest, i.e. parcels, buildings, water, boundaries, and so on. They are defined like "area" and identified by a "user-code" (parcel number) and by their own level as well.

Logical levels are identified by organized blocks in a tree shaped structure.

All data must be continuously kept up to date. The data-output must be very flexible; scale, size, figures and contents of the plans have to be easily adaptable to the user's need. Obviously, there is a link with the administrative data, so that it is possible to obtain the complete cadastral situation of a single parcel.

The information levels can be combined in an arbitrary way, and it is possible to modify the structure of the level in an interactive way; it is also possible to add other levels, thus obtaining a multipurpose cadastre.

## 1.2. UPDATING OF THE EXISTING CADASTRAL MAP

Some control measures were carried up to verify the reliability of the digitized co-ordinates. Such measures were done especially in those zones with a more recent expansion, in which cadastral measures are taken care of by private surveyors. Central zones, surveyed by Cadastral Dept. and with few new buildings, have in fact a good reliability. By means of other tests, a medium difference of 35 cm between the digitized and calculated position of well-defined points (corners of buildings, especially) has been pointed out. Some precision polygonals were carried out, by a AGA 136 distanziometre: most significant data are given in fig. 2.

About 600 buildings were surveyed. For 300 buildings the co-ordinates calculated were compared with the co-ordinates coming from digitalizing of the existing cadastral map and stored on DST data-base. The linear discrepancy  $\Delta L = \sqrt{\Delta x^2 + \Delta y^2}$  was calculated.

fig.2

N. POLIG.	TOTAL LEN.	MED. SIDE	SIDES
POL 1	5217.91	474.35	11
POL 2	1206.02	603.01	2
POL 3	3620.03	452.51	9
POL 4	3812.90	762.58	5
POL 5	2244.44	448.89	5
POL 6	1862.16	310.36	6
POL 7	4567.48	761.25	6
POL 8	1163.29	129.25	8
TOTAL	23694.23		

The " $\Delta L$ " distribution is not uniform in the Municipality's territory, but it is always congruent for a scale of 1:2000. The maximum value is  $\Delta L = 0.69$  m in the town's North-West area ("Osmannoro" neighborhood), the minimum is  $\Delta L = 0.29$  m in the South-West area ("Isolotto" neighborhood); the medium value is  $\Delta L = 0.48$  m, actually not so good as in the central zone, sufficient however for a scale of 1:2000.

### 1.3. SPECIFIC REQUIREMENT OF THE MUNICIPALITY OF FLORENCE

The new cartographic product required by the Municipality of Florence is specified in the agreement. As provided in the contract, the Cadastral Dept. has to transform the n.279 files DST (i.e., the cadastral digitized map of Florence) into n.79 files, covering the whole territory of the Municipality. The co-ordinates have to be referred to both to the Cadastral system (Cassini-Soldner) and to the regional system (Gauss-Boaga); every file must be plotted on an astralong sheet, with a dimension of drawing of 60x80 cm (see fig. 3 and 4).

The sheet has two frames: the Gauss-Boaga grid is in

the inner side, the Cassini Soldner grid is in the external side.

The new sheet, coming out from the assembling of different cadastral sheets (till to the maximum of 21 different cadastral sheets giving origin to a new sheet) is with an "opened perimeter", i.e. the particles near the border are "cutted". The new sheet contains the same geometric elements and the same information as the original cadastral map (parcel number, texts, symbols,...).

Another drawing required by the contract is a "union table", at the scale of 1:20000, in which the two maps with the relative reference grid are represented (fig..5).

Another product required is a magnetic tape containing the original DST files (n.279) and another tape containing the new ASCII files (79).

The last product required is a tape containing the original files in the NTF format, to permit data exchange between different LIS.

## 2. ELABORATION PROCEDURE

The process for the elaboration essentially consists of three different steps:

- study of algorithms to obtain the above described cartografic product by means of batch procedures as much as possible;
- interactive revision, by means of work-stations, to eliminate all redundant elements;
- creation of plotting files and drawing up of the map.

### **2.1. MAKING THE NEW CARTOGRAFIC PRODUCT**

The first operation has been the transformance of the original cadastral co-ordinates into the Regional system

of co-ordinates (Gauss- Boaga).

To this effect, the Cassini-Soldner co-ordinates were first transformed into geografic co-ordinates to be made into Gauss-Boaga system. Obviously, in such transformation, the variation of reference ellipsoid and the azimuthal variation were considered.

The co-ordinates of 12 points per sheet were inityially transformed, and the whole file was subsequently reorganized by means of a Syscan program called "DSTREORG". All such operation and tranformation, startig from the sorting out of 12 points, were made in a batch way.

Another procedure was adopted to carry out the Regional grid, and to place in a file the co-ordinates of all the frames necessary for new DST structures and for plotting the parameters.

At this stage, the most important problem was to cut all those parcels crossed by the border of the sheet. Infact, the DST structure associates the area concept to every logical element, and by cutting the parcel the area concept proper ceases to be.

The solution was to interrupt some connections, so removing area blocks, but keeping all related data in temporary files. Such data were also necessary to restore texts, giving new dimension and parameters fit to the new parcel's shape.

Next step was, by using the Sysscan "EXMAN" procedure, the "merging" of the cadastral sheets relative to every grid's element, and the "clipping" of the parcels inside the frame, so creating the new DST data base.

## 2.2. INTERACTIVE REVISION

The new data-base had some redundants elements, placed on the border of the cadastral sheets, such elements being sometimes repeated or overlapped. An interactive revision was necessary, utilizing the Sysscan "GINIS" procedure.

Operating by work-stations, all repeated or

overlapped elements were eliminated, and all variations to the shape of the text were carried out, as well as to the dimension and the direction suitable to obtain better readability.

Other operations which were not possible by means of a batch procedure, as some attribution of correct pen number for the drawing, some particular links to appropriate levels, were done at this stage. Upon ending of all these operations, a plotting by a electrostatic plotter was made, to achieve final controls before final drawing up.

### 2.3. FINAL DRAWING UP

Using frame files, it was possible to identify the relationship between plotter parameters and the co-ordinates of the border, well fitting astralong sheet on the table (a "KONSBERG DM 1216" plotter).

Such last step required many tests in order to choose the appropriate pens and ink, height of plotter head, working speed and acceleration, pressure, pen cleaning, .... Continuous care was taken, in order to allow an immediate intervention, if necessary.

All described steps had a further difficulty. Each new file requires in fact about 2, 3 Mbytes to be processed: consequently, some sectors limitation of files and memory compactation were necessary, by using the DSTREORG program.

Copies of files were made during each stage, therefore obtaining the second product required by the Municipality.

### 3. CONCLUSIONS

The possibility of using the Cadastral Map for other purposes by transferring it to digital form is obvious. Accuracy and graphical representation requirements must be well known.

For the requirements of the Municipality of Florence

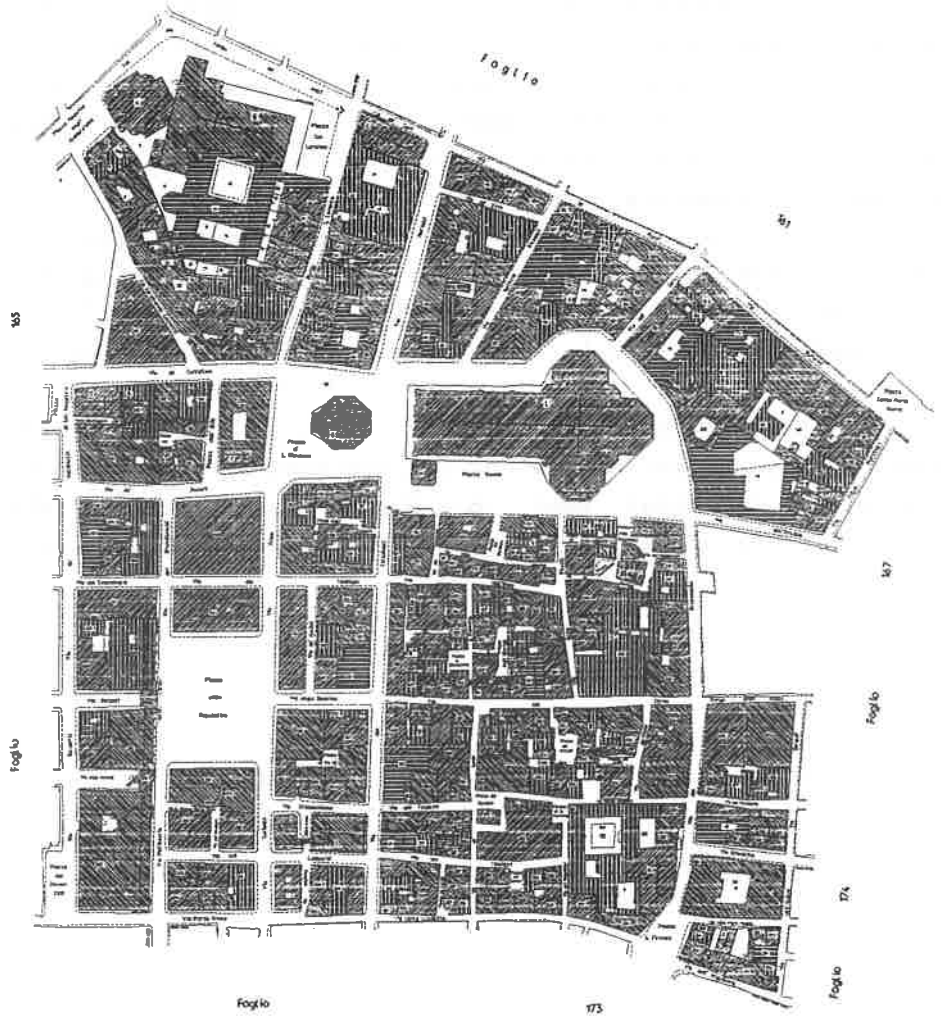
the substantial accuracy for a scale of 1:2000 of the Cadastral digitalized map has been tested. For different purposes it was thus possible to utilize the cadastral map from other public authorities (the Municipality itself in the above case).

The Cadastre is infact not only the body to collect property taxes and to find out legal rights at the "Land Registrar's Conservatory Office", but it is as well the body for the control of the property use in agreement with the land use laws, and finally it serves the purpose as a basis for physical planning, construction planning, etc..

The flexibility offered by the Cadastral digitized map, i.e. the possibility of extending or changing the structure of logic levels, permits a correlation with other data-bases (in this case, a link with urban planning is expected).

Another important fact is that, at present time, every survey entailing map variations must be made known by law to the Cadastral Dept. in a digital form (starting from January 1989), therefore it is easy to update the data-base.

Foglio 158



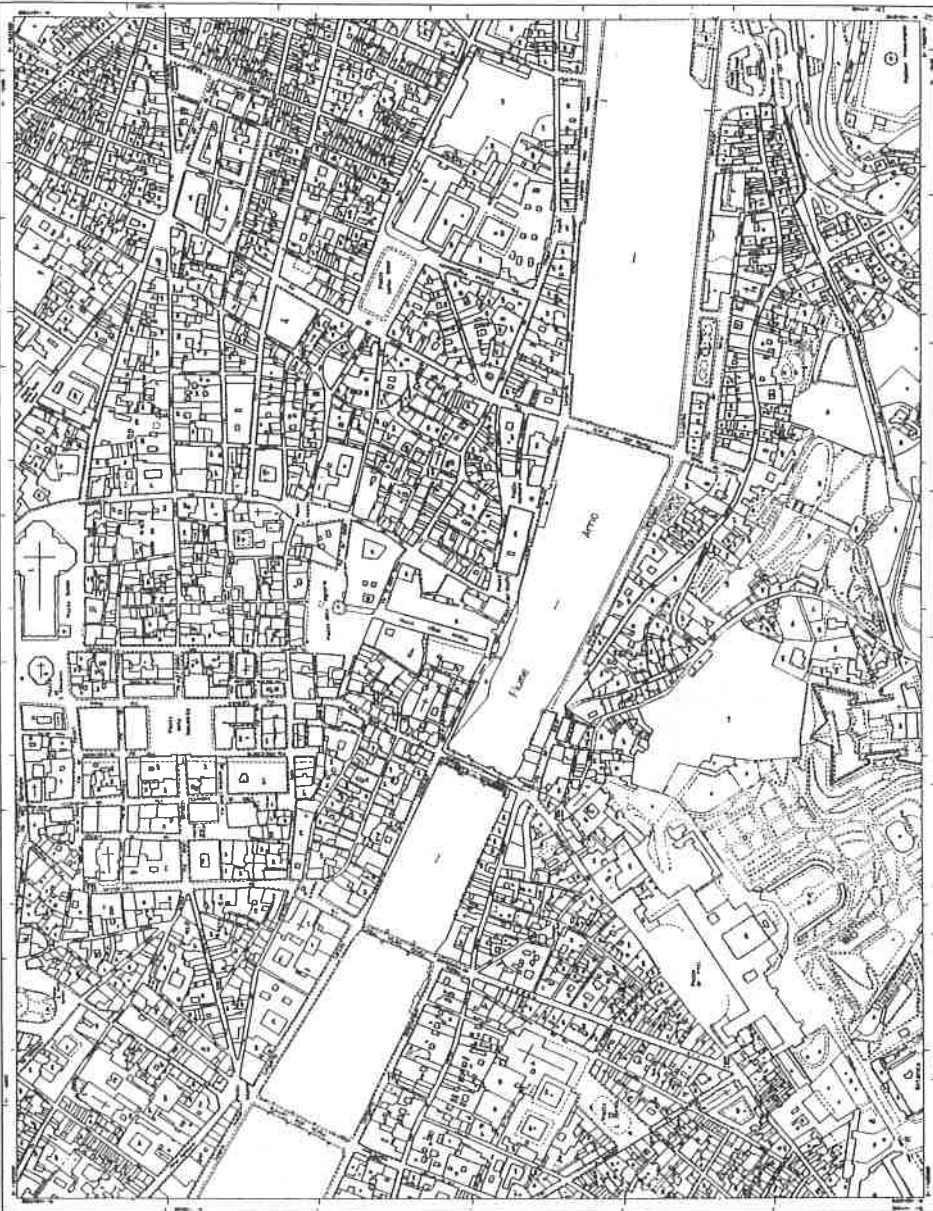
PROVINCIA DI FIRENZE

Comune di Firenze

Foglio N. 166

Scala 1:1000

- figura 1 -

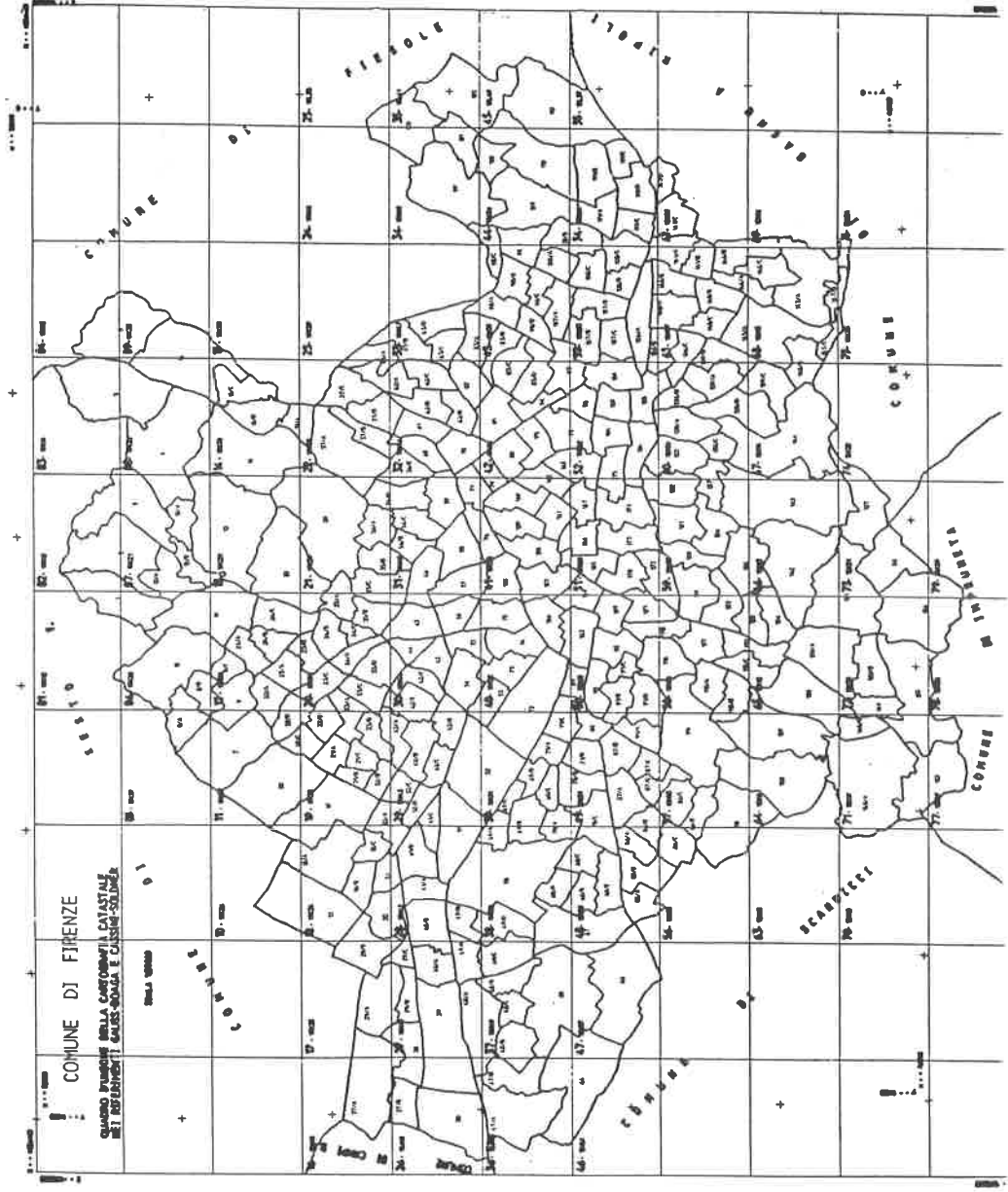


- figura 3 -





- figura 4 -



- figura 5 -





SEMINARIO INTERNACIONAL  
SOBRE  
CADASTRO RUSTICO E URBANO  
MULTIFUNCIONAL  
— SICRUM —

OS NOVOS CONCEITOS DE SISTEMAS DE INFORMAÇÃO GEOGRÁFICA  
(SIS/LIS) INTEGRANDO INFORMAÇÃO TOPOGRÁFICA, CADASTRAL  
E TEMÁTICA

SIMEÃO CAMBACO

MOÇAMBIQUE

LISBOA, PINHAL-20 a 25 Novembro de 1989

DIRECÇÃO NACIONAL DE GEOGRAFIA E CADASTRO

OS NOVOS CONCEITOS DE SISTEMAS DE INFORMAÇÃO GEOGRÁFICA  
(LIS/GIS) INTEGRANDO INFORMAÇÃO TOPOGRÁFICA, CADASTRAL E  
TEMÁTICA

POSSIBILIDADE DA SUA INTRODUÇÃO EM MOÇAMBIQUE

AUTOR: SIMEÃO V. CAMBACO  
(Eng<sup>o</sup> Geógrafo)

### ABSTRACT

Cadastre is one of the oldest practices man has ever known. It is a very important tool for administering land, whether it is for taxation or juridical purposes. It is sometimes necessary to relate ownership status to taxation.

The need for a more integrated Cadastral system was necessary. The multipurpose cadastre came to life as a result of such a need. This in turn has been boosted by the advent of computers which made possible the computerisation of cadastral records. Thus data bases are created to aid the management tasks, for it is possible to store information in them and retrieve it quickly and efficiently.

This paper attempts to analyse the LIS/GIS trends and it examines its possible application in Mozambique. The various constraints are also looked at.

## GENERALIDADES:

Sistemas de Informação Territorial, como o próprio nome sugere, são acerca da Terra, isto é, acerca de dados espaciais, recursos e a sua gestão. A gestão eficaz de quaisquer dados relacionados com o terreno, embora conceptualmente simples, apresenta uma série de factores que concorrem quer positivamente quer negativamente. Importa realçar, desde já, que a componentes mais importante na implementação de LIS é negavelmente a económica.

Por outras palavras, o nível de desenvolvimento económico do País é que determina o grau de automatização de qualquer sector da vida desse País.

Os países em vias de desenvolvimento encontram-se na linha da frente nesta desvantagem, quer dizer, são os mais afectados sob o ponto de vista económico daí que a implementação do Sistema de Informação do Terreno (LIS) não esteja imediatamente ao seu alcance.

LIS é o ponto culminante do cadastro multifuncional (multipurpose cadastre), pelo que a sua materialização passa necessariamente pela realização do Cadastro nos seus diversos aspectos, nomeadamente o Cadastro jurídico, o Cadastro fiscal e, por assim dizer, o Cadastro de Serviços.

Por outro lado, é com a materialização de um cadastro eficiente que os países em vias de desenvolvimento exclusivamente de economia agrária, poderão melhorar as suas economias em geral. As transacções de terras alguns países, assim como a cobrança de impostos constituem um grande contributo para o cofre do Estado. O Sistema de Informação de Terreno fornece dados que ajudam a quem de direito para a tomada de decisões adequadas e para a planificação económica.

### 1. O CADASTRO E OS SEUS VÁRIOS ASPECTOS

A Terra é a base de qualquer forma de riqueza. É sobre a Terra que as actividades humanas se desenvolvem. Por conseguinte, o conhecimento exacto da extensão disponível a qualquer momento é de primordial importância quer sob o ponto de vista de tributação, quer sob o ponto de vista de planificação agro-económica.

O Cadastro, não é mais do que um inventário metodicamente arranjado, de dados de propriedades num dado país, ou região; baseado no levantamento das suas confrontações (limites); tais propriedades são sistematicamente identificadas por designação separada. Por outras palavras, o cadastro tem por objecto a identificação e a descrição de uma dada porção de terreno tanto sob o ponto de vista, juridico-fiscal como sob o geométrico.

O cadastro multifuncional é o instrumento fundamental para o fornecimento de dados inerentes a aspectos jurídicos, fiscais e serviços. Conforme o fim a que o cadastro se destine, as expressões cadastro jurídico, fiscal e cadastro de serviços são empregues. Assim, designa-se por cadastro jurídico quando está relacionado com a "posse" da Terra, isto é, o registo oficial de direitos de que um cidadão desfrute duma porção de Terra.

É este tipo de cadastro que "inter alia", confere e protege os direitos de propriedade, ou, no caso de Moçambique, confere e protege os direitos de uso e aproveitamento da Terra.

Quando o cadastro se destine à cobrança de impostos ou taxas, a expressão cadastro fiscal é usada.

Importa, porém, referir que tanto o cadastro jurídico como o fiscal precisam duma fonte de informação. A colheita de dados para efeitos cadastrais pode ser feita de diversas formas. Alguns dados podem ser obtidos directamente do campo utilizando instrumentos próprios para o efeito tais como taqueómetros electrónicos, universalmente conhecidos por "estações totais"; de cartas já existentes, de relatórios, só para mencionar algumas fontes. Para efeitos de cadastro geométrico, computadorizado os taqueómetros electrónicos são os mais ideais, porquanto facultam dados directamente na forma digital (vectorial).

O cadastro deve constituir um instrumento de criação de riqueza e de planificação.

Nos países em vias de desenvolvimento tem-se assistido à proliferação de "bairros da lata" (shanty towns) onde as condições de vida estão muito aquém das condições consideradas aceitáveis. Nestes "shanty towns" não há as mínimas condições de saneamento, não há água canalizada, etc.

Estas condições devem-se à falta de mapas na devida escala que possam ajudar no processo de planificação de recursos materiais e humanos. Como será demonstrado na próxima secção, o cadastro deve abarcar não só aspectos de duas dimensões mas também na terceira dimensão. Isto equivale a dizer que, o cadastro deixa de ser para um só fim, por exemplo, legal e passa à multitude de funções. Tal estado das coisas oferece uma série de vantagens, nomeadamente:

- a).- Possibilidade de porcionar quaisquer informações sobre as características de uma dada parcela de terreno.
- b).- Garantia de uma conservação menos dispendiosa e de certa confiança aos utentes de terra. Este aspecto está em directa conexão com transacções de terras não registadas as quais podem ser, por vezes, fraudulentas.



c).- Estímulo aos investimentos na terra. Com efeito, os credores só podem prontificar-se a conceder créditos se houver qualquer garantia de investimento.

d).- Redução de litígios devido a várias razões, dentre as quais sobreposições de parcelas ou múltiplas transacções da mesma porção de terreno.

Se bem que argumentável, o certo é que em muitos países em vias de desenvolvimento, têm-se verificado muitas disputas relacionadas com a terra.

e).- Identificação rápida e eficiente de qualquer parcela de terreno para efeitos de impostos. Aliás, esta foi a função primeira do cadastro desde o alvor da História.

O conceito de cadastro multifuncional é simples como se viu. Uma das características mais importantes para que o cadastro seja multifuncional é que tenha o mesmo sistema referencial. Quer dizer, tem de se adoptar um sistema de referência que seja universal, permitindo assim o relacionamento de dados dum ponto com dados doutro ponto da terra ainda que milhares de quilómetros um do outro. Isto equivale a adoptar um sistema geodésico de referência combinado com a correspondente rede de ordem superior. A este propósito, e a título corroborativo podemos evocar J. Bernstein (1985) a qual frisou que os elementos básicos de um cadastro multifuncional eram "inter alia" a rede geodésica, uma série de cartas topográficas, mapas cadastrais

O cadastro para fins múltiplos é, por assim dizer, a fundação do sistema de Informação do Terreno. Aliás, o cadastro é também um sistema de Informação do Terreno diferindo apenas na unidade de trabalho que é, neste caso, a parcela.

De acordo com estudos feitos em centros de renome, os custos de estabelecer um cadastro multifuncional são bastante avultados correndo na ordem de alguns milhões a centena de milhões de dólares americanos. os custos por hectare são avaliados entre 12 e 30 dólares americanos. nas zonas mais; e entre 65 e 10.000 dólares nas áreas urbanas (valores deduzidos dos dados de (J.Bernstein tendo em conta a depreciação do dólar americano).

### 1.1. SISTEMA DE INFORMAÇÃO DO TERRENO (LIS): A FORMA MAIS COMPLETA DO CADASTRO.

O Sistema de Informação do Terreno (LIS), como se viu, não é uma nova invenção.

Muitos países usam o sistema de Informação do Terreno há já muitos anos se bem que de forma rudimentar. Foi atrás frisado que o cadastro é um LIS baseado na parcela de terreno. A colheita, armazenagem e disseminação de dados relacionados com a Terra constituem algumas das mais antigas práticas que a humanidade experimentou. Tais dados nem sempre estiveram relacionados com a posse de Terra. Eles incluíram entre outras áreas, a geológica, a estatística, e geográfica.

O Sistema de Informação do Terreno (LIS), como qualquer sistema de informação comporta dados e a sua codificação. O individuo de direito para decidir só pode fazê-lo se tiver à sua disposição dados já modelados, isto é, dados já em forma de informação.

Hoje em dia no mundo industrializado, a informação passou da fase de simples troca de novidades para uma fase comercial. Quer dizer, a informação transacciona-se como uma mercadoria qualquer. Com efeito existem instituições cuja actividade principal, senão única, é a produção de informação. Tais instituições, antes de pôr a mercadoria (informação) em circulação têm de fazer sondagens relativas à procura que a mesma virá a ter. É nesta fase de sondagens e publicidade (appraisal stage and marketing) e as que a análise de prováveis custos e benefícios é feita. Assim, a produção e colocação em circulação só fará sentido se os benefícios que advierem forem maiores que os custos de produção e de colocação.

O sistema de Informação do Terreno não difere, em princípio, do sistema de Informação em geral. LIS é aplicado numa multiplicidade de áreas tais como:

- Planificação e gestão de serviços públicos;
- Gestão do uso da Terra e dos recursos rústicos;
- Controlo (monitorização) do meio ambiente
- Gestão das redes de serviços
- Gestão das redes de transportes
- Localização dos mercados
- Localização dos trabalhos de engenharia civil
- Fornecimento de dados para os sistemas de defesa e segurança.
- etc.

Como se pode depreender, apesar desta longa lista o sistema de Informação Territorial tem muitas mais aplicações noutras áreas, se bem que algumas delas tais aplicações não sejam directas. Em suma, LIS é a combinação de factores humanos e materiais actuando como uma ferramenta eficaz para decisões jurídicas, administrativas, económicas e para efeitos de planificação em geral.

Quando o LIS abranja áreas geográficas maiores que a simples parcela de terreno, isto é, quando se refira a regiões ou mesmo um País a designação Sistema de Informação Geográfica (GIS) é usada. É importante, no entanto, salientar que o GIS é subsidiário de LIS.

## 2. O Cadastro em Moçambique após a independência.

### 2.1. Informação introdutória.

Moçambique proclamou a sua independência em 1975 como resultado de 10 anos de luta armada movida pela FRELIMO contra os colonizadores portugueses.

A essência da luta armada era de libertar a Terra e os homens. Durante cerca de quinhentos anos a Terra, pertencera a um punhado de latifundiários predominantemente estrangeiros.

Foi essa filosofia que guiou os dirigentes da Frente de Libertação de Moçambique, segundo a qual, não se pode conceber uma verdadeira independência sem a terra.

Assim, a terra foi nacionalizada e o Estado passou a ser o único proprietário da Terra, conforme reza o artigo 8 da Constituição da República Popular de Moçambique que "A terra e os recursos naturais situados no solo e subsolo, nas águas territoriais e na plataforma continental de Moçambique, são propriedade do Estado. O Estado determina as condições do seu aproveitamento e do seu uso". Isto significa que nenhuma pessoa singular ou colectiva pode ter posse absoluta da terra. Daqui se segue que a terra em Moçambique não pode ser alienada.

No entanto, pode ser titular do uso e aproveitamento da terra toda a pessoa singular ou colectiva com capacidade jurídica (artigo 4 da Lei de Terras). É claro que nem tudo correu maravilhosamente. Experimentaram-se nessa mesma fase problemas de vária ordem. O Estado tentou enveredar pela via de empresas estatais agro-pecuárias muito grandes cuja gestão estava além das capacidades da maioria do pessoal moçambicano; pela via das cooperativas agrárias onde a responsabilidade estava tão diluída que só produziam prejuízos. Os sectores familiar e privado estiveram praticamente esquecidos.

Porém, como é já uma tradição, os erros não devem ser eternos. Ao invés eles devem constituir uma base para que novas decisões sejam tomadas isentos de novos erros. Foi, talvez, nesta ordem de procedimento que se verificou a devolução da maior parte das grandes empresas estatais agrárias aos sectores privado e familiar, sendo este último reconhecido como o maior produtor do excedente destinado à comercialização.

### 2.2. A tramitação processual de pedidos de terrenos

Conforme foi atrás referido (artigo 4 da Lei

de Terras da República Popular de Moçambique), pode ser titular do direito de uso e aproveitamento da terra toda a pessoa singular ou colectiva com capacidade jurídica.

Assim, qualquer pessoa jurídica, desejando obter o direito de uso e aproveitamento, junta os documentos necessários e encaminha o pedido de acordo com os mecanismos apropriados.

As vias a seguir diferem consoante o terreno se situe nas áreas rurais ou urbanas, sendo estas últimas da responsabilidade dos Conselhos Executivos se estiverem devidamente equipados para o efeito.

#### 2.2.1. Terrenos situados nas zonas rurais.

A Direcção Nacional de Geografia e Cadastro (DINAGECA) é órgão competente para a tramitação processual nas áreas rurais através dos seus Serviços Provinciais.

De facto, o requerente mete o pedido da concessão do direito do uso e aproveitamento da terra na autoridade distrital nos casos de distritos com delegações dos Serviços de Geografia e Cadastro. Este pedido é depois encaminhado para o Serviço Provincial de Geografia e Cadastro onde pareceres técnicos são emitidos, sendo o processo, em seguida enviado para despacho superior. Este pode ser do Governador Provincial, do Ministro da Agricultura ou do Conselho de Ministros. Compete ao Governador Provincial autorizar a concessão do direito de uso e aproveitamento da terra para exploração agrícola, pecuária e silvícola ou florestal até 250; 500 e 1 000 ha, respectivamente (artigo 8, alínea a) do Regulamento da Lei de Terras). O Governador também pode autorizar a concessão do direito do uso e aproveitamento da terra nas zonas de desenvolvimento agrário planificado e nas zonas de protecção parcial até certo limite em termos de extensão.

Acima das referidas áreas e até limites de 2 500, 5 000 e 10 000 ha, respectivamente, e fora das áreas de desenvolvimento agrário planificado e das zonas de protecção, a autorização da concessão é da competência do Ministro da Agricultura.

Áreas superiores às acima mencionadas só o Conselho de Ministros é que pode autorizar a sua concessão.

Entende-se por zonas de desenvolvimento agrário planificado aquelas áreas onde o Estado define critérios científicos de aproveitamento racional dos recursos ou potencialidades nelas existentes. , o direito de uso e aproveitamento da terra, sejam quais forem os fins a que se destine, é condicionado pelo plano das respectivas zonas (artigo 12, nº 2 da Lei de Terras). Por outras palavras, nas zonas de desenvolvimento agrário planificado deve existir um plano director, o qual define, de maneira integrada, orientações de utilização da terra. Este plano define por exemplo, a área destinada exclusivamente à agricultura, à pecuária, à silvicultura ou à combina-

ção de quaisquer duas ou todas das áreas retromencionadas.

Após a autorização da concessão, seguem-se a demarcação do terreno em questão e a correspondente emissão do título do direito de uso e aproveitamento da terra. Este título serve de prova plena em juízo ou fora dele dos factos que nele estejam inscritos (artigos 34 e 36 do Regulamento da Lei de Terras).

No Sistema de Registo de Terras, pelo menos no Britânico ou "Commonwealth", o título (Title registration) é conotado com uma série de garantias incluindo, "inter alia", hipotecas sobre investimentos de capitais na terra. Uma série de questões se coloca:

- Será esse o tipo de cadastro que se prevê em Moçambique?
  - Será possível hipotecar uma porção de terreno melhorado?
  - Que garantias (segurança) existem dos bens imóveis construídos no terreno titulado?
- Poderei, sendo detentor do título de uso e aproveitamento da terra transferir os meus direitos para terceiros?

As respostas às questões precedentes podem ser sim e não. Porém, mais pormenores serão discutidos na secção 2.3. deste documento.

#### 2.2.2. Terrenos situados nas áreas urbanas.

É da competência dos Conselhos Executivos das Cidades autorizar a concessão do direito de uso e aproveitamento da terra nas áreas abrangidas pelos planos de urbanização. Os Conselhos Executivos de Distrito, de Posto e de Localidade também podem conceder o direito de uso e aproveitamento da terra, contanto que seja nas áreas dos campos urbanos funcionando como sedes daquelas divisões administrativas e, claro, se tiverem serviço de cadastro.

Em centros urbanos que não haja serviços de cadastro próprios, os Serviços Provinciais de Geografia e Cadastro asseguram a organização da tramitação processual, devendo, no entanto, ouvir o respectivo Conselho Executivo (artigo 10 do Regulamento da Lei de Terras)

As mesmas questões colocadas na secção anterior prevalecem.

#### 2.3. O EMPRÉSTIMO BANCÁRIO E A HIPOTECA SOBRE A TERRA.

A criação de um cadastro de terras só fará sentido se trazer benefícios para todas as partes envolvidas no processo. A obrigatoriedade do registo de terras é a premissa maior, porquanto só o terreno legalmente registado é que pode oferecer garantias. A questão lançada na secção 2.2.1. volta ao pódio: que tipo de garantias?

Em Moçambique a terra é propriedade do Estado, por conseguinte nenhuma pessoa singular ou colectiva pode aliená-la. Porém, o titular do direito de uso e aproveitamento da terra pode alienar os bens imóveis que haja construído no terreno de que detém o título. Se assim for, o novo proprietário dos imóveis deverá requerer a concessão do direito de uso e aproveitamento da terra onde os imóveis se acham construídos. De igual modo, o titular do direito de uso e aproveitamento da terra pode hipotecar os bens por ele construídos ou comprados no terreno. Se bem que os títulos não signifiquem domínio pleno (posse absoluta), eles representam a legalidade da ocupação perante o juízo e fora dele. Portanto a pessoa detentora do título pode solicitar um empréstimo bancário utilizando o título como um dos argumentos, além de um detalhado e claro plano de exploração. Os montantes a conceder pelo Banco, à discreção deste, são geralmente condicionados pela área a explorar e pelo acima referido plano de exploração.

#### 2.4. TRANSMISSÃO DOS DIREITOS DE USO E APROVEI- MENTO DA TERRA.

Pelas razões referidas em secções anteriores a terra não pode ser vendida ou hipotecada. A transmissão dos direitos de uso e aproveitamento só pode ser feita aos herdeiros e/ou meeiros, mediante a apresentação de um certificado do processo de sucessão de acordo com o código civil. Em outras palavras, os herdeiros e/ou meeiros devem declarar expressamente, que desejam continuar com a exploração após provar que eles são herdeiros ou meeiros de juri.

As doações, caso as hajam, serão efectuadas em conformidade com o Código Civil.

3. O cadastro na sequência da aprovação do Regulamento da Lei de Terras.

A Direcção Nacional de Geografia e Cadastro (DINAGECA), através do Departamento de Agrimensura e Cadastro e dos seus Serviços Provinciais está empenhada na implementação de um novo cadastro à luz do Regulamento da Lei de Terras aprovado em 1987.

Em Moçambique são reconhecidos os seguintes tipos da ocupação da terra:

- Familiar
- Privado
- Cooperativo
- Estatal
- Misto

Considera-se familiar o uso e aproveitamento da terra, que visa essencialmente a subsistência, isto é, o que não emprega nenhuma mão-de-obra assalariada. Este tipo de ocupação não está sujeita a registo obrigatório. De facto, a ocupação da terra para fins considerados do tipo familiar não carece de uma autorização das entidades competen-

tes mencionadas na secção 2.2., bastando a autorização pela estrutura política ou administrativa local. Isto significa que o cadastro dessas terras nesta fase não poderá ser feito com base em cada ocupante da porção de terra mas com base no bloco de porções. Esse procedimento tem em vista facilitar a codificação de dados a serem computadorizados para um novo cadastro que a DINAGECA se propõe introduzir.

O sector privado foi, na opinião do autor deste artigo, o maior beneficiário da aprovação do Regulamento da Lei de Terras. Com efeito, logo após a independência, a enforia que a rodeiou, fez com que o sector privado fosse, quase, senão totalmente esquecido. Esta atitude, não obstante ter tido consequências, em alguns casos desagradáveis, era necessária. Não faria nenhum sentido considerarmos-nos independentes sem a terra. Era necessário devolver a terra aos moçambicanos.

É importante notar, no entanto, que o investimento privado é o mais rentável para o Estado porquanto os riscos são dos próprios investidores. Uma análise do binómio custos benefícios exibiria uma vantagem talvez superior à razão 3.1. O Governo da República Popular de Moçambique reconheceu o papel dos capitais privados na economia nacional. Foi assim que em 1897 promulgou a Lei 5/87, dos investimentos privados.

Como foi referido atrás, o sector privado foi o maior beneficiário pois havia muitos privados que estavam interessados em investir na terra mas não sabiam que garantias os podiam assistir. Agora é sabido que uma vez concedido o direito de uso e aproveitamento da terra, ninguém lhes pode tirar. Mesmo o Estado, que tem preferência, pode ter que indemnizá-los pela perda dos bens ou trabalho que possam ter investido na terra. O título que lhes é emitido oferece a segurança do seu investimento. A propósito, já foram emitidos ao sector privado cerca de vinte títulos de uso e aproveitamento da terra.

Os sectores estatal e cooperativo, no que diz respeito ao impacto do Regulamento da Lei de Terras pouco ou quase nada há a salientar, pelo próprio facto de serem estatal e paraestatal. O sector misto é de certo modo importante pois nele participam capitais estatal e privado.

Nestas condições as garantias são tácitas para o co-participante privado pois sabe que o Estado irá assumir os encargos. De facto, pode ser muito desvantajoso para o Estado.

3.1. O Cadastro Nacional de Terras e o Tombo Nacional de Terras: LIS em Moçambique?

O Regulamento da Lei de Terras deu a luz verde para a criação e manutenção sistemática de um Cadastro Nacional de Terras. O Cadastro Nacional de Terras contém os dados necessários relacionados com o Fundo Estatal de Terras. Tais dados têm por objecto permitir:

- Conhecer a situação económico-jurídica das terras;
- Organizar a utilização da terra, sua protecção e conservação de uma maneira eficaz
- Determinar as regiões próprias para produções especializadas

A organização actual do Cadastro em Moçambique é feito manualmente e consta de uma série de cartas topográficas à escala 1:50 000, e 1:250 000 onde os pedidos são lançados e um registo onomástico, constituindo este último os alicerces para o Tombo Nacional de Terras previsto na lei de terras e do seu regulamento. O futuro Tombo Nacional de Terras terá a função de arquivar e manter actualizada e em condições de segurança contra qualquer situação os seguintes documentos:

- i). Os processos legais de ocupação;
- ii).- Os processos legais de criação, alteração ou extinção das zonas de protecção;
- iii). Os processos legais de atribuição de jurisdição de terras a órgãos do Estado ou entidades estatais;
- iv). Documentação sobre as delimitações das fronteiras;
- v). Informação completa sobre a triangulação geodésica e topográfica;
- vi). Documentação que possa interessar à história da cartografia.

Como se pode ver, nas condições actuais a actualização do Tombo não é prática. É por essa razão que a DINAGECA está em fase de computadorização do Cadastro e do Tombo de modo a acelerar o processo de registo e de actualização. Com efeito, em virtude dessa situação, existem casos em que um mesmo terreno possui muitos processos. Devido à falta de capacidade de actualização eficaz a numeração dos processos é ainda crescente, isto, a partir do último número anterior à promulgação da Lei de Terras e do seu Regulamento, sendo o número total de processos cerca de 65 000. Desses 65 000 processos, talvez metade é que tem dono.

Embora reconhecendo que a ideia da informatização do Cadastro e do Tombo é, ambiciosa não é menos verdade que ela é necessária. A DINAGECA está apostada a criar condições para ser capaz de informar sobre a situação económico jurídica de qualquer porção de terra a qualquer momento sem demora. Isso implica a criação de uma base de dados contendo tais elementos como o titular do direito de uso e aproveitamento, a área do terreno; as potencialidades agro-económicas, etc.

Está em fase bastante avançada a arrancada de um projecto piloto da informatização do cadastro, o qual terá apoio financeiro e de consultoria da Suécia. A ideia



preliminar sobre a base de dados a criar é que ela (a base) deve ser capaz de ser interrogada, isto é, dada a parcela de terreno, por exemplo e talvez mais alguns atributos, a base deve fornecer informações tais como a área, o posto administrativo ou distrito onde o terreno se situa. A materializar-se o projecto, estará montado um "oracle relational database". Numa fase posterior, de acordo com as intenções dos organizadores, será ligado um digitalizador.

#### LIMITANTES

A implementação de qualquer projecto de automação requer um investimento de capitais e de força de trabalho qualificada. Sabido que é que Moçambique é um País em vias de desenvolvimento muito carente de fundos, para que este projecto seja coroado de êxito é necessário que se faça uma sensibilização junto de instituições, nacionais e internacionais de modo a apoiar o seu financiamento. A realização do projecto, se bem que beneficie maioritariamente moçambicanos, poderá igualmente beneficiar os estrangeiros através do fornecimento de informações precisas e actualizadas numa fracção de minutos, se não segundos.

A força de trabalho qualificada é outro factor muito determinante para o sucesso do projecto. Neste momento, existe um número bastante reduzido de pessoal familiarizado com o computador em geral, e com o sistema de Informação do Terreno em particular.

O cadastro nos moldes aqui descritos não é mais nem menos do que um cadastro multifuncional, e este é a fundação do LIS. Alguns dos componentes mais importantes do cadastro multifuncional são um sistema geodésico de referência e cartas topográficas na devida escala. Neste momento, em Moçambique não há redes de triangulação adequadas. As únicas redes as quais os portugueses consideram da 1ª ordem, estão longe de satisfazer os requisitos para tal. Quanto às cartas topográficas, existe uma cobertura de todo o País na escala 1:250 000 se bem que com base fotográfica desactualizada. Situação semelhante se verifica nas cartas 1:50 000 as quais cobrem quase 2/3 do País sendo algumas delas baseiadas em fotografias aéreas com idade à volta de duas décadas. Quase que nada existe em escalas maiores.

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**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
**MULTIFUNCIONAL**  
  
- SICRUM -

CADASTRAL SURVEYING EXPERIENCE IN  
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CHRISTOPHER B.S. CASE

PORTUGAL / U.K.

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SEMINÁRIO INTERNACIONAL SOBRE CADASTRO RÚSTICO E URBANO MULTIFUNCIONAL  
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CADASTRAL SURVEYING EXPERIENCE IN VARIOUS COUNTRIES  
and the relevance of this experience to Portugal

Christopher B S Case

Chris Case is a Chartered Surveyor. He was educated in England, but has spent all except one year of his working life as a Land Surveyor in other countries of the World. In most of these countries he has worked in a Professional capacity as a Cadastral Surveyor, which include not only his present adopted country, Portugal, but also Tanzania, Qatar, Nigeria, South Africa, California, New Zealand, Lesotho, and the Cayman Islands in the West Indies.

SUMMARY

1. Introduction.
2. The Countries where I worked mostly in Cadastral Surveying:
  - 2.1 South Africa
  - 2.2 New Zealand
  - 2.3 Lesotho
  - 2.4 The Cayman Islands
  - 2.5 General Surveying experience in other countries that had a bearing on Cadastral Surveys.
3. The relevance of that experience to possible the future needs in Portugal.

In each case I will deal with the individual countries under various various headings after a general introduction. These headings will deal with:

- a) The Education of the Land Surveyor.
- b) The Survey Regulations governing Cadastral Surveys
- c) The operation of a private practice.
- d) The end product.
- e) The cost of Cadastral Surveys.
- f) Conclusion

## 1. Introduction

I have been in Private Practice since 1971, most of which time having been spent running my own firm. Previously I was employed by various other private Survey Companies before I decided to work independently, this latter was to the chagrin of my wife.

In Professional Private Practice I have been subjected to true market forces. First, I have had the handicap of being 'that blank foreigner'.

Secondly, I have had to take cognisance of the professional competition, their technical capabilities, their prices, their delivery schedules, the standard of their work, and generally their reputations.

Thirdly, I was and am, caught as my American Cousins say, 'between a rock and a hard place', being pressurised on one hand by private clients who were sure that I was using my qualifications through a Cartel to overcharge them, and, on the other hand the various Local Authorities or Government Departments who were sure that I have been making a vast income, living an irresponsible life of Riley, and being instrumental in the wrecking the flora and destroying the fauna of the World in order to make exorbitant profits for developers.

Neither is true. However, my work has given me the great privilege of being able to work with some wonderful people, and to live in various beautiful countries.

### 2.1 South Africa.

- a). To qualify as Land Surveyor in South Africa (Zimbabwe or Namibia) the student has to pass a full time University Degree course, followed by a period of articles working under supervision, before he or she sits a series of practical and administrative examinations. Standards are very high.
- b). The active Central Council of Land Surveyors on which the Private sector is well represented, has the duty to maintain standards, advise on the amending of Regulations, and the fixing of tariffs, amongst its other responsibilities.

The Regulations cover all technical aspects of Land Surveying. They are updated approximately every 6 months, in line with changing social conditions, technical changes or inflationary pressures on the economy.

The basic mathematics of, say, traverse closures, or a resection do not change, but Regulations are amended very quickly to adjust to new Computer technology, and how this can speed up not only Surveying and computing techniques, but also in the providing of Plans and Diagrams for legal purposes to the various Departments of the Government....or the client, of course.

c) Private Practice in a very ordinary way means:

- i/ Surveying parcels of land for subdivision, the beaconing of the new lots, and the preparation of plans showing Co-ordinates, beacon, boundary information, drawing up the final Plan of the property at an approved Scale, with an area, and a legal description of the land. The Authority for the subdivision and Survey Records are submitted to the Surveyor General for approval. This plan of diagram is annexed to the Deed of Transfer.
  - ii/ Replacing property beacons from co-ordinates of such a Survey, or other old records.
  - iii/ Preparing Certificates for properties where new buildings are to be erected.
  - iv/ Surveying existing buildings for Strata/Sectional Title development.
  - v/ Surveying Farmland for subdivision or consolidation.
  - vi/ Surveying contracts for the Government for Roads, Railways or changes in the Shoreline of the Sea, or Rivers, or Powerline or Pipeline servitudes.
- All of this work requires that records are submitted to the Surveyor General.

Private Practice also involves Town Planning, providing Ground control for Air Surveys, the preparation of plans for Court Cases, setting out Civil Works for Contractors or Consultants, or any other work where any person or statutory body requires a professional service.

d) The end product of Private Practice as a Land Surveyor for me was the satisfaction in providing against fierce competition an inexpensive fast service for all sectors of the community. The other professions appreciated the service, in particular the Attorneys dealing in land matters, and the Architects and Engineers to whom information was usually supplied instantly on disc.

On many major projects I was called upon to provide information as to the boundaries of the land, rights in or over the land, the topography of the land, and environmental issues. I liaised with the Local Authority as to their criteria for development. I recommended setback lines for coastal protection having inspected dunelands and their fragile vegetation. I investigated the requirements of the Provincial Roads or Railways. My firm then set out the Roads services for the development. Then if the development was phased it would mean that I had to submit Diagrams to the Surveyor General, and on approval I was responsible for preparing the legal plans for the transfer of Apartments or other rights within the development.

There was immense job satisfaction in my work.

- e) The cost of Cadastral Surveys was laid down by Government Gazette, but looking at inflation, and international exchange rates I would say that the cost of Surveys for either subdivision, or beacon replacement would average at about 1% of the value of the property at the time of Survey.

Naturally the market answered to 'its cheaper by the dozen', and usually a client asked for a precise figure of cost before work started. The time scale was most relevant too, and depending on factors outside my control I usually advised my clients that a beacon replacement could be done within 24 hours, and subdivision cleared through the various Departments within 10 weeks of getting the approval to subdivide. This meant that the property market moved quickly since the private sector could be relied on to deliver the goods.

- f) In conclusion I feel that with the high standards of Survey, the fierce competition, the non-interference by the State, and a highly disciplined and confident profession I was able to provide an inexpensive, reliable service to all sectors of the community.

## 2.2 New Zealand.

- a) The New Zealand student has to take much the same route for qualification as the South African surveyor. ie a University Degree followed by a period of Articles. There was a clause that allowed for recognition of certain branches of the British Chartered Surveyors examinations. I found that standards were as high in New Zealand as in South Africa.
- b) I believe that I am correct when I state that there is a Board established by Statute that draws up Regulations and administers professional discipline. I found that the technical aspects of cadastral Surveying in New Zealand were much as in South Africa, but with minor changes in the technique of the calculation and presentation of work to the Local Government Survey Office that dealt with the Cadastre.
- c) The new Zealand Surveyor does not have a perfect climate in which to work, and I found his responsibilities took in more of the Town Planning, Engineering, and Hydraulic aspects of work than I had experienced before. However there were similar plans to be drawn for clients, for Applications to subdivide, similar relocation of beacons and boundaries to be made, and the same searches to be made in Government Offices for information. Again the parallel to the standards, and techniques, presentation to clients and Government offices, as well as the continuous financial tightrope, was the same that I had experienced in South Africa.

- d) The end product for me was job satisfaction, and becoming fairly fit from bush bashing and wielding a peg bar. Historically the new Zealand Land Surveyor has a reputation of serving the community well, and with providing an inexpensive and comprehensive service.
- e) The cost of Surveys was covered by tariff, and since the competition was efficient it meant that the Cadastre was updated at a minimum cost. This applied to the other disciplines in which I worked.
- f) In conclusion I found that my working as a Land Surveyor in New Zealand confirmed my experience in South Africa, that the Private Sector is capable of supplying the Cadastre/Lands Office/Land Registry with accurate, up to date, comprehensive data at a minimum cost to society. What costs there were, were borne by the developers of land, unless it was for a Local Authority or Government, where costs were again minimised by bidding for the contract.

### 2.3 Lesotho

- a) While I was in Lesotho working on Cadastral Surveys the Registration of Land Surveyors was in its infancy. Until the late 1970s work had been carried out by qualified expatriate Land Surveyors. However with the establishment of a Department of Lands and Surveys a Survey Board was constituted who accepted for Registration any person whose experience or outside qualifications were deemed acceptable.
- b) This Board laid down Regulations for Surveys carried out in Lesotho, and had powers to discipline Surveyors. Because of the pressure on the Government to amend the Law to give title to land quickly to citizens who had an acceptable claim, it became necessary to carry out Surveys equally quickly. This meant that somewhat unorthodox methods were accepted after records of the Survey had been scrutinised by the Survey department. Orthophoto mapping methods were being planned when I departed from Lesotho, but these ideas were still untried and it was acknowledged that a qualified land Surveyor would be required to identify boundaries on the future mapping.
- c) Private practice in Lesotho covered everything from surveying boundaries of occupation of parcels or area of land, and submitting records to the Department of lands and Surveys, to setting out parcels by way of fence posts, and surveying them into the Trig network from plans prepared by the Government Town Planning Department. It also meant supplying the Government with Reference Marks in the various Towns and villages for future use by Land Surveyors, and providing ground Control for Air Surveys.
- d) The end product in Lesotho was a feeling of quiet desperation in that too much attention was paid to the Town Planning aspects of the exercise of trying to mark out lots, when the previous Air Survey was out of date. (Often the land was either already occupied by legitimate housing, or that erosion had created canyons, or the local farmer wanted my blood for trespass).

I was also frustrated by the Chief Examiner of records who paid unnecessary attention to detail. . ie, traverse closures, or beacon descriptions. I was working the nearest 10 centimetres, and the object of my work was to complete surveys of properties for the good people of Lesotho so that they could buy land they had occupied for a generation, and then like any other person on this planet, use that land as collateral security to finance the education of their children, or making improvements to their homes.

- e) The cost of Surveys for Government was by tender, and I had competition. However most of my clients had funds and willingly paid for a Survey by a private Land Surveyor. The price was paid in Malutis, and equated usually to the standard 1% of the value of the property.
- f) I very much enjoyed working in Lesotho, apart from my disagreements with the Town Planners and the Chief examiner. My skills were totally used, and I felt that I had been of service to both the public and private sectors.

#### 2.4 The Cayman Islands

- a) The qualifications to practice in these Islands was to be a Chartered Surveyor in the Land Survey branch or to have passed the equivalent examinations, and to sit an examination of Cayman Island Laws, administration and to have a working knowledge of Survey practise.
- b) Survey Regulations were adapted from the Survey of Kenya and interpreted in a somewhat individualistic manner by a Chief Government Surveyor. Professional standards and discipline was maintained by the Survey Board who were nominees of the Chief Surveyor.
- c) Because the Cayman Islands are in the Caribbean, a Banking centre, a tax haven and a tourist centre, there was and is much money around. Land became incredibly valuable, particularly since developable areas are limited. There were two official standards of Survey. Originally the higher standard was intended for 'fixed boundaries' with co-ordinates to the nearest 3mm. This was intended for Banks and the commercial centre, or for Condominiums on Seven Mile Beach. The lower standard of Cadastral Survey was for Farm land or for areas in the mangrove swamp or interior of the three islands.

I was fortunate in that I was awarded the Surveys of a large Marina, two Hotels, sundry Condominiums and other valuable pieces of Real Estate. . . . amongst the usual smaller bread and butter work.

Regrettably much of the Trig control was destroyed and not replaced. It appeared to me that the Survey department spent much of its time inventing new rules in order to hide their inadequacies. There were so many farcical instances that the mind boggles. Eventually work in the bush had to be carried out to a precision that would be appreciated in setting out of a high speed railway through the centre of Tokyo, so that the Survey became more costly than the property.



Absurdity reigned.

For instance I was required to observe two complete rounds of angles at every station irrespective of what I was fixing as a boundary marker. In many cases such points were 'Birch' trees of about 30cms girth. I always check-fixed any boundary point twice, the proving angle and distance using the same techniques. This meant that each boundary marker was fixed eight times.

Reason was not applied.

When I suggested at a Professional meeting that the Regulations should be amended to bring them up to date, I was told 'we do not have the time'. There was no sense to the running of that Survey department

- d) The end product in Cayman eventually became not acting as a responsible professional making recommendations, and ensuring that the Cadastral and legal systems functioned properly for the benefit of the citizen, but merely to anticipate at the next Diktat so that ones work was passed for Legal purposes.
- e) The cost of surveys for any work was about \$75 US an hour for the Land Surveyor, with additional costs for his team of men, and transport and bush-clearing charges. Costs became prohibitive.
- f) I enjoyed my time in the Caymans, and made some good friends, but it was not a pleasure to deal with the Survey department.

### 3. Cadastral work in other countries

In Tanzania the few Cadastral surveys I worked on do not seem to have been cost effective, or in the changing socio-political scene do they appear in retrospect relevant for the needs of the country.

In Nigeria I was a very small cog in the vast wheel of Shell/BP, and only involved in the computations of Oil Mining Leases.

I did not see the end product as far as the Land Registration was concerned, But standards were high, and apparently the Diagrams and Plans that were passed on to the Nigerian Land Registration authorities were without fault.

In California I worked for a firm of Engineers who produced 'Plats' for the Company selling parcels of Land. This Company was owned by a Title Insurance Company. The Plats I worked on, and the system of marking boundary points, and the Town planning exercise were very novel to me. Because of the total professional responsibility by the private sector, and the competition, costs were minimised, there was guarantee of Title and Boundary, and there were no costs for the taxpayer.

Finally, I have only worked one year in England as a professionally qualified Land Surveyor in a private capacity. Mapping is carried out by the para-State Ordnance Survey. Land Registration is based on Title, with either a Planning layout or a print of the Ordnance Survey map annexed to define the parcel situation. The usual Scale of that mapping is 1/1250 in Urban Areas.

There is no boundary survey in the United Kingdom.

If there are boundary disputes the legal fees could be expensive.

To me as a Cadastral Surveyor the situation is an abrogation of professional responsibility and a resort to expedience. Modern instrumentation, techniques and computerisation make the General Boundaries concept irrelevant.

#### 4. Conclusion

I feel that the private practising Cadastral Surveyor can be of immense use to Portugal in the proposed new Multipurpose Cadastre. I would not suggest that a Californian concept is adopted by the Private Sector (There is not enough money around to start with), nor would I recommend the British system of a Secret Land Registry, with sometime doubtful mapping, and with the only voice from the Private Sector being that of the Legal Profession.

I am sure that a balance can be achieved.





**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
**MULTIFUNCIONAL**

— SICRUM —

THE ROLE OF THE PRIVATE SECTOR  
IN THE EXECUTION & UPDATING OF A MULTIPURPOSE CADASTRAL  
SYSTEM

CHRISTOPHER CASE

INGLATERRA

LISBOA, PAVILHÃO DO BOM SUCESSO - 20 a 25 Novembro de 1989

## THE ROLE OF THE PRIVATE SECTOR

### IN THE EXECUTION & UPDATING OF A MULTIPURPOSE CADASTRAL SYSTEM.

Christopher B S Case.

Chris Case is a Chartered Surveyor. He was educated in England, but has spent all except one year of his working life as a Land Surveyor in other countries of the World. In most of these countries he has worked in a Professional capacity as a Cadastral Surveyor and include not only his present adopted country, Portugal, but also Tanzania, Qatar, Nigeria, South Africa, California, New Zealand, Lesotho, and the Cayman Islands in the West Indies.

#### SUMMARY

1. The assumed basis of a new Cadastral System.
  - 1.1 The proposed Land Registry
  - 1.2 The Administration of the Land Registry
  - 1.3 The updating of information.
  
2. The Role of the Private Sector is not in the setting up of the Land Registry but in the capacity to supply information to the state, community, authorised bodies or individuals.
  - 2.1 Proposed methods of mapping, accuracies and tolerances.
  - 2.2 The Updating of such processes.
  - 2.3 Adjudication.
  - 2.4 Methods of payment
  - 2.5 Supply of information to other Government Departments.
  - 2.6 Re-emparcement.
  
3. The training and education of future land surveyors and the setting up of a professional body controlling the examinations, technological changes, and professional charges and discipline.
  
4. Conclusion,
  - e/ The price paid for the land or right should be given.

## 1. The assumed basis of a new Cadastral System

### Introduction

From low Latin the word 'Capitastrum' meant the register for a Poll Tax. As I understand the meaning of it, today, Cadastre has come to describe the Public Register of the lands of a Country. For this paper I must assume that legislation has been passed on to the Statute Books by the Assemblia de Republica that establishes a Land Registry in which various rights in land are recorded and shown, and a unique Parcel numbering is established.

I also assume that this legislation so passed (setting up the Land Registry) also established methods of investigations into the Multipurpose cadastral system that was also a Land Information System, from which other branches of the Government can benefit. I refer here to direct information that can be supplied for Taxation purposes, or to Departments dealing with Planning, Valuation, Agriculture, Water, Mining, Electricity, Roads, Railways, Airports, Harbours, Forestry, Telecommunications, Statistical Information, or District and Municipal Services.

At present in Portugal there exists over much of the country a system of mapping of Rural areas at 1/2000 Scale, from which a Fiscal Register is made. This would appear to be an ideal basis from which to establish the new Parcel numbering that can be used by the Land Registry. The infrastructure exists already and Government Departments have trained personnel and a good start in their Computer technology. To utilise and extend this would minimise costs and make inter-departmental changes relatively harmonic both as far as the State, the legal system, and the individual are concerned.

### 1.1 The Land Registry

From my general experience I would recommend that the Registry be set up as follows:

- a/ By using a Land or Ground Book, with a single sheet for each land Parcel.
- b/ The land should be held by various forms of Title, ie Absolute Title, Provisional Title, or Leasehold Title. The type of Title is shown against the Parcel number.
- c/ The owners full name, or the name of the Company or Body Corporate should be shown, together with the date of transfer of the Land.
- d/ The Appurtenances to, and Encumbrances over the Land should be shown.
- e/ The price paid for the land or right should be given.

- f/ Although Mortgages are shown against the property, a separate Mortgage Register is kept, with details of Mortgagor, Mortgagee, and the amount of loans against the property, and any other relevant data.
- g/ The Parcel is shown on a registry map at a Scale taking cognisance of of the area. ie Rural mapping at 1/2000, Urban areas at 1/1000 or 1/500 Scale.  
The Registry Map master copy should be held in Lisboa, with a duplicate copy held by the relevant Câmara.
- h/ The Land Registry should be open for Public inspection for a fee.

### 1.2 The Administration of the Land Registry

From my past experience I would recommend that although the Land Registry should be centered at the administrative centre of the country, each Câmara should have a similar Land Registry of the parcels of land within its boundaries.

With the present Fiscal Rural Cadastre there already exists, a computer link up between the main offices of IGC, and the various Provincial centres. This infrastructure can be expanded for the future Land Registry.

The parcel numbering should be by lots within each Freguesia, in Rural areas, and by lots within convenient suburbs or zones in Urban areas.

A registry should also exist for Mortgages in each Câmara.

A similar Register should exist where Sectional/Strata or Timesharing Titles are concerned.

The Land Registry should be headed by a Registrar General, with deputy registrars in the Câmaras.

At the same time as the Registrar is responsible for the maintenance of the Land Registry, he or she should also be responsible for the mapping that defines the parcel numbering.....plus any mutations to such numbering.

### 1.3 The updating of information

Assuming that this system has been established it would be necessary to update both the Register of Parcels on transfer of ownership, subdivision or consolidation of lots, and the simultaneous amendment of the Registry map.

At present this is carried out by the staff of IGC by traditional methods.

After the establishment of the proposed Registry techniques could be carried out to update both the Register and the Mapping. Provided both are on a database then this will simplify matters, and will save time. It is just about inconceivable that records should be maintained or amended in future by any other methods than on a database, with a print-out being supplied whenever it is required from such stored information.

## 2. The Role of the Private Sector.

### 2.1 Methods of mapping.

The proposed new Cadastral system will require Mapping. The most relevant way the Private Sector can efficiently assist would be in the providing of new cartography for the various areas of Portugal.

I would suggest that this is done by either:

- a) Photogrammetric methods
- b) Traditional classical ground survey methods, or,
- c) If the cost factor is too high to use one of the former, then a 'fudge' is made using existing mapping, and updating it piecemeal.

I do not think that the costs or accuracies of Remote Sensing or Satellite navigation systems would warrant using their technologies or capacities at this time, or under present circumstances, unless I misunderstand their capabilities.

#### a) Photogrammetric methods.

The exercise of providing Portugal with particular mapping in a hurry can only be done Photogrammetrically.

I understand that the Portuguese Air Force is supplying photography to IGC on demand, but I do not feel that capacity of the Private Air Survey Companies has been explored or used as fully as it may.

Therefore I would suggest that a series of contracts should be let for pilot schemes to competing Companies. I would suggest that each Company is given the opportunity to provide photography of both Rural and Urban areas from which either Analog or Digital mapping can be made. The qualifications and track record of such Companies should be examined before they are awarded any such Contract.

Further, I would suggest that the four contracting Companies who deliver the mapping on schedule and to the standards required by IGC should then be awarded further contracts, for not only the Air Survey, but also for the supply of data and mapping to IGC for other parts of Portugal. IGC could then act as the 'clearing house' for data gathered for other Government Departments.

This is therefore a place where I should add that before Contracts are awarded, the various Government Departments who are interested in obtaining information should each give IGC their requirements...For instance, that Powerlines be shown on a separate format on the database, or that Eucalyptus plantations be specially pinpointed, or particular types of buildings be shown.



The specifications would be the normal Air Survey Contracts, but additional clauses would be written in to enable the supply of such Land Information Systems.

b) Traditional classical ground survey methods

There is immense potential in this area, but the size of the task and the amount of information required by various Government Departments would seem to preclude such methods.

Historically the private Land Surveyor would appear to be a poor second cousin to State Organisations. This applies over much of the World and not only Portugal. The fault lies with the Land Surveyors themselves, but there is opportunity here to show that they are capable of filling in gaps that Photogrammetrical methods can not complete for technical reasons.

However an excellent Trigonometrical network exists throughout Portugal, and it is possible that IGC could accept Surveys by suitably qualified Land Surveyors, provided that such Surveys were based on the Trig network, and that Surveys were submitted in a standard format under a system of Survey regulations.

To date this is the practice in many countries of the World, but it is expensive. On the other hand such Surveys are usually financed by private persons (at no cost to the State) and if market forces are given the opportunity, and survey Regulations are sensibly applied, then such surveys can be fast, cost effective, and more accurate than Air Surveys.

I have been working in such systems in various countries of the World for the past 30 years, and understand what is required using such classical methods, but, there is not the organisation here, and the task of building a Multipurpose Cadastre by such methods is not realistic. However in the eventual updating of the Cadastre, and in a backup to Air Survey methods the qualified Land Surveyor is a vital necessity.

c) The 'fudge' or mixture

The best laid plans of mice and men oft go awry. Therefore though I am sure that Photogrammetric means are the optimum methods of achieving mapping for the Multipurpose Cadastre, there may be reason for accepting a mixture of methods. This would be the case if financial considerations slowed down the need for reform. It could also be a reserve idea if for technical reasons there was a hiccup in the schedule.

The most probable reason for accepting this 'fudge' would be financial. As I said in the Introduction, there is already a Fiscal Register of much of Rural Portugal (I understand that this covers approximately 50% of the country), and such line mapping could act as a basis for those areas so covered. The Urban areas within such mapping could be surveyed either by classical/traditional land survey methods, with survey records submitted to the local IGC office by Private Land Surveyors appointed to the task, or by Air Surveys flown to provide (say) 1/500 mapping, but with the local private Land Surveyor carrying out the post mapping groundwork that is then put into the database at either the Air Survey company's office, or the IGC office. This could mean that approximately half of Portugal could be mapped within the foreseeable future. This would minimise expense, and reserve the other areas of Portugal for the clean slate approach.

As an aside, the more I think of this idea, the more I like it.

It should work, and we do have the parcel numbering partially established. But on the other hand there is always the question at the back of my mind, 'are there enough trained and experienced people around to do the job'?.....and, we are discussing the setting up of a Multipurpose cadastre, so that if this 'fudge' idea was adopted as expedient, then we would not succeed in providing other Government departments with information unless the process were well thought out in advance.

## 2.2 The Updating of such processes

I am sure that the private sector can provide an efficient and professional service to the community in the field of updating a multipurpose cadastre.

It is a accepted cliché that as soon as a map is produced it is out of date. If however a database is maintained of all information whether it is topographic, cadastral, or relates to other Land Information Systems, then provided that the organisations who are responsible for the updating can feed the new data into a compatible system, then the new output will be as up to date as the input.

For instance, assuming that new cadastre is based on digitised mapping, then the local Land Surveyor who is either resurveying a property for sub-division, or for a new road, need only place his survey on the same co-ordinate system. The records of his survey can be submitted to the local office of the IGC who can immediately update their mapping and/or parcel numbering.

This is a small example of updating.

A larger example would be a contract awarded to an Air Survey Company to re-fly, say, Porto, every 5th year, and, using the original database to update it. Not only would new Roads, Housing or general developments be shown, but also changes to public services. Such a service can be done in the smaller villages by the local Land Surveyor, but such a major revision should be routine for the large cities.

It will be axiomatic for the Professional Engineer, Architect, Surveyor, Town Planner, Geologist, or Estate Agent to have in their office a computer system that has software that is compatible to the multipurpose cadastral system database at IGC. Each professional discipline can in its own way contribute toward providing the central database with new information. These professional skills should be harnessed to the 'instant information revolution'.

What will be necessary is the legal mechanism that will allow either central Government or a local Câmara to advertise for private sector to bid for contracts for the supply of data. An example of this could be the local Land Surveyor aforementioned, winning a contract and carrying out subdivisions of land, or similarly for an Engineer to submit designs and then to construct roads. An Architect would in future be required to submit his proposed plans to the Câmara related to database information. This would ensure that a new building would instantly be nationally recorded.

As the system becomes more used it is probable that a series of set Reference co-ordinates (to the centimeter) will be established in Urban centres, and of slightly lower standard in Rural areas, from which the various professional bodies will take their measurements or designs.

The information on the database is a system of co-ordinates, as accurate as the original survey that produced the data. It can be envisaged that these co-ordinates will become more recognised and used as time proceeds.

Finally, there is the situation where the older line mapping will be in use until it is superseded. In spite of the technical drawback that the Cadastral base is not computerised the various Professional disciplines should be encouraged to use the system of national co-ordinates when sensible. This will allow their present work to be placed on the database when it is established. Such a system would also be useful to IGC, and although such input to the Cadastre will require skilled draughtsmanship it will ensure the maintenance of standards.

### 2.3 Adjudication

Although this is presently a duty of the State, I cannot see why suitably qualified professionals are unable to do this. In various countries of Africa and in the West Indies I was called upon to make recommendations as to the position of boundaries, and as to the rights of persons to land, and as to their title to land.

The latter situation should not arise in Portugal, but my short experience in this country has caused me to reflect on the need for decisions to be made where boundaries are concerned. This is not a case of hubris, but of necessity where I have been unable to find local residents who can advise me, or much evidence on the ground of old markers, walls, hedges or that could define a boundary.

Until a respectable cadastral system is fully established, with an open Land Register, with definitive mapping annexed, this will continue to be a problem. It is a problem for all persons dealing with land. In the change over period before the panacea of a databased multipurpose cadastral system is established I fully expect to be called upon again to have to make recommendations which will have to be submitted to the local IGC, where rights or boundaries are concerned.

I am not the only Land Surveyor who has been put in this awkward position, and I am sure I speak for my fellow professionals when I say that the quicker we have the new system the better. I acknowledge that this is what I am here to do, but it is a wretched job to have two irate ladies each using one of my ears, each convinced that I favour the claim of the other, and eventually neither agreeing to the decision or the account. I assure you this has happened to me several times. Once in pouring rain, and another time in the scorching sun.

Therefore I would recommend that in future when a parcel of land is dealt with by one of the Professional Surveyors, Attorneys, Architects, et cetera, who find a problem in say, access rights, then they make the problem and their suggested solution known to the local IGC, so that the database to be amended.

### 2.4 Methods of Payment

Costs are important, not only in the setting up of a new system, but also in the later updating of the database. Initially the income of the State will increase merely from the efficiency of the new system, then the

particular for that of the Land Registry. This latter is the case in the Netherlands where the Cadastre is run at a profit.

I can foresee that the Private Sector can assist the future Cadastre by ensuring that any private land development is paid for and there are no costs for either the local Câmara or for the future Land Registry.

Then secondly there is the situation where technology changes daily. This presents a problem with both hard and software. Therefore I would suggest that in order to have access to the database the private sector contribute by way of, say, a Registration fee, to a central fund that constantly updates the system. It could be that a special Department is set up by the Government to do this because many other organisations will be using information from the database.

## 2.5 The supply of information to other Government Departments

Ideally the Private Sector should through the various professionals, or, directly, feed information into the multipurpose cadastre. In this I envisage that the database is also a Land Information System with data on any certain parcel of land such as:

- a) The Land Registry reference, and other information from the Register.
- b) Demographic or commercial information, if possible.
- c) Details of buildings and boundaries.
- d) Details of land use, and,
- e) Details of topography and municipal services.

Hence, whenever one of the professional disciplines who deal with these subjects has information as to changes, then such information should be fed into the national database.

This is an idealistic situation, and such philosophy definitely intrudes into the realms of personal privacy.

## 2.6 Re-emparellment

At present this is carried out on request, by the Government.

However there is no reason in future why a multidisciplinary professional team should not carry this out. They would be instructed by either Local Government, or a group of landowners.

This is a legal and technical exercise and should be paid for by the persons who benefit. The area under survey need not be on the National co-ordinate system at present, but the results should be submitted to the local offices of IGC for input into the proposed new cadastral system with future database criteria being adhered to.

I understand that the fragmentation in northern Portugal is serious. In this instance I am sure the private sector could be of assistance if it were given authority to do so by IGC.

### 3. The training of future Surveyors and Professional organisation

It is essential that education in Surveying, and other similar fields be improved. The Private Sector can assist by giving grants to students. Such grants should be tax deductible to encourage the betterment of education. After a student has completed his academic education he or she should work for approximately one year in an office of IGC, and a second year in the office of a Private Practice in order to gain as wide an experience as possible. Final professional examinations should be taken at that stage, after which they should become Registered.

Next the Private Sector can assist by forming self-discipling professional bodies. This does not mean the setting up of a series of Cartels, but such bodies could advise on the minimum tariff that could be charged for their services, suggest regulations to Government Departments for application to their members, and set up their own examinations for membership.

In my own rather narrow field I know that the Public must be protected, and given service, with standards maintained, that new technology should be researched, and students encouraged. This can only be done through an active professional body. The control of such a body should be shared by both the State and the Private Sector. Cross pollination works.

### 4. Conclusion...

There are many ways that the private sector can assist in updating of the multipurpose cadastre. First by the use of photogrammetrical methods, secondly by the highly trained professional Engineer, Architect, Planner, Attorney or Land Surveyor liaising with the IGC and inputting their latest information and ideas, and finally by their constant international contacts that can improve research into new hardware and software that will keep such Land Information Systems constantly up to date.





**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
**MULTIFUNCIONAL**

— SICRUM —

" PROPOSITIONS POUR UN PLAN NUMERIQUE NATIONAL"

Georges COUDERT

FRANÇA

LISBOA... ENCHAL-20 a 25 Novembro de 1989



## PROPOSITIONS POUR UN PLAN NUMERIQUE NATIONAL

### ORDRE DES GEOMETRES-EXPERTS FRANCAIS

#### I INTRODUCTION

##### 1/ Le Cadastre Français; aspect foncier

La France est dotée d'un système foncier créé par Napoléon I, depuis la loi du 15 septembre 1809.

Cette loi prescrit l'exécution d'un cadastre parcellaire. C'est donc à cette initiative que nous devons la description exhaustive du parcellaire français.

Au début le plan n'était pas mis à jour, seules les matrices portaient rectifications des informations littérales concernant les propriétaires, les surfaces et surtout les divisions.

Une loi du 16 avril 1930 apporte une amélioration par la mise à jour des plans anciens, c'est la rénovation cadastrale. Lorsque les plans sont de trop mauvaise qualité on procède alors au renouvellement des feuilles défectueuses.

Enfin, un décret loi du 30 avril 1955 réforme la conservation cadastrale et institue la concordance entre la documentation littérale cadastrale et le fichier immobilier de la Conservation des Hypothèques (fiches de propriétaires, fiches d'immeubles, fiches parcellaires).

Cette description graphique de la propriété foncière n'a été établie qu'à des fins fiscales. Les tribunaux lui ont toujours refusé force probante en matière de limites foncières.

##### 2/ Le droit de propriété en France

Le droit de propriété français est fondé sur l'"usucapion". C'est par l'usage continu, public, paisible et trentenaire d'un bien fonds que s'établit le droit de propriété qui peut être publié aux Hypothèques par ministère de Notaire.

La limite physique de ce droit de propriété se fixe :

- soit par le consensus des voisins, consacré par un Procès Verbal de Bornage établi par un Géomètre-Expert (monopole)
- soit, à défaut d'accord, par le Juge du Tribunal d'Instance dans le cadre d'une procédure judiciaire qui débouchera sur un jugement susceptible d'appel.

A la diligence des propriétaires, les Procès Verbaux de Bornage ou les jugements peuvent être publiés aux Hypothèques. Ainsi, prennent-ils date certaine et sont opposables aux tiers.

Dans la pratique, très peu de propriétaires font procéder à cette publication. Il en résulte une perte d'information et un gaspillage auquel l'Ordre des Géomètres-Experts Français voudrait remédier. Il propose donc aux Pouvoirs Publics depuis 1981 de mettre en oeuvre un Plan Numérique National (P.N.N.). Cette proposition a été argumentée et défendue dans la Commission Nationale de l'Information Géographique, dite Commission LENGAGNE, qui a remis son rapport au gouvernement fin 1983.

## II POURQUOI UN PLAN NUMERIQUE NATIONAL ?

Le fondement même de l'activité économique réside dans la connaissance précise des sols, des bâtiments, des biens, des servitudes qui les grèvent, de l'étendue du Domaine Public et de ses diverses prérogatives ; or, le différentiel en ce domaine avec nos voisins européens se compte en dizaine d'années (ex : Allemagne et Suisse). Aussi la nécessité de promouvoir une politique coordonnée de la topographie et du foncier, puisque nous sommes à l'heure des choix, s'impose avec une impérieuse acuité.

Une forte demande de plans numériques se développent en France, venant des Départements et des Communes. Toutes les techniques de gestion des collectivités passent aujourd'hui par la Télématic qui impose une forme numérique à l'information.

La numérisation des plans cadastraux par digitalisation a commencé d'une façon totalement anarchique :

- qualité graphique inégale,
- structure des différents fichiers hétérogènes,
- redondance de numérisation par non concertation des utilisateurs.

Il est urgent d'organiser cette évolution technique pour qu'elle se fasse avec méthode et que l'information ainsi transformée, puisse être utile à la collectivité nationale.

### III LE CONCEPT DU PLAN NUMERIQUE NATIONAL

L'appropriation du sol est un fait social et politique ancré dans la constitution française (article 2 et 13 de la Déclaration des Droits de l'Homme). Les courants politiques qui voudraient s'y opposer ne semblent pas assez convaincants pour pouvoir remettre en cause une réalité sociale revendiquée par la grande majorité des Français.

Face à cette réalité, on constate que :

- D'une part, la nécessité de l'aménagement de l'espace doit prendre inéluctablement en compte ce que l'on appelle "le foncier". La législation et la réglementation d'urbanisme réduisent lentement depuis un siècle l'étendue du droit de propriété.

Cependant, chaque Français aspire à détenir ce droit de propriété, et fera des sacrifices financiers importants pour atteindre ce qu'il considère comme un espace de liberté.

Ce phénomène imprègne tellement nos mentalités que les conflits de voisinage débouchent régulièrement sur une revendication territoriale. On peut dire à ce propos que tout ce qui concourt à pérenniser la limite foncière, juridiquement définie, est un facteur d'Ordre Social et d'Ordre Public.

- D'autre part, sur un plan plus général, une bonne connaissance du contour juridique, physique et économique de la propriété immobilière, qu'elle soit du Domaine Public ou du Domaine Privé, est un facteur décisif d'un meilleur aménagement du territoire, comme d'une meilleure gestion des Collectivités Territoriales.

Ce que nous appelons aujourd'hui "Plan Numérique National", mais qui aurait pu s'appeler "Conservatoire du Domaine", doit être un projet d'outil de mise à disposition publique de tous les éléments qui décrivent la propriété immobilière dans son contour juridique, physique ou économique. Nous entendons par fonction économique le bien immobilier considéré comme valeur spéculative, support d'activité ou lieu d'aménagement.

Un certain nombre de pays étrangers, en particulier en Europe, disposent déjà d'un système de référence qui permet de connaître rapidement les caractéristiques principales du foncier en un point du territoire. Même si le droit de propriété est d'une nature juridique différente, l'organisation administrative a su trouver des solutions de synthèse qui peuvent permettre d'imaginer des solutions adaptées à notre pays.

Il est impératif de doter aujourd'hui notre pays d'un instrument d'information géographique foncière qui aura pour vocation d'être un "Conservatoire de la limite foncière publique et privée juridiquement établie". La mise en place de cet instrument ne modifie en rien le Droit de propriété et les textes qui le régissent. Il permettra de mieux connaître les limites réelles et de pouvoir les fusionner avec les éléments topographiques d'occupation du sol.

SON INTERET EST TRIPLE :

#### 1 Ordre public :

En donnant une forme numérique (x,y) à la documentation parcellaire existante, on disposerait de l'architecture d'un système qui, par substitution progressive permettrait de conserver les limites foncières publiques et privées juridiquement définies.

Cette information, repérée dans un système national (système LAMBERT ou RGF), mise à disposition des usagers selon des modalités à définir, permettrait une bien meilleure gestion des conflits:

- Domaine Privé / Domaine Privé
- Domaine Public / Domaine Public
- Domaine Privé / Domaine Public.

C'est par là même un facteur d'ordre social et d'ordre public qui à lui seul justifie le projet.

#### 2 Intérêt général

Cette documentation à forme numérique pourrait être la base des systèmes de gestion de banque de données localisées orientés vers la gestion commerciale. On trouverait là l'image de base permettant de localiser les informations nécessaires à la gestion : "mieux connaître pour mieux gérer".

Les applications sont multiples et intéressent les 36 000 communes de France :

- gestion de la voirie,
  - gestion des réseaux divers en sous-sol,
  - servitudes publiques,
  - conception des POS et leur gestion,
  - connaissance de l'appropriation du sol,
  - réseaux de sécurité (plans des pompiers)
- etc...

Ce domaine d'utilisation est sûrement la source d'un financement d'une partie du système, assumé par les Collectivités Territoriales.

D'un point de vue purement technique, l'information foncière numérisée pourrait enfin être fusionnée avec l'information topographique. La conséquence à terme (lorsque le système sera suffisamment enrichi des limites réelles) sera la possibilité de réaliser des documents d'enquête parcellaire précis et peu onéreux.

### 3 Intérêt fiscal

Le Plan Numérique National pourrait enfin se substituer au plan cadastral graphique en restant lié à la matrice cadastrale par l'identifiant des parcelles : Commune, Section, Numéro.

Ainsi l'assiette de l'impôt foncier serait plus équitable et exhaustive.

La mise à jour de la banque de données du Plan Numérique pourrait se faire en même temps que la documentation littéraire gérée par MAJIC II. La connaissance de l'identifiant mis à jour en temps réel confère au Plan Numérique un intérêt accru pour ses applications non fiscales. L'accès par voie télématique à l'information hypothécaire pourrait être ainsi envisagée.

La forme numérique du Plan permettrait, en outre, les mises à jour de l'occupation du sol par la télédétection (surfaces d'emblavure par exemple). Examinons maintenant les conditions de mise en œuvre.

#### IV VOIES ET MOYENS

Le projet, une fois le concept admis, peut se réaliser en plusieurs étapes :

##### PREMIERE ETAPE

Il y a une urgence à mettre en place des spécifications nationales cohérentes qui s'imposeraient à toute entreprise de digitalisation de plans cadastraux :

- rattachement au système LAMBERT (ou RGF) de 8 points par feuille. Les points choisis seront identifiables sur le terrain. La technique de localisation par satellite (GPS) est aujourd'hui opérationnelle et permet d'abaisser les coûts dans des proportions importantes,

- densification des cavenas sur les communes concernées avec une densité de 3 points par rue dans les zones urbanisées et 1 point tous les 10 ha pour les parties rurales,

- adoption d'un format d'échange de données numériques permettant d'entrer dans des systèmes de banques de données à modèle relationnel et topologique,

- définition d'un cahier des charges minimum de digitalisation,

- obligation de valider les fichiers créés au "Plan National".

##### DEUXIEME ETAPE

Mise en place d'une politique d'équipement systématique du territoire avec priorité sur les zones sensibles. Et couverture totale du territoire en une période de 10 ans. Incorporation des limites foncières juridiquement opposables déjà numérisées (grands ouvrages, remembrement, cadastre numérique).

##### TROISIEME ETAPE

Mise en place d'une réglementation obligeant les propriétaires fonciers voulant aliéner un terrain à bâtir ou bâti, à garantir la superficie par bornage contradictoire des limites et à fournir des données numériques rattachées au système LAMBERT (ou RGF), des contours réels de la parcelle comme du bâti existant.

De même, faire obligation aux concessionnaires du Domaine Public de définir les alignements, par des données numériques rattachées au système LAMBERT (ou RGF) et versement de cette documentation au Plan Numérique National.

#### CHOIX D'UN ORGANISME RESPONSABLE ET DECONCENTRATION DU SYSTEME

Etant donné la masse des informations à gérer et à stocker, la dimension départementale nous semble la plus adaptée. La qualité des opérations de mise à jour fera la richesse du système. On ne peut donc concevoir le système que par une spécification nationale qui confère un caractère général à l'architecture, et que par une gestion départementale qui donne la souplesse tout en permettant d'adapter les moyens aux besoins locaux.

La seule Administration qui, aujourd'hui en France, présente l'organisation adéquate et les agents les plus aptes à gérer un tel système, est, sans conteste, le service technique du Cadastre.

Mais il s'agit, pour cette administration, d'une nouvelle mission de vocation qui sort de son rôle traditionnel fiscal. Le Service du Cadastre est rattaché au Ministère des Finances qui n'a pas d'intérêt direct à prendre en compte le "Conservatoire du Foncier".

Il y a là un débat à ouvrir au sein des Pouvoirs Publics, et trouver une solution administrative afin que l'Intérêt Collectif soit pris en compte, au-delà du seul Intérêt de l'Etat.

En outre, la réforme en profondeur que constitue la décentralisation en France depuis 1985 transfère aux Collectivités Territoriales la responsabilité de l'aménagement. Pour tenir compte de cette réalité, il faudra trouver une solution qui associe non seulement les préoccupations de plusieurs Ministères, mais aussi des divers Collectivités Territoriales qui gèrent le territoire français.

Georges COUDERT  
Président de la Commission Informations Géographiques

NOVEMBRE 1989



**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
**MULTIFUNCIONAL**

– SICRUM –

PRESENTATION GENERALE DU CADASTRE FRANÇAIS  
LES DIFFÉRENTS ASPECTS DE LA MODERNISATION DU CADASTRE  
FRANÇAIS

JEAN-MARC FENET

FRANÇA

LISBOA... ONCHAL-20 a 25 Novembro de 1989



MINISTERE DE L'ECONOMIE,  
DES FINANCES ET DU BUDGET

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DIRECTION GENERALE DES IMPOTS

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Service des Opérations  
Fiscales et Foncières

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Sous-Direction des affaires foncières,  
cadastrales et domaniales

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Bureau III A 1

Paris, le

8 NOV. 1989

SEMINARIO INTERNACIONAL SOBRE CADASTRO  
RUSTICO E URBANO MULTIFUNCIONAL

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Communication de M. Jean-Marc FENET,  
Administrateur civil, responsable de l'administration générale du  
cadastre français.

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PRELIMINAIRE : PRESENTATION GENERALE DU CADASTRE FRANCAIS.

THEME : LES DIFFERENTS ASPECTS DE LA MODERNISATION DU  
CADASTRE FRANCAIS.

Novembre 1989

**PRELIMINAIRE :**

**PRESENTATION GENERALE DU CADASTRE FRANCAIS**

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Avertissement : la présentation qui suit (nécessairement sommaire) du Cadastre français, cherche à dégager les caractéristiques essentielles de cette institution : fondements administratifs, contenu des missions, structures et moyens, performances.

Pour plus de détails, il y a lieu de se reporter à la notice LE CADASTRE FRANCAIS.

## I - LES FONDEMENTS DU CADASTRE FRANCAIS

Héritier du droit romain, fondé sur les principes égalitaires de la Révolution, le cadastre a été établi en France entre 1808 et 1855 sous l'impulsion de l'Empereur Napoléon, qui voulut en faire à la fois un instrument juridique pour régler la possession du sol et un outil fiscal capable d'assujettir équitablement les citoyens à l'impôt foncier.

Mais, à l'époque, la tenue à jour des plans cadastraux n'avait pas été envisagée. Aussi, une rénovation générale du cadastre napoléonien -ou ancien cadastre-, fut-elle prescrite en 1930. Cette opération est aujourd'hui terminée, sauf pour quelques communes d'Alsace et de Moselle.

En France, le cadastre décrit la propriété apparente, c'est-à-dire telle que les propriétaires s'accordent à la reconnaître et à en user sur le terrain.

C'est un cadastre de type fiscal : document de portée administrative, il ne rapporte pas la preuve de la propriété. Il n'en participe pas moins aux effets juridiques attachés à la publicité foncière : l'opposabilité aux tiers est conférée aux actes publiés..., qui ne peuvent l'être qu'à condition de désigner les immeubles en conformité avec le cadastre. Cadastre et fichier immobilier se complètent ainsi pour fournir un inventaire complet du foncier, réel et personnel.

## II - LES MISSIONS DU CADASTRE

Le Cadastre français a trois missions principales et indissociables.

### . La mission fiscale.

Le cadastre recense, actualise et exploite les données servant à asseoir la fiscalité directe locale, c'est-à-dire : les taxes foncières (sur les propriétés bâties et non bâties) et, en partie, la taxe d'habitation et la taxe professionnelle.

### . La mission foncière.

Dans le cadre des liens légaux qui l'associent aux mécanismes de la publicité foncière, le cadastre assure l'identification de chaque immeuble susceptible d'avoir une vie juridique distincte.

### . La mission technique.

Le Cadastre établit et tient à jour la cartographie foncière à grande échelle du territoire national.

Mais, compte-tenu de sa richesse documentaire, le cadastre se trouve de facto investi d'une mission de service public à caractère plus général. C'est ainsi, à titre d'exemples, qu'il est utilisé comme base des remboursements ruraux (300.000 ha par an), qu'il sert à mener les enquêtes préalables dans toutes les opérations d'infrastructures (voies routières, TGV) et qu'il constitue la trame des banques de données territoriales.

### III - L'APPAREIL ADMINISTRATIF ET LES MOYENS

#### . Les principales caractéristiques.

Le cadastre français est placé sous l'autorité de l'Etat (Ministère chargé du Budget-Direction générale des Impôts).

Mais son administration est territorialement déconcentrée et il concourt largement à l'assiette de la fiscalité directe locale, laquelle bénéficie exclusivement aux collectivités territoriales. Ce système concilie le principe d'égalité des citoyens devant l'impôt (mode unique de recensement et d'évaluation des biens) avec les libertés locales (fixation des taux d'imposition par les communes, les départements, les régions).

Par ailleurs, il y a lieu de noter que l'administration du Cadastre, celle de la Publicité foncière et celle du Domaine de l'Etat dépendent de la même autorité (DGI) et des mêmes structures déconcentrées (Directions Régionales, Directions des Services fiscaux), ce qui a pour conséquences :

- l'unité de doctrine et de commandement ;
- la rationalisation des coûts administratifs et la réalisation d'économies d'échelle ;
- une politique cohérente de modernisation.

#### . Les structures et les moyens.

Le cadastre français dispose de 7 500 agents, dont 1 500 géomètres qui se consacrent aux travaux de terrain, répartis dans des structures déconcentrées à différents niveaux.

##### Niveau national

Outre l'échelon central de commandement, il existe :

- l'Ecole Nationale du Cadastre (à Toulouse) où sont formés les inspecteurs, techniciens-géomètres et contrôleurs du cadastre ;

- le Service de la Documentation Nationale du Cadastre qui centralise certains travaux d'édition et réédition de plans, ainsi que la micromation des documents cadastraux.

#### Au niveau des régions

Les Directions régionales des Impôts accueillent :

- les Brigades régionales foncières (B.R.F.) spécialisées dans la réalisation des opérations techniques de grande envergure ;

- 4 centres régionaux de photogrammétrie ;

- 5 centres régionaux d'informatique (C.R.I.) à vocation foncière.

#### Dans les départements

309 centres des impôts fonciers (en moyenne 3 C.D.I.F. par département), sont placés sous l'autorité des Directions des Services fiscaux.

On notera enfin que chaque commune (il y a 36 000 communes en France) détient une copie du cadastre de son territoire et que, pour la plupart, les travaux cadastraux (travaux neufs et tenue à jour) sont effectués aux frais de l'Etat.

#### IV - LES REALISATIONS

Le Cadastre français est entièrement constitué et tenu à jour en permanence sur l'ensemble du territoire national, ce qui n'exclut pas de le remettre en chantier chaque fois que l'évolution du tissu parcellaire le nécessite, dans le cadre d'opérations dites de remaniement (seconde rénovation, à raison d'environ 100.000 ha par an).

La documentation cadastrale représente, en nombre d'entités à gérer :

. 100 millions de parcelles, figurées sur 580.000 feuilles de plan,

. 35 millions de locaux (propriétés bâties),

. 25 millions de propriétaires,

. 6,7 millions de dénominations de voies et lieuxdits.

Ce parc est touché, chaque année, par

- . 17,5 millions de changements affectant les données alpha-numériques,
- . 2,3 millions de changements intéressant le plan.

Le plan cadastral, hormis quelques grandes villes (PARIS, LYON, BORDEAUX, ST-ETIENNE) pour lesquelles a été constitué un fichier topographique cadastral (FTC), n'existe que sous la forme graphique.

La gestion des informations littérales est, quant à elle, entièrement informatisée :

. MAJIC 1 est un système de la première génération (traitements batch annuels, au niveau des C.R.I., sur des données organisées en fichiers).

. MAJIC 2 remplace progressivement MAJIC 1 (1). Des bases de données domiciliées dans les 5 C.R.I. fonciers sont gérées, interactivement et en temps réel, à partir des terminaux équipant les CDIF.

Sous MAJIC 2, la chaîne des traitements automatisés va de la saisie des informations élémentaires sur les terminaux écrans-claviers, jusqu'à l'édition et l'adressage des avis d'imposition par les C.R.I.

Ce niveau de performances est atteint, notamment, grâce à une normalisation et à une identification rigoureuses des données (personnes, biens, adresses).

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(1) au 1er novembre 1989, 222 CDIF sur 309 avaient basculé de MAJIC 1 à MAJIC 2.

**THEME :**

**LES DIFFERENTS ASPECTS DE LA MODERNISATION  
DU CADASTRE FRANCAIS**

## PREAMBULE

L'exposé qui va suivre présente tout d'abord un bilan de la principale étape récemment franchie, en termes de modernisation, par le cadastre français : l'informatisation complète du domaine des applications alphanumériques.

C'est l'occasion d'évoquer les effets internes de cette évolution sur le fonctionnement du corps administratif et l'impact sur ses relations externes : vis-à-vis des "administrés" que sont les contribuables, ou des "usagers" pour qui le cadastre représente avant tout une source d'informations.

En contrepoint d'une démarche qui, pour la Direction générale des Impôts, suivait la logique de sa politique administrative, il existe une problématique au sujet de l'informatisation du plan cadastral. Les difficultés résultent, pour une large part, de contraintes économiques. Mais on y trouve aussi la marque d'une très ancienne divergence dans la manière de concevoir la topographie cadastrale, selon que le but assigné est d'administrer la fiscalité foncière ou de décrire la géographie foncière du territoire.

Devant l'importance des enjeux, au regard du service public, une démarche contractuelle innovante est en voie de concilier les objectifs de l'Etat et ceux des grands acteurs du foncier (collectivités territoriales, gestionnaires de réseaux).

Enfin, l'exposé évoque au passage un certain nombre de thèmes qui étaient proposés aux congressistes : "role of cadastre in modern planning and urban data management", "challenge of digital technologies in concepts and working methodologies", "cadastre and fiscal applications", "graphic cadastre versus numeric cadastre".

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## I. LA REFERENCE EN MATIERE DE MODERNISATION DU CADASTRE FRANCAIS : MAJIC

(MAJIC = Mise A Jour des Informations Cadastrales)

La maintenance de la documentation littérale (ou alphanumérique) du cadastre représente une charge considérable compte tenu de la masse d'informations à gérer.

Ces données, en perpétuelle évolution, sont affectées chaque année par environ 17,5 millions de modifications. Un tel trafic appelle le recours à l'informatique de gestion.

Les informations littérales ont été prises en charge de la fin des années 1960 au milieu des années 1970, à l'aide d'un système dénommé MAJIC 1.

MAJIC 1 visait d'une part à constituer et à tenir à jour une documentation cadastrale magnétique, d'autre part à éditer des documents annuels, actualisés des changements constatés dans l'année civile écoulée (périodicité en phase avec l'annualité de l'impôt). C'est un système centralisé :

- cinq centres régionaux informatiques (C.R.I.) gèrent les informations sur support magnétique et assurent les différentes productions (avis d'imposition destinés aux contribuables, documents de position à l'usage des services) ;

- chaque centre des impôts fonciers (C.D.I.F.) transmet par voie postale les documents de saisie à son C.R.I. de rattachement pour la mise à jour des fichiers magnétiques (fichier des propriétaires, fichier des propriétés non bâties, fichier des locaux, fichier RIVOLI des voies et lieux-dits, fichiers annexes).

MAJIC 1 comporte toutefois des limites en termes de performances et génère des contraintes :

- limites fonctionnelles, car les applications ne couvrent que les missions fiscale et documentaire ;

- limites structurelles, eu égard à la centralisation du système et à la nécessité de rédiger manuellement des documents de saisie (en double-emploi avec la saisie informatique) ;

- contraintes ergonomiques pour les agents des services de base (manque total de convivialité du système, dépossession de l'outil de travail).

Ces inconvénients ont rapidement conduit à concevoir un nouveau système, MAJIC 2, dont la mise en place a commencé en 1985 et doit s'achever en 1990 (à la fin de l'année 1989, 85 directions départementales dont quatre outre-mer, soit 246 C.D.I.F. sur 309, auront basculé de MAJIC 1 à MAJIC 2).

MAJIC 2 élargit le champ des applications en prenant en compte, outre les fonctions de MAJIC 1 :

- l'identification des immeubles pour les besoins de la publicité foncière,
- la délivrance et la comptabilité des extraits et reproductions de la documentation cadastrale,
- la gestion des affaires contentieuses,
- l'élaboration des statistiques de production à tous les niveaux et d'un tableau de bord pour les responsables locaux.

Avec MAJIC 2, les informations cadastrales sont organisées en bases de données. Chaque C.D.I.F. gère sa propre base à l'aide d'écrans-claviers et au moyen de transactions qui se déroulent en temps réel et sur un mode conversationnel (le temps de réponse est d'environ 1,5 seconde).

MAJIC 2 met en relation les C.D.I.F. avec les C.R.I. où sont domiciliées les bases de données, par l'intermédiaire du réseau TRANSPAC (ou DOM PAC - transmissions par satellite - pour les départements d'Outre-Mer).

#### 1.1. Les conséquences de MAJIC 2 sur les performances de l'appareil administratif (effets internes)

L'amélioration des méthodes et des conditions de travail.

Le passage à MAJIC 2 modifie profondément l'éventail des tâches des agents du C.D.I.F. : en supprimant certains travaux, liés par nature à MAJIC 1 ou assumés désormais par MAJIC 2, et en leur offrant des méthodes nouvelles de travail sans rompre avec la logique administrative héritée des procédures manuelles.

Les travaux supprimés sont :

- ceux liés au traitement par lot, de type centralisé, tels que l'établissement des bordereaux de saisie, la confection de liasses et la manutention liée au trafic postal, le recyclage des anomalies ;

- ceux relatifs à l'exercice de la mission foncière, lequel nécessitait auparavant une tenue à jour manuelle provisoire, entre deux éditions annuelles de documents de position.

Les travaux mis à la charge du système permettent de rentabiliser la charge de saisie et de supprimer les tâches les moins qualifiantes (travaux de copie, d'enregistrement, de calcul, établissement de statistiques).

Enfin, l'automatisation réduit les possibilités d'erreur et améliore la présentation - voire le contenu - des documents à destination extérieure.

Désormais, l'activité des agents consiste pour une large part à analyser des documents-sources (extraits d'actes de ventes, déclarations de constructions nouvelles ou de changements de nature de culture, etc...), saisir les informations correspondantes à l'écran et gérer l'activité d'impression des documents produits sur place (1).

Du reste, la mise en oeuvre du système MAJIC 2 s'est accompagnée d'une nouvelle organisation interne des services de base, reposant notamment sur les principes suivants :

- la déparcellisation des procédures administratives, MAJIC 2 permettant de traiter directement et en une phase unique l'ensemble d'un document-source (contrairement à la décomposition du traitement qui était induite par l'organisation en fichiers, sous MAJIC 1) ;

- la polyvalence qualificative des agents, qui répond à une nécessité ergonomique (limiter le temps de présence devant l'écran-clavier) et qui enrichit le contenu des tâches.

Indépendamment des bénéfices qualitatifs, les gains de productivité observés sont actuellement de l'ordre de 25 %.

#### Un meilleur accomplissement de la mission fiscale du Cadastre

Les différents impôts assis sur les données cadastrales (taxes foncières, taxe d'habitation, taxe professionnelle) sont établis annuellement, à raison de la situation des biens au 1er janvier de l'année d'imposition, étant observé que les avis d'imposition portant sur l'année N sont adressés aux contribuables au cours de l'été N.

L'enjeu, pour les services, est donc d'exploiter jusqu'à une date aussi tardive que possible des informations qui leur parviennent, inévitablement, avec un décalage dans le temps par rapport aux faits générateurs.

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(1) étant observé que les éditions "lourdes", telles que celle des avis annuels d'imposition, continuent d'être assurées par les C.R.I.

Avec MAJIC 2, disparaissent les contraintes de la saisie centralisée (calendriers de prise en charge, délais nécessaires aux transmissions et au recyclage des anomalies). Les services sont donc en meilleure situation pour respecter les échéances.

Il s'ensuit une forte diminution du contentieux qui provenait jusqu'alors des mutations en retard.

Par ailleurs, l'informatique rend beaucoup plus aisée l'exécution d'opérations de masse, en employant des programmes spécifiques au niveau des C.R.I. ou par des transactions de type collectif, au niveau des C.D.I.F. On peut citer par exemple l'application des majorations forfaitaires annuelles des bases d'imposition sur l'ensemble du territoire, ou encore l'intégration des résultats des grandes opérations foncières (remembrement des terres) ou de la réfection du plan cadastral.

Cette capacité de mobilisation des données est par ailleurs un atout considérable pour concevoir et mettre en oeuvre une révision générale des évaluations fiscales.

## 1.2. Les bénéfices de la modernisation pour les usagers du cadastre.

L'informatique multiplie les potentialités documentaires du Cadastre et suscite une demande accrue de produits cadastraux, de la part des particuliers aussi bien que des collectivités et autres services publics.

### L'amélioration pour les usagers particuliers.

L'informatique a permis, dès MAJIC 1 et vers 1980, de produire la documentation littérale sous forme de microfiches venant remplacer les volumineux registres (appelés matrices cadastrales) qui encombraient les services. Complétées de différentes tables d'accès, les microfiches fournissent, par propriétaire, le détail de ses biens au 1er janvier de l'année considérée.

L'information des contribuables s'en trouve améliorée, notamment lors de la sortie des avis d'imposition. Il est par ailleurs délivré au public des photocopies de microfiches, pour une somme modique (9 F pour une microvue).

La visualisation sur écran de la base de données MAJIC 2 permet de consulter à tout moment une information actualisée des derniers changements connus. Il est possible d'éditer les extraits correspondants sur support papier. Ces extraits complètent les services offerts par la micromation.

En matière de délivrance d'informations relatives au plan cadastral, le progrès accompli au cours de ces dernières années a consisté à transférer les 580 000 plans, de leur support papier d'origine sur un support transparent inerte (plastique polyester). Il est ainsi possible, dorénavant, de produire au niveau des C.D.I.F. les copies destinées au public.

**Un service amélioré au profit des collectivités locales et autres organismes publics.**

. L'aide à la décision en matière de fiscalité directe locale.

Les directions départementales des impôts fournissent chaque année aux communes, départements, régions, le montant des bases d'imposition ainsi que les variations observées par rapport à l'année précédente, afin que les assemblées territoriales disposent des éléments nécessaires au vote des taux annuels.

De plus, pour les éclairer sur leurs choix budgétaires, la DGI peut à la demande effectuer des simulations selon différentes hypothèses : abattements à la base, surimposition des terrains urbains, etc...

**Le Cadastre, fournisseur des systèmes d'informations territoriales.**

Avec la décentralisation du pouvoir politique qui leur a conféré des attributions étendues en matière d'urbanisme et d'équipements collectifs, les villes ont besoin de disposer d'une information complète sur les caractéristiques de leur espace urbain.

Le Cadastre, complété d'autres informations fiscales à référentiel cadastral (toutes disponibles en copie de masse, sur support magnétique) fournit un inventaire détaillé des patrimoines, de la démographie, de l'activité économique (habitat, commerces, bureaux, artisanat et industrie).

Les applications sont de toutes tailles, depuis les systèmes lourds à composante topographique dont se dotent les grandes villes et les ensembles "villes nouvelles" ou "communautés urbaines", jusqu'à des systèmes légers montés par des associations de petites communes et qui sont gérés par un serveur Minitel.

**Autres exemples de délivrance de masse, à des fins diversifiées.**

Beaucoup d'utilisateurs, hormis les collectivités territoriales, sont intéressés par les informations foncières sur support magnétique.

Parmi les demandeurs et les applications poursuivies, on peut citer :

- l'établissement du cadastre viticole (en application de la réglementation européenne) ;

- la recherche des propriétaires dans le cadre de grands travaux d'infrastructure ferroviaire (TGV Sud-Est et Sud-Ouest) et autoroutière ;

- les enquêtes pour la réglementation des boisements, l'aménagement des structures foncières, le remembrement rural ;

- les études prévisionnelles d'implantation de réseaux ainsi que la codification des adresses de l'annuaire téléphonique, par France Télécom ;

- l'étude des possibilités d'hébergement et de transport, dans le cadre de la préparation des Jeux Olympiques d'hiver en Savoie ;

- les recherches sémantiques sur les toponymes effectuées par des universitaires ou des chercheurs.

## **II. LA MODERNISATION DANS LE DOMAINE DE LA TOPOGRAPHIE CADASTRALE**

En matière de topographie, le Cadastre français n'innove pas. Sa démarche consiste à adopter, parmi les matériels et les techniques éprouvés, les schémas les mieux adaptés à la thématique cadastrale.

### **2.1. Les travaux neufs**

Sur l'étendue du territoire, les plans cadastraux sont d'inégale valeur : il y a des disparités d'échelle (du 1/500 au 1/5000), d'origine et de précision (dans les zones rurales, on rencontre encore beaucoup de plans qui ont été rénovés par simple mise à jour de l'ancien plan napoléonien).

Or, les extensions urbaines, industrielles et touristiques rendent certains plans inaptes à enregistrer correctement cette évolution du tissu parcellaire. Il faut donc procéder à leur réfection (dans notre jargon administratif, l'opération s'appelle "remaniement").

1989 marque la première année d'exécution d'un plan de 12 ans visant à remanier, au total, 1 500 000 hectares jugés prioritaires. Pour cela la production annuelle, qui avoisine aujourd'hui 100 000 ha, progressera dans les prochaines années.

Cette production se répartit comme suit :

- 80 % par photogrammétrie (grands chantiers, en général) ;
- 20 % par levé terrestre.

Jusqu'alors, dans la filière photogrammétrique, les stéréominutes étaient produites uniquement en mode graphique (1) (sur appareils analogiques, WILD AMH en majorité, pour les appareils de la DGI) et à l'échelle du document définitif. Elles étaient ensuite complétées sur le terrain pour aboutir au dessin manuel du nouveau plan et au calcul - en procédés semi-manuels - des contenances parcellaires.

Dans la filière par procédés terrestres, le même retard technologique est observé : le meilleur des applications se limite à exploiter les observations de terrain en vue du report automatique des points levés, avec enchaînement par les procédés graphiques traditionnels.

Mais une phase importante de modernisation est amorcée, en accompagnement du plan duodécennal de remaniement.

Déjà, pour les calculs d'aérotriangulation, les quatre centres de photogrammétrie de la DGI sont reliés au mini-ordinateur BULL DPS 7 de l'Ecole nationale du Cadastre.

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(1) Production assurée pour moitié dans les ateliers de la DGI, confiée pour l'autre moitié au secteur privé.

En parallèle au renouvellement de son parc de matériels (1) de la DGI est en voie d'automatiser entièrement la chaîne de production des plans neufs.

Dans ce processus, une base primaire de données sera alimentée par,

- . la restitution numérique,
- . la digitalisation des plans particuliers intégrables dans le nouveau plan cadastral,
- . l'exploitation des carnets électroniques issus du levé terrestre.

L'élaboration définitive du plan cadastral (formation des parcelles, figuration du bâti et des détails topographiques par signes conventionnels) se fera par traitement interactif à l'écran, en exploitant les croquis de levé terrestre, ou de post-complètement pour la filière photogrammétrique.

Enfin, la description des entités cadastrales complètera ce dispositif pour aboutir à la constitution d'une base de données cartographiques cadastrales. Celle-ci, compatible avec le standard d'échange en cours de définition par la DGI (2), sera apte à alimenter les banques de données territoriales et le futur P.C.I. (voir chap. III).

A ce jour, le module de restitution assistée par ordinateur mis au point par l'Ecole nationale du cadastre est en cours d'installation sur les trois autres sites de production.

D'autres logiciels sont prêts : digitalisation, dessin et calcul de contenances, exploitation des carnets électroniques de levé. Reste à adopter le module de post-complètement de la photogrammètrie (des expériences "maison" et des consultations à l'extérieur sont en cours).

## 2.2. La tenue à jour du plan et des natures de culture

En ce qui concerne les divisions de parcelles, les lotissements, les changements intéressant l'emprise de la voirie etc..., les règles de la publicité foncière imposent aux propriétaires de produire les documents cartographiques correspondants avant la passation des actes, en vue du numérotage cadastral des parcelles nouvelles. La tenue à jour du plan s'opère donc "en continu", sans intervention administrative sur le terrain.

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(1) Notamment acquisition récente de 3 stéréorestituteurs analytiques et renouvellement en cours des appareils de levé terrestre par des stations intégrées.

(2) En concertation avec le Conseil national de l'Information géographique (CNIG) et les grands utilisateurs (ordre des géomètres-experts, collectivités territoriales, gestionnaires de réseaux).



Par contre, selon la loi, il appartient à l'Administration de relever elle-même "les changements de toute nature n'intéressant pas la situation juridique des immeubles" c'est-à-dire, pour l'essentiel, les démolitions et les constructions nouvelles d'immeubles bâtis. La règle veut que cette mise à jour soit effectuée annuellement.

Il arrive que, dans des zones à forte évolution et pour des motifs fortuits, des retards importants soient à résorber. Les mises à jour sont alors assurées par photogrammétrie, avec calage des modèles stéréoscopiques directement sur les planches cadastrales.

Par ailleurs, l'interprétation d'agrandissements photographiques à des échelles voisines du 1/5000e constitue un moyen performant de constatation des changements de nature de culture. Une campagne s'est achevée récemment, qui a permis de traiter ainsi 5 millions d'hectares.

Toujours à cette fin, l'utilisation des images satellitaires devrait devenir, à terme, un procédé à la fois fiable et efficace. C'est pourquoi, le développement technique des satellites SPOT fait l'objet d'un suivi attentif.

### III. LA PROBLEMATIQUE INHERENTE A L'INFORMATISATION DU PLAN CADASTRAL.

On a vu que le cadastre était doté, pour la gestion de ses données littérales (ou alphanumériques) d'un outil informatique très performant.

Les avancées sont moindres en ce qui concerne la gestion des données topographiques.

Deux causes principales à cela :

- l'ordre des priorités que s'est fixé la DGI en matière d'informatisation, par rapport à l'ensemble de ses missions ;

- le coût élevé des investissements nécessaires et le rapport coût/avantages peu incitatif pour la DGI, dès lors que le plan dans sa version graphique est suffisant pour les besoins de l'assiette fiscale.

Pourtant, l'obsolescence du système en place est largement démontrée. De plus, la pression de la demande devient très forte, de la part des grands gestionnaires de données territoriales.

C'est pourquoi une première décision a été prise : celle de doter le cadastre d'un outil propre de gestion. Le système PCI (plan cadastral informatisé) sera à la fois le pendant et le complément du système MAJIC 2. Le projet est actuellement au stade de l'étude détaillée.

Mais deux obstacles importants demeurent :

- le coût des matériels de gestion et celui de la saisie des données, à partir des planches graphiques ;

- l'impossibilité, pour la DGI seule, de répondre sans délai à une demande forte et incontrôlable dans ses développements.

La solution au problème ainsi posé passe par une politique de conventionnement avec les principaux acteurs intéressés, en veillant à préserver l'unicité du "service public cadastral".

#### . L'obsolescence du système actuel de gestion

Les insuffisances du support graphique par rapport aux potentialités de l'informatique sont connues :

. dégradation physique du support,

. la tenue à jour en mode manuel entraîne une perte progressive de la précision initiale du plan,

. les modes de reproduction aux fins de diffusion sont limités,

. le découpage du territoire en sections, les disparités d'orientation et d'échelle entre feuilles voisines, pénalisent l'utilisateur.

Accessoirement, on observe que la tenue à jour en mode graphique requiert l'intervention de dessinateurs qualifiés. Or, les conditions nouvelles de gestion des personnels dans une grande administration (mobilité des agents, aspiration à la polyvalence et à la promotion) deviennent incompatibles avec l'exercice d'une profession qui est d'ailleurs en voie de disparition dans des domaines comparables (industrie, architecture).

Enfin, d'un point de vue esthétique, la facture du plan cadastral graphique donne une image de marque surannée.

### . Les besoins des utilisateurs externes

La parcelle cadastrale (ou le local) constitue la plus petite entité physique capable de recevoir des attributs relevant de concepts ou de domaines aussi divers que :

- la propriété et tout ce qui s'y rattache,
- le foyer (habitat, démographie, fiscalité, desserte par les réseaux et consommation en général),
- l'activité économique et culturelle (agriculture, commerce, écoles, associations, etc...)
- l'urbanisme (application des règles collectives et individuelles).

Par ses fonctions topographiques, identifiantes, topologiques, le plan cadastral constitue donc la trame nécessaire à tout système gestionnaire de données localisées, agissant dans un ou plusieurs des domaines énumérés.

C'est le cas par excellence des collectivités territoriales, mais aussi des grands aménageurs et gestionnaires de réseaux. Equipés d'outils modernes de gestion, ces organismes veulent disposer d'un plan cadastral informatisé en complément des données alphanumériques (cf. § 1.2). A cette fin, ils recherchent la collaboration de la D.G.I.

### . La politique de conventionnement

Cette politique a pour objectifs :

- d'organiser la collaboration entre la DGI et les gestionnaires de banques de données afin de garantir la qualité de la saisie et de la tenue à jour ultérieure des données ;
- de permettre à la DGI de récupérer le plan cadastral numérique, dès qu'elle sera dotée de son propre système (P.C.I.).

La saisie des données est à la charge du demandeur. Elle est contrôlée par le Cadastre, qui bénéficie d'un droit de retour et, en contre-partie,

. fournit les mises à jour,

. autorise l'exploitation des données, y compris par la rediffusion de produits de synthèse cumulant des informations cadastrales avec des données d'autres provenances (compléments topographiques, mobilier urbain, réseaux, etc...).

#### IV. LES PERSPECTIVES

Comme il a été dit en préliminaire (présentation générale du Cadastre français, § III), Cadastre et Publicité foncière sont placés sous l'autorité unique de la DGI. Au niveau des services de base, les C.D.I.F. et les Conservations des Hypothèques ont des compétences territoriales harmonisées et sont soumis à des règles strictes de concordance entre leurs documentations respectives.

Le fichier immobilier (1) est encore géré par les Conservations des Hypothèques selon des procédures manuelles.

Le projet d'informatisation le concernant a pour nom FIDJI (Fichier Informatisé des Données Juridiques Immobilières). Ce projet est au stade des études détaillées, menées dans l'optique d'une connexion entre MAJIC et FIDJI, de manière :

- à assurer l'harmonisation parfaite des deux fonctions (identification des biens et exposé de leur situation juridique),

- à optimiser le fonctionnement de ce "bloc foncier" en supprimant toute intervention administrative redondante, qu'il s'agisse de la vie des entités cadastrales (créations, suppressions, filiations) ou du suivi des liens entre immeubles, propriétaires et contribuables.

De la même manière, l'étude PCI est menée sous la contrainte d'être parfaitement compatible avec MAJIC et FIDJI.

A terme (1995 ?), l'ensemble MAJIC + FIDJI + PCI constituera la B.I.U. (Base Immobilière Unique) de la D.G.I.

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(1) Le fichier immobilier retrace la vie juridique des immeubles, au vu des actes soumis à la publicité foncière. Il y a en réalité trois fichiers physiques :

- un fichier réel (pour l'accès aux actes publiés par l'identifiant cadastral),
- un fichier personnel,
- un fichier "réel personnalisé", en milieu urbain (accès direct aux données personnalisées par l'identifiant cadastral).

## CONCLUSION

Bien qu'elle soit inégale et qu'elle rencontre des obstacles, la modernisation du cadastre français permet à cette institution de mieux assurer ses missions traditionnelles, tout en suscitant l'émergence de nouvelles applications. Celles-ci deviennent à leur tour des facteurs d'évolution.

Mais il paraît intéressant, à la fin de cet exposé, d'évoquer deux idées sur la conception d'un système cadastral moderne.

Un cadastre est un outil coûteux, en dépenses d'investissement et de fonctionnement. Sa rentabilité économique et sociale ne peut plus se mesurer seulement en termes de fiscalité foncière ou de sécurité apportée au droit de propriété. Cette rentabilité sera de plus en plus liée à des impératifs élargissant le champ des applications cadastrales :

- qualité et actualité des données,
- disponibilité des informations, au sens moderne du terme (normalisation du contenu, recours aux nouvelles techniques de communication).

C'est en intégrant ces contraintes que le Cadastre français a pu parvenir à son stade actuel de modernité et se fixer des objectifs clairs pour les prochaines étapes.

Par contre, dans le contexte français actuel (juridique, politique, administratif) le concept de cadastre "multifonctionnel" n'implique pas nécessairement un enrichissement quantitatif des données. C'est aux utilisateurs de le faire, en fonction de leurs propres besoins et dans le respect :

- . des prérogatives de chaque fournisseur de données,
- . des règles déontologiques d'exploitation de ces données.

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**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
**MULTIFUNCIONAL**

— SICRUM —

THE FRENCH CADASTRAL SYSTEM

JEAN-MARC FENET

FRANÇA

LISBOA... NCHAL-20 a 25 Novembro de 1989

## THE FRENCH CADASTRAL SYSTEM

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**Jean-Marc FENET**  
**Ministère de l'Economie,**  
**des Finances et du Budget**  
**- PARIS -**

Descended from Roman law, founded on the principles of equity of the French Revolution, the cadastral survey was established in France between 1808 and 1850. Napoleon wanted to make it both a legal instrument to settle the question of the possession of land and a fiscal measure in order to subject the citizens to land taxes in a fair way.

Today, the Cadastre is a part of the tax administration (Direction Générale des Impôts), in the Ministry of Finances.

It is reviewed every time that the evolution of the land parcelling so requires (100 000 Ha are dealt within this way each year), and is kept permanently updated.

540 000 maps portray the 546 000 sq. km of French national territory.

7 500 agents, of whom 1 500 are surveyors, handle with 97 million parcels of land and 35 million premises.

About 10 % of this information must be changed every year. The up-dating is carried out in 5 Data Processing Centres ; the system involves the use of almost 700 programs consisting of more than 400 000 instructions.

The maps of the major cities : PARIS, LYON, MARSEILLE, TOULOUSE, SAINT-ETIENNE, BORDEAUX, etc, are already numbered and generated automatically. Conventions are being signed with other local authorities to extend this kind of management under graphic process.

On the other hand, the literal data of the French cadastre, i.e all the data but those concerning the maps themselves, have being processed, as a whole, in an updating system of cadastral information - called MAJIC 1 - since 1970. This system provides both fiscal and documentary missions. But the legal mission - the administration of which is manual - was completely left out.

Therefore a new system - called MAJIC 2 - has been developed so as to fill this requirement too. It is becoming general in the whole country. A decentralized maintenance by means of real time and conversational procedures, features the system MAJIC 2. The background of this maintenance consists of the delivering the information without any documentary constraint. With MAJIC 2, the daily activities of the cadastre as well as the permanent ones are possible by using four kinds of functions. The documentary task can be characterized by the disposal and the accessibility of the information, whenever you need it. The updating job is working from taking straightly into consideration the documents.

With regard to the function of output, it supplies all the yearly issues as also the daily or periodic ones. The service functions include more particularly the administration of the legal department, the elaboration of statistics, a set of tools for simulations of management, and the chronological account of the updating procedures.

MAJIC 2 bears on a data base which is directly stemmed from the MAJIC 1 files. The 306 cadastral survey offices can access to the data base by terminals, in order to ask for information, to update the data, or to have certificates printed on paper (certified excerpts). The procedures are chosen by selecting them among a catalogue. The data acquisition is guided by the system itself which keeps a function "help", so that the agent does not need looking for the directions for use in manuals.

Finally, with the systems MAJIC 2, the control of the cadastral information comes back to the cadastral survey offices.

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The objectives of the Land Registry are threefold :

. FISCAL OBJECTIVE. Each year more than 40 Million tax advice forms are generated and printed automatically so as to procure fiscal resources for the local communities.

. LEGAL OBJECTIVE. In every constitutional, transfer or final deed related to land ownership, usufruct or emphyteutical property rights, the assets of the estate are designated and referenced in the Land Registry declarations. In this way the Land Registry gives a real civil status of the property.

. ECONOMIC OBJECTIVE. Through the information which it provides concerning the land parcelling and the buildings, the Land Registry operates an inventory of the real estate capital of the country in terms of :

- agricultural and forestry resources,
- community infrastructures,
- industrial, commercial and residential constructions.



In this way, it constitutes an indispensable tool where land operations are concerned. To give some examples, urban and rural development is based, new infrastructures are developed, (the French High Speed Train), databanks containing urban information for the management of the towns and cities are compiled, (town planning, energy distribution, network reorganisation, etc...) from the information obtained from the Land Registry.

Fiscal objective is particularly important since France has been making the choice of cadastral rental values as a basis for local taxation. The cadastral rental value can be defined as the theoretical rent an owner would draw from his property in the normal market conditions.

Valuation methods carried out by the Cadastre are different according to the kind of property considered : land property, or built property.

- The tax on land properties essentially relies on agricultural plots, but also concerns urban properties free of building.

As regard agricultural properties, at the level of the municipality, the plots are distributed in various categories according to their nature : fields, woods, orchards... Within each category, the plots are divided in classes of different quality. For each class, a tariff is calculated by the tax administration, from a sample of "normal" farming leases, or - in the case of orchards, woods and vines, where leases are scarce - from an estimation of the average product per hectare. This tariff applied to the surface of the plot determines the rental value.

As regard urban properties free of building, in particular development sites, the reference is the true market value, and the rental value is calculated by applying a general rate of 1%.

- Building are distributed in three different groups : Dwellings, trading premises and industrial premises.

For dwellings, the valuation methods are based on an analysis of the rental market in each municipality. The premises are divided in 8 categories according to their quality. For each category, a reference house is chosen. Its rental value is calculated from the weighted surface (more or less important according to the standards of comfort) and a tariff fixed after investigating the rental market : an average level of rent is estimated from a sample of "normal" leases. If the leases are scarce on the municipality's territory, two other tariff methods can be used :

- comparison with reference premises of neighboring municipalities,

- if comparison is impossible, interest rate applied to the true market value.

The same methods, with some differences, are implemented as regard trading premises and small industrial premises. Large industrial firms are taxed every year on the basis of accounting data drawn from the balance sheet.

As soon as the rental value is fixed for each property, the most important issue is that of their regular updating. For this purpose, the Cadastre gives an essential assistance.

At the present time, the maintenance of this valuation system consists of three complementary operations :

- a complete revaluation of the bases of assessment, programmed every six years, and leading to new rates and tariffs.
- an updating every three years, between two revaluations carried out at a more agregate level (land region or "département").
- an annual increase by means of a rate fixed at State level.

However, the valuation system as described above is sometimes considered as exceedingly complicated and difficult to implement. For instance, the revaluation itself, as programmed every six years, leads the service to reconsider the case of 97 million land parcels and 35 million premises, in the 36 500 municipalities. In fact, no revaluation operation has been carried out since 1961 as regards land properties, and since 1970 as regards built properties.

A reordering of rental values, in relation to market evolutions, would be now necessary to ensure equity among local taxpayers. It could be decided by the French Parliament in 1989/90.

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Many countries wish to undertake the constitution of a Land Registry System, or to increase the potential of and improve an existing system. THE FRENCH ADMINISTRATIVE BODIES ARE READY TO HELP SUCH COUNTRIES BY CARRYING OUT AN ANALYSIS OF THE EXISTING SITUATION AND REQUIREMENTS AND TO RECOMMEND A PLAN OF ACTION.

In so doing, the French Administration often relies on French Companies who are specialised in the fields of topography, data processing and management consulting.

The countries which make use of such services are thus guaranteed that they receive a high level of service and the required degree of competence.

The proposed services are modular to take into account :

- . the fundamental options (emphasis to be placed on a fiscal, legal or economic Land Registry system),
- . the required depth in the quality and accuracy of the topographical, litteral and statistical data and information,
- . the sophistication required in the management system.

The services which are provided jointly by the French Administration and the associated organisations, cover all technical (topographical and data processing) and administrative aspects (regulations, setting up or reform of existing structures, professional training).

By working closely with the local administrations who request the project, a tool is provided which is :

- well ADAPTED to the local legislation,
- as EFFICIENT in the maintenance phase as in the development phase,
- CAPABLE OF BEING EASILY MODIFIED to meet new requirements.

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SEMINARIO INTERNACIONAL  
SOBRE  
CADASTRO RUSTICO E URBANO  
MULTIFUNCIONAL  
— SICRUM —

criação e operacionalização de um serviço  
nacional de cartografia e cadastro

CELSO FERNANDES

CABO VERDE

LISBOA... ENCHAL-20 a 25 Novembro de 1989



MINISTÉRIO DA ADMINISTRAÇÃO LOCAL E URBANISMO  

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**SERVIÇO NACIONAL DE CARTOGRAFIA E CADASTRO**

COMUNICAÇÃO AO SEMINÁRIO INTERNACIONAL SOBRE  
O CADASTRO RUSTICO E URBANO MULTIFUNCIONAL FA  
CE AS NOVAS TECNOLOGIAS -

PORTUGAL 20 A 25/11/89

TEMA - A CRIAÇÃO E OPERACIONALIZAÇÃO DE UM  
SISTEMA NACIONAL DE CADASTRO EM CABO  
VERDE.

ELABORADO POR CELSO FERNANDES, DIRECTOR GERAL  
DO SERVIÇO NACIONAL DE CARTOGRAFIA E CADASTRO

NOVEMBRO DE 89 .-

SEMINARIO INTERNACIONAL SOBRE O CADASTRO  
RUSTICO E URBANO MULTIFUNCIONAL -FACE AS  
NOVAS TECNOLOGIAS

PORTUGAL 20 A 25/11/89

1. Agradeço muito sensibilizado o convite e a oportunidade de expôr a curta mas promissora experiência de Cabo Verde nessa matéria:

2. Caracterização ( sucinta) do País e do Sector

2.1 - Cabo Verde ascendeu à independência com acentuadas carências em infraestruturas e equipamentos, o que justifica o enorme esforço que vem sendo desenvolvi do tendo em vista o lançamento de infraestruturas básicas e equipamentos colectivos - VER QUADRO 1

Assim, dada a necessidade urgente de informação cartográfica e cadastral, foi criado o Serviço Nacional de Cartografia e Cadastro em 1987.

2.2 - A esse Serviço, foram cometidas responsabilidades no domínio de Cartografia - Coordenar o processo de produção cartográfica e no domínio do cadastro - estabelecer metodologia de cadastro urbano e promover a elaboração do cadastro rústico.

2.3 - Responsabilidade tamanha recaiu pois em Serviço cujo sector enfrentava enormes carências de Recursos Humanos, inexistência de equipamentos, cartografia escassa e desactualizada, legislação desactualizada

e in experiência na elaboração de cadastro - VER QUADRO 2 ( 2A, 2B, 2C ...)

2.4 - A preocupação imediata foi a elaboração de diagnóstico , o estabelecimento de medidas a curto, médio e longo prazos, a concepção de Programas e Projectos e a procura de financiamento - VER QUADRO Nº 3

2.5 - Antes de entrar propriamente no tema que nos propomos abordar, ou seja, a tipologia de cadastro a estabelecer, as estruturas a criar, a cartografia a produzir e a formação a implementar, importa caracterizar sucintamente as zonas rurais e a agricultura e as zonas urbanas e o desenvolvimento urbano;

2.5.1 - No tocante a zonas rurais e à agricultura

Pela análise dos Quadros Nº 4 ( 4A, 4B, 4C... ) , concluiu-se:

- A agricultura praticada é de subsistência e a ela está afectada cerca de 60 % da população ;
- A área cultivada é de 60.000 ha, o que representa 15% da área do país;
- A agricultura de regadio pratica-se em 2.000 ha - 3% ;
- A agricultura de sequeiro em 58.000 ha - 97 % ;
- A área média da parcela é de 0,10 ha no regadio e 0,50 ha no sequeiro ;
- A área média cultivada por família é de 1,4 ha no sequeiro e 0,60 ha no regadio ;
- 48 % da área cultivada é-o em regime indirecto;

- Cerca de 40 % de camponeses são rendeiros ou parceiros, por tanto não tem terra própria;

Dadas as características apontadas - exploração indirecta e percentagem elevada de camponeses sem terra - o regime caboverdiano entendeu elaborar e aprovar a LEI DE BASES DA REFORMA AGRARIA, cujo objectivo é o de aumentar a justiça social- proibição de parceria - e a produção e a produtividade - distribuição de terras em posse útil, assistência técnica e crédito agrícola.

Assim, torna-se urgente e inadiável a disponibilização da informação cadastral e a tipologia de cadastro a adoptar deverá ter em conta essa realidade.

Outro aspecto importante a ter em conta é o pendor desenvolvimentista que caracteriza algumas regiões, pela via dos Projectos e Planos Regionais Integrados, estes também carecendo com urgência de informação cadastral

#### 2.5.2 - No tocante a zonas urbanas e ao desenvolvimento urbano

Pela análise dos Quadros Nº 5 ( 5A, 5B, 5C ... ) contacta-se :

- A existência de 2 centros urbanos principais com 118.000 hab ( 31 % do total)
- A existência de 12 centros urbanos secundários com 56.380 hab ( 15 % )
- Que a capital, a Praia vem crescendo a uma taxa de 30 %
- Que o ritmo de construções sobretudo na Praia é elevado - cerca de 800 licenciamentos por ano.

Em síntese, os centros urbanos, mercê de um ritmo acelerado de crescimento, <sup>vêm</sup> colocando os Municípios na difícil missão de zelar por um desenvolvimento urbano harmonioso, não contando no entanto com esse instrumento fundamental que é o cadastro urbano.



### 3. Tipologia de Cadastro

Marcê da caracterização sucinta que se levou a cabo, pergunta-se :

Que tipo de cadastro implementar ?

Cadastro fiscal, jurídico ou económico ?

Creemos dever ser o económico sem descurar os restantes 2 aspectos, o fiscal e o jurídico.

De entre os económicos, qual privilegiar ?

Não temos dúvidas que deva ser o cadastro geométrico real.

Porém gráfico ou numérico ?

Afigura-se-nos que, em razão da prevalência da propriedade de sequeiro, em que as extremas regreas geral não estão definidas, deve ser o numérico com compensação topográfica das marcas previamente materializadas, além de que o numérico é mais preciso.

Posto isto, vejamos as fases

Tradicionalmente o cadastro geométrico compreende :

- Ficheiro dos proprietários e dos prédios;
- Ficheiro das áreas das propriedades;
- Quadros de qualificação e classificação e quadros de tarifas ( avaliação cadastral)

Porém perguntamos ?

Dada a grande carência de quadros e a política de racionalidade que orienta a afectação dos mesmos aos vários Departamentos Estatais ;

Pelo facto de existir no Ministério de Desenvolvimento Rural e Pescas o Gabinete de Reforma Agrária, ao qual o respectivo Diploma Orgânico comete igualmente a responsabilidade de promover a realização do cadastro geométrico da propriedade rústica;

Marcê ainda da política de disponibilização de informações cadastrais prioritariamente para o processo de Reforma Agrária ;

Não deveria pensar-se em que os dois Departamentos, o Serviço Nacional de Cartografia e Cadastro e o Gabinete de Reforma Agrária se completassem, elaborando aquele a delimitação das extremas, a inventariação dos nomes dos proprietários e dos cultivadores ( novidade) e procedendo este á determinação da avaliação cadastral?

Porém que articulação estabelecer , que circuito adoptar que delimitação exacta de fronteiras instituir ?

No presente momento em que nos preparamos para elaborar um Projec . to de Lei Quadro do Cadastro , a resposta a essas interrogações é urgente.

Igualmente / é ainda urgente o estabelecimento de interligação entre este Serviço técnico de cadastro, as Finanças - Contribuição e Impostos - e os Registos e Notariado.

#### 4. Estruturas a criar e a dotar

Dada a descontinuidade física do país em que a realidade ilha é bem marcante, mercê do já consagrado hábito de concepção e implementação de Planos Regionais Integrados e tendo em linha de conta que os principais financiadores se vem especializando e concentrando em dadas regiões, afigura-se -nos que a filosofia mais correcta é a da criação e dotação de Divisões Regionais de Cadastro - VER QUADRO Nº 6 ( Divisões a criar).

Que relacionamento e grau de interdependencia deve haver entre as Divisões Regionais, os Municípios, Serviços Desconcentrados do Estado, o Serviço Central - o SNCC, e a Comissão Nacional de Cartografia e Cadastro ? (Ver QUADRO 7)

Dado o impacto do Cadastro no desenvolvimento regional e local não deverão essas entidades locais e regionais participar no estabelecimento de prioridades, planos de actividades, orçamentos etc ?

Que papel reservar aos Municípios nesse processo, enquanto guardiões do desenvolvimento local, sobretudo no presente momento em viram as suas atribuições e competências e meios financeiros substancialmente alargados ?

Enfim, trata-se de questões sobre as quais nos vimos debruçando, pelo que gostaríamos de conhecer a opinião dos presentes

#### 5. Base Cartográfica a produzir

5.1 - Anteriormente fizemos referência que a cartografia do país está já desactualizada.

Na verdade pela análise do QUADRO Nº 2 contacta -se haver cartografia às escalas 1/100.000, 1/75.000 e 1/50.000, não cobrindo porém todo p

país, à escala 1/25.000 essa constituindo a base cartográfica nacional e às escalas 1/10.000 e 1/5.000, também não cobrindo todo o país.

As escalas maiores 1/2.500, 1/2.000, 1/1.000 e 1/500 existem também mas o seu grau de desactualização, excepto num caso ou outro, é muito acentuado.

Assim anima-nos o propósito de levar a cabo, a breve trecho, o levantamento aéreo do país, estando em fase de execução o D.A.O.

Vai-se pois proceder ao levantamento aéreo:

- Do país - 400.330 ha - à escala 1/15.000 ;
- Dos 14 centros urbanos e secundários - 20.000 - ha à escala 1/5.000
- A áreas prioritárias para a elaboração do cadastro - 3/4.000 ha - à escala 1/5.000

No tocante à restituição tencionamos proceder também à contratação de empresas externas para a produção de cartografia para alguns centros secundários - 2.000 - ha, reservando porém a restante área para ser levada a cabo por nós próprios.

5.2 - Concretamente, no tocante ao cadastro que cartografia utilizar ?

Creemos não dever ser o ortofotomapa que, não obstante a sua riqueza de pormenor, comporta no entanto para o nosso país inconvenientes, mercê da orografia acentuada do terreno e do baixo nível de pormenor do mesmo, o que tornaria os elevados custos de investimento em tecnologias de ortoprojecção pouco rentáveis.

Assim, a fotografia aérea é que constituirá o prato forte da nossa intervenção.

Que escalas adoptar ?

Creemos que nas propriedades de regadio pela sua diminuta dimensão deva ser 1/1000 e nas propriedade de sequeiro 1/2.000.

Porém convém frisar que nalgumas propriedades de regadio, se tenha talvez que optar pelo levantamento clássico, dado o elevado nível de pormenor que requer.

## 6. Sistema de Informação Geográfica ( S.I.G)

No estágio actual de organização e funcionamento do nosso Serviço, não constitui ainda uma prioridade a implementação de um S.I.G .

Porém, pensamos dever ter esse objectivo presente, quando vamos encetar brevemente o processo de aquisição de equipamentos.

Assim, anima-nos o propósito de adquirir equipamentos de restituição analógicas embora, mas " ad inicio" acopladas a sistema de aquisição, processamento e conservação de dados, tendo em vista a sua posterior integração em cadeias de produção digital.

Por outro lado, iremos envidar todos os esforços no sentido da digitalização de informações cadastrais, de modo a construir um banco de dados.

Outra preocupação norteia a nossa acção, a de que um futuro S.I.G se desenvolva e amadureça no interior do presente Serviço e nunca fora dele.

## 7. Formação/Assistência Técnica

7.1 - Pela sua importância, desde cedo dispensámos a maior atenção à formação e superação dos nossos técnicos.

A esse propósito, o nosso programa consiste no seguinte :

- Leccionação de Curso de Topografia no país de quatro anos, já iniciado, a partir do qual serão formados 28 topógrafos ;
- Envio de quadros para frequência de Cursos técnicos profissionais na Escola do Instituto Geografico e Cadastral de Portugal, em que temos já 6 ;
- Envio de quadros para frequência de estágios em Marrocos no Serviço congénere, em que temos já 5 e brevemente enviaremos outros 5 ;
- Frequência de estágios de 3/4 meses no Instituto Geografico e Cadastral, por parte dos nossos técnicos superiores e médios;
- Leccionação no país de Cursos de Formação de Topógrafos Auxiliares e de Auxiliares de Topografia;

7.2 - Começamos pois a criar as condições para a disponibilização de quadros ao sector.

Porém até que se formem, careceremos de recorrer à assistência técnica externa, pelo que contamos com a valiosa colaboração dos organismos aqui representados e das individualidades convidadas.

Nesse aspecto, uma palavra especial dirigimos naturalmente aos membros da ACAPEP, que, estamos convictos, se transformarão, a breve trecho, num fórum privilegiado de colaboração e ajuda mútuas.

## 8 - Conclusões

Cremos, não ser exagerado afirmar, que este Serviço, recentemente criado embora, vem encetando um assinalável esforço no sentido de se organizar, de se dotar de equipamentos e de formar os recursos humanos necessários.

Porém, muitas vezes esses processos revelam-se minuciosas e lentas, pelo que contamos sinceramente com a colaboração dos presentes para levar a bom termo a tarefa a que nos propusemos. Aqui e agora, esperamos poder contar com a vossa opinião abalizada a respeito das questões suscitadas na presente Comunicação.

Um muito Obrigado.

Feito na Praia, aos 15 de Novembro de 1989

/CELSO FERNANDES/  
DIRECTOR GERAL DO SERVIÇO NACIONAL  
DE CARTOGRAFIA E CADASTRO

A N E X O

CONTEM QUADROS

## INDICE DOS QUADROS

- Quadro Nº 1 Infraestruturas e Equipamentos
- Quadro Nº 2 A.B.C.D. - Cartografia existente:
- Quadro Nº 3 - Programas e Projectos Concebidos
- Quadro Nº 4 A.B.C. - Carecterização da Zona Rural
- Quadro Nº 5 A.B.C. - Carecterização das Zonas Urbanas
- Quadro Nº 6 - Divisões Regionais de Cadastro a Criar

QUADRO Nº 1

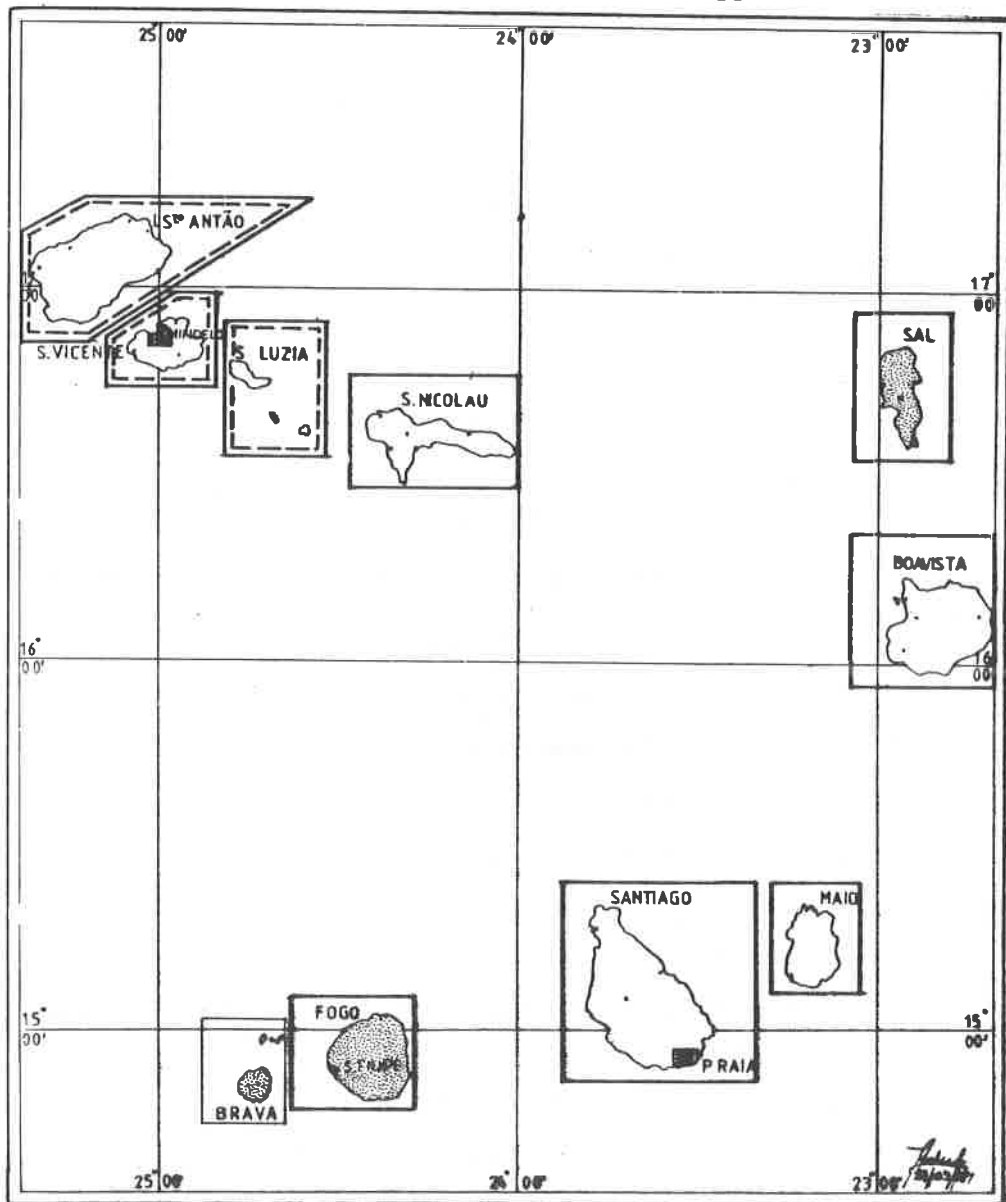
INFRAESTRUTURAS E EQUIPAMENTOS

EM CONSTRUÇÃO

1. Infraestruturas Urbanísticas;
2. Infraestruturas de Saneamento;
  2. 1 - Plano Semitério da Praia;
  2. 2 - Plano Semitério do Mindelo
  - 2.3 - Infraestruturas do Lixo nos 12 Centros Secundários;
3. Infraestruturas Portuárias;
4. Infraestruturas Aeroportuárias;
5. Infraestruturas Semitárias;
6. Infraestruturas Escolares;
7. Infraestruturas Turísticas;
8. Infraestruturas Desportivas;
9. Infraestruturas de Pesca;
10. Infraestruturas no domínio do Desenvolvimento Rural (regua, correcção torencial etc.)
11. Restruturação de Nucleos Urbanos;
12. Infraestruturas para a Administração Pública



# ESBOÇO DA COBERTURA CARTOGRÁFICA DE CABO VERDE



1: 1 500 000

## Escalas existentes

1: 100 000	———	1: 25 000	□
1: 75 000	- - - -	1: 10 000'	▒
1: 50 000	———	1: 5 000	▨

QUADRO Nº 2 A  
CARTES A ESCALAS PEQUENAS  
CARTES PHYSICO-GEOGRAPHIQUES GÉNÉRALES

Cartes topographiques generales

Nº	Cartes Existantes (iles)	Echelles	Projections	Ellipsóide	Date	Pays D'Editio.
1	Ilha do Maio	1:100000	U T M	Intemation	1928	Portuga.
2	Ilha de São Nicolau	1:100000	"	"	1929	"
3	Ilha do Fogo	1:100000	"	"	"	"
4	Ilha de Santo Antão	1:75000	"	"	1930	"
5	Ilha de Santa Luzia	1:75000	"	"	"	"
	Ilhéu Branco	1:75000	"	"	"	"
6	Ilha do Sal	1:100000	"	"	"	"
7	Ilha da Brava	1:50000	"	"	"	"
8	Ilhéus Secos	1:50000	"	"	"	"
8	Ilha de S.Vicente	1:75000	"	"	1932	"
	Ilha de Santiago	1:100000	"	"	"	"
10	Ilha da Scavista	1:100000	"	"	1937	"
11	Ilha de São Nicolau	1:150000	"	"	1929	"
12	Ilha de Santo Antão	1:100000	"	"	1954	"
13	Ilha de São Vicente	1:100000	"	"	"	"
14	Ilha de Santa Luzia	1:100000	"	"	"	"
	Ilhéu Branco	1:100000	"	"	"	"
	Ilhéu Raso	1:100000	"	"	"	"

ANNOTATION - Ces cartes presentent une erreur d'altimetrie de six (6) mètres approximativement.

QUADRO Nº 2 B

CARTAS A/1/25.000

NO	ILES	NOMBRE DE FEUILLES	DATE D'EDITION
1	Sal	3	1968
2	Santiago	12	1974
3	Santa Luzia	4	1972
4	Ilhéu Branco	1	"
5	São Vicente	5	1975
6	Ilhéu Raso	1	"
7	São Nicolau	8	"
8	Beavista	8	1978
9	Santo Antão	9	1979
10	Maio	4	"
11	Brava	2	"
"	Ilhéus Secos ou de Rombo	-	-

Cartes établis à l'échelle de 1:25.000

PROJECTION: U T M

ELLIPSOÏDE: INTERNATIONAL

PAYS D'EDITION: PORTUGAL

IV) - Cartes topographiques aux échelles de 1:5000 et 1:10 000

ILES	LOCALITES	NOMBRE DE FEUILLES	DATE	ECHELLES	SUPERFICIES (ha)	OBS
São Vicente	Mindelo	1	1969	1:10 000	26 10	a)
	Mindelo	4	"	1: 5 000	26 10	a)
Santo Antão	?	?	1959	1: 5 000	907	a)
Sal	Tout l'île	9	1969	1:10 000	21600	b)
Santiago	Praia etenirrons	1	1969	1: 5 000	1750	a)
Fogo	Tout l'île	23	1981	1:10 000	47600	e)
Brava	Tout l'île	4	1981	1:10 000	6740	e)

QUADRO 2 D

CARTAS A 1/2,500

ILES	LOCALITÉS ET ENVIRONS	NOMBRE DE FEUILLES	ÉCHELLES	SURFACES (HA)
Santo Antão a)	Village de Porto Novo	3	1:2500	563
São Vicente a)	Ville de Mindelo	22	1:2500	2616
a)	Aerodromo de S. Pedro	8	1:2500	640,44
S. Nicolau a)	Village de Rã Brva	4	1:2500	242,6
a)	Village de Terrafal	2	1:2500	159,4
Sal a)	Palmeira	7	1:2500	860,0
a)	Freguiça	8	1:2500	1093,0
a)	Village de Stª Maria	6	1:2500	759,0
Santiago a)	Ville de Praia	19	1:2500	2092,7
a)	Pedra Badejo	17	1:2500	1800,0
a)	Riba Grande ( Cidade Velha )	4	1:2500	500,0

a) Effectués en tríos couleurs: bleu, marron et noir

b) Seulement en: noir et blanc.

### QUADRO Nº 3

#### PROGRAMA E PROJECTOS ELABORADOS

- 1 - Programa de Criação de um Serviço Nacional de Cartografia e Cadastro;
- 2 - Projectos de Revisão, Reobservação, construção e Reconstrução da Rede Geodésica do País;
- 3 - Projecto de Reforço da Gestão Urbana - Levantamento Aéreo, Restituição de (alguns) Centros Urbanos Secundários e aquisição de Equipamentos de Restituição;
- 4 - Projecto de Aquisição de Equipamentos de Topógrafia;
- 5 - Projecto de Criação e Instalação da Divisão Regional do Fogo e Brava;
- 6 - Projecto de Criação de Instalação da Divisão Regional de Santo António;
- 7 - Projecto de Criação e Instalação da Divisão Regional de Santiago;
- 8 - Projecto de elaboração de Lei Quadro de Cadastro
- 9 - Programas de Formação;
- 9 - 1 - Curso de Topógrafia no país;
- 9 - 2 - Formação no exterior.

QUADRO 4 A

INCIDÊNCIA DA PARCERIA

	Área cultivada em P	% da área total	Nº Chefes família com contrato Parceria	% do total de chefes de família
Santiago	47 278	22	5 201	34
Stº. Antão	24 949	43	2 429	4
S. Nicolau	6 515	38	582	50
Fogo	25 263	47	1 849	52
Brava	1 396	29	131	50

QUADRO 4 B

ÁREA MÉDIA CULTIVADA POR FAMÍLIA

E

ÁREA MÉDIA POR PARCELA

1 lit=1.000 m<sup>2</sup>

1 lit= 0,1 ha

	A.M.C.F.			Ar. M. Parcela		
	Regadio	Sequeiro	Total	Regadio	Sequeiro	Total
Santiago	0,3	13,9	14,2	1	6,4	5,7
Stº. Antão	1,5	9,2	10,7	0,2	5,4	
S. Nicolau	0,46	14,1	14,56	2	4,2	
Fogo	0	15,3	15,3	0	6	
Brava	0,9	17,5	18,4	2,3	3,2	

Nº. médio de parcelas por ch. f. 2,8

QUADRO A C

ILHA DE SANTIAGO

Nº. de Chefes de Família segundo as formas de exploração

	CP	%	R	%	P	%	CP+R	%	CP+P	%	CP+R+P	%	R+P	%
Tarrafal	1096	31	353	10	409	12	629	18	662	19	322	7	117	3
Stª Cruz	341	11	744	25	496	16	437	16	295	10	285	9	426	14
Praia	283	11	1034	40	307	12	1327	14	164	6	90	4	321	13
Stª Catarina	615	11	2491	44	344	6	1211	21	238	4	332	6	482	8

ÁREAS RESPECTIVAS

	CP	%	R	%	CP	%	CP+P	%	CP+R+P	%	CP+R+P	%	R+P	%
Tarrafal	13739	27	3758	7,5	4239	8,5	10222	20	11283	22	5321	11	1957	4
Stª Cruz	5132	12	10039	20	6298	13	7958	16	5449	11	6309	13	7884	16
Praia	4074	12	11431	33	3892	11	5892	17	2993	8	1807	5	5025	14
Stª Catarina	7953	10	30793	37	3400	4	21159	26	3538	4	7153	9	8287	10

QUADRO 5 A

CRESCIMENTO DA POPULAÇÃO

DE 80 A 2.000

	1980		1985		1990		1995		2.000	
	População	%	População	%	População	%	População	%	População	%
Centros Urbanos	76.557	26	94.677	28	118.000	31	147.585	33	185.000	36
Centros Secundários	20.842	12	42.228	13	56.380	15	76.345	17	104.937	21
Zonas Rurais	182.304	62	199.750	59	209.337	54	217.988	50	219.330	43
TOTAL	295.703	100	336.655	100	383.717	100	441.918	100	509.267	100

PLANAL

EVOLUÇÃO DA POPULAÇÃO

ESTADO DE ALOJAMENTO

DE 80 A 85

			POPULAÇÃO			ALOJAMENTOS			
	1980	1985	Acréscimo de 1980/85	Composição média/família	Acréscimo de famílias	1980	1985	Acréscimo de 1980/85	Variação dos alojamentos clássicos
Praia	38.300	49.600	11.300	5,3	2.132	7.263	9.932	2.669	-35
Mindelo	38.257	45.077	6.820	4,9	1.392	8.047	9.315	1.268	+287
S. Filipe	4.285	5.229	944	5,0	189	846	1.045	199	-2
Espargos	3.860	5.132	1.272	4,8	265	936	1.034	98	+111

Os aumentos da população atingiram, portanto, os seguintes valores:

Praia -----	30%
Mindelo -----	18%
S. Filipe -----	22%
Espargos -----	33%

Nos casos da Praia e de S. Filipe houve um aumento de alojamentos ligeiramente superior ao aumento estimado do nº de famílias. De referir também que no caso de Espargos houve uma diminuição do nº de alojamentos clássicos.

2.2. CRESCIMENTO DEMOGRÁFICO

Conforme foi acima referido, grande parte das carências habitacionais no período do II PND resultarão do próprio crescimento, com o consequente aumento do número de famílias, agravadas com o fenómeno da concentração urbana.



QUADRO 5.C

No período de 1980/85, considerando a dimensão média das famílias, terá havido um acréscimo da procura de alojamentos da seguinte ordem de grandeza:

Variação de 1980/85

	População	Nº de famílias (Alojamentos)	Estimativa dos alojamentos construídos
Centros Urbanos	18.120	3.524	3.937
Centros Secundários	5.386	1.036	1.063
Zonas Rurais	17.446	3.355	
TOTAL	40.952	7.915	5.000 a)

a) - Estimativa global do relatório de diagnóstico, possivelmente inferior ao valor real.

Embora as estimativas a nível global (1.000 fogos/ano) conduzam a um valor inferior ao aumento estimado do nº de famílias, verifica-se que nos dois centros urbanos principais - Praia e Mindelo - o aumento de alojamentos (clássicos e não clássicos) foi superior ao nº de famílias, não se podendo, portanto, afirmar que, globalmente, o volume de carências tenha aumentado.'

QUADRO Nº 6

DIVISÃO REGIONAIS DE CADASTRO A CRIAR

1. Divisão Regional de Santiago e Maio
2. Divisão Regional do Fogo e Brava
3. Divisão Regional de Santo Antão
4. Divisão Regional de São Nicolau, Boa Vista e Sal





**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
**MULTIFUNCIONAL**

— SICRUM —

THE DUTCH CADASTRE AND LAND REGISTRATION AS AN  
EXAMPLE OF A MULTIPURPOSE SYSTEM

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## THE DUTCH CADASTRE AND LAND REGISTRATION AS AN EXAMPLE OF A MULTIPURPOSE SYSTEM

by

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### I INTRODUCTION

A very important and indispensable source of land information for all levels of government in the Netherlands is the Agency of the Cadastre and the Public Registers.

The reason for this importance is that this Agency has a methodically arranged inventory of the real properties covering the complete Netherlands, based on surveys of their boundaries. This Agency is also in charge of registration of ships and aircraft.

All real estate is systematically identified by means of a separate designation on a large scale map, forming a unit together with the relevant registers. These registers conveniently show for each property the legal situation of every right in realty, and also relevant data with regard to the state, nature and size of the property.

In this paper attention is paid to the Dutch Agency of the Cadastre and the Public Registers. It points out what are the tasks, who is using the data, and what are the developments. As well land information systems on lower governmental levels are mentioned.

### II THE NETHERLANDS

#### Size and Inhabitants

The Netherlands is a small country in Western Europe. The surface area of the country is 41.000 km<sup>2</sup>, and there are about 14 million inhabitants. This means that there are about 300 inhabitants per km<sup>2</sup>.

#### Levels of Government

There are three levels of government, the central government in The Hague, 12 provinces and 800 municipalities. In addition there are the so-called waterboards, which are public bodies responsible for water management within specific areas.

According to the constitution the government is decentralized for several activities, which means that provinces, municipalities and waterboards are independent in all matters which are not ruled by the law or a higher body of government.

### III AGENCY OF THE CADASTRE AND THE PUBLIC REGISTRARS

The Dutch Cadastre, which was established at national level 150 years ago as a department of the Ministry of Finance, has operated since 1973 as a separate Division of the Ministry of Housing, Physical Planning and Environment.

Just like most of the other West-European cadastral agencies originally its task was in the fiscal sphere, namely to furnish the basis for levying land tax and also to ensure legal security with respect to real estate. The latter became possible by linking the cadastre with the public registers. However, a history of one and a half centuries has steadily increased the significance of the cadastre as a source of information. The fiscal purpose of the cadastre has meanwhile been abandoned.

The cadastre possesses data which provide insight into the legal status of goods of special social significance: real estates, ships and aircraft. Also other relevant data with regard to the nature, size and location of real estate are registered.

The cadastre possesses in particular extensive information on land: what stands on it and in respect of many things that lie below its surface. Owing to the growing need for information which the Dutch Cadastre has available it is very likely that the data will also be used for administrative purposes to an increasing extent. At present these data are used by several ministries of the central government, the Bureau of Statistics, the municipalities, the waterboards, utility services, the notaries public and by individual citizens.

Several data per 1983:

Registered are: 5.500.000 parcels  
3.500.000 rightful claimants.

Mutations concerning the main information in the registration annually took place on the basis of: 300.000 deeds  
275.000 mortgages  
235.000 deletions of mortgages  
30.000 statements of succession  
110.000 subdivisions

Annually 2.000.000 mutations take place.

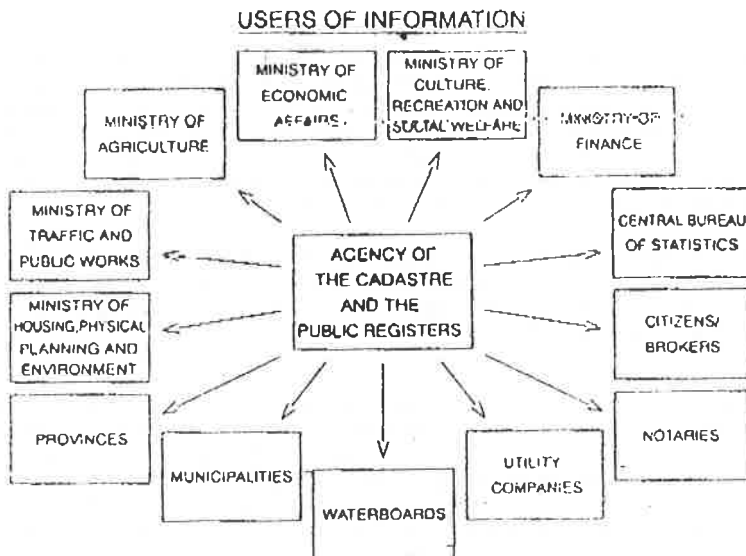
About 100 land consolidation projects (total area of 600.000 hectares) are in execution; in preparation are about 60 projects (total area of 300.000 hectares).

In 1984 about 1.400 sheets of the large-scale base map have been completed (total area 60.000 hectares). In total about 9.500 sheets of this map have been completed (total area 380.000 hectares).

The Agency, which employs some 2900 civil servants (one half of the total personnel strength of the Ministry of Housing and Physical Planning), is headed by the Director General of the Cadastre and the Public Registers. He is responsible for the eleven provincial directorates within all fourteen establishments, as well as for the state of affairs at the central office in Apeldoorn. Of these 2900 persons, about 150 are of academical level and 2000 are of medium level. Concerning the costs and incomes can be remarked that the costs and incomes are even at the amount of HFL. 300.000.000 which is about US \$ 145.000.000.

#### IV USERS OF THE CADASTRAL INFORMATION

As can be seen from the following diagram the Cadastre supplies the data to the following persons and institutions.



Users on the

governmental level:

- a. The Ministry of Traffic and Public Works, on behalf of the management of the main roads, canals, rivers, dykes, etc..
- b. The Ministry of Agriculture, on behalf of rural planning, forestry.
- c. The Ministry of Economic Affairs, on behalf of the Dutch Statesmines.
- d. The Ministry of Culture, Recreation and Social Welfare, on behalf of the protection of historical monuments.
- e. The Ministry of Finance, on behalf of several tasks and the management of state properties.
- f. The Ministry of Housing and Physical Planning, on behalf of housing policy and control of subventions.
- g. The Bureau of Statistics.
- h. The Municipalities on behalf of a variety of tasks in the field of urbanization, planning, housing, tax-levying.
- i. The waterboards, on behalf of management of several waterworks and of tax-levying.

Private users:

- a. Utility services on behalf of management of utility networks.
- b. Notary public, on behalf of preparation of deeds.
- c. Citizens on behalf of obtaining data for purchasing, alienation, boundary-disputes.

#### V HISTORICAL

At the beginning of the cadastre its purpose mainly was fiscal. Early in the nineteenth century in Europe, cadastres were established as a result of the Physiocrats' view that all wealth is based on the land. Consequently

funds for the maintenance of society should mainly be obtained by taxing landed property. Thus cadastres, systematic inventories of all the real estate of the country and the persons who exercise real rights on them, based on a survey of the boundaries, were needed to make a just levying of this land tax possible.

Because The Netherlands were part of the French Napoleonic Empire in the beginning of the last century, the Dutch Cadastre was set up according to the French rule. It was established for the complete country in 1832. However, already in these Napoleonic times it was stated that the cadastre would also limit litigation concerning ownership of landed property and the boundaries of this ownership. In other words, the cadastre had to serve two purposes, namely land tax levying, and legal protection.

As society developed, its complexity increased and consequently the complexity of the government's tasks increased, so that on several levels of government a need arose for all kinds of information e.g. on behalf of physical planning, administration and management of landed property, land consolidation, legal protection and property tax. In order to comply with these needs, among other things, the tax cadastre developed into a multipurpose cadastre, a land information system on behalf of several users.

## VI TASKS

The Dutch Cadastre receives, processes and furnishes data relating to the legal status of real estate, ships and aircraft, and data with regard to nature, size and location. On the strength of this task the Cadastre performs the following duties:

- a. Keeping public registers for real estate, ships and aircraft.
- b. Making and updating cadastral registers and maps.
- c. Maintaining a network of co-ordinate points.
- d. Assisting in land consolidation projects.
- e. Making, updating and publishing the large-scale base map of the Netherlands.

### a. The public registers for real estate, ships, aircraft

The public registers for real estate - which in the Netherlands have been linked with the cadastre and form one organizational unit - serve to publish legal facts, such as the establishment of mortgages, transfer of titles, establishment of other rights in rem (such as building rights, leasehold, easements), and the conveyance of real estate. In several countries these public registers are called "land registration".

The most important category of register goods, certainly as regards volume, is that of real estate. The registers are intended to serve as an important source of information concerning the legal status of register goods, i.e., land, ships and aircraft, and constitute an instrument to promote the legal status for register goods. In a lot of cases the relevant right in rem likely to arise cannot be transferred without entry in the registers. The situation in The Netherlands is such that entry in the registers is one of the conditions that must be fulfilled before the title of a given register good can be transferred in the event of sale!

There are separate public registers for real estate, Netherlands ships and Netherlands aircraft. The public registers of real estate are moreover the



most important source for keeping cadastral registration up-to-date.

#### b. Cadastral registers and maps

The 'Cadastré' in The Netherlands consists of a large scaled map (cadastral map), a relating register and some auxiliary registers for easier handling. The Netherlands system furthermore makes a distinction between 'public registers' and 'cadastral registers', but a relationship exists between these two kinds of registers. In spite of this distinction, public registers and cadastral registers are in one organizational unit. The public registers are used to publish legal facts, such as transfers of title and establishment of mortgages, by recording notarial deeds. In the Cadastre these legal facts and other data as well are represented in readily surveyable form in cadastral registers and on cadastral maps.

The parcel designation is also a characteristic of the Netherlands system. A parcel is a part of Netherlands territory belonging in principle to a single owner and of which the boundaries have been surveyed and mapped by officials of the Cadastre. The parcel is designated by the so-called cadastral characteristics: cadastral municipality, section and number. The parcel boundaries and the most important buildings are shown on the cadastral map. The registers contain a record per parcel of data relating to that parcel.

Nowadays the cadastral Agency has the following data concerning all the real properties of the country at its disposal:

- parcel identification
- real entitled person
- real right
- date of obtaining and of alienation of the parcel
- price, year of purchase
- identification water control board
- indication purchaser is inhabiting leaser
- restrictions on ownership and public legal encumbrances.

Concerning mortgages the following data are at the disposal of the cadastral Agency

- date of insertion of the mortgage deed into the public register
- kind of mortgage
- creditor, kind of creditor (mortgage bank, general bank, life insurance company, etc.)
- domicile creditor
- debtor, kind of debtor
- sum of the loan
- interest
- kind of the real estate on which the mortgage rests.

#### c. The national triangulation system

Another activity of the Cadastre is the maintenance of a network of coordinate points, better known as the National Triangulation System. This system plays an important part in making maps in The Netherlands. Originally each municipality in The Netherlands had its own system of co-ordinates and the result of this was that maps of different municipalities did not match. For this reason a start was made in 1885 with the formation of a national network of co-ordinate points.

#### b. Electronic document storage (MEGADOC)

A system for storage and retrieval of several millions of images of original document (called MEGADOC of Philips) is developed to be used in office automation applications. The design is based on modularity and expendability, applying as much as possible normal EDP components and internationally accepted standards to allow growth and easy interfacing. The Dutch Cadastre receives hundreds of thousands of deeds to be stored "eternally". Nowadays access is accomplished by a manual administration and indexation system.

#### c. Surveying and cartographical data processing

The Cadastre produces both cadastral and large-scale topographical maps (1 : 1000; 1 : 2000). The automatic data processing system of the cadastre serves to incorporate these maps in computer data files. To this end the data must become available in digital form. For the data file automation is important in that the surveying data are directly and automatically recorded with the aid of recording surveying and fotogrammetric equipment.

An important role will furthermore be played by what is known as interactive graphical system, enabling the map information and even any modifications made to be selectively displayed on the screen on any desired scale. Automatic data processing is being introduced step by step.

#### d. Automation real estate information for land consolidation

In a land consolidation project it is necessary to have actual information concerning legal status, size, location, use, condition and value of the real estate. To this end the Cadastre sets up and maintains a real estate system for each land consolidation project. This almost fully automated real estate information system works with three mutually linked main files (parcel file, name-address-real-rights file, lot file after allocation). In the various stages of the procedure new data are incorporated in the files all the time, and changes in the legal status are regularly processed.

The basic data are derived from the cadastral record. Within the framework of the overall land consolidation procedure further relevant data are added. One of the uses of this system is to prepare notices and voting papers for the land consolidation voting procedure, as well as documents to be presented for public inspection and mostly also deeds of allocation which serve to lay down juridically the result of land consolidation projects.

The above system is already being applied on behalf of 110 land consolidation projects, in either the planning or the implementation stage, involving a total area of 700.000 hectares.

#### e. Automation of draft allocation in land consolidation projects

This automated system is applied for re-parcelling purposes in land consolidation and rural land development projects. In order to eliminate over-demands and under-demands in parts of a land consolidation block the computer performs a transfer process. Parcels are then transferred from one part of a block to another until they match as closely as possible and over- and under-demands no longer occur. The system controls these transfers by weighing the interests of the owners and users and with the

aid of a mathematical translation of the allocation policy.

A rough positioning of the parcels within the block is followed by sketching in the parcels and further finishing. The automated system makes it possible in an early stage to check the planned provisions against the possibilities of the farming establishments within the block. The allocation possibilities are examined with reference to the structure of the establishment. The main issues considered here are optimal networks of roads and watercourses and the consequences of moving a farming establishment. The results can be effectively used for developing alternative land consolidation plans.

#### f. Coupling-system parcel-address-coordinates

Many official bodies collect and process data on real estate these data to the real estate is done in different ways. It can be done by the cadastral parcel identification, by the address of the estate or by the coordinates of a point of this estate. This concerns parcel, address or coordinates oriented data. For several purposes it can be necessary to couple, generate or integrate these data. In order to complete this coupling of several real estate data, the Agency of the Cadastre and the Public Registers is developing a system which establishes a relation between parcels, addresses and coordinates, the so-called PAC-system. Experiments are done on the computer of the general-directorate in Apeldoorn. By this way of integration it is not necessary to identify the estate in the relevant three ways in each kind of land information system.

### VIII NEW LEGISLATION

In view of its original fiscal aim the Dutch Cadastre is based on the Land Tax act. This act, which for that matter is expected to be withdrawn, constitutes too narrow a basis for the present-day cadastre.

Nowadays the cadastre is a general recognized information source for data of real estates for all kinds of purposes. It is laid down in a number of books of the so-called 'New Civil Code' and in the Cadastre Act (these acts already are submitted to The Netherlands Parliament).

The above-mentioned Act, the Rural Land Development Act and the statutory scheme concerning the registration of bodies responsible for conduits and cables enable the Cadastre to furnish more complete and more exact information concerning the legal and other status of real estate.

In addition to regulations for the cadastre, the Cadastre Act will also contain provisions on behalf of the registration of register goods (real estates, ships and aircraft).

The "Rural Land Development Act" defines rural land development as (re)construction of the rural area, in accordance with the functions of that area, as laid down within the framework of physical planning. In 1985 the Rural Land Development Act has replaced the Land Consolidation Act of 1954

### IX CO-ORDINATION OF LAND INFORMATION

#### The structure plan

Land information in The Netherlands clearly lacks co-ordination. Therefore a commission which was in charge of co-ordination of problems of automated and to be automated information systems between the several levels of government,

has finished a structure plan especially designed for land information. This plan indicates how activities concerning real estate within the government should be adjusted to each other and possibly integrated. The plan contains proposals which can make the flow of data from source to users as efficient and effective as possible. The structure plan recommends placing the Minister of Housing, Physical Planning and Environment in charge of the national co-ordination of the complete land information, as he is responsible for the most extensive national source of land information, i.e. the Cadastre.

#### The Council for Land information

According to the above mentioned recommendation, the Minister of Housing, Physical Planning and Environment is in charge of the national co-ordination of the completed land information. A national Council for Land information, in which agencies and institutes involved in land information, participate, has been appointed in 1984

### **X LAND INFORMATION ON LOWER LEVELS OF GOVERNMENT**

Because the cadastral data contribute in many cases to the establishment and maintenance of a land information system (maps and registers) on the lower levels of government, some general points concerning provinces, municipalities and waterboards are given below.

#### 1. The province

On the provincial level land information is generally derived from other systems. In order to perform its tasks in the field of real estate (mainly control of the policy of the municipalities) the province receives data from several sources. Only if required data cannot be furnished by any institution the province itself will collect them.

The most important land information which the provinces have at their disposal concerns

- plans for intended use of real estate
- statistical collections concerning dwellings
- provincial properties
- refuse-dumps
- addresses concerning environment levies
- licences, for example for industries.

The data for this land information are mainly furnished by the municipalities and the Central Bureau of Statistics.

#### 2. The municipality

The municipalities are independent in the fields of policy which are not ruled by the law or a higher level of government. Consequently the organizational structure of municipalities can differ considerably one from another because they are adjusted to the local circumstances.

In general municipalities have the following land information at their disposal.

- a. Registration of dwellings.
- b. Registration on behalf of the levying of real property tax.
- c. Registration on behalf of the properties of the municipalities.
- d. Registration of data for the general municipality management of the land

- and for the management of the utility agencies.
- e. Registration of the addresses of the houses.
  - f. Some kinds of maps, especially for utility activities, urbanization and physical planning.
- For some registrations and maps the municipality needs the data of the cadastral agency.

### 3. The waterboards

The waterboards raise their funds by a special levy. Therefore the following data are needed:

- folio number of the cadastral register containing name and address of owners or real entitled persons,
- unbuilt acreage of all the cadastral parcels along with the parcel number,
- taxable revenues of builded properties.

The levy tells apart built and unbuilt property. The data concerning unbuilt property are furnished by the cadastral agency, the data concerning built property are obtained by own valuation or from the municipal real estate tax departments.

Apeldoorn, October 1989

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NEW LEGISLATION IN THE FIELD OF CADASTRE AND  
LAND REGISTRATION IN THE NETHERLANDS

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I GENERAL

In the Netherlands a new legislation concerning land registration and cadastre is submitted to Parliament. The civil legal aspects of the land registration (public registers) are incorporated in the new Civil Code, for which the Minister of Justice is first responsible. For the executive aspects of land registration, which are incorporated in a new Cadastre Act, and for the new cadastre itself, the first responsible is the Minister of Housing, Physical Planning and Environment.

II DEFINITIONS

By "land registration" is understood the legal or public registers, in which legal facts are published as prescribed by the Civil Code or another law.

In this paper instead of land registration the word public registers is used.

By "cadastre" is understood a methodically arranged inventory of data relating to all the real estates in a country or an area.

These data refer to the legal status and other facts (size, culture, etc.) of each real estate. The cadastre comprises two parts: the cartographical part and the descriptive part

III INTRODUCTION

A characteristic feature of the Netherlands in this subject matter is that these two institutions, the Public Registers and the Cadastre, are incorporated in a single organization. This organization is "the Agency of the Cadastre and the Public Registers". This Agency belongs to the Ministry of Housing, Physical Planning and Environment.

In that Agency registrars are responsible for the public registers and the cadastral registers, and land surveyors for the maps and the technical activities in land surveying.

The combination of the Public Registers with the Cadastre was long ago introduced for the following reasons:

1. The keeping of a cadastral registration and the updating of the cadastral maps take place on the strength of changes that become apparent from the public registers.
2. The public registers can only be consulted, if either the name of the title holder or the cadastral number, i.e. the parcel number from the cadastre, is known. Furthermore, the object of the title is briefly, clearly and unmistakably identified by the cadastre number in the deed and consequently in the public registers.

For a long time the Agency of the Cadastre and the Public Registers has not only been responsible for keeping the records of real estates, but also for the registrations of ships and aircraft. Hence, in our new legislation (Civil Code and Cadastre Act) reference is frequently made to register properties.

According to the Civil Code register properties are properties of which, in the case of transfer of title, the deed must be published in the public registers.

This transfer procedure is required for real estates, ships and aircraft and consequently these properties are register properties. As far as publication is concerned the Civil Code contains identical inscription provisions for these three kinds of register properties. Therefore the registration aspect of ships and aircraft have also been included in the Cadastre Act.

#### IV DEVELOPMENT

During the time of existence of the public registers (from the beginning of the 19th century) there is an increase of legal facts and public legal encumbrances, which have to be inscribed by law in the public registers and sometimes consequently in the cadastral registers. Besides during the time a need was growing for extending the legal protection of third parties in good faith, consulting the registers, within the negative publicity system, as discussed later on.

The cadastre originally served as a basis for levying land tax, as was the case in many other countries as well. As far back as in the period from 1811 to 1832 the Netherlands were defined on maps and in registers. These included: 1. the tax-payer, 2. the object in respect of which the tax was payable and 3. the tax base. The regulations for this institution originated from the tax legislation.

Since the foundation of the Agency of the Cadastre and the Public Registers, this institution has developed into one which derives its significance from the fact that it has become a source of information in respect of real estates, ships and aircraft for various purposes, in other words has become among other things a land data system for various purposes.

The land tax aspect has gradually disappeared into the background.



What I mean to say in describing the Cadastre as a "source of information for various purposes" is that, as was the case in former years, it no longer serves for the purpose of legal security or tax levying but also other purposes such as land consolidation, physical planning, land administration, town planning and statistics. Such an information system is multipurpose, or we can say a multipurpose cadastre in the widest sense. This metamorphosis or development was one of the reasons for making a new legislation on behalf of the public registers and the cadastre (Civil Code and Cadastre Act).

For a long time the Agency of the Cadastre and the Public Registers has an important executive task in land consolidation, national triangulation and in the making of a large-scale topographical map.

## V NEW CIVIL CODE

### GENERAL

Our present Civil Code dates back to 1838 (influenced by the French Code Civil).

A new Civil Code (eight books instead of four books in the present one) is necessary because:

1. Various principles have become obsolete.
2. Jurisprudence requires to be incorporated.
3. Several regulations have to be adapted to the development in society.
4. There is a need to improve its general surveyability.
5. Especially in the field of the inscription in the public registers there is a need for more legal protection for third parties in good faith who consult these registers.

The eight books of the new Civil Code concern:

- Book 1: Natural persons and family
- Book 2: Legal persons or corporations
- Book 3: Patrimonial law in general
- Book 4: Hereditary
- Book 5: Real rights
- Book 6: General aspects of obligations
- Book 7: Special obligations
- Book 8: Traffic and transport.

Book 1 and 2 are already in force. Books 3, 5 and 6 will be in force with the Cadastre Act. They are submitted now to the parliament.

Concerning the inscription of legal facts of register properties in Book 3 of the Civil Code, a subchapter is formed entitled "Inscriptions concerning register properties".

In the introduction of this paper is already mentioned that the civil legal aspects of the public registers are incorporated in the Civil Code and the executive aspects in a separate chapter of the new Cadastre Act.

By this legislation the regulations concerning the public registers are easily surveyable and clear. This is not the case at the moment.

The decision of ownership mentioned above is a new feature in Dutch civil law. It means that a person can demand a decision from the court of law on ownership. In that case he has to call all interested parties publicly and the registered parties by name to testify and give him opportunity to prove his rights.

Concerning the good faith in relation to the public registers the Civil Code states that an appeal, of a person who obtained a register property, in good faith is not accepted if this appeal includes an appeal on not knowing facts which he could have known by consulting the registers.

The registrar (a lawyer), a civil servant of the Agency of the Cadastre and the Public Registers, is responsible for the public registers and also for the cadastral registers. He has the power as stated in the Civil Code, to refuse inscription in the registers in case of not fulfilling the prescribed inscription formalities concerning the document, f.i. the notarial deed. In that case the registrar has to make a note in a special register (Register of Provisional Notes, chapter 2, Cadastre Act). If the interested party doesn't agree with the refusion he can appeal to the president of the civil court. The president decides.

It is recognized that under the new Civil Code public registers and cadastre will be much more integrated. Therefore it is also recognized that the cadastre, which was strictly regarded as of public legal importance will then have importance for civil law as well.

The new Civil Code states clearly that the government is responsible for all damages by incorrect or incomplete inscriptions or updating of the public registers and by incorrect and incomplete issued documents from the public registers.

The Civil Code orders all further executive regulations to be ruled by the Cadastre Act (chapter 2 of this act).

## VI NEW CADASTRE ACT

### GENERAL

The new Cadastre Act is drawn up so flexibly in view of the following points:

1. The growth and the significance of the cadastre.
2. The expansion of its task.
3. The policy that the cadastre should form the framework for all kinds of land administration and means of coordination.
4. The interface with the public registers.

Codification has also played a part as far as various existing regulations have been combined. The subject matter has been made easily surveyable in a single set of regulations. The Act is drawn up in the form of general legislation, which means that the technical implementation has not been incorporated in the Act in view of the very fast rate of technological developments. This has been made subject to lower-level (ministerial) regulations, which can be amended very quickly.

For the Public Registers and the Cadastre to be an effective source of information with respect to register properties the following requirements must be taken into account and naturally allowance has been made for them also in the relevant legislation:

1. The identification of the properties (real estates, ships, aircraft) must be unambiguous.
2. The data in the registers and maps must, as far as possible, be up to date.
3. Seeing that we have adopted the negative publicity principle, it is more often necessary to go back in history to establish the actual legal status. To achieve this the data file must present a historical continuity.
4. The data must be correct and complete.
5. It must be possible to examine the data (registers and maps) effectively and quickly.
6. The registration must be so arranged as to be open-ended, which means that, if necessary, it should be possible to make allowance for new developments, thus enabling fresh data to be entered in the registration.

The new legislation and the newly introduced technical facilities (automation) enable these requirements to be met on behalf of both the public and the government.

#### CONTENTS OF THE CADASTRE ACT

The Cadastre Act is made up of the following chapters.

- Chapter 1. General provisions
- Chapter 2. Public Registers
- Chapter 3. Cadastral registration, maps, network of coordinate points
- Chapter 4. Keeping registers up to date
- Chapter 5. Register for ships
- Chapter 6. Register for aircraft
- Chapter 7. Revenues and fees
- Chapter 8. Miscellaneous and final provisions

#### Ad Chapter 1. General provisions

This chapter is first of all concerned with the definition of the parcel: a parcel is a part of the Netherlands territory, of which part the Cadastral Agency vice has fixed the boundaries with the aid of measuring data based on the real legal status, the nature and the use, and which part is identified by a cadastral designation.

The cadastral designation is prescribed in the Act. Not prescribed is the exact form, since numerous methods can be developed; but instead it is left to be decided at lower level.

Chapter 1 further lays down the tasks of the Agency of the Cadastre and the Public Registers as follows:

- A. The keeping of public registers. These can be compared to the German or Swiss 'Grundbuch'. However, the Netherlands Agency of the Cadastre and the Public Registers keeps a 'Registration of Deeds' and the German or Swiss 'Grundbuchamt' a 'Registration of Titles'. This means that in the Netherlands a copy of the notarial deed is published.

- B. a. Keeping the cadastral registration.
- b. Keeping cadastral maps.
- c. Maintaining the coordinate points (national Triangulation); the national triangulation consists of the 1st., 2nd., 3rd. and 4th. orders and main coordinate points; unlike before, this activity has now been incorporated in the Act, but it has always formed part of the task of the mentioned Agency.
- C. Making the large-scale topographical base map of the Netherlands; this concerns a general topographical map in the national system of coordinate points to a scale of from 1 : 1000 to 1 : 2000. The making of this map has been the responsibility of the mentioned Agency since 1975.
- D. Keeping registrations of ships and aircraft.
- E. Furnishing information. An open system has been adopted and thus no 'just cause' is required for consulting the data. The public registers and the cadastre are open for everybody.
- F. Miscellaneous; a very important clause, because other Acts can impose a task on the Agency. Technically speaking this need not be repeated; it is explained in the Explanatory Memorandum to the Act what it comprises.

As an example of what is meant under F. above, there now follows a short description of the important task which the Land Consolidation Act imposes on the Cadastre.

This Act lays down that the Agency shall assist the local committee which executes a land consolidation project in examining the rights involved in that project for allocation activities, for the new allocation deed and for the valuation. A very important task, on which about 600 civil servants of the Agency are employed.

Since the Cadastre is considered to serve a number of different purposes, Chapter 1 of the Act prescribes a Cadastral Council, a body in which the Agency and its users are both represented. This enables the Agency to learn the requirements of its users.

Chapter 1 furthermore deals with the organization of the Agency.

#### Ad Chapter 2. Public Registers

Chapter 2 concerns the public registers. Among other things, this chapter describes:

1. What registers there should be and for what properties.
2. The form the registers should have.
3. The requirements to be fulfilled for publication.
4. The kind of publication.
5. The Register of Provisional Notes.

With reference to point 2. it is pointed out once more that a 'registration of deeds' is applied. This means that the deeds are published in full.

The requirements for registration (point 3.) concern the form and the contents of the document. They can be divided into:

- a. Requirements for the nature of the document (notarial deed, court decision, etc.).
- b. General requirements (personal data, identification of properties, language).

The notary plays an important role in all this.

The names of the appearing parties in the deed must be correct and complete, while furthermore the objects must be designated by the cadastre number, if a proper publicity system is to be ensured. The obtained right must also be exactly indicated.

Concerning the Register of Provisional Notes, it may be added that, if the registrar has refused the inscription, this is noted in this separate register. The registrar can refuse the inscription in case of not fulfilling the prescribed formalities (vide also page 5).

In this case it is possible to obtain a decision from the court within a fortnight.

#### Ad Chapter 3. Cadastral registration, maps, network of coordinate points

Chapter 3 concerns:

1. the cadastral registration
  - a. Functions:
    - Accessibility of the public registers
    - Efficient representation of the data related to land
  - b. Form of registration (automated or otherwise)
2. the maps:
  - a. Cadastral map
  - b. Large-scale topographical base map of the Netherlands
  - c. Other maps. Developments are continuing and consequently different maps are required.

The cadastral registration contains or will contain the following data:

1. Title-holders, i.e. holders of real rights on real estates.
2. References to the public registers.
3. Public encumbrances.
4. Cadastral designation, location and size.
5. Purchasing price.
6. Mortgage data.
7. Data concerning the sort of culture, as well as data that must be entered pursuant to other statutory provisions.

#### Ad Chapter 4. Keeping registers up to date

Chapter 4 concerns, among other things:

1. Updating of the cadastral registers and the maps.
2. The sources for updating, viz.:
  - a. The public register (main source).
  - b. Information concerning deaths and changes of domicile.
  - c. Information concerning accretion and erosion of soil by water.
  - d. Information concerning changes in the sort of culture
3. The updating procedure.

The updating procedure comprises:

- a. Keeping the registration up-to-date as and when a change in the registered situation occurs (occasional updating).
- b. Renewal.

In the case of occasional updating the procedure is as follows:

1. Immediate indication in the cadastral registration, that there is some change.
2. Especially in case of subdivision of parcels:
  - a. Summoning the interested parties to furnish information in the field.
  - b. Indication of boundaries in the field.
  - c. Surveying measurements.
  - d. Official report.
3. Publication of updating results.
4. Procedure for lodging appeal.

In the appeal procedure the civil court acts as a administrative court.

In the case of cadastral renewal it is suspected that the data in the cadastral registration are no longer in conformity with reality. They can in various cases be amended so as to conform to reality (renewal). Consequences according to civil law: by inscribing the official report in the public registers, the registered rightful claimant will be regarded as possessor in good faith as far as becoming owner after 10 years by prescription is concerned, if, of course, he was not already the real owner.

The part of the new legislation relating to this renewal of the cadastre contains the following points:

1. Definition of terms.
2. When can or must a renewal procedure take place?
3. The procedure.
4. The consequences according to civil law.

The procedure for renewal of the cadastre is as follows:

1. Communication of intention (publication in registration).
2. Gathering information.
3. Proposal.
4. Procedure for lodging appeal.
5. Official report.
6. Publication in the public registers.
7. Updating the cadastre.

Also in the case of this updating procedure there is yet an appeal procedure, which is simil to the procedure in case of occasional updating.

#### Ad Chapters 5 and 6. Registers for ships and aircraft

As stated before, the Cadastre Act includes regulations concerning the registration aspects of ships and aircraft as prescribed by the Civil Code.

## Ad Chapter 7. Revenues and fees

Chapter 7 concerns:

1. the furnishing of information from:
  - a. the public registers,
  - b. the cadastre,
  - c. other records,

as well as:

2. the form in which the information is furnished.

Nowadays, information is very important both for the citizen and for the government. Hence, it is also important where and how information can be obtained.

Whereas formerly the subject of furnishing information was scattered haphazardly among all kinds of regulations and provisions, it is now essential that it should be neatly arranged in a separate chapter.

For the cadastre fees there has hitherto been separate legislation as a basis. Since the new Cadastre also aims to achieve codification, this basis has now been incorporated in this Act.

## Ad Chapter 8. Miscellaneous and Final Provisions

Chapter 8, bearing the title Miscellaneous and Final Provisions concerns, among other things:

1. Map conversion.
2. Correction of errors (publication and appeal procedure).
3. State liability for:
  - Updating errors and
  - Incorrectly furnished information.

As regards map conversion it should also be pointed out that new maps are made with the aid of old surveying data already available in the cadastre eventually completed with newly obtained surveying data. The new maps have to be in the national coordinate system.

## **VII FINAL REMARKS**

The author hopes that he has succeeded in giving an impression of new cadastre and land registration legislation in the Netherlands. This legislation has been drafted to contain the possibilities of the development in the informing need now and in the future.

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Apeldoorn, The Netherlands, October 1989

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**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
**MULTIFUNCIONAL**  
  
— SICRUM —

INTEGRATED INFORMATION FROM ADMINISTRATIVE REGISTERS  
WITH DIGITAL MAPS FOR MULTIPURPOSE USE

HELGE HOJKAER

DINAMARÇA

LISBOA, PORTUGAL - 20 a 25 Novembro de 1989

**National Survey and Cadastre-Denmark**  
Helge Hojkaer, Head of Division.

**"Integrated Information from Administrative Registers  
with Digital Maps for Multi-purpose Use"**

**1. Introduction.**

Denmark has 5.3 million inhabitants and covers an area of 43,000 sq.km. More than 80 % of the inhabitants live in towns and about one third live in the metropolitan region of Copenhagen.

There are three levels of government administration in Denmark

- central government
- county authorities
- municipalities

and to secure an efficient administration including a reliable taxation system, manual information systems on land and properties were established in the course of the last centuries.

**1.1. The history of computerization.**

In the middle of the sixties the government contemplated the establishment of a centralized land information system. The plan was not implemented, but instead some of the agencies and municipalities started to computerize their own individual systems in the beginning of the seventies. Though they have not followed the original plan minutely, they have generally speaking followed its outlines.

In addition a row of new information systems has been established partly supplementing the existing information systems, partly overlapping them.

Gradually over the last decade the computerbased information systems in the government administration have changed from stand-alone systems with none or very little interference to a network of subsystems with exchange of information.

In the same period some of the municipalities and some utility companies - especially the natural gas companies - have established computerbased geographic information systems on land, properties and utility.

In the last couple of years, the government administration has succeeded in opening the administrative registers for users outside the administration.

In the same period, there has been a growing understanding for the need of cooperation between both government levels, utility companies, and private enterprises in establishing and running the various subsystems on land, properties and utility.

In 1988 the government decided to establish "National Survey and Cadastre" by merging Geodetic Institute, the Nautical Chart Division and the Danish Cadastral Department. One of the new tasks is to act as coordinator of geodata activities in cooperation with the Ministry of Housing.

## 1.2. The present strategy.

First of all, the goal is an efficient and economic information system on land and property,

It is characterized by

being

- . reliable and updated
- . homogeneous
- . segmented/modular/decentralized

and having

- . only data for fundamental use
- . a broad circle of users.

The present tools are:

- . reuse of existing data and systems
- . changes by small steps and pilotprojects
- . standing committee for coordination.

At present the establishing of a coordinated information system on land and property is completed, as well as the concept of expanding and changing the system to a geographic-oriented system.

Activities in the close future are:

- gathering computerized geographic information

- . coordinating the update of geographic data
- . increasing the circles of users to reorganize the way of doing things.

All activities will be coordinated by the standing committee of coordination.

## 2. The administrative subsystems - the present situation.

Below the present state of the existing administrative subsystems is described and supplemented with the plans for the separate subsystems:

- the Cadastre
- the Land Registry
- the Municipal Register of Real Property
- the Central Population Register
- the Building and Dwelling Register.

All five subsystems are covering the entire country.

### 2.1. The cadastral subsystem.

The present Cadastre was formed more than 140 years ago. It consists of

- the parcel register (2.5 mill. parcels)
- the cadastral maps (15.000 maps, most of them in 1:4000)
- the register of controlpoints ( 400.000 points)
- measurements related to boundaries (2 mill. files)

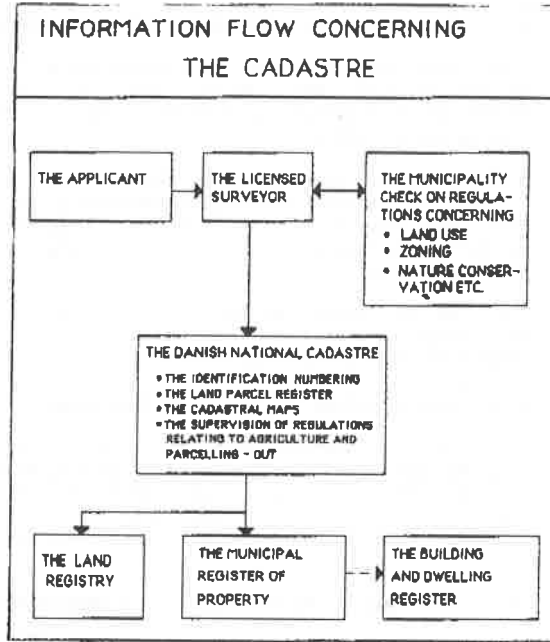
and it defines each parcel by a unique number and has information about the area and the definition of the boundaries. It is updated daily.

Alterations of properties, consisting of one or more parcels, are entered in the Cadastre on the basis of measurements and documents worked out by licensed surveyors in private practice.

The parcel register and the register of controlpoints are already computerized, and it has been decided to computerize the maps and the measurements as well. At present approximately 2 % of the country is covered by digital cadastral maps, and the intention is to cover the whole country in the next 10 years.

The Cadastral subsystem is placed at National Survey and Cadastre, The Ministry of Building.

Figure 1.

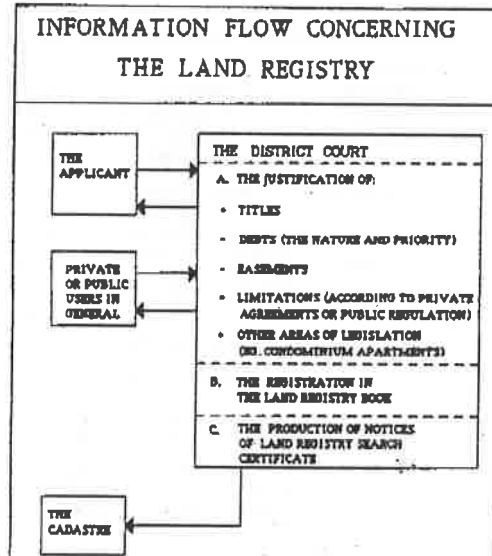


## 2.2. The Land Registry.

In the Land Registry all titles (landowners), deeds, and mortgages etc. are recorded under the cadastral parcel number. It is a decentralized register placed at 85 district courts under the Ministry of Justice, and it is daily updated.

Only one district court has computerized its register, but it is intended to computerize all of the registers within the next 8 years.

Figure 2.



### 2.3. The Municipal Register of Real Property

The Municipal Register contains data on landowners, valuation and taxation of land, utility, buildings etc. based on the property number (one or more parcels) and the parcel number.

The register was computerized in the beginning of the 1970s. It is continually updated by the municipalities and used for valuation and for management and collection of property taxes. Each municipality is responsible for its own data.

For use of "computerized valuations" the Inland Revenue, Ministry of Taxation, has established a supplementary register for property sales.

### 2.4. The Central Population Register.

In 1968 the Central Population Register was conceived and established as a computerized system. The identification is a unique number for each person, and the register contains data about the address of each person, his household, age, matrimonial status etc.

### 2.5. The Building and Dwelling Register.

This register contains information on water supply, sewage disposal systems, purposes for use, material, year of construction, areas, number and types of storeys and rooms, heating, facilities, rents etc. etc. about each building including dwelling- and trade units.

The information is linked to the property and the address. The register is owned by and updated at the municipality, but the Ministry of Housing has the responsibility of coordination.

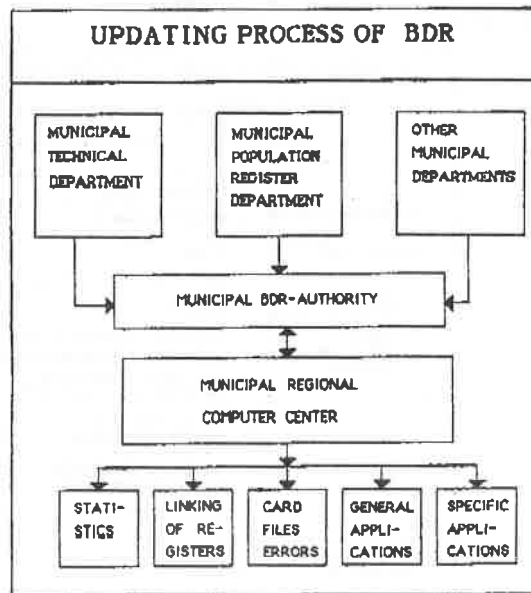


Figure 3.

## 2.6. Other subsystems

To supplement the basic registers on land and property, various registers containing information on special topics have been and are being established. To secure the possibility of exchanging information, these registers are using the same keys as the basic registers. Examples of some of these registers are:

- The Register of Plans
- The Natural Resources Data System
- The Tax System (income and value added tax)

## 2.7 The framework - an umbrella.

In all the subsystems, at least one of following unique keys is used:

- the parcel number
- the property number
- the building number
- the address
- the number of plan

A couple of years ago it was decided to create all necessary cross references between the different keys in order to secure the exchange of data and (the ability always to obtain) all the necessary information on a certain property or building defined by one of the keys.

The references are established and maintained in the so-called "cross reference register". The register is very closely connected to the Municipal Register of Property and the Building and Dwelling Register.

More than 90% of the cross references are established by using already existing information in the registers.

The register is currently being used, and it is expected that the missing information will be collected within one year.

## 2.8. Applications

During the last 5 years, some project-oriented applications for

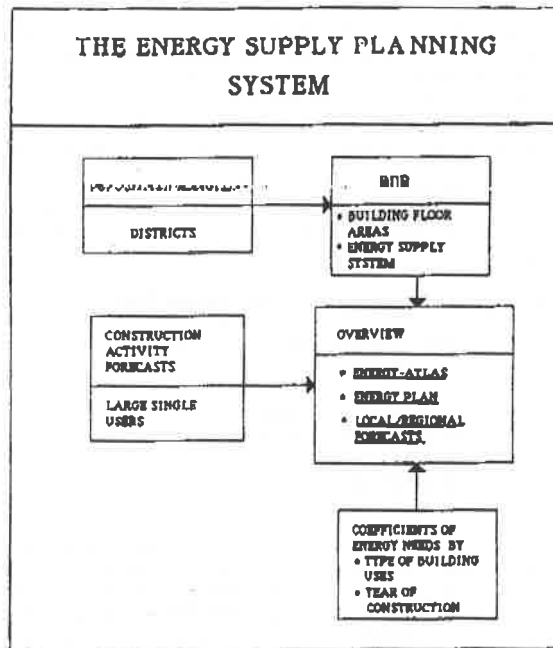
- energy supply planning
- conservation of houses
- etc.

have been developed.

These applications - perhaps succesful in themselves - have not met with the wishes of the broad usergroups, but are still mainly for "experts".



Figure 4.



## 2.9. Conclusion.

Denmark has succeeded in establishing a well-functioning computerized information system on land and property by computerizing existing subsystems and reusing data collected by the various levels of administration within their several fields of responsibilities.

Nevertheless, the use of the system is limited because the Land Registry has not been completely computerized.

On the other hand, it is only during the last year that "outside" users have discovered the possibilities of using the information systems as tools in their business.

At the moment the computerization has caused very little change in the manner of administrative routines, but in the next couple of years we expect to see major changes.

## 3. The mapping area - the present situation.

In Denmark large scale maps are produced at municipality level and for utility and construction purposes and, of course, for cadastral purposes.

Traditional topographic maps have until now only been produced in scale 1:25.000 or smaller by the National Survey and Cadastre.

In the last 5 years nearly all Danish map producing firms have changed from analog map production to computerized production and products.

Some of the leading municipalities and utility companies - especially the natural gas companies - have used computerized geographical information systems for some years and with good results.

The map production has grown very rapidly in the last 5 years. There has been a tremendous change in strategy from computerizing existing maps to start new map production from scratch.

Below the strategies and plans for total coverage with large scale maps will be described.

### **3.1. The National Grid.**

Both for municipal, topographic and cadastral use the National Survey and Cadastre has defined and maintained a national grid covering the whole country. In the field more than 350.000 controlpoints are marked and coordinated for common use. The controlpoints are maintained in a computerized information system.

### **3.2. Large scale topographic maps.**

The utility companies - mostly in collaboration with the municipalities and National Survey and Cadastre - have planned to cover rural areas (farming and forest areas) with simplified topographic maps in 1:10.00 within 4 to 5 years.

About 40 % of the urban area is at the moment covered with maps typically in scale 1:1.000 or larger. A strategy for total coverage has not yet been devised, but is expected in the next couple of years.

The main objective of this effort is to create a unique map basis for the creation of geographic utility information systems.

### **3.3. Cadastral maps.**

As mentioned above, the plan is to cover the country with computerized cadastral maps in the next 10 years. The leading members are the National Survey and Cadastre in collaboration with municipalities and some of the utility companies.

### **3.4. Other large scale maps.**

Normally the municipalities cover the urban area with maps in scale 1:1.000. Only a minor part is covered by digital maps. According to the plans the map production by the municipalities and the utility owners will continue in the urban areas when they have finished the rural areas.

### **3.5. Other map products.**

The orthophoto production made by National Survey and Cadastre has resulted in a coverage of more than 10% of the area of Denmark with maps in scale 1:4.000.

The demand for these maps has not been as great as expected, and it would seem that the topographic maps are a better solution for the majority of users.

### **3.6. Conclusion.**

If all the existing short term plans are accomplished, Denmark will be covered with computerized large scale maps within 8 years.

It is worth mentioning that nearly all the activities were initiated by the utility companies.

Thus we can conclude that it is now the users of information that make the trend and not the map producers.

## **4. The strategy for integration - maps and registers.**

It is a matter of course for both the National Survey and Cadastre, the municipalities and the utility owners to make sure that the new map products are integrated into the framework of the administrative registers.

It is namely essential that the geographic facilities can be used in applications at the administrative level as well as the information in the registers for utility and facility purposes.

### **4.1. Objects of interest**

In accordance with the above mentioned experiments, the decision has been made to integrate only the most important keys of interest.

- addresses linked to building objects
- addresses linked to road network
- parcel numbers linked to parcel objects
- building numbers to building objects

All other connections to the above mentioned cross reference register can be derived from the registers.

The fundamental idea is to link only object oriented information in the computerized map to the registers.

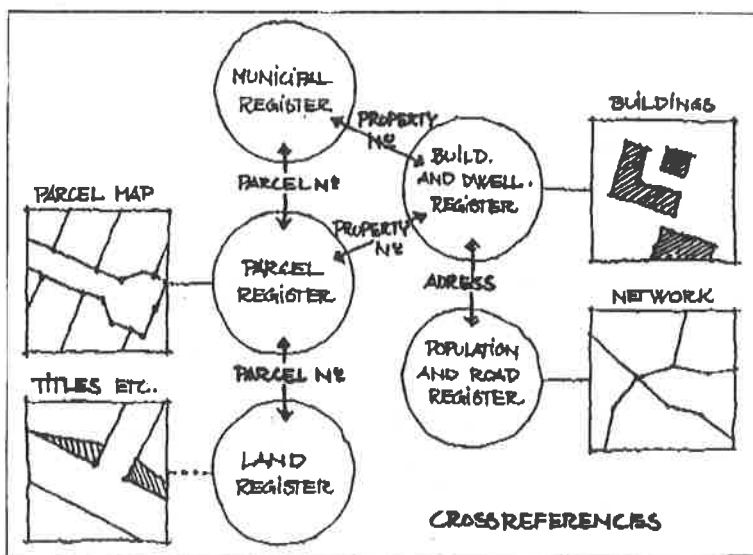
#### 4.2. The choice of scale

To operate around scale 1:10.000 for buildings and roads, between 1:4.000 to 1:10.000 for cadastral purposes at the rural area and about scale 1:1.000 to 1:2.000 for urban areas for information seems in most cases sufficiently accurate.

#### 4.3. The geographic frame.

This choice of strategy concerning a common frame - few, precise and simple keys - at the register level can correspond to the geographic frame with the same description - few, precise and easily understood objects, see figure 5.

Figure 5.



#### 5. The economic factor - cost/benefit

In Denmark it is traditional to sell information from registers and maps paid for or produced by the public authorities at a price very much below the production costs.

A further use of data has therefore not been restricted because of the price, but only because of technical and administrative reasons. Therefore we have only a vague idea of the value (for the use) of data for other purposes.

Nevertheless, it is agreed to increase the price to a level covering the costs of maintenance and part of the cost of establishing the data.

For the moment the trend is that new maps are established by economic joint ventures among the producers and the main customers, and the only way to establish new data -for example topographic maps in 1:10.000 - is to secure new customers who are willing to pay for the product.

It no longer depends on a cost/benefit-rate and public funding, but on commitments from users.

Besides, it is very important to develop tools for presentation and manipulation. The new customers will not adopt the existing customers' way of doing things.

#### **6. The integrity of the individual.**

The LIS/CIS concept indicates a system having qualities as

- . open-end access
- . open-end applications.

For the integrity of the individual the access is restricted to the circle of users with a legal right, as for example:

- for governmental and municipal purposes
  - . nearly none restrictions for LIS-data
- agencies and concessionary companies
  - . only few restrictions
- private companies and individuals
  - . unrestricted access needs permission from owner.

#### **7. The users.**

The successful establishing of a frame both for registers containing data on land and for production of large scale maps is changing the role of the users radically and fast.

Each user is assuming the role of producer maintaining the data in his own field of responsibility. In a way the user is only a "user" so to speak when using data from outside his own field.

Only when we talk about collecting great amounts of data is the word "producing" in the old sense meaningful.

#### **8. Basic information contra particular data.**

The concept of a frame suggests a division of information within the area of land information into the following categories

- the basic information
  - . usable for everybody
- general information about land
  - . usable after permission
- special information
  - . protected by the owner
  - . usable after restricted permission

In order to make the system work it is essential that the basic information can be 100% relied upon. Errors in the "special information" category while regrettable, only have limited consequences.

The only way to achieve this is to delegate maintenance of the "special information" level to the several agencies with the fields of responsibilities. They have the knowledge and they authorize the changes.

#### **9. Final remarks**

As presented, we have succeeded to integrate the various LIS-subsystems to a CIS.

The coming challenge is at the application level. Are we able to set up convenient and userfriendly applications for broad circles of users?

We believe so, because we have prepared the way for the whole development of CIS-applications by establishing

- . reliable and sufficient CIS-data
- . maintenance of routines for CIS-data
- . proper forums for intermedia of CIS-data
- . proper forums for further developments.

During the presentation at the seminar, I'll present examples from urban areas, where general land information is used for multiple applications.





SEMINARIO INTERNACIONAL  
SOBRE  
CADASTRO RUSTICO E URBANO  
MULTIFUNCIONAL

— SICRUM —

A SUMMARY OF THE PRESENT STATUS OF THE CADASTRAL  
ACTIVITIES IN SWEDEN

TORSTEN LINDSKOG

SUÉCIA

LISBOA... ENCHAL-20 a 25 Novembro de 1989



## A SUMMARY OF THE PRESENT STATUS OF THE CADASTRAL ACTIVITIES IN SWEDEN

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### Introduktion

Sweden has an area of 450 000 square kilometres and a population of 8.3 million. About 90 per cent of the population is living in the southern part of the country, mainly in urban areas. The country is divided into about 3.5 million real properties mostly owned by private individuals.

The tradition of keeping registers is very old in Sweden. The oldest books with land records are from the end of the 15th century. The first official mapping mission in Sweden was given 1628 and Statistics Sweden was born 1749. Based upon the registration tradition computerisation started early.

### The purpose of the Swedish cadastral system

Real property registration deals with the division of land into real properties. The Real Property Register includes a real property registration map. The Real Property Register is the basic register of real properties in the country. In principle the register serves as a way in to the cadastre documents. The register serves important activities in society such as land registration, real property credit, land taxation, agricultural statistics, land surveying, population registration, urban and regional planning etc.

No changes in the division of land can be made without having it registered in the Real Property Register.

The main purpose of the Land Register is to give publicity and legal protection for acquisition of rights in real property. An orderly, well-functioning land registration

system is a prerequisite for guaranteeing security and facilitating economic transactions. The content of the Land Register has legal power and is guaranteed by the state.

At present, the handling of real property and land registration is in the process of being automated. An EDP-system is replacing the register books which, up to now, have been in use. The system is called the Swedish Land Data Bank System.

Formally the contents of the Land Data Bank System are divided into a real property register and a land register.

The real property register contains facts on such items as area, location, land-use plans etc.

The land register contains information on legal-economic matters concerning the real property units, for example information about owner and mortgages.

This system is being implemented in order to rationalize and effectivize real property and land registration. The Land Data Bank System also offers a wide range of possibilities in urban and regional planning, mainly based on the use of centroid-coordinates.

### Organisation

Real property registration is performed by Real Property Register Authorities. There are some 55 such authorities. The National Land Survey (NLS) has a supervisory responsibility.

24 of the Real Property Register Authorities are governmental authorities. The other are municipal authorities in the larger municipalities.

All changes in the real property division are carried out by Real Property Formation Authorities. About 100 of them are governmental authorities supervised by NLS and 42 are municipal authorities.

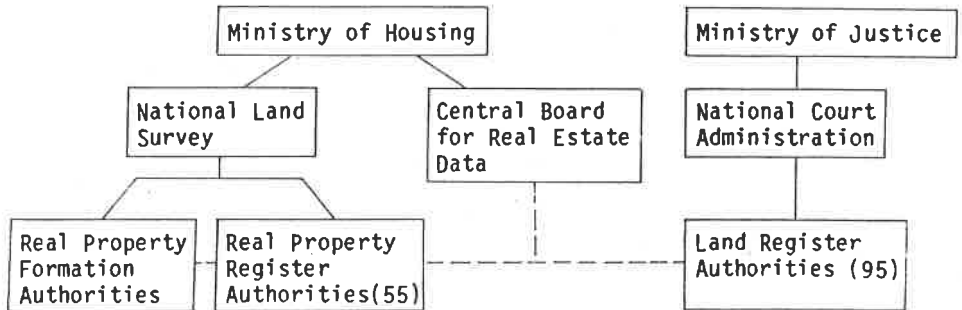
Land registration is performed by about 95 Land Register Authorities. These authorities are part of the general lower courts and are administratively supervised by the National Court Administration (NCA).

The Central Board for Real Estate Data (CFD) - has the main responsibility for development, implementation and processing of the Swedish Land Data Bank System. The work

is carried out in close cooperation with the land survey and the court organizations.

The yearly costs for real property registration and implementation and maintenance of the Land Data Bank system were for the governmental organisations involved in 1987/88.

NLS	129	million SEK	(19,8 million USD)
NCA	165	"-	(25,4 "- )
CFD	60	"-	( 9,2 "- )



#### Real property registration maps

In rural areas the real property map is a part of the economic map in scale 1:10 000 (1:20 000 in the northern mountains). The economic map is based on orto photo.

In urban areas the real property map is usually based on municipal large scale base-maps and carried out in scale 1:1 000 or 1:2 000.

#### Information contents of the Land Data Bank System.

The contents of the Land Data Bank System are mainly based upon documents and records kept at the Real Property and Land Register Authorities. The contents are a selection of the information that is most frequently used.

The Land Data Bank System also contains information on taxation derived from the real property taxation register.

For each real property unit the land data bank system contains mainly the following information:

#### Location

The administrative area where the real property unit is located, the address, its location on the real property register map, centroid coordinates for the unit and coordinates for the buildings situated on the property.

#### Area

The area of the real property unit.

#### Value

The tax assessment value.

#### Owner

The name, address and civic registration number of the owner/owners. Particulars on how (for example by purchase) and when the real property unit was acquired. The purchasing sum is also shown.

#### Plans and regulations

Building plans and regulations affecting the unit.

#### Encumbrances

Mortgages: The amount of the mortgages and the name of the holder of the mortgage bond.

Easements: For example obligation to allow the owner of another real property unit to make use of a facility situated on the unit.

#### Entitlements

Easements that are beneficial for the real property unit. For example the right to use a private road.

## Survey Measures

Formal and technical measures that have been taken. A document identification number referring to maps and other documents in archives is shown.

## Notations

For example notations on executional measures.

## Overview of the Land Data Bank System

The Land Data Bank System is an on-line system built up around a central computer. The primary users - the Real Property Register and Land Register Authorities - use display terminals and printers connected to the computer via leased telephone lines.

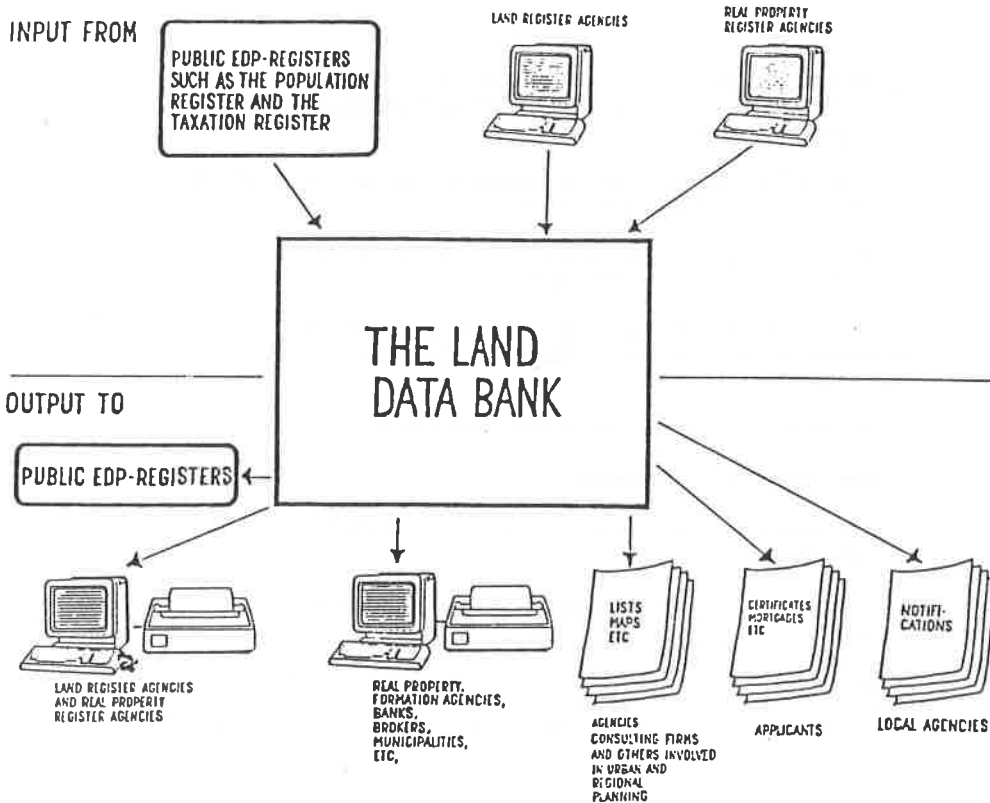
Information retrieval from display terminals is possible for banks, municipalities, property formation authorities, brokers, insurance companies and other major users of land information.

Only the Real Property Register and the Land Register Authorities are permitted to update the register contents and they are only permitted to change data concerning their own jurisdiction. Information retrieval is not limited in this way; each display terminal has access to any part of the system.

Diary sheets and other documents needed in the daily work are printed out on the local printers. Official documents such as certificates, mortgage bonds etc, and other documents intended for the applicants are printed out at the central computer and distributed therefrom.

Beside the primary goal of facilitating real property and land registration the Land Data Bank System serves urban and regional planning with landrelated data. This task is based on the system's spatial referencing system - the coordinates - and the linking of the system with other public EDP-systems.

The Land Data Bank System regularly provides up-dated information to other public EDP-systems. These include the systems for population registration and land taxation. It also retrieves data regarding taxation, owner's addresses and their marital status from other systems.



### Use in urban and regional planning

In addition to facilitating real property and land registration, the Land Data Bank System is aimed at serving urban and regional planners with landrelated data. This task is mainly based on the registration of coordinates and the linking of the system with other public EDP-registers.

Coordinates are captured by means of digitizing. A pair of coordinates are recorded for the central point of the real property unit, for main buildings and for historical monuments from the national Economic map. The national coordinate system is used.

A condition for the use of the coordinate method is that landrelated data can be linked to the spatial referencing system - the coordinates. The Land Data Bank System contains certain data of this type. It is extremely important that linking with other systems is possible. This linking is mainly based on the fact that

- \* the real property unit's designation is used as identifier not only in the Land Data Bank System but also in other systems,
- \* there is in the population register information on which real property unit each person lives,
- \* the civic registration number is widely used as identifier in public EDP-systems.

Using coordinates to quickly and easily locate real property units on a map is the most simple application of the coordinate method.

Lists of real property units are used for e.g.

- \* town and country planning
- \* notifications concerning real property formation measures.

The various lists are delivered with sets of address labels.

Joint processing of the coordinates in the Land Data Bank System and data from public EDP-systems means that different coordinate positioned data can be presented as grid net maps, dot maps or isarithmic maps.

### Implementation

The implementation process is completed for some 65 % (2.5 million) of the properties. It is estimated that the implementation will be accomplished in 1995.

Costs for data conversion including for development/maintenance and loading of data bases 60 SEK (9.25 USD) per real property (1988).

Costs for collecting additional information e.g. coordinates, map references, assessed value, address are 40 SEK (6.15 USD) per real property (1988).



**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
**MULTIFUNCIONAL**

– SICRUM –

NEW CONCEPTS ON LIS IN SWEDEN

TORSTEN LINDSKOG

SUÉCIA

LISBOA... ENCHAL-20 a 25 Novembro de 1989



## THE NEW CONCEPTS OF LIS IN SWEDEN

In my earlier paper for this seminar I gave a short presentation of the present status of the cadastral activities in Sweden. In this paper I will give you some ideas on the dynamic and exciting development in the area of Land Information Systems (LIS) or if you prefer to call them Geographical Information Systems (GIS).

The development is primarily due to the changes of information needs of the society. But, of course, the new technical conditions are also important for the development. This concerns techniques for storing, handling and presentation of information.

### The importance of an integrated approach

In spite of the new and better techniques for data acquisition we have to face that the costs for data will be an important limitation for the establishment of geographical information systems.

In data acquisition it is, therefore, a self-evident issue of co-operation to avoid duplicated work. In particular basic topographical information should be captured only by one authority. The updating of such information should also be a responsibility for one single organization. To assure flexibility in use of data bases some basic claims on co-ordination have to be accepted. This may concern the use of a common reference system, attribute codes, classification rules etc. In this context basic standards and co-ordination are necessary pre-requisites for flexibility and usefulness.

Every demand on co-ordination reduces on one side the right of option in the development of a system of a single authority or organization. On the other side, however, the total effect of lack of co-ordination may be complex and expensive systems. Inadequate co-ordination may even give the result that a desired function is not attained.

In order to minimize the costs for data collection and to get compatibility between data bases questions concerning co-operation, co-ordination and standardization are in Sweden lively discussed and investigated in The Research and Development (R&D) Council for Land Information Technology (ULI). The members of ULI consists of map producers, GISusers, and research organisations.

The long term goal of ULI is to develop a standard for simultaneous transfer of vector, screen and attribute data.

## Digital geografic information in Sweden

The National Land Survey (NLS) produces the official maps of Sweden. Digital techniques are used to a large extent in the production of the official map series and the information is stored in data bases available to interested users. The data bases have, mostly been specified to correspond mainly to cartographic demands. Moreover the production scheme is closely linked to the official map production.

As a background, it should also be pointed out that NLS is responsible for mapping for both civilian and military purposes. In a data base context this fact is of quite some relevance since the use of digital data is fairly widespread in military applications. Moreover it should be mentioned that the responsibility of NLS comprises maps at the scale of 1:10 000 and smaller scales. Mapping at larger scales is a responsibility of the municipalities.

It has become apparent that the demands are greater and, to some extent, also different from those anticipated when the present mapping programme was formulated in 1983. Since some years a broader approach has been adopted. NLS responsibility is not only limited to map production. It also includes methods for handling basic geographical data in order to rationalize the activities of other users and producers of land information.

Parliament has given NLS responsibility for co-ordinating the establishment of geographical data bases by central and local authorities. NLS executes this task mainly by discussions with other organizations about co-ordination and co-operation, by initiatives in the field of standardization.

A user need study made by NLS clearly demonstrated a rapidly growing demand for digital data. At present map producers, the defence industry and military organizations are the main users. The introduction of GIS has already resulted in increased demands from other users and the potential of this group of users is great. The study gave clear indications regarding quality demands and also gave a good basis for priority discussions.

Most of the data bases so far established have been specified to meet only cartographic demands. However, many applications call for data in a non-generalized form. Thus, in order to assure multiple usage data must be captured and stored to meet high accuracy specifications. This means that the basic information must be generalized before it can be used for cartographic purposes. There will, thus, be a clear difference between the geographic and cartographic data bases.

NLS tries to meet the increasing demand of digital geografic information in two ways - through modification of how to produce official maps and through work on special thematic spheres (ie roads or power transmission lines) in order to get a rapid coverage of the whole country. This work is summarized in the concept Geographical Sweden Data (GSD).

The most important parts of GSD are today the following data bases:

#### **National elevation data bases**

The Land Survey has established two national data bases. In both of these, elevations are stored for intersections of regular grids.

One data base with a 500 m grid interval (grid size 25x25 km) covers the whole country and was established during the 1970's.

The other data base has a 50 m grid interval with a grid size of 5x5 km. Complete coverage (19,000 grids) will be achieved in the middle of 1990. Data is obtained primarily through photogrammetric methods.

Elevation data bases are used for ortho photo mapping, visibility studies, hill shading etc.

#### **National flight information data bank**

A national flight information data base has been established co-operatively by the Land Survey, the Swedish Air Force and the Board of Civil Aviation. It covers the whole country and includes flight information needed to produce overprints to air navigation charts. It is also used to produce background in flight supervision equipment. Up-dating of the data base is paid for primarily by the Air Force.

#### **Place names**

All place names shown on the 1:50 000 map series are stored in a data base. The updating of the base will be carried out in connection with the revision of this map series. The costs for this base are shared equally by the Land Survey, the Defence Forces and the Emergency Rescue Services. It contains some 450,000 place names together with coordinates, category codes and administrative affiliation.

A new base with all place names shown on official maps at smaller scales is planned to be built up during the next few years to provide data for production of maps and gazetteers. Within a time frame of some ten years all place names in the Economic Map series at 1:10 000 will also be stored in a data base.

### **Basic topographic information**

The Land Survey also provides data bases containing basic topographic information for Sweden.

One of these data bases, intended mainly as background in the production of small-scale thematic maps (1:1 million and smaller), contains:

- administrative boundaries (county, municipal and parish)
- hydrographic details such as shore lines, lakes, islands and rivers
- urbanized area (outlines)
- public roads and railways

Another data base is used for map presentations at scales of 1:200 000, - 1:500 000. This data base contains the same features as the one mentioned earlier, but gives more details. It also contains place names and some other planimetric details.

### **Hydrographic data base**

A hydrographic information data base has been established co-operatively by the Land Survey and the Swedish Meteorological and Hydrological Institute (SMHI). It contains data on all bodies of water (and islands) greater than 1 sq km and also includes rivers and streams. Data has been captured from the 1:250 000 general map. This data base constitutes the geographical reference in SMHI's information system, the Swedish Water Archive.

### **Digital small-scale mapping**

The Land Survey makes use of digital technology in the production of the Economic Map at 1:10 000 and 1:20 000, the Topographic Map at 1:50 000 and 1:100 000 as well as for general maps at smaller scales. The digital information collected for this map production is stored in data bases and is available to any user.

### **Ancient monuments**

In the revision of the 1:10 000 map series ancient monuments are digitized. It is proposed that this digitising should be extended to include the identification numbers as used by the Central Board of National Antiquities thus making it possible to link co-ordinates to non-graphic information stored at this authority. The ancient monuments data base is not a high priority task. Data capture in connection with the Economic Map revision programme should result in a complete data base within the next 15 years.

## A new national road data base

A high quality, national road data base must have been given high priority. NLS has started a production in co-operation with the National Road Administration. Photogrammetric methods are used in the acquisition of x, y and z-co-ordinates for road centre lines. Aerial photos taken from an altitude of 13 200 m with super-wide angle lens (negative scale 1:150 000) are used as the base material. Inertial technique is used in the mountain areas. This results in a geometric accuracy of centre line co-ordinates of about  $\pm 2-3$  m.

In the first phase, mainly public roads will be included in this data base. This part of the work is planned to be completed by 1990. During the following 2-3 years the data base will be extended to include private roads as well.

A well-managed up-dating of the road data base is of great importance to the users. As far as public roads are concerned, the Road Administration is able to up-date the base continuously. The up-dating of private roads is more difficult. The main part of the changes in the private roads are the result of the activities of forestry organizations. Close co-operation with these authorities and enterprises will make a provisional updating every year possible. A more accurate revision of the base is planned to be carried out every 3-5 years.

## Urban areas

An urban area data base containing information on streets, block subdivision and classification, important buildings as well as street names and addresses is needed for a number of applications. High geometric accuracy is necessary to assure multiple usage. Thus photogrammetric methods should primarily be used in data acquisition.

Highest priority has been given to the largest cities. The building up of a national urban areas data base has started with a pilot study comprising Stockholm, Göteborg and Kiruna. The aim should be to complete the data base by 1993.

## Land coverage data

For many applications terrain coverage data is of great importance. In a first phase, a general terrain coverage data base has rapidly been built for the whole of Sweden. Data were captured by scanning existing feature separates (woodland, marshland, lakes, urbanized and other areas) of the general map at the scale of 1:250 000. The data base provides coverage data in raster format with a 25 m resolution.

For applications such as electro magnetic wave propagation and visibility studies, woodland data is of particular importance. A working group suggests that NLS should establish a national woodland data base within five years. Data for this base can be captured from ortho photos at the scale of 1:50 000 produced for up-dating and revision of topographic maps. Information on clear-cut areas must be included in this base. The up-dating, in particular concerning the clearings, is important and has to be carried out at short intervals.

A high resolution arable land data base is also needed. Data for such a base can be captured from the Economic Map at the scale of 1:10 000 by scanning the yellow colour separate. This base should be established within three years. An important user of this information is NLS itself in the production of a new topographic map series at the scale of 1:50 000.

### Digital maps in raster format

Several users have asked for rasterized information. From a technical point of view it is fairly easy to satisfy such demands by scanning feature or colour separates of existing official maps. NLS has recently decided on technical specifications for digital maps in raster format and has also produced bases over test areas. If the users are willing to share the costs nation-wide bases can be produced within one year.

### Digital cadaster maps

The map belonging to the real property register is operated at present using traditional techniques. The cadastre map/cadastral index map for rural areas is based on the economic map. This is published at a scale of 1:20 000, but is prepared from smaller original maps to a scale of 1:10 000. Reporting is done using a co-ordinate system common to the whole country. The map is normally divided into three originals - real properties, easements and regulations - and is produced on transparent material that permits photographic reproduction.

The cadastre map for urban areas is based on large-scale local authority base maps, with either the national grid or local reference systems. This cadastre map is produced at a scale of either 1:1 000 or 1:2 000.

As said before digital techniques are extensively used in the production of the economic map and in the production of the large-scale maps. There are therefore a considerable amount of map data that have been collected in digital form, but they are not arranged in such a way that they can form the basis for a LIS.

When we now are facing the task of taking EDP into service for handling the cadastre, the solution must be to create an information system that fits into that larger system structure of GSD to form a LIS/GIS. This

means that the cadastre map will also act as a complement to the register information in the Land Data Bank System. It must be possible for all users who require data about real property divisions, no matter whether they concern large-scale or small-scale applications, to be able to collect the data from a single data base that is continually kept up to date. It is therefore important that keeping the data base up to date is arranged in existing routines for reporting changes in real property divisions.

### Technical prerequisites

The NLS has created a technical system called AutoKa for handling geographical data. It is not a complete geographic information system. It has been specially designed to permit rational collection and storage of data and provide support for map production, in both large-scale and small-scale surveying. The cadaster map is one of several applications handled by AutoKa. For advanced GIS applications, the NLS uses the ArcInfo program.

AutoKa consists of two parts. One part is a number of minicomputers connected in a network, which act as an archive for data. The archive system is designated GEODATABANK. The other part is local personal computers, which act as work stations for all types of processing and presentation of data.

Whenever processing is to be done, a part of the data is transferred to the work station. The limit on the data to be transferred may be both geographical and thematic. After processing, updating of the Geodatabank is done in accordance with routines that include authorization checks. Maps that will not be subject to further processing can be displayed directly from the Geodatabank.

### Performance requirements

In the development work, we have been steered by different performance requirements some of which can be summarized in the following points.

1. Real property and certain other phenomena on the cadastral index map are characterized by their occurrence as one or more parcels. The system must have sufficient topological functions to identify and handle each area as one object.
2. Co-ordination must be achieved with the Land Data Bank System so that graphic and non-graphic data can be supplied at the same time. The land data bank system and the cadastre map must therefore be constructed as two independent parts of a larger information system. In technical terms the co-ordination must be based on data communications and standardized identity concepts.

3. Keeping data up to date must be included as a natural operation that forms an integral part of operating the real property register.

4. It must be permissible to mix data of different accuracies, but each item must be quality-marked. Only the best available data should be stored.

### **Building up**

Depending on the appearance of the available basic information we will select different methods for building up the Geodatabank. In areas where the cadastre map is at present based on the economic map, we will also co-ordinate the production in the future. This means that the production methods will be changed so that the product in the first instance becomes a data base included in the Geodatabank. The map will be produced as one of several products based on the data base.

In areas where there are large-scale maps based on good geodetic support, the build-up will be based on the geodetically measured points. The real property boundaries will be "pointed" in between the boundary points, either manually or automatically using methods that employ the scanning technique.

### **Updating**

All changes in real property divisions are made after examination by a Real Property Formation Authority. All decisions are documented in a description and on maps. In the future the map will be made and drawn on local work stations that are in communication with the Geodatabank. It will therefore be possible to use all the data required for drawing the map directly for updating the Geodatabank. In this way we hope to have made sure that the Geodatabank will always be kept up to date.

### **Development projekt**

The ideas for this work will be tried out in a development project being run in Gävleborg County, where the town of Gävle is situated. As both the NLS and CFD are located in Gävle we considered it suitable to start there. This project started in 1988 and will involve entering the data from some 700 cadastre maps on scale 1:10 000 in a Geodatabank.

The project task also include organizing and testing a routine for keeping the data base up to date, using the basic functions contained in AutoKa. Relationships are also to be established with the Land Data Bank System.



## Realization

We count on spending at least 10 years to build up a nationwide data bank. This means that we are working with a planning horizon stretching to the year 2000.

The cost of building up the Geodatabank has not been calculated yet. I believe that in round figures it will run to some 700 million SEK, which is roughly 100 million USD. We do not expect to get requested grants from the government for all of this amount to build up the system. Instead, we plan to reorganize the production system for economic maps and use the funds that are already at the disposal of the NLS to expand the cadastre map. But it is necessary for the government to be prepared to make up the balance with a rather large sum if the project is to be carried out.

### The Land Data Bank System

In my paper "A summary of the present status of the cadastral activities in Sweden". I presented the running Land Data Bank System. In this paper I want to add some information on demand for additional information in the Land Data Bank System.

Presently, the creation of a register on buildings is under consideration. Through such a register the property and land registers in the Land Data Bank will be supplemented with basic data on buildings. The main purpose is to provide each object with a unique identifier for common use. It is anticipated that the Land Data Bank System will be an important node in the complex network of communication links in which data on buildings are transported between municipalities, tax authorities, loan granting authorities, Statistics Sweden and so forth. Institutions dealing with real estate credit are very much interested in obtaining building information through the Land Data Bank System since it will facilitate their valuation work. Pilot tests with data on buildings are being carried out in five municipalities.

### Other public information systems

The great demand for geographic information depends among other things on the growing access to data in EDP registers at different levels of the community. At national level The National Environmental Protection Board (SNV), The National Board of Physical Planning and Building, The Central Board of National Antiquities and others are building up EDP registers within their fields.

At the regional level the County Administration (there are 24 counties in Sweden) the County Council and other regional authorities and organisations are building up registers containing more detailed information.

Finally municipal authorities and organisations and private companies are using EDP for their purposes about e.g. buildings, their own real properties, natural resources employees and so on.

These registers at regional and local levels are used for the handling of single cases but also for statistics and other kinds of analyses. They now begin to be used also in connection with the data bases from NLS, mentioned above, for spatial analyses and physical planning. There is however still a lot of problems to solve about co-ordination and standardization before there will be a real break-through.





**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
**MULTIFUNCIONAL**

— SICRUM —

EL SISTEMA DE INFORMACIÓN TERRITORIAL  
CATASTRAL

SEBASTIAN MAS MAYORAL

ESPAÑA

LISBOA., PORTUGAL-20 a 25 Novembro de 1989

EL SISTEMA DE INFORMACION TERRITORIAL CATASTRAL  
CARACTERISTICAS. ORGANIZACION E IMPLANTACION

Sebastian Mas Mayoral  
Dr. Ingeniero Geógrafo  
Subdirector General Adjunto  
de Informatica  
Centro de Gestión Catastral y  
Cooperación Tributaria  
España

Noviembre, 1.989

La Ley Reguladora de las Haciendas Locales, en su Disposición Adicional cuarta, número 1, define los Catastros Inmobiliarios Rústico y Urbano, como:

"Constituidos por un conjunto de datos y descripciones de los bienes inmuebles rústicos y urbanos, con expresión de superficies, situación, linderos, cultivos o aprovechamientos, calidades, valores y demás circunstancias físicas, económicas y jurídicas que den a conocer la propiedad territorial y la definan en sus diferentes aspectos y aplicaciones."

Esta Ley asigna al Centro de Gestión Catastral y Cooperación Tributaria, no solo el cometido de llevar a cabo la gestión catastral, como: "conjunto de operaciones y actuaciones administrativas de diversa índole, necesarias para la formación, mantenimiento y revisión de los catastros", sino que además establece la obligatoriedad de configurar dichos catastros como base de datos utilizable por las Administraciones Públicas.

Pero los bienes inmuebles rústicos y urbanos constituyen unidades territoriales elementales cuya integración, complementada con los elementos estructurales del terreno, puede constituir el continuo de información territorial de mayor grado de resolución del territorio nacional. Además de la consideración como atributos de estas unidades de: "cultivos o aprovechamientos, calidades, valores y demás circunstancias físicas, económicas y jurídicas", transforma a este continuo de información catastral en un producto de un interés extraordinario por su utilidad en aplicaciones tan amplias como:

- conocer la realidad agraria nacional, con la máxima resolución y detalle,
- analizar ocupación del suelo, distribución y evolución de cultivos, distribución de la propiedad, recursos naturales, etc.,
- actuar como sustrato fundamental a partir del cual confeccionar y actualizar distintas cartografías temáticas, para un gran número de aplicaciones,
- servir como soporte cartográfico, detallado y preciso, para otras aplicaciones cartográficas (urbanismo, redes de servicios, ordenación territorial, etc.)
- servir de base cierta para distintos tipos de actos civiles (créditos hipotecarios, seguros, autorización de emplazamiento, etc.),

- constituir un soporte básico del Registro de la Propiedad y de las actuaciones de expropiación.

Sin olvidar, su aplicación prioritario como base de la Gestión Catastral, que a través del establecimiento de los Padrones, permite lograr la correcta exacción del Impuesto sobre Bienes Inmuebles.

#### 1.- El Sistema de Información Catastral (S.I.C.)

Los Catastros Inmobiliarios, como inventario organizado é informatizado de bienes inmuebles, junto con las actividades y elementos para el tratamiento estructurado de esta información catastral, constituyen un sistema de información, al que la integración de la modelización de la componente territorial de los bienes inmuebles extraída de la cartografía y de los recursos adecuados para su gestión informatizada, lo eleva a la dimensión de sistema de información territorial.

Este sistema de información territorial, como modelo del mundo real integrado por los objetos y fenómenos catastrales, cuyo núcleo esta constituido por los Catastros Inmobiliarios Rústico y urbano, es lo que denominamos Sistema de Información Catastral (S.I.C.).

El S.I.C., como consecuencia de la diversidad de usos previsibles y de la amplia gama de organismos con los que se pretende el intercambio de información, se caracteriza por:

- Ser un sistema abierto, que posibilita el trasvase e intercambio de información, en forma coordinada, con otros sistemas. La utilidad para una amplia gama de usuarios y aplicaciones de la información catastral, ha dirigido el diseño y establecimiento del S.I.C., a priorizar la capacidad de difusión e intercambio de información.
- Ser un sistema descentralizado, por el que cada Gerencia Territorial, como verdadera " oficina del Catastro", dispone de su sistema informático y de las bases de datos relativas a su ámbito territorial, y se responsabiliza de su explotación y mantenimiento.
- Ser un sistema de base geográfica, ya que los bienes inmuebles son unidades elementales territoriales, y

como tales admiten una representación cartográfica que debe ser recogida por el sistema.

- Ser un sistema normalizador y productor de estándares. Por la extensión, resolución y precisión que deberá alcanzar, S.I.C. reúne las condiciones para constituir una buena base y referencia, en forma directa o generalizada, de otros sistemas de información territorial en el ámbito público o privado, pudiendo constituir un aglutinante de un sistema de información territorial que a través de una referencia cartográfica unificada integre ó ponga en relación todos los aspectos de interés para la gestión de las Administraciones Públicas. Bajo este aspecto debe ser capaz de coordinar y mantener la sintonía de los restantes sistemas que se basarán en él ó que deben entrar en comunicación. Esto exige la adopción de normas y estándares, de uso generalizado, y cuando se detecte su carencia, el establecimiento de los mismos mediante acuerdo con un amplio espectro de usuarios.

El Sistema de Información Catastral puede considerarse compuesto por unos subsistemas que, con entidad y características propias, son susceptibles, al menos teóricamente, de tratamiento independiente:

- Subsistema de Información Básica (SIB).
- Subsistema de Información Geográfica.
- Subsistema de Valoración.
- Subsistema de Imposición.

A continuación se va a analizar cada uno de estos Subsistemas.

## 2.- El Subsistema de Información Básica (SIB).

Los Catastros Inmobiliarios Rústico y Urbano incluyen en el conjunto de datos que los constituyen, las descripciones de los bienes inmuebles con expresión de sus superficies, situación, linderos, cultivos o aprovechamientos, calidades, valores y demás circunstancias físicas, económicas y jurídicas. Alcanzando todo el nivel de detalle que es necesario para una perfecta valoración de los bienes inmuebles, y que comprende:



- Las características técnicas de los inmuebles (construcciones, cultivos, etc.).
- Usos y destinos.
- Servicios generales y urbanización.
- Edificabilidad, ordenación y calificación urbanística.
- Tipología constructiva.
- Tipología de cultivos.
- Superficie de locales, construcciones y cultivos.
- Titularidad de la propiedad.

Toda esta información, como atributos de los bienes inmuebles, se recoge y almacena en una Base de Datos Catastrales alfanuméricos (BDC).

#### 2.1.- Base de Datos Catastrales Alfanuméricos (BDC).

Esta base de datos es manejada por el gestor de bases de datos relacionales DDB/4, y está integrada por un conjunto de tablas que recogen, tanto las circunstancias físicas, económicas y jurídicas de los bienes inmuebles, como la información necesaria para desarrollar correctamente la gestión catastral y tributaria.

Entre las más de 60 tablas que integran esta base de datos, destacan aquellas que recogen directamente los atributos de los bienes inmuebles:

CENSO, FINCA, SUELO, UVC, PONENCIA, para los bienes inmuebles urbanos.

MODUAL, CONTRIB, PARCELA, SUBPARC, CULTIVO, para los bienes inmuebles rústicos.

Así mismo, existe un conjunto de tablas que facilitan la gestión catastral y tributaria y el mantenimiento del Registro General.

## 2.2.- Plan de carga de las Bases de Datos Catastrales.

Los datos físicos, económicos y jurídicos del catastro se recogen en soporte informático y se cargan en las BDC implementadas en las Gerencias Territoriales, siguiendo un plan sistemático de carga iniciado con la incorporación y tratamiento de los datos necesarios para la emisión del Padrón base de la Contribución Territorial Urbana y Rústica, en 1.989, y del futuro Impuesto sobre Bienes Inmuebles, y que sigue con la información detallada generada en las Revisiones del Catastro Inmobiliario Urbano y en las Renovaciones del Catastro Inmobiliario Rústico. Las revisiones generan un conjunto de datos organizados en cinco ficheros informáticos secuenciales por cada municipio: Ponencia, CU-2 y ficheros F.I.N. (A,B y Básico), que actualmente están siendo incorporados a las tablas que componen las BDC.

## 2.3.- Recursos lógicos de gestión y mantenimiento de los datos catastrales.

Los recursos lógicos que permiten la gestión de los datos catastrales, como atributos de los bienes inmuebles, son:

### 2.3.1.- Aplicación de captura y mantenimiento de los datos catastrales.

Es una aplicación compleja desarrollada en lenguaje COBOL Microfocus y lenguaje de 4ª generación DIALOG. Accede interactivamente a la base de datos relacional DDB/4.

Trabaja bajo el control del sistema operativo UNIX System v, realizando:

- Validación y carga de datos catastrales procedentes de revisiones del Catastro de Urbana.
- Validación y carga de datos catastrales procedentes de las Renovaciones del Catastro de Rústica.
- Mantenimiento de datos catastrales.

- Carga y mantenimiento de las tablas con datos de los municipios y sus vías.
- Atención y gestión de consultas y recuperación de información catastral.

### 2.3.2.- Recursos de consulta y gestión directa de la información recogida en la base de datos.

Son estos los recursos con que cuenta el gestor de bases de datos relacionales DDB/4 para:

- Acceder a la información recogida en las tablas de la base de datos y presentar ésta en forma conveniente para el usuario.
- Plantear consultas y mantenimientos complejos, con intervención de varias tablas de la base de datos.
- Efectuar gestiones sobre la información recogida en la base de datos utilizando un lenguaje de 4ª generación.
- Definir pantallas de consulta y presentación de datos mediante recursos específicos.
- Crear, modificar y borrar tablas de la base de datos o datos de una tabla particular.

Estos recursos permiten efectuar operaciones sobre los datos recogidos en la base, sin necesidad de programación ni de una consideración y análisis previos.

### 3.- Los Subsistemas de Valoración é Impositivo (S.V./S.I.).

En el Proyecto Informático Global del Catastro, la Gestión Catastral Informatizada era el aspecto prioritario a desarrollar, por cuanto era clave para facilitar una Gestión Tributaria que posibilite la correcta exacción de las Contribuciones Territoriales Urbana y Rústica, y del futuro Impuesto sobre Bienes Inmuebles, y en este sentido la realización del Proyecto ha comenzado por:

- La dotación de las Gerencias Territoriales con sistemas informáticos capaces de realizar los procesos de Gestión Catastral y Tributaria y de mantener la información y el valor catastral.
- La definición, organización y carga de bases de datos que recogen los datos catastrales como atributos de los bienes inmuebles.
- El desarrollo de un conjunto de aplicaciones informáticas y la implantación de recursos lógicos específicos que:
  - \* Facilitan la gestión de las Gerencias Territoriales, dándolas autonomía de funcionamiento.
  - \* Posibilitan la recuperación e integración de la información catastral generada por las Revisiones Catastrales.
  - \* Permiten el mantenimiento continuo de datos catastrales, así como la fijación interactiva y masiva de valores catastrales de los bienes inmuebles.

Dan la capacidad de obtención automática de Padrones y otros productos necesarios para la gestión catastral y tributaria.

En cada Gerencia Territorial, la Gestión Catastral Informatizada se desarrolla mediante una aplicación compleja que accede al Subsistema de Información Básica y desarrolla los Subsistemas de Valoración e Impositivo.

#### 4.- El Subsistema de Información Geográfica del Catastro (SIGCA)

Los Catastros Inmobiliarios Rústico y Urbano incluyen en el conjunto de datos que los constituyen, las descripciones de los bienes inmuebles con expresión de sus superficies, situación, linderos, cultivos o aprovechamientos, calidades, valores y demás circunstancias físicas, económicas y jurídicas. Esta descripción física de los objetos territoriales de los

Catastros se refleja en una Cartografía detallada realizada con métodos, y en un sistema de representación, que asegura la localización absoluta sobre la superficie terrestre. Esta cartografía refleja también las relaciones espaciales entre los objetos catastrales y entre éstos y su entorno.

Dado el volumen de información a procesar y la complejidad de los procesos a realizar es aconsejable realizar un tratamiento y gestión informatizada del conjunto de datos catastrales, tratamiento que deberá incluir la información cartográfica, recogiendo sus aspectos de:

- \* Localización absoluta sobre la superficie terrestre.
- \* Descripción geométrica de los objetos catastrales y su entorno.
- \* Clasificación y codificación de los propios objetos catastrales, así como de todos aquellos parámetros que lo califican y cuantifican, de interés catastral (atributos).
- \* Relaciones espaciales con los demás objetos de su entorno (topología).

Sobre esta información cartográfica informatizada, organizada y estructurada como base de datos cartográficos, va a actuar "un conjunto de instrumentos y métodos especialmente dispuestos para capturar, almacenar, analizar, transformar y presentar información territorial referenciada del mundo real". El conjunto de instrumentos, métodos y datos estructurados en bases de datos, constituyen el Sistema de Información Geográfica Catastral (SIGCA).

SIGCA es un subconjunto del Sistema de Información Catastral (SIC), siendo su dominio de definición el mismo: el aspecto del mundo real constituido por el inventario de los bienes referenciados sobre el territorio nacional. SIGCA está orientado hacia el análisis y la presentación espacial de la información catastral, en base a la información recogida en las bases cartográficas catastrales y los atributos que califican y cuantifican a los objetos catastrales (bienes inmuebles), y que en general, están recogidos en las bases de datos alfanuméricas catastrales.

#### 4.1.- Descentralización de SIGCA.

SIGCA es un instrumento orientado al análisis y la presentación espacial de la información catastral. La consecución de una capacidad de análisis espacial global en toda la extensión del territorio nacional aconseja la instalación del sistema en forma centralizada, pero simultáneamente hay poderosas razones que aconsejan una instalación descentralizada en cada una de las Gerencias Territoriales, y entre las que se pueden destacar:

- El gran volumen de información a manejar.
- La necesidad de acceder, por parte de SIGCA, a algunos atributos recogidos en las bases de datos catastrales (BDC).
- La utilización de algunas funciones de SIGCA como funciones auxiliares de la gestión catastral. Especialmente funciones de presentación.
- Un mejor y más directo conocimiento del entorno territorial por parte de las Gerencias Territoriales, que facilitará las labores de captura y mantenimiento de información.

Como forma de atender las dos posibilidades se ha optado por desarrollar una organización descentralizada, mediante la instalación de los componentes de SIGCA en cada Gerencia Territorial, y a la vez, instalar el sistema también en los Servicios Centrales, bajo la dependencia de la Subdirección General de Informática, encargándose este sistema de realizar los análisis globales y resúmenes estadísticos, a partir de información elaborada.

#### 4.2.- Las Bases Cartográficas Catastrales (BCC).

El núcleo de SIGCA es una base de datos cartográficos catastrales. Cada una de estas bases de datos desarrollan entre otros, los cometidos tradicionalmente asignados a la cartografía, esto es: "constituyen un modelo abstracto de

los aspectos catastrales del mundo real, que muestra la situación, distribución y relaciones de los bienes inmuebles y sus características o atributos, así como de aquellos elementos del entorno territorial directa o indirectamente relacionados con ellos".

Para ello la información digital, que se obtiene por modelización del mundo real, mediante un proceso cartográfico de puesta en soporte informático, es tratada mediante otro proceso que permite clasificarla, codificarla y organizarla de acuerdo con una estructura de bases de datos capaz de contemplar los objetos catastrales, no solo a nivel de su descripción geométrica y sus atributos calificadores y clasificadores, sino también las relaciones entre ellos.

De esta forma se pueden efectuar análisis y consultas condicionadas, que permiten extraer datos elaborados e informes complejos, a partir de la información catastral.

#### 4.2.1.- Estructura de la BCC.

La estructura de las BCC debe contemplar, y en consecuencia, dar posibilidad de manejar conceptos como:

- ENTIDAD GEOGRAFICA U OBJETO CARTOGRAFICO, como imagen digital de una unidad geográfica individual, que puede extenderse, sin limitaciones de dominio, por todo el territorio a cartografiar. Puede ser: puntual, lineal ó superficial.
- NODO, como punto de discontinuidad en un objeto cartográfico lineal, que origina la partición de éste en tramos.
- TRAMO O SEGMENTO, como unidad homogénea y continua de información geográfica lineal dentro de un objeto cartográfico, limitada por dos nodos consecutivos.
- ATRIBUTOS o características cualitativas y cuantitativas, que pueden adscribirse a las entidades o a sus tramos.
- RELACIONES TOPOLOGICAS de vecindad de áreas a tramos (bordes) y de tramos cerrando áreas (recintos), además de las existentes entre tramos y entre puntos y tramos definidas por nodos.

- DESCRIPCION GEOMETRICA, bidimensional o tridimensional, de la información geográfica recogida a nivel de segmento lineal.
- MALLAS REGULARES DE VALORES ESCALARES, sistema habitualmente utilizado para presentar los modelos digitales de elevaciones del terreno.

De esta forma, se facilita la consulta interactiva y el análisis exhaustivo de la información catastral recogida en BCC. Para ello aprovecha:

- Las relaciones jerárquicas definidas implícitamente en los códigos de los objetos cartográficos.
- Las relaciones topológicas definidas explícita o implícitamente a través de los conceptos antes citados.
- La descripción espacial de la información.

Resumiendo se puede decir, que las bases de datos cartográficas catastrales deben ser: BASES DE DATOS ESPACIALES TOPOLOGICAS ORIENTADAS A LOS OBJETOS CARTOGRAFICOS.

#### 4.2.2.- Clasificación y codificación de la información cartográfica.

La gestión informática de la información cartográfica, y en especial, la consulta interactiva y el análisis de la información catastral requieren que, simultáneamente a su puesta en soporte informático, se proceda a clasificar y codificar esta información. Así, una vez puesto en soporte informático, cada objeto irá acompañado por un código diferenciador.

El sistema de codificación adoptado por el C.G.C.C.T. enlaza perfectamente con el que se desarrolló en el Instituto Geográfico Nacional para las Bases Cartográficas Numéricas, difundido a



través de la publicación "BCN 200/25 Clasificación y Codificación de la Información Geográfica 1.987".

La Clasificación de la información cartográfica se distribuye en 18 temas diferentes, cada uno dividido, a su vez en diferentes grupos y estos en subgrupos.

#### 4.2.3.- Enlace con la Base de Datos Catastrales (BDC).

La característica más importante de SIGCA es su capacidad de análisis espacial de la información catastral, y este análisis se consigue por la relación directa existente entre los objetos cartográficos catastrales (bienes inmuebles y sus componentes) y los atributos que los califican, que no son otros sino los datos catastrales recogidos para esos inmuebles.

El volumen de información y la operativa de la gestión catastral han aconsejado la separación en dos bases de datos de los objetos cartográficos catastrales (BCC) y de sus atributos (BDC), y para evitar el problema que de cara al funcionamiento de SIGCA crearía esta situación, se establece un enlace directo entre ambas bases, mediante un identificador o clave común de las entidades.

#### 4.3.- Plan de realización de cartografía catastral informatizada y su carga en las BCC.

El Plan se llevará a cabo en las zonas en las que se vienen ejecutando trabajos de renovación y revisión catastral por las Subdirecciones Generales de Catastro Inmobiliario Rústico y Urbano.

Para los Catastros Inmobiliarios Rústicos la realización de cartografía informatizada se concentrará en las áreas en las que se efectúan ortofotomapas.

La realización de la cartografía catastral informatizada, tanto de rústica como de urbana, se basará en la integración de los documentos cartográficos iniciales, (ortofotomapas, planos convencionales, salidas de restitución asistida por ordenador, etc.), con una labor previa de control riguroso de la referenciación absoluta, de la calidad intrínseca y de la actualización de la información, que de no dar un resultado positivo supondrá el rechazo de esa documentación y la obtención de una nueva de calidad asegurada.

Esta integración se articulará mediante la puesta en soporte digital de la información cartográfica, y tratamiento de su codificación y estructuración, como paso previo a su carga en BCC y su enlace con los datos catastrales recogidos en BDC.

Una preocupación primordial del C.G.C.C.T. es asegurar la continuidad territorial dentro de cada BCC y entre las distintas Gerencias, y para evitar los problemas que se derivarían de las pérdidas de calidad, continuidad y bondad de referenciación, se van a:

- Dictar normas de trabajo de obligado cumplimiento, tanto para las Gerencias como para las empresas ejecutoras.
- Establecer pliegos unificados para la contratación de trabajos, tanto de ejecución como de comprobación.
- Establecer un sistema de control escalonado, para la comprobación de la calidad de los trabajos realizados bajo contrato y para asegurar la continuidad de los mismos.
- Establecer un sistema lo más automatizado posible, para contrastar la calidad del producto cartográfico puesto en soporte informático.

La actualización de esta cartografía informatizada es responsabilidad de las Gerencias Territoriales. En esta tarea, y en particular para llevar a cabo los procesos de detección de variaciones y la captación de la información, normalmente mediante trabajos de campo, sería muy interesante poder contar con la colaboración directa de las Entidades Locales.

## 5.- La implantación de SIC: Niveles de realización.

El desarrollo del SIC, hasta su plena operatividad, se ha planificado en dos fases ó niveles de realización en función de los objetivos inmediatos a alcanzar en cada uno de ellos.

### 5.1.- Nivel Interno.

La primera fase del desarrollo de SIC, constituye el Nivel Interno, y está dirigida a atender los cometidos impuestos por la Ley que tienen un carácter prioritario, y que en conjunto constituyen los distintos aspectos de la Gestión Catastral como llave para una correcta Gestión Tributaria que permita la correcta exacción del Impuesto sobre Bienes Inmuebles. Los objetivos a conseguir para la realización de este Nivel Interno son:

- Autonomía en la gestión informática de las Gerencias Territoriales del C.G.C.C.T. como forma de evitar tiempos muertos en su gestión y conseguir una alta capacidad de respuesta frente a las demandas de los ayuntamientos y particulares.
- Recuperación é integración de la información catastral generada en los procesos de Revisión del Catastro Urbano y de Renovación del Catastro Rústico.
- Estructuración y carga de las Bases de Datos Catastrales (BDC).
- Mantenimiento y actualización continua de la Información y el Valor Catastrales.

Los medios puesto por el C.G.C.C.T. para alcanzar estos objetivos han sido:

- Desarrollo y total operatividad de la Gestión Catastral Informatizada mediante los subsistemas de SIC: S.I.B., S.V. y S.I.

- Cartografía Catastral Informatizada como instrumento de apoyo a esa Gestión Catastral.
- Implantación de microinformática para el trabajo cotidiano de las G.T.
- Establecimiento de un plan de procesos a informatizar a corto plazo.

Esta primera fase viene desarrollandose desde 1.987 y estará concluida en su integridad en el primer semestre de 1.990. Se inició con la dotación de sistemas informáticos a las Gerencias Territoriales, implementandose a la vez las aplicaciones, recursos lógicos y bases de datos que constituyen la infraestructura de los subsistemas: S.I.B., S.V. y S.I. Actualmente se está efectuando la carga en las bases relacionales de los datos catastrales recogidos hasta 1.990.

Durante 1.989 se ha iniciado la realización de cartografía catastral informatizada, tanto urbana como rústica, debiendo concluirse el plan de informatización cartográfica en tres años.

Casi todos los procesos relacionados con la Gestión Catastral, é incluso con la Gestión Tributaria, han sido asumidos y realizados por las Gerencias Territoriales durante 1.989. Entre estos cabe citar:

- Carga de datos Censo Urbana 1.988.
- Actualización del Censo 1.988 hasta 1.989.
- Cálculo del Censo de Urbana 1.989 y emisión del Padrón.
- Implantación del Registro General Informatizado y la Gestión de Expedientes.
- Carga de los datos catastrales de los Municipios de 2ª revisión, así como de los revisados en 1.988.
- Carga de Ponencias de Valores y valoración catastral masiva.

- Carga de Censos del Catastro Rústico.
- Mantenimiento del Catastro Rústico.
- Plan de Inspección y cruce de Censos.
- Manual de Procedimiento de Gestión Informatizada.

## 5.2.- Nivel Externo.

La segunda fase del desarrollo de SIC, cuya andadura comienza actualmente desarrollándose en paralelo con los trabajos correspondientes a las etapas finales de la primera fase, está encaminada a realizar el mandato de la Ley (L.R.H.L. 39/1988. Disposición Adicional cuarta) por el cual el C.G.C.C.T. ejercerá la formación, conservación, renovación, revisión y demás funciones inherentes a los Catastros Inmobiliarios, "todo ello sin perjuicio de la configuración de dichos Catastros Inmobiliarios como base de datos utilizable tanto por la Administración del Estado como por la Autonómica y Local".

### 5.2.1.- El Banco de Datos Catastral.

El conjunto de datos y descripciones que constituyen los Catastros Inmobiliarios constituyen un banco de datos con un gran volumen de información territorial, que tiene un interés extraordinario por su utilidad en un gran número de aplicaciones, y en consecuencia es un valioso instrumento para las distintas Administraciones Públicas y el sector privado en el cumplimiento de sus propios fines. Esto ha aconsejado al C.G.C.C.T., organizar ya el acceso general a esta información, estableciendo unos cauces de acceso, formas de realizar la difusión, e incluso tarifas.

Las formas de realizar la difusión de la información del banco de datos varían en función del tipo de datos a transferir. Estos tipos de datos pueden ser:

- Información cuya difusión esta reglamentada por la Ley ó por convenio entre C.G.C.C.T. y las Administraciones Locales.

- Información estandar. Que es aquella que tiene definido previamente su contenido y es de difusión pública y generalizada.
- Información no estandar. Que es aquella que no está clasificada expresamente como estandar y que se produce a petición del interesado requiriendo una elaboración específica.

#### 5.2.2.- El SIC como instrumento fundamental del Servicio Público constituido por el Banco de Datos Catastral.

La informatización y estructuración de la información que integra el banco de datos como sistema de información, no solo facilita la difusión directa de información estandar, sino que posibilita la elaboración de la misma produciendo un alto valor añadido en la gestión del Banco de Datos Catastral.

Esta es una de las principales razones que aconsejan la creación de SIC.

La Gestión de la dimensión territorial de los inmuebles rústicos y urbanos se hace posible mediante el subsistema SIGCA que permite una gestión conjunta de la información cartográfica recogida en las bases cartográficas (BCC) y de los atributos recogidos en las bases de datos alfanuméricas (BDC).

El cometido fundamental de SIGCA, de cara a la gestión del banco de datos, es facilitar la consulta interactiva y el análisis exhaustivo de la información. En este sentido no solo facilita la recuperación directa de información cartográfica, sino que permite elaboraciones de alta complejidad, para la extracción y representación de datos catastrales, tanto gráficos como alfanuméricos.

#### 5.2.3.- Plan para la realización de la Segunda Fase del desarrollo de SIC.

La segunda Fase se desarrollará siguiendo varias líneas maestras de evolución:

- Ampliación de la capacidad de proceso y almacenamiento de los Sistemas TARGON (NIXDORF) de las Gerencias. La capacidad de almacenamiento total pasará de 35 GB iniciales a 74 GB.
- Instalación de SIGCA en las Gerencias Territoriales. Para ello ya está resolviéndose el primer concurso público para dotación de 6 Gerencias con el software y hardware necesarios. Durante 1.990 y el primer semestre de 1.991 se completará esta dotación en las 65 Gerencias.
- Digitalización y estructuración de la información cartográfica. Este proceso ya ha comenzado como parte del plan de informatización de la cartografía que complementa la Primera Fase. Así al final de 1.989, se dispondrá de más de 100.000 ha. de cartografía digital urbana y más de 300.000 Ha. de rústica. Durante los años 1.990, 1.991 y 1.992 deberán terminarse 1.000.000 Ha. urbanas y 8.000.000 Ha. rústicas. El trabajo de digitalización y estructuración lo realizan empresas bajo contrato.
- Organización del soporte central al SIC.  
 SIC es un sistema descentralizado por el que cada Gerencia Territorial dispone de un sistema informático y de las bases de datos relativas a su ámbito territorial y se responsabiliza de su explotación y mantenimiento. Esta organización presenta grandes ventajas, tal como ya se ha expuesto, y es absolutamente necesaria para conseguir una relación fluida y directa con los Municipios. Pero para que los 65 sistemas informáticos funcionen coordinada y homogéneamente es necesario que a nivel de Servicios Centrales una Unidad se encargue de:
  - a) La coordinación del funcionamiento informático de las Gerencias.
  - b) La preparación y validación masiva de datos para acelerar aquellos procesos que requieren un gran consumo de tiempo y recursos en las Gerencias.

- c) El desarrollo de aplicaciones y procedimientos.
- d) El soporte informático a la Dirección del C.G.C.C.T. y al Ministerio de Economía y Hacienda, en los aspectos catastrales.
- e) La conexión física de los Organismos de la Administración Central y las grandes empresas de ámbito estatal con el SIC.
- f) La realización de procesos y análisis espaciales que requieren conjuntamente de información cartográfica y de los atributos de esos objetos cartográficos en áreas extensas ó dispersas de España.

Durante 1.990 se gestionará la dotación del C.G.C.C.T. con un sistema informático centralizado capaz de dar respuesta a las necesidades que justifican la organización del soporte central al SIC.







**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
**MULTIFUNCIONAL**

— SICRUM —

EL MODELO DE INFORMATIZATION DEL CADASTRO ESPANOL.  
Su RELACION CON LA ESTRUCTURA ADMINISTRATIVA  
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JORDI GUMET PERENA

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LISBOA... NCHAL-20 a 25 Novembro de 1989

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**Jordi Guimet Pereña  
Dr. Ingeniero Industrial  
Subdirector General de Informática**

**Centro de Gestión Catastral y  
Cooperación Tributaria  
Ministerio de Economía y Hacienda**

**Noviembre 1.989**

## I.- EL CATASTRO EN ESPAÑA.

La Ley de 1.906, aún vigente, implantó en España el Catastro parcelario con la única finalidad de servir de soporte a la Contribución Territorial, que habrá sido durante el s. XIX y todavía era a principios del s. XX el principal impuesto estatal, no solo en España sino en todos los países europeos.

De entonces a nuestros días se han venido produciendo dos procesos en relación con el Catastro y con la tributación territorial. El primero de ellos afecta al carácter de dicho impuesto, que ha pasado a ser un impuesto más dentro del complejo sistema tributario actual, con carácter exclusivamente municipal. El segundo proceso se refiere a la propia institución catastral, que de ser sólo un instrumento de tributación local y estar atomizado en multitud de catastros locales, ha pasado a servir de base a no menos de cinco tributos cuyas recaudaciones se destinan a los tres niveles de la Administración Pública (Central, Autónoma y Local), habiendo concretado su gestión y datos en una base propia dentro de la Administración Central del Estado. El Catastro adquiere la consideración de instrumento imprescindible de conocimiento e información para aplicar los supuestos sobre la propiedad inmueble de forma justa o igualitaria en todo el territorio nacional, configurándose el valor catastral como el valor fiscal de referencia para la compleja política tributaria sobre inmuebles que gestionan las distintas Administraciones Públicas: IRPF e Impuesto sobre el Patrimonio, por lo que respeta a la fiscalidad estatal, Impuesto sobre Transmisiones, Sucesiones y Donaciones, en la fiscalidad autónoma, e impuesto sobre Bienes Inmuebles y sobre Incremento del Valor de los Terrenos, en la fiscalidad local.

La creación de un organismo administrativo para la gestión del catastro, traduciendo la idea de que el Catastro es único, a nivel de todo el Estado (a excepción de las provincias Vascas y Navarra, con un régimen foral especial), se produce en 1.985, con la creación del Centro de Gestión y Cooperación Tributaria, en el seno del Ministerio de Economía y Hacienda, absorbiendo las competencias de los 65 "Consortios" u órganos autónomos territoriales que hasta aquella fecha representaban la organización administrativa que gestionaba el Catastro.

En 1.987, el referido organismo perfila sus contenidos más específicos, pasando a denominarse "Centro de Gestión Catastral y Cooperación Tributaria", con funciones exclusivamente catastrales, y coincidiendo con un notable impulso del desarrollo de las revisiones catastrales, caracterizándose por dotar a la Institución de una dirección centralizada a nivel nacional, la implantación de medios técnicos e informáticos en todas las Oficinas Territoriales y una estructura organizativa y funcional coordinada en todo el territorio.

Así pues, la estructura administrativa actual en España de la institución catastral radica en un Organismo Autónomo del Ministerio de Economía y Hacienda, con rango de Dirección General, estructurado en unos Servicios Centrales y en 65 Oficinas Territoriales denominadas Gerencias Territoriales, una por cada provincia, más, en algunos casos especiales, oficinas con ámbito municipal.

Las funciones que la normativa vigente atribuye al citado órgano son:

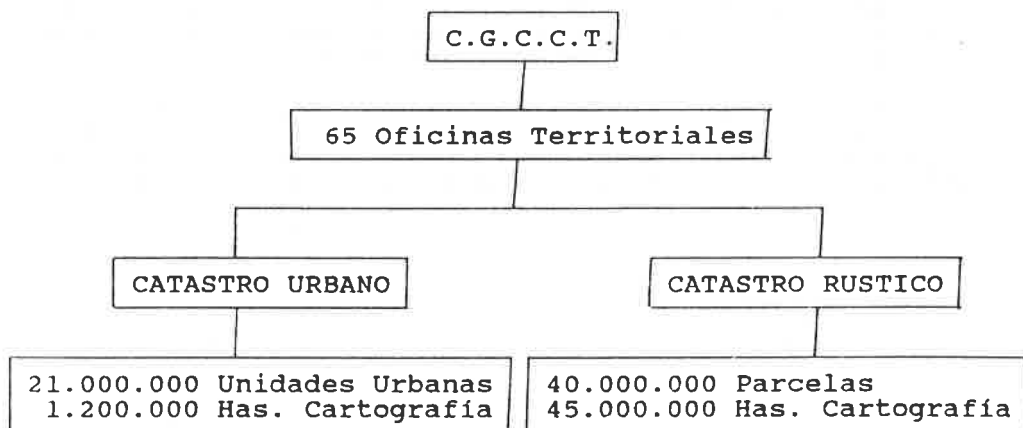
- a) La realización de los trabajos técnicos de formación, conservación y revisión de los catastros inmobiliarios, rústicos y urbanos.
- b) El estudio y coordinación de los sistemas de valoración de los bienes inmuebles.
- c) La gestión e inspección de las Contribuciones Territoriales, Rústica y Urbana, directamente a través de los procedimientos de colaboración que se establezcan con las Corporaciones Locales.
- d) La elaboración y análisis de la información estadística relativa a la tributación de los bienes inmuebles.

#### La información catastral.

Las antes referidas funciones se proyectan sobre una realidad inmobiliaria territorial que, resumidamente, comprende:

21.000.000 de unidades urbanas  
40.000.000 de parcelas rústicas  
(7.000.000 de propietarios)  
1.200.000 Has. de suelo urbano (cartografía)  
45.000.000 Has. de suelo rústico (cartografía)  
8.200 Municipios

**ESQUEMA**



### Las revisiones catastrales

Para dotar al país del instrumento de conocimiento territorial que una sociedad moderna y su desarrollo precisan, hubo que poner en marcha un importante proyecto de revisión, actualización y puesta al día, del Catastro. El año 1.982 se iniciaron los procesos de revisión del Catastro de Urbana, que se prevén finalizar en 1.991, en todo el territorio. Asimismo, ya este año se ha iniciado la revisión del Catastro de Rústica, abarcando, en una primera fase que se prevé ultimar en 1.992, unos 25 millones de Hectareas.

Las inversiones destinadas a tal fin, sobrepasaría los 60.000 millones de pesetas, lo cual da una idea realmente impresionante del Coste derivado de la captura de la información en que consiste el Catastro.

## II.- LA INFORMATIZACION DEL CATASTRO. EL SISTEMA DE INFORMACION CATASTRAL.

Con la creación del Centro de Gestión Catastral y Cooperación Tributaria se asume de inmediato un Plan de Informatización del Catastro que, subsanando las carencias que venía sufriendo la Institución en medios técnicos de tratamiento del enorme volumen de información que debía gestionar, permite cumplir las funciones y objetivos expresados en la disposición antes mencionada, garantizando, a la par que una correcta gestión, el mantenimiento actualizado de la información, cuyo coste de captura ya hemos visto es extraordinario, y configurando, en fin, un catastro moderno multifinilaritario.

A principios de 1.989, todas las Oficinas Territoriales disponían de Sistemas Informáticos para la gestión de información alfanumérica, constituyendo un porque de 65 Sistemas Territoriales y 1 Sistema Central, con S.O. Unix y una capacidad de almacenamiento on-line de 60.000 Mb, que en breve será ampliado. En una segunda fase, que se iniciará dentro de este mismo año, se irán instalando sistemas gráficos en las referidas oficinas, para la gestión de la Cartografía Catastral Digitalizada (proyecto SIGCA), cuyas características se comentarán más adelante.

La visión informática del Catastro permite una cierta abstracción del mismo, que presentamos como S.I.C.

### El Sistema de Información Catastral. (S.I.C.).

El Centro de Gestión Catastral y Cooperación Tributaria incorpora un amplio valor añadido conseguido a partir de los datos de los Catastros, simplemente organizándolos como núcleo de un sistema de información territorial. Y esto sin necesidad de realizar un esfuerzo extraordinario, ya que la propia gestión informatizada de los datos catastrales, para alcanzar la valoración e identificación de los bienes inmuebles, resulta claramente mejorada con la integración de dichos datos, junto con las actividades y recursos propios de la gestión catastral en un sistema de información. Al igual que en todos los sistemas de información, un aspecto fundamental de éste lo



constituye su capacidad, para sintetizar la dinámica de los fenómenos que refleja, esto es, su capacidad para reflejar y analizar la variación del valor y la titularidad de los bienes inmuebles, así como de los diversos atributos que sirven de base para fijar estos.

La integración en el sistema, junto con los datos catastrales alfanuméricos, de los componentes territoriales de los bienes inmuebles extraída de la cartografía y de los recursos adecuados para su gestión informatizada, lo eleva a la dimensión de sistema de información territorial, extendido a todo el territorio sujeto al Impuesto sobre Bienes Inmuebles, donde la gestión catastral la ejecuta el C.G.C.C.T.

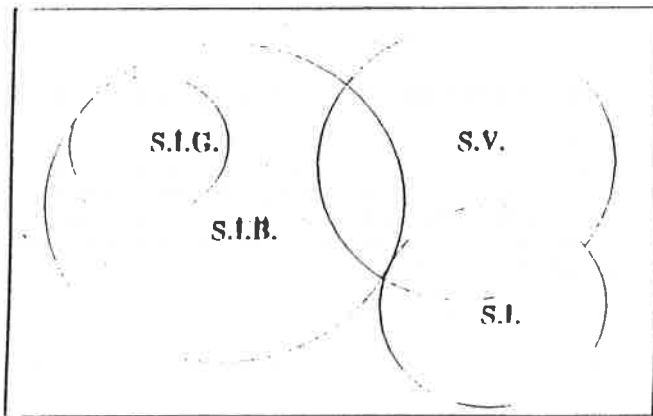
Este sistema de información territorial, cuyo núcleo está constituido por los Catastros Inmobiliarios Rústico y Urbano, lo denominamos Sistema de Información Catastral (S.I.C.).

El conjunto de datos que, según su definición tradicional (inventario -valorado- de la riqueza inmobiliaria de un territorio, con la descripción de sus características técnicas, económicas y jurídicas) conforman el Catastro, constituye, desde una visión técnicamente neutra, un Sistema de Información imposible de gestionar sin el soporte de las tecnologías de tratamiento automatizado de la información.

Este Sistema de Información Catastral puede considerarse compuesto, a su vez, por unos subsistemas que, con entidad y características propias, son susceptibles, al menos teóricamente, de tratamiento independiente:

- Subsistema de Información Básica.
- Subsistema de Información Geográfica.
- Subsistema de Valoración.
- Subsistema de Imposición.

Los elementos de información que constituyen y gestionan cada uno de estos subsistemas están representados en la figura.



### SISTEMA DE INFORMACION CATASTRAL

#### S.I.B. Sistema Información Básica

Características técnicas de los Inmuebles  
(construcciones, cultivos agrícolas)  
Usos y destinos  
Georeferenciación Localización espacial  
Urbanización Servicios generales  
Edificabilidad Ordenación y calificación urbanística  
Tipología constructiva Año construcción/rehabilitación  
Tipología de cultivos  
Superficie de locales, construcciones y cultivos  
Titularidad de la propiedad

#### S.I.G. Sistema Información Geográfico

Cartografía parcelaria  
Referenciación geodésica  
Representación de la ordenación urbanística  
Niveles de Información Cartográfica Básica  
Índices de conexión con BcD Alfanumérica

#### S.V. Sistema de Valoración

Valor del suelo urbano  
Valor de repercusión del solar sobre coste  
edificación  
Servicios comunes. Coeficientes de Propiedad  
Coste de la construcción  
Coeficientes correctores del suelo  
Coeficientes correctores de la construcción  
Intensidades ocupación del suelo. Calificación  
urbanística  
Rendimientos económicos de los cultivos

#### S.I. Sistema Impositivo

Valor catastral inmuebles  
Bases Imponible y liquidable  
Exenciones y bonificaciones  
Datos fiscales de los titulares  
Tipos de gravamen impositivos  
Datos tributarios históricos  
Fecha de Alta, Modificación, etc  
Domiciliación bancaria y otros datos

El Sistema de Información Geográfica Catastral.  
(S.I.G.C.A.).

Dentro del S.I.C. adquiere una relevancia significativa el subsistema que denominamos SIGCA, desarrollado a través del proyecto, ya en ejecución, del mismo nombre y cuyas características más particulares serán expuestas en otras Ponencias.

El origen y justificación del Proyecto de numerización de la Cartografía Catastral, que lleva a cabo nuestro Centro, se encuentra en los siguientes motivos:

- a) Política gubernamental, materializada a través del Centro, en orden a conseguir un Catastro multifuncional, utilizable en diversos ámbitos de la esfera pública, y soportado con medios tecnológicos actuales.
- b) Necesidades detectadas y tangibles, de la propia Administración Central, coincidentes, en muchos aspectos, con los de las Administraciones Autonómicas, en el ámbito de la Planificación.
- c) Su consideración como factor de desarrollo económico, equivalente a una infraestructura territorial, como pueden ser las obras públicas u otros tipos de infraestructura material.
- d) Dar respuesta a las abundantísimas iniciativas que están surgiendo en este campo, tanto en la esfera pública como en la privada, y que con toda probabilidad conducirían a una producción de cartografía digitalizada totalmente descoordinada y variada, y por ello, ineficaz desde una perspectiva global.
- e) En relación con lo anterior, y como su consecuencia, conseguir una estandarización en la producción cartográfica, a la par que una economía de escala en la misma.
- f) Garantizar el mantenimiento actualizado de la cartografía informatizada.

La tarea del mantenimiento permanente de dicha cartografía es un aspecto de gran importancia en el Proyecto, y en la misma se cuenta con la participación y colaboración de los municipios, primeros usuarios de dicha cartografía, además del Centro.

Sin entrar en detalles, queremos dejar resaltados dos aspectos básicos que incorpora el Proyecto: el primero de ellos es la consecución de la continuidad territorial, entre las distintas zonas cartografiadas, aún en diferentes escalas, y el segundo la construcción de un sistema integrado entre las BbD alfanuméricas y los gráficos, a partir de las adecuadas interfaces.

Para la ultimación del proyecto, que representa la numerización e integración en las BbD gráficos del Centro del millón de Hectareas de suelo urbano y los 25 millones del suelo rústico revisado, se prevé un plazo de 3 años y una inversión cercana a los 10.000 millones de pesetas.

Destinatario	Tipo de información	Medios/soportes
Administración Fiscal Central	BdD Catastral	Soportes magnéticos anuales (DGIT) Terminales remotas (Delegac. Hacienda)
Administración Fiscal Autonómica	Consulta a la BdD Catastral	Terminales remotas
Administración Local	Liquidaciones Alteraciones al Censo Alteraciones al Catastro Padrón anual Información Censal Información Catastral Cartograf. Informatizada	Soportes magnéticos (cintas)
Registros Propiedad/Notarios	Cartograf. Informatizada Cédulas Identificación Catastral	Cintas/diskettes Papel
Empresas Servicios Públicos	Cartograf. informatizada	Cintas
Organismos y Público en general	Información estándar alfanumérica (Censo, Inmuebles, Inventario inmuebles) Información no estándar (específico) Cartograf. informatizada	Cintas Papel (Listados)  Cintas Papel Cintas

### III.- LA DIMENSION FISCAL DEL CATASTRO. SU TRADUCCION EN RELACIONES INFORMATICAS CON LAS ADMINISTRACIONES PUBLICAS.

Como se ha indicado al principio de este documento, actualmente el Catastro es la base de información sobre la que se apoyan figuras tributarias gestionadas por los tres niveles de las Administraciones Públicas: Central, Autónoma y Local. Además, las propias normas legales definidoras del Organo Catastral le encomiendan a éste su configuración como base de datos al servicio de todas las Administraciones.

En este marco, pues, se articula todo el sistema de soporte informático y de relaciones, de transferencias de información y de intercambio inter-administraciones, que, esquemáticamente, aparece en el cuadro adjunto.

#### Relaciones con la Administración Local. (Municipios)

La nueva Ley de Regulación de las Haciendas Locales, que establece a partir de 1/1/90 el Impuesto sobre Bienes Inmuebles, sustituyendo a la antigua Contribución Territorial, como impuesto de carácter exclusivamente local, asigna las competencias para la gestión del tributo a los Entes locales, pero atribuyendo a la Administración Central, a través del Centro de Gestión Catastral y Cooperación Tributaria las competencias en gestión catastral.

Se producen dos fases en la gestión que antes era única: Gestión Catastral y Gestión Tributaria. Esta última debe apoyarse en la primera, aunque también es cierto que, a través de la segunda, puede capturarse información trascendental para la primera. Este sistema, por cierto harto complejo en su materialización, no será posible si no se arbitran los adecuados canales de transferencia de información, tanto anuales como periódicas, entre las Administraciones implicadas. Por ello, el Centro ha definido unos Formatos estándar y un proceso informático adaptable por cada municipio a sus características propias, que permitan, a partir de la entrega de soportes magnéticos con los susodichos formatos, como entrada de datos a los Sistemas Locales, la continuidad en la gestión tributaria propia de estos últimos. Los formatos más importantes son los de Padrón del Catastro

de Urbana, Padrón de Catastro Rústico y Liquidaciones. En un futuro no lejano cabe presumir un incremento en los grados de colaboración con los municipios, que requerirán a su vez de nuevos métodos y desarrollos informáticos para darles soporte.

### Relaciones con las Comunidades Autónomas.

Las CCAA gestionan el Impuesto sobre Transmisiones y el Impuesto sobre Sucesiones y Donaciones. En ellos el valor catastral de los inmuebles es un valor referencial, que las CCAA pueden comprobar y modificar. Aún así, es un parámetro que proporciona una información inicial, cuando no única, para proceder a la liquidación del impuesto.

Con algunas CCAA se están ultimando acuerdos, que esperamos se generalicen, por medio de los cuales accederán a las Bases de Datos de las distintas Oficinas Territoriales del Catastro, a través de terminales por conexión remota, para poder consultar no sólo el valor asignado por el Catastro a cada inmueble, sino los distintos parámetros de valoración que se le han aplicado y las características físicas y técnicas de los mismos.

### Relaciones con los otros Organos de la Administración Central.

Desde una perspectiva exclusivamente fiscal, las relaciones del Centro con otros Organos de la Administración Central se ciñen, en el propio Ministerio de Hacienda, a suministrar los datos sobre la propiedad inmobiliaria y su valoración a la Dirección General de Informática Tributaria, que los integra en su Base de Datos Nacional (BDN) a efectos de estudios y control fiscal sobre los Impuestos IRPF y Patrimonio.

Dicha transferencia de información tienen carácter anual, y se base en la transmisión vía soportes magnéticos.

Por encima de tratamientos fiscales, existe también una transferencia de información de carácter administrativo u oficial, con los Ministerios de Agricultura, el Instituto Nacional de Estadística y otros. Caso particular, pero con enorme proyección e importancia futura, son las relaciones de coordinación con los Registros de la Propiedad, que por primera vez en nuestro país, pueden llegar a materializarse en base a la utilización de las tecnologías informáticas.

#### IV.- LA DIMENSION DE BASE TERRITORIAL DEL CATASTRO. ASPECTOS SOCIOECONÓMICOS. EL BANCO DE DATOS CATASTRAL.

El Catastro dibuja la fotografía de una realidad sobre lo que es posible el diseño ajustado de estrategias sociales y económicas, política de inversión, industriales, comerciales o de simple interés privado, que deben permitir una más acertada distribución de los recursos y en sólido apoyo al progreso general de la sociedad. El inventario de la riqueza inmobiliaria del país no puede limitarse a ser utilizado sólo como plataforma de una mejor estructura tributaria. Tanto las Administraciones Públicas como las empresas privadas y los ciudadanos pueden y deben aprovechar esa fuente de datos como base de su propia actuación.

#### El Banco de datos del Catastro

Además de la función fiscal que es propiamente inherente a la institución catastral, ha aparecido una nueva función llamada a cobrar cada día mayor importancia. Se trata de las posibilidades del banco de datos del Catastro, posibilidades crecientes en la medida en que la informática, aplicando tratamientos cada vez más complejos, permite no sólo la explotación óptima de la propia información, sino llegar a obtener un conocimiento de la realidad antes impensable, a través del cruce de la información contenida en diferentes bancos de datos. El Catastro se convierte así en una pieza fundamental del acervo de datos que son imprescindibles en una sociedad moderna.

Las crecientes demandas que la ciudadanía vuelca sobre el sector público y la cada vez mayor complejidad que la gestión de las colectividades viene adquiriendo requieren una planificación de las acciones y una previsión de los efectos reales del proceso de toma de decisiones que no puede llevarse a cabo sin un conocimiento detallado y fehaciente de la realidad sobre la que se opera. Cada vez con más urgencia y de manera más necesaria, los Ayuntamientos, los órganos de las Comunidades Autónomas y los del propio Estado necesitan contar con una descripción fiable y completa del entramado económico y demográfico sobre el que haya de recaer el efecto de una decisión. Parece claro que un Ayuntamiento no podrá programar adecuadamente sus



inversiones en infraestructuras de servicios si no cuenta con censos auténticos que determinen la distribución real del hábitat urbano, del mismo modo que la eficacia del establecimiento de una determinada política viaria por el Estado tendrá que contar previamente con la descripción detallada y homogénea, a la vez, del sector demográfico y del sector de actividad económica a los que esa política pretenda atender. Y no puede hacerse extrapolación hacia el futuro de la evolución de las cantidades de población o de actividad económica si no se cuenta con un retrato auténtico y preciso de la realidad presente. El Catastro se convierte de este modo en un banco de datos imprescindible para la puesta en práctica de un buen número de decisiones políticas, o para orientar adecuadamente la gestión pública de los servicios y las inversiones, tanto de los Ayuntamientos cuanto del resto de las Administraciones Públicas.

Y no es sólo la actividad política o económica la que se beneficia por el Catastro renovado. También es la creciente complejidad y el alto nivel de competitividad que está definiendo la evolución de la actividad económica del sector privado, lo que exige a las empresas una mayor capacidad para tomar decisiones sobre su estrategia económica de medio y largo plazo con bases sólidas de conocimiento de la realidad.

La ubicación de una fábrica, la apertura de una sucursal, el establecimiento de una red de servicio, la rentabilidad de un capital inmovilizado, son cuestiones que requieren un conocimiento previo de datos de población y distribución de la propiedad urbana y rústica que hasta estos momentos resulta muy difícil y en todo caso muy costoso obtener.

El Catastro debe convertirse en el banco de datos que sobre la distribución, características y valor de las propiedades inmobiliarias facilite la adopción de estrategias económicas acertadas por las empresas.

No debe olvidarse tampoco que en las decisiones individuales de carácter económico, inversiones inmobiliarias, adquisición de vivienda, establecimiento de explotaciones agrícolas de carácter familiar sería muy útil contar con un conocimiento previo de la situación que todavía es muy difícil obtener en España, dada la falta de transparencia que caracteriza al sector inmobiliario. También en este ámbito el Catastro puede representar una aportación decisiva en beneficio

de la ciudadanía.

El Catastro se convierte así en un banco de datos de cuya utilidad van a beneficiarse tanto el sector público como el privado. Esta nueva dimensión del Catastro está destinada en un futuro muy próximo a superar en desarrollo y trascendencia aquellas funciones más tradicionales de la institución catastral. La incorporación de España a la Comunidad Europea plantea desafíos a las instituciones públicas y a los intereses privados que sólo pueden atender adecuadamente si cuentan con los datos más completos y actuales en sus procesos de toma de decisión. En ellos, los datos que sobre la propiedad inmobiliaria recoge el Catastro pueden resultar imprescindibles.

### El futuro de las nuevas funciones del Catastro

El impulso a las nuevas facetas y funciones del Catastro, paradójicamente no surge en los países europeos que tienen ya una tradición casi secular de catastros eficaces, sino que aparece en un país como España, primero como un importante subproducto y enseguida como una función de trascendencia suficiente como para llegar a afectar a la propia naturaleza histórica del Catastro. Ello es así, en parte porque el retraso en materia de evolución catastral que lleva España respecto de sus socios europeos se convierte en una ventaja no sólo porque se puedan introducir en la revisión de nuestro Catastro las tecnologías informáticas más avanzadas sin tener que esperar a la amortización de equipos costosos ya establecidos, como ocurre en algún país vecino. De hecho la informática entró en los catastros europeos hace ya mucho tiempo. Pero lo que estos países han construido durante todo este tiempo es una cristalización legislativa y burocrática, un sistema de gestión y unos hábitos de funcionamiento que, como suele ocurrir en todas las estructuras sólidamente establecidas, hacen muy difícil la aparición de innovaciones, sobre todo si esas innovaciones amenazan con modificar de forma importante la naturaleza misma de la institución.

España no contaba con ese freno, y a la hora de plantearse con voluntad de modernidad la implantación de un Catastro que responda eficazmente a las exigencias de los tiempos, ha podido descubrir e incorporar estas nuevas funciones, que convierten al Catastro en uno de los instrumentos básicos de la

ordenación jurídico-económica del país.

En particular, una de las primeras aplicaciones que el Catastro debe permitir es la construcción de Sistemas de Información Territorial de ámbito local.

En un sentido amplio se puede decir que un Sistema de Información Territorial (S.I.T.) es el conjunto de actividades y elementos que permiten un tratamiento estructurado y organizado de la información sobre el territorio. Esta definición, en el ámbito local, nos lleva al concepto más generalizado de SIT, como instrumento que facilita una gestión integrada de información sobre:

- Catastro
- Planeamiento urbanístico
- Estructura de la propiedad
- Topografía
- Redes de servicios
- Etc.

La formación de un SIT tan general debe afrontarse por integración de sistemas parciales, tanto en el aspecto del territorio abarcado como en el de la información recogida.

La consecución, como meta, de un SIT general para toda la nación, obtenido por integración de sistemas locales, y la necesidad de impulsar y coordinar una Gestión Tributaria informatizada de los Impuestos sobre Bienes Inmuebles desarrollada a partir de la información alfanumérica y cartográfica obtenida por el C.G.C.C.T., ha llevado a éste a plantear a los Municipios una oferta de información y colaboración no sólo en base a facilitarles la gestión tributaria, sino como aspecto integrante de un SIT de ámbito municipal. De esta forma se consigue referenciar los sistemas sobre una base cartográfica informatizada común, que es mantenida coordinadamente, y proporcionar al Municipio los aspectos catastrales que le son necesarios para su gestión de impuestos.

Todo lo anterior trasciende o deriva en una

actividad de difusión de la información catastral, que el Centro está poniendo a punto.

Los primeros y más grandes usuarios son los Entes Locales, que están en su mayoría desarrollando proyectos de implantación de S.I.T. para basar en ellos una parte importante de su gestión. El Centro les facilitará dicha Cartografía de forma gratuita, esperando de su colaboración la participación en los procesos de actualización y mantenimiento de la misma, habiéndose arbitrado formas para el continuo intercambio de información en soporte magnético. Sobre esta cartografía base, los municipios implantarán otros niveles de información, como mobiliario urbano, planeamiento urbanístico, distribución de servicios, redes de transporte, etc.

Otro colectivo importante van a ser los Registros de la Propiedad.

También se han iniciado contactos con compañías de servicios públicos (teléfonos, gas y electricidad, etc.), con fórmulas que aseguran que la información que los mismos vayan a incorporar sobre la cartografía informatizada básica que el Centro les proporcionará a precios inferiores a la de la comercialización pública, sea también suministrada a los Municipios de forma gratuita. Con ello, los municipios llegarán a disponer una amplia y compleja información de base geográfica.

Otros importantes usuarios institucionales son, o van a ser próximamente, el Instituto Nacional de Estadística, los Ministerios de Agricultura, Educación, Sanidad, Obras Públicas y probablemente, Defensa. En algunos de estos casos, se intenta aprovechar dicha utilización de cartografía con referenciación parcelaria para la unión de bases de datos de distintos Departamentos. Las Comunidades Autónomas no serán tampoco extrañas en esta demanda, para aplicaciones similares a los anteriores.

Finalmente, en el ámbito de lo privado, se prevé también una demanda intensa que irá acrecentando conforme las tecnologías gráficas vayan siendo asumidas como lo han sido en años pasados los ordenadores personales, en las estructuras de gestión de oficinas. Pensamos en Arquitectos e Ingenieros, Entidades Financieras, Agentes de la Propiedad Inmobiliaria e Inversores, etc.





**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
**MULTIFUNCIONAL**

— SICRUM —

EL SISTEMA DE INFORMACION GEOGRAFICA CATASTRAL (SIGCA)  
LAS BASES DE DATOS CARTOGRAFICAS CADASTRALES (BCC)

MIGUEL MARTIN PERALO

ESPAÑA

LISBOA., FUNCHAL-20 a 25 Novembro de 1989

EL SISTEMA DE INFORMACION GEOGRAFICA CATASTRAL (SIGCA)  
LAS BASES DE DATOS CARTOGRAFICAS CATASTRALES (BCC)

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Cartografía Informatizada  
Centro de Gestión Catastral  
y Cooperación Tributaria

EL SISTEMA DE INFORMACION GEOGRAFICA CATASTRAL (SIGCA)  
LAS BASES DE DATOS CARTOGRAFICAS CATASTRALES (BCC)

- Descripción del SIGCA.
  - Diseño de las BCC.
  - Capturá de la información.
  - Proceso de carga de las BCC
  - Explotación y aplicaciones.
- 

DESCRIPCION DEL PROYECTO:

El Centro de Gestión Catastral y Cooperación Tributaria (CGCCT) ha diseñado el Sistema de Información Geográfica Catastral (SIGCA), dotándolo de un conjunto de instrumentos y métodos capaces de cargar y gestionar las Bases Cartográficas Catastrales (BCC) nacionales.

Estas se distribuyen en sus 65 Gerencias Territoriales conformando un Sistema de Información distribuido con métodos y fines homogéneos.

El SIGCA alimenta las BCC con la información cartográfica de las modalidades catastrales urbana y rústica.

Cada una de estas modalidades es contemplada con escalas y forma de captura diferentes.

La cartografía catastral urbana abarca todas los cascos de población urbana sobre un total de 1.200.000 hectáreas y se cubre con hojas cartográficas obtenidas por restitución fotogramétrica a escalas 1:1000 o 1:500.

La modalidad rústica cubre la totalidad del ámbito territorial sobre el que tiene jurisdicción este Organismo a excepción del suelo urbano. Actúa sobre un total aproximado de 45.000.000 hectáreas mediante ortofotomapas y sus escalas de representación son normalmente 1:5000 o 1:2000.



El SIGCA prevé la asociación de sus BCC con los atributos almacenados en sus bases de datos relacionales de propósito general, residentes en los equipos informáticos que actualmente gestionan la información catastral española.

#### DISEÑO DE LAS BASES CARTOGRAFICAS CATASTRALES (BCC).

En función de la gestión a realizar contra las BCC, se han definido los diferentes objetos cartográficos y la información que ha de conformar la ESTRUCTURA DE INFORMACIÓN de las BCC.

La citada estructura necesita de medios para ser soportada fuera de las BCC en sus procesos de entrada/salida. Dichos medios son tablas que describen la geometría, relaciones y características de los objetos cartográficos contemplados en la estructura y que forma el FORMATO DE LA ESTRUCTURA DE DATOS DE LAS BCC.

Dicho formato contempla 5 diferentes ficheros para dar cabida a cada uno de los diferentes objetos cartográficos que prevén las BCC y los complementos y relaciones que entre ellos se establecen.

Los tres primeros ficheros son los fundamentales para el SIGCA. Contienen todos los aspectos geométricos, topológicos, identificadores y de relaciones de cada uno de los objetos cartográficos a recoger. Son:

FICHERO DE ENTIDADES PUNTUALES  
FICHERO DE TRAMOS  
FICHERO DE ENTIDADES SUPERFICIALES

Los otros dos ficheros complementan el concepto cartográfico con información añadida de atributos excepcionales y rotulación. Son los siguientes:

FICHERO DE ATRIBUTOS  
FICHERO DE TEXTOS

Los mencionados ficheros tienen como características: organización secuencial, formato fijo, longitud de registro de 80 posiciones y escritura en código ASCII.

Dichos ficheros constan de un primer registro de identificación. En los siguientes se describen la geometría y relaciones espaciales de los diferentes objetos cartográficos.

La información se divide en las unidades de captura que componen cada uno de los módulos de representación cartográfica: hojas cartográficas en urbana y ortofotomapas en rústica.

La estructura de las BCC está especialmente orientada para facilitar la consulta interactiva de las mismas. Con este fin la información recogida habrá de llegar registrada de acuerdo a la traba de CODIFICACION DE LA INFORMACION GEOGRAFICA.

Tal codificación está formada por 3 grupos de dos posiciones cada uno estableciendo una clasificación de niveles jerarquizados que pretende facilitar la consulta o análisis de elementos individualizados o de conjuntos de objetos cartográficos.

Las consultas y procesos de información se pueden dirigir a un nivel determinado, eligiendo un aspecto clasificado o un colectivo homogéneo, comprendido frecuentemente en un intervalo continuo de códigos.

La codificación, pues, se estructura en 3 niveles jerarquizados que son:

TEMA(TT).-Capítulos independientes de información geográfica.

Los nueve primeros temas se destinan a clasificar la información geográfica con propósito general.

El tema 10 se dedica a información geográfica y topográfica.

Los temas 11 al 20 son de información específicamente catastral.

GRUPO(GG).-Capítulo homogéneo en los que se estructura un tema.

SUBGRUPO(SS).-Diferencia características comunes de información dentro de un grupo.

#### CAPTURA DE INFORMACION.

Como se citó anteriormente, el SIGCA alimenta las BCC con la información cartográfica de las modalidades

catastrales rústica y urbana y para ello contempla diversas opciones en el origen de la información a recoger.

En cualquiera de los casos, la numerización se nutrirá de los documentos cartográficos existentes o generados en el futuro, fruto de los trabajos de revisiones catastrales urbanas y rústicas como métodos para inventariar y actualizar la información.

Los medios de captura utilizados para numerizar la información catastral a recoger se divide en:

-En la modalidad rústica, se realizará digitalizando los ortofotomapas empleados en la tarea de renovación.

-En la modalidad urbana se obtendrá fundamentalmente digitalizando las hojas existentes. También en los procesos de generación cartográfica por procedimientos de restitución fotogramétrica numérica.

-Por otra parte el SIGCA contempla aquellos casos de transformación a la estructura de datos de las BCC, de aquellas numerizaciones existentes ejecutadas previamente a la definición del proyecto.

Las BCC se disponen orgánicamente dentro del SIGCA atendiendo a una serie de propiedades y características de la información que en ellas se almacenan. Estas son:

-La Unidad de Proceso es siempre el término municipal, y como tal constituyen los elementos individualizados de tratamiento y almacenamiento.

-Toda la información se referencia al documento cartográfico original (hoja cartográfica/ortofotomapa para los procesos de captura y edición, independientemente de los conceptos superficiales que contenga.

-Las BCC imponen continuidad territorial en todos sus aspectos cartográficos para conseguir una base cartográfica única a fin de permitir análisis espaciales globales. Por ello el SIGCA dispone condiciones rígidas en la captura de datos para lograr unicidad en las delimitaciones de entidades superficiales de las diferentes unidades de proceso.

Así contempla los casos de coordinación de trabajos de numerización entre áreas de urbana y rústica, y entre los diferentes trabajos que componen la totalidad del territorio rústico.

-Cada tramo deberá tener una única descripción geométrica, aún cuando pertenezca a más de un objeto cartográfico. (por ejemplo a 2 superficies adyacentes, o a una superficie y a una entidad lineal). Se diferencian únicamente por los diferentes códigos de los objetos a que pertenecen.

-Las superficies se definen por un punto interno (Centroide). Los contornos que las delimitan se componen implícitamente por la codificación de los tramos componentes.

-Los tramos que pertenecen a una determinada Entidad Lineal, describen e identifican a esta.

-Los ejes de calle se numerizan formando una malla con todos los de un casco urbano para así facilitar la consulta y análisis lineal de aspectos viales, o de superficies adyacentes a las calles referenciadas sobre tales ejes.

En función de las características propias de la información y de la explotación que con ella se efectúa, el SIGCA establece una serie de condiciones que garantizará la correcta organización y estructuración de los datos provenientes del Formato de entrada y almacenados en las BCC. Estos condicionantes son:

.En el caso de tramos sin intersecciones intermedias, solo se admiten los nodos inicial y final de los mismos.

.Deberá existir continuidad analítica en todas las entidades cartográficas lineales y en los contornos de entidades superficiales. Estos contornos habrán de cerrarse íntegramente.

Por tanto no se aceptará información numerizada en que alguno de los tramos rebase o no alcance a otros con los que debe mantener intersección.

.Todas estas intersecciones lineales dan lugar a nodos y como tales siempre han de inicializar o finalizar los tramos que pertenecen a cualquier entidad lineal o superficial.

.La intersección de cualquier entidad con los límites de una Unidad de Captura generará los nodos pertenecientes a ambos.

.De igual forma la intersección de una entidad superficial con los bordes de unidades de captura a los que rebasa generará tantas entidades superficiales diferentes como en unidades de captura estén contenidas dichas entidades.

Con estas condiciones se trata de garantizar una total consistencia geométrica para conseguir dentro de las BCC información de sus objetos cartográficos topológicamente correctas.

#### ORGANIZACION DEL PROCESO DE CARGA.

Es de gran importancia la recepción de la información capturada en los procesos de numerización previos al proceso de carga en las BCC.

Tal información ha de ser congruente con la estructura de información diseñada, con el formato informático de los datos y con las características y condicionantes exigidos para que el almacenamiento en las BCC sea lo más rápido y eficaz posible.

Por ello el CGCCT ha diseñado una metodología informática concreta en el proceso de recepción de la información, como preámbulo valiosísimo a la incorporación en las BCC. Dicha metodología consta de las siguientes fases:

- \* Control visual para evaluar la calidad de la numerización de los elementos geométricos.
- \* Validación del formato de la estructura de datos, controlando valores -y sus ámbitos-, campos y registros informáticos.
- \* Control de la codificación, consistencia geométrica y topología de la información, en función de los condicionantes mencionados. Cuantificación del número de errores de la fase de numerización.
- \* Depuración de errores.
- \* Incorporación de la información a las Bases Cartográficas Catastrales respetando la distribución y estructuración del diseño.
- \* Asociación de la información gráfica y alfanumérica en procesos de cruce de las claves elegidas.

## EXPLOTACION Y APLICACIONES.

El SIGCA ha previsto una serie de utilidades dispuestas para la explotación integrada de sus BCC y alfanuméricas.

Estas se dividen en 4 grupos:

### 1) Consulta/gestión.

Las consultas contemplan respuestas gráficas a interrogantes sobre atributos, y respuestas literales o en forma de informes a interrogantes punteados en la pantalla gráfica.

### 2) Trazados.

Sobre plotter o hardcopy, seleccionados con parámetros variables sobre escala, límites, temas o niveles de información y simbología de representación.

### 3) Análisis.

Toda una serie de análisis territoriales con aspectos estadísticos, demográficos, sociales, etc.

### 4) Mantenimiento/actualización.

El CGCCT, consciente de la vital importancia que significa el mantenimiento de la información que guarda en sus BCC, ha dispuesto en el SIGCA una metodología para la actualización cartográfica a través de:

- Canales de información de las variaciones producidas.
- Métodos topográficos o fotogramétricos de actualizaciones numéricas.
- Incorporación de esa información en las BCC.

Igualmente tiene previstos canales de intercambio de información con diferentes organismos -que como él- comparten la preocupación por obtener un eficaz sistema de información geográfica sobre el territorio.

Así existen convenios con numerosos Ayuntamientos del estado en materia de intercambio y mantenimiento de cartografía catastral informatizada que procura la colaboración en forma de información compartida sobre bases cartográficas a grandes escalas y sobre las cuales cada organismo asociará las características cualitativas y cuantitativas propias de su gestión.





**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
**MULTIFUNCIONAL**  
**- SICRUM -**

FISCAL CADASTRE

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DINAMARCA

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## FISCAL CADASTRE

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## FISCAL CADASTRE

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The subject of this tutorial paper is the fiscal cadastre. The fiscal cadastre is the information base for taxation of properties. The fiscal cadastre should contain those types of information which best support valuation and collection. The most important types of information are land and building descriptions and sales prices and rents. The fiscal cadastre is first of all an alpha-numeric (letters and numbers) register, but it is often supported by a parcel map.

Section 1 describes how the the cadastre has assumed a dual role as fiscal cadastre as well as a legal cadastre recording ownership of properties. The different types of relations between the two cadastres are described using U.S.A. and Denmark as examples.

Section 2 deals directly with the fiscal cadastre. Different sources of information are compared, and the information contents are described. Finally the use of computers is discussed.

The role of parcel maps for valuation is a very crucial question. If maps are produced to support the legal cadastre, they should of course be used for valuation as well. If they are not produced for other purposes, then the large production costs will not always be justified by their usefulness for valuation. In rural areas they are quite needed. In urban areas, however, they are less important. Often street maps, technical maps or inexpensive photomaps combined with field inspections can fulfill more or less the same objectives. This is described in section 3.

Section 4 describes the very important coordination with other activities. An important way of improving the quality of the information in the fiscal cadastre and of reducing costs is to share the information with other activities. The increasing use of computers has very much increased the possibility of communicating information between different agencies. Two types of integrated land information systems (LIS) are described. One is "high-tech LIS" based on digital maps, and the other is the network of alpha-numeric systems used in Denmark.

The paper is primarily based on Anders Müllers more comprehensive tutorial paper about fiscal cadastre (10).

## 1. MAIN PURPOSES.

Today the two main purposes of the cadastre is taxation and registration of ownership, and we often speak about two types of cadastres:

- Fiscal cadastre
- Legal cadastre

However, the relation between the two types of cadastres and the role of cadastral mapping are very different from country to country. Fig. 1 shows two typical situations.

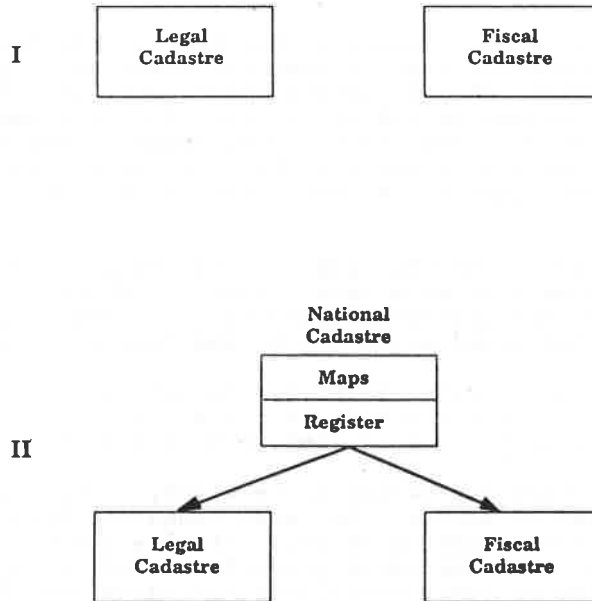


Fig. 1. Relation between legal and fiscal cadastre.

In situation I there is no relationship between the two cadastres. The legal cadastre or the land register records all transfers of land, and sometimes the parcels are defined by parcel maps included in the deeds. The entry to the legal cadastre is the names of the owners and it does not give a systematic inventory of parcels in the area. This type of land register is called "registration of deeds". The fiscal cadastre assigns parcel numbers to the parcels, compiles information, and often produces parcel maps as well. Situation I is typical for USA and to some extent also for UK.

II shows the situation in Denmark and more or less also the situation in Germany, Sweden and Norway. The national cadastre is a complete updated inventory of all parcels of land, and this serves as the basis for both the legal and fiscal cadastre. All parcels of land are identified by a parcel number and the land area is measured and recorded. In addition a parcel map of the whole country is maintained and updated. Neither ownership nor property values or taxes are recorded in the national cadastre.

The legal cadastre or land registry has the cadastral parcel number as entry. Each parcel has a page in the register where ownership, easements, and mortgages are recorded. In the deeds the transferred property is identified by the cadastral parcel number and no parcel maps or other descriptions of the property is included in the deed. Because this type of land register gives a complete and updated inventory of all parcels and owners it is called "registration of title".

In the fiscal cadastre the properties are also identified by the cadastral parcel number. Information about the land area is received from the national cadastre. Information about the build-ings are compiled by the fiscal cadastre.

The contents of a typical modern fiscal cadastre are:

- Identification
- Address
- Owner (name, address)
- Land description (area, quality etc.)
- Building description (areas, age, installations, materials, etc.)
- Type of property (residential, commercial, etc.)
- Market information (sales prices, rents)
- Estimated market value
- Tax

#### 1.1. Tax Administration.

The purpose of the fiscal cadastre is to be the information base for taxation of properties.

The administrative procedures involved in taxation of properties are:

- Discovery
- Information gathering and updating
- Valuation
- Calculation of taxes
- Collection

The different parts of the fiscal cadastre are used in different procedures. The market information (sales prices, rents) are used to determine the current market value of different types of properties. This knowledge is then used to estimate the value of each single property based on the land and building description

and the type of property. The estimated market value is used to calculate the tax, and the name and address of the owner is used for the mailing of the tax bill.

### 1.2. Differences.

The way a fiscal cadastre is designed and organized depends on a number of things. The more important ones are:

- Which taxes use the fiscal cadastre as an information base
- What is the tax base and exemptions and who is liable to pay?
- How does the valuation take place ?
- Can some of the information be supplied by other authorities?
- What is the relation to the legal register ?
- How can computers be used for the different procedures and should the fiscal cadastre itself be computerized ?
- What is the role of maps for the fiscal cadastre ?

These questions are addressed in the following sections of this paper.

## **2. THE FISCAL CADASTRE.**

The purpose of the fiscal cadastre is to be the information base for taxation of properties. Firstly, it should include all taxable properties, and secondly, it should contain information which can support valuation of the properties and collection of taxes.

The exact design of a fiscal cadastre has to be based on a balance between benefits and costs. The types of information included in the cadastre should be those, which most influence the value of the properties, and at the same time it should not be too expensive to gather and update these information. Also concerning the accuracy of the information included in the cadastre benefits and costs must be balanced.

It can only be justified to spend a rather low percentage of the tax revenue on the administrative costs including valuation, collection, and the fiscal cadastre.












Creation and running of a fiscal cadastre is very much the question of information management. How can a reasonable result be obtained at minimum costs ? The important parameters are:

- How can the information be gathered and updated ?
- How can the information be stored and retrieved ?
- Can the costs be reduced by sharing some of the information with other activities ?

### 2.1. Sources of Information.

Fig. D3 and D4 shows how the information in the fiscal cadastre






## D 3 VALUATION - Info. Base 1

	US	DK	PT
Parcel Identifier	AS	§	AS
Parcel Maps	 		—
Land Area	 		
Building Descrip.	 		







EXPL - D 3

### EXPL - D 3

#### Source of Information

- a  Tax Payers
- b   Field Survey
- c § Legal Register
- d  Cadastre
- e  Other Public Agency
- f AS Assigned by Valuation Adm.

## D 4 VALUATION - Info. Base 2

	US	DK	PT
Land Use Regul.			-
Sales Prices	§	§	-
Rents			
Tax Payer	§	§	

### EXPL - D 3

is obtained from very different sources in the 3 countries; U.S.A., Denmark and Portugal.

The cheapest and most unreliable source is information given by the tax payer in questionnaires filled out at revaluations or when registering his property in the fiscal cadastre. This is more or less the only source of information in Portugal, where furthermore no parcel maps exist in the urban areas.

The most expensive and very reliable source is if the valuation administrations themselves conduct field surveys. This method is used in U.S.A. for both land and building descriptions and for the production of parcel maps.

In Denmark all information in the fiscal cadastre (except rents.) are received from other authorities. This inexpensive arrangement producing reliable information has been obtained by extensive coordination between different authorities using and producing land information (see section 4). Parcel maps and land areas are received from the national cadastre, where they mainly are produced to support the legal register. The building descriptions was before obtained from the tax payers on questionnaires sent out at each revaluation. The questionnaires for the 1977-revaluation was, however, used to create a computerized building register which is used, updated and controlled by the municipal authority giving permissions to new constructions.

One of the reasons why so extensive coordination has been possible in Denmark is that the parcel identifier assigned by the national cadastre is used by many other authorities and also for the fiscal cadastre. In U.S.A. and in Portugal the parcel iden-

tifier is assigned by the valuation administration and not used by other authorities.

Both in U.S.A. and in Denmark the sales prices and the name and address of the new owner is received from the legal cadastre. In U.S.A. the valuation authority usually arrange to receive copies of the deeds. In Denmark the new owner must fill out a "sales report" to have the transfer registered, and this sales report is handed over to the valuation authority. In Portugal the valuation authorities do not receive any information about sales prices, and the sales prices stated in the deeds are not correct anyway (on average 60% of true sales prices). In Portugal the new owner is himself required to report his name and address to the fiscal cadastre.

## 2.2. Use of Computers.

As seen from F1 and F2 computers are used for calculating the property tax and printing the tax bill in both U.S.A., Denmark, and Portugal.

Estimation of values for residential properties is 100% computerized in Denmark and in 40% of U.S.A. It is very attractive to computerize the valuation - especially for residential properties - since the quality of the valuation can be improved and the costs can be reduced.

It is, however, a condition that land and building descriptions are computerized as well - preferably as an updated computerized fiscal cadastre - and this is by far the most expensive and time consuming part of introducing computerized valuation. If the valuation should be based on sales prices then these also have to be computerized.

A computerized fiscal cadastre is thus a computerized database used to support computerized valuation and collection. Entry of data and retrieval of information can happen on-line or as batch operation. Also portable computers or optical scanning can be used for data entry. If there is no on-line access to the database then paper print-outs or microfiche will serve as the basis for day to day operations. The programs for the database can be standard software or they can be tailor-made. If the database covers a larger area it will usually be worthwhile to have tailor-made programs which are based on standard software.

## 2.3. Information Contents.

The key to the fiscal cadastre is the identification of the properties. In Denmark these identifications are used in parallel:

- Property number.
- Cadastral parcel number(s).
- Address.



## F 1 Computerization 1

	US	DK	PT
<b>Tax Billing</b>	100	100	100
<b>Accounting - Collection</b>	100	100	100
<b>Valuation Results</b>	100	100	0
<b>Land Descriptions</b>	70	100	0
<b>Building Descriptions</b>	70	100	0

## F 2 Computerization 2

	US	DK	PT
<b>Sales Information</b>	40	100	-
<b>Estimation of values</b>			
<b>Residential</b>	40	100	0
<b>Commercial</b>	30	0	0
<b>Agricultural</b>	10	(100)	0

The cadastral parcel number is originating from the national cadastre and is also used for the legal cadastre and other activities as well. The property number is assigned by the valuation authority and also used for other activities. Some properties consist of several cadastral parcels. The property number is permanent.

In U.S.A. the valuation authorities assign a permanent property number to each property, but this is usually not used for other activities. The address is of course also recorded.

In Portugal a non permanent property number is assigned by the valuation authorities and the address is recorded.

In Denmark the owner is identified by:

- Name.
- Address.
- Civil registration number.

The civil registration number allows communication of property values to the income tax registers so that imputed rent and net wealth tax can be calculated and collected by computer. The civil registration number also allows automatic updating of address from the computerized population register.

In Portugal the fiscal number of the owner is also recorded in the fiscal cadastre, while in U.S.A. only name and address are recorded.

In Denmark the following information about the land is recorded:

- Land area.
- Part of area used for road.
- Planning area.
- Land value area.

The land area is very accurate since it originates from the national cadastre.

The planning area is used for communication with a computerized planning register containing updated information about the planning regulations. The agricultural quality of the soil is used for the valuation of farm land, but the quality coding is not recorded in the fiscal cadastre, but is expressed as a value per hectar.

In U.S.A. more information is often recorded about the land. Sometimes information about the shape of the plots are recorded, but experience from Denmark shows this to have less and less importance for the value.

In Portugal only the land area is recorded, and because that is estimated by the owner it is a rather unreliable information.

In Denmark the building descriptions are not part of the fiscal cadastre, but are contained in a separate updated computerized

building register used for several purposes. The following information is communicated to the fiscal cadastre prior to at valuation.

Building level;

- Type of building
- Number of apartments
- Year of construction
- Year of rebuilding
- Material for walls
- Material for roof
- Total floor area
- Ground floor area
- Number of floors
- Usable attic area
- Basement area
- Area of outhouses and garages
- Elevator
- Pending rebuilding

Apartment level;

- Area
- Toilet
- Bathroom
- Kitchen
- Annual rent
- Heating installations
- Fuel type

In U.S.A. more information about the buildings is usually recorded in the fiscal cadastre. Often more subjective types of information is recorded like quality of construction, design, effective age, and state of maintenance. The introduction of computerized valuation has often been combined with recording of more information, but it must be advised that only the most important types of information are recorded.

In Portugal only very little information is recorded about the buildings.

As a part of the valuation process the properties has to be classified and the class has to be recorded in the fiscal cadastre. The classification does not necessarily reflect the present use, but more the possible use which determine the value. A possible classification could be:

- Residential (one family, two family, etc.)
- Commercial (retail, wholesale, light)
- Industrial (light, heavy)
- Agricultural
- Recreational
- Public utility
- Institutional (government, religions, educational, hospital)
- Mining
- Vacant land

In Denmark the land use regulations are also recorded in a separate updated computerized register used for planning and other purposes. Prior to valuations the following information is communicated to the fiscal cadastre:

- Type of permitted land use
- Permitted building/land ratio

In U.S.A. planning regulations are recorded in the fiscal cadastre. In Portugal it is estimated that only 10% of the urban areas have planning regulations.

Concerning the sales prices the following information is recorded in the fiscal cadastre in Denmark:

- Sales price (excl. personal property etc.)
- Date of sale
- Type of sale (arms length, family, etc.)
- Mortgages

Similar information about sales prices are recorded in U.S.A., while sales prices are not recorded in Portugal.

In Denmark the following results of the valuation is recorded in the fiscal cadastre:

- Total value
- Land value
- Details about the calculation of the land value
- Owners expenses for improvements of the land (deducted for the land tax)
- Code explaining the reasons for a change of a computer estimated value.

It can be recommended to have the owners to review the contents of the fiscal cadastre. This way some mistakes get corrected, and the owners get to accept the information base for the valuation.

The number of types of information included in the fiscal cadastre should definitely be limited. Important questions are:

- How much do they contribute to the estimation of the value compared to the types of information already included ?
- Can the information be continuously updated ?

### 3. Role of Maps.

The fiscal cadastre is basically an alpha-numeric database - that is information consisting of letters and numbers. Maps only play a secondary role compared to the alpha-numeric information.

Maps are useful for valuation in the following ways:

- A. Avoid Escapes.  
Securing that all taxable properties are included in the valuation list.
- B. Accurate Land Areas.  
If the parcels are surveyed to produce parcel maps then a by-product will be accurate land areas.
- C. Define Districts.  
The map define blocks, districts or areas used to define location.
- D. Find Properties.  
Assisting in finding properties for inspection.
- E. Land Value Maps.  
If land values per square meter or hectar are recorded on the map then consistency of valuation can be checked.
- F. Record Planning Regulations.  
Planning regulations and other public regulations influencing the values can be recorded on the map.

If parcel maps are produced to support the legal cadastre - as they are in Denmark and many other countries - they should definitely be used in the valuation process.

If parcel maps are not produced for other purposes, then it should carefully be considered how important they are for valuation and what the alternatives are.

There is a difference between rural and urban areas.

In rural areas parcel maps are quite important to avoid escapes, to record quality of soil, and to find the properties. Traditional surveys are, however, very expensive, so use of photomaps which could also be used to estimate approximate land areas could be considered.

In urban areas parcel maps are less important. Escapes can usually be avoided by using a street map and field inspections. A street map can be used to find properties and to define districts. Approximate land areas can possibly be derived from photomaps, and the use of traditional surveys could be limited to the more expensive parts of town where accurate land areas are essential for equitable valuation. Photomaps could be used to check areas of buildings. Street maps or photomaps could be used to produce land value maps and for recording of planning regulations. A good address system reduces the need of parcel maps.

Computers are now used more and more to produce maps - so called digital maps. By recording geographical coordinates of parcels and buildings alpha-numeric and graphic information can be combined and many types of maps can be combined. Also land areas

and building areas can be calculated automatically. Finally updating of the maps becomes more easy.

For valuation purposes digital maps are better than hand drawn (analog) maps, but the difference is not very large. If no parcel maps, land areas, or buildings areas, exists then possibly it will be worthwhile to digitize estimated parcel boundaries and building areas on a photomap to produce approximate land areas and building areas. If parcel maps already exist then digitizing will usually not increase the benefits of the maps for valuation purposes very much.

In Denmark continuously updated parcel maps have been produced by the national cadastre for centuries. When they were created they were of course very important for the establishment of the fiscal cadastre. Now the cadastral maps only have a limited role for valuation. The alpha-numeric information from the cadastre (parcel number and land area, new parcel and changes) are very important, but the parcel maps are not used very much.

The parcel maps are now being digitized and comprehensive computerized land information systems will be created during the next decade. This development will only be of limited use for valuation, and valuation does not contribute to the large development costs.

In U.S.A. the valuation authority usually produce parcel maps themselves. It should however be remembered that the property tax revenue and the standard of accuracy of the valuation is very high in U.S.A. So this fact does not prove that parcel maps is an indispensable part of the fiscal cadastre.

In Portugal parcel maps only exists in rural areas in the Southern part of the country. In these parts the parcel maps are combined with a very accurate recording of the actual agricultural production. In the rest of the country no parcel maps exists.

#### 4. COORDINATION WITH OTHER ACTIVITIES.

A number of very different activities have one thing in common - they are all based on information about land, buildings, infrastructures, and the human activities taking place on the land. The most important activities are:

- Land registration
- Property taxation
- Urban planning
- Urban renewal and rehabilitation of dwellings
- Environmental planning and pollution control
- Administration of building permits
- Land acquisition for development
- Management of roads, utility lines (water, sewerage, electricity) and public land

Many of these activities are based on the same information, and

often information produced by one activity is useful to have for another activity. The growing application of computers has very much increased the possibility of transferring information from one activity to another or of creating multipurpose databases serving several activities. The main motive for multiple application of information is to reduce the overall costs of data collection and updating. An additional motive is that the information often become more accurate if applied for multiple purposes.

This development has given rise to a new subject which in essence is to take a broad view on information management concerning all the activities. This new subject is called land information management or urban data management.

A very elegant way of coordinating the information management for a number of activities is to record geographical coordinates and combine many types of digital maps. This way a selection of the maps can be displayed as "overlays", see fig. 3, and alpha-numeric information can be displayed as well. It could be one system serving several activities or it could be a network of subsystems which are linked together on demand.

This concept is called a land information system (LIS) or a multipurpose cadastre. To distinguish this concept from manual systems or computer systems only processing alpha-numeric information I will however call it a "high-tech LIS".

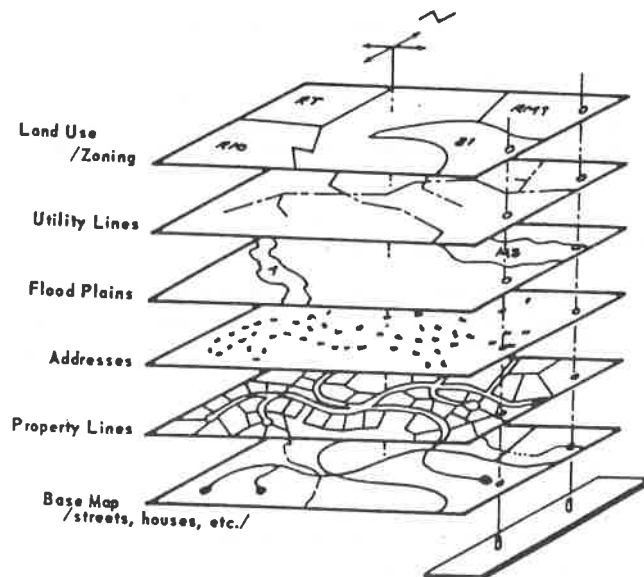


Fig. 3. High-tech LIS.

Some of the richer industrialized countries have started to establish LIS based on digital maps and recording of geographic coordinates. Countries like Australia, New Zealand, Canada, Sweden and Denmark have started to establish national systems.

Even though computerization of maps have become much less expensive than before the process of establishing high-tech LIS is still extremely expensive and time consuming. Implementation lasts 10 - 20 years and only parts of any countries have been covered so far.

It is worth noting that it is still more expensive to digitize a map system than to continue the manual system. The expected benefits from digitizing of maps arise from the increased possibility of multiple use of the maps and the digital information.

An important reason to establish a national high-tech LIS is to coordinate the development of digital maps in a number of different agencies which are just about to start an uncoordinated development of digital maps.

In Denmark the development of land information management has been very different from the idea of the high-tech LIS. Computerization of the fiscal cadastre has been the basis of the creation of a network of alpha-numeric databases which can be combined according to need, and which probably constitutes the most comprehensive national land information system in the world.

Table 4 shows the present situation. The Danish approach so far can be described as:

- A network of national subsystems have been established. It has never been attempted to establish one system serving all purposes.
- By using several identifiers in each register cross-references exists for all combination of registers.
- Each register is integrated in the daily administration of the responsible authority thus ensuring high data quality and continuous updating.
- Each register is used for multiple purposes by multiple authorities.
- The computerization has taken place step by step over a period of 25 years and each step has been profitable in its own rights.
- Many activities have been decentralized to the municipalities.
- Uniformity and possibilities for aggregation to regional and national level have been secured by coordination and the existence of two computer companies serving the local authorities and central government.
- Registers related to taxation of properties have been the basis of computerization and integration.
- Overall coordination has been secured by a standing coordination committee for land information.



National System	Status	Identifiers					
		Parcel number	Property number	Address code	Person number	Enterprise number	Planning area
Cadastrre: - Maps	Manual	R					
- Register	Computerized	R	X				
Land Registry	Manual	X					
Valuation Register	Computerized	X	R	X	X	X	X
Sales Register	Computerized		X	X			
Building Register	Computerized		X	R			
Planning Register	Computerized						R
Population Register	Computerized			X	R		
Income Tax Register	Computerized		X		X	R	
Enterprise Register	Computerized						X

R: Responsible for assigning identification

X: Part of the multi-identification

Before 1988 geographical coordinates and digital maps were not applied for the national LIS. The process of digitizing the parcel maps have started now and will be completed after 10 years. The main motive has been to avoid an uncoordinated development of digital maps by the municipalities, the utility companies and the central governments mapping agencies. Computerization of the alpha-numeric land register has also started and will also be completed around the year 2000.

An important basis for the Danish network of LIS is the reform of the postal addresses carried out in 1970 as a part of a reform of local authorities.

Within each municipality all streets and roads were named (different names) and signs were put up on roads previously unmarked. All houses were assigned street numbers and signs were put on all houses. A uniform system of addressing apartments were established. Within each municipality the streets was numbered to make the addresses suitable for easy access in the computer registers.

The unique addresses is a geographical reference which constitute an inexpensive alternative to the geographical coordinates. For example the address is used as cross reference for combining the building register and the population register to produce a population and housing census - without sending questionnaires to the citizens. Other important applications of the network of LIS are:

- Property taxation
- Administration of building permits
- Urban planning
- Urban renewal
- Energy planning
- Civil defense
- Management of subsidies to housing and agriculture
- Management of public owned properties.

In U.S.A. development of LIS takes place on the local level. The high-tech LIS approach is usually applied, and many problems has so far been encountered.

In Portugal very little exists at the moment. To enable computerized valuation for urban properties it will, however, be necessary to establish a computerized alpha-numeric fiscal cadastre in the urban areas. This database could probably also serve other activities and then constitute an urban multipurpose cadastre. The alpha-numeric database should probably be supplemented by multipurpose technical maps based on inexpensive areal photography. Recently prof. Arnaud has suggested a step by step geocoding strategy based on the postal address (9).

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**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
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— SICRUM —

"TOWARDS A STRATEGY FOR A NATIONAL GEOGRAPHIC SYSTEM"

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## TOWARDS A STRATEGY FOR A NATIONAL GEOGRAPHIC INFORMATION SYSTEM

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### ABSTRACT

*The paper will describe an evolving strategy for geographic information on a national level in Norway. This strategy consists of several parts, of which the most important are 1) the establishment of a national centre for storing and distributing geographic information, 2) a new level of standardization, 3) several regional centres to promote the use of this information by pilot projects and education, and 4) a plan for the digitization of prioritized information. There is for the time being, a great interest for a strategy in this field at the governmental level. Such a strategy of course have industrial aspects and must cover activities at different authority levels.*

### RÉSUMÉ

*Ce rapport présente une stratégie nationale d'information géographique. Cette stratégie consiste des parties suivant :*

- 1) l'établissement d'un centre nationale*
- 2) spécification d'une base des données commune*
- 3) l'établissement d'un nombre des centres regionaux*
- 4) un plan national de convertissement d'information analogue*

*Présentement, il y a un très grand intérêt pour cette initiative.*

### 1. INTRODUCTION

For a long time in Norway the notion GIS was viewed as an academic discipline mostly concerned with the analysis of spatial information. The main interest was in map production and systems related to the automation of the map making process. In the last couple of years we have seen a tremendous change in the approach to digital geographic information. Now nearly every public office or private company dealing with this kind of information has the intention of implementing some sort of GIS system within the near future. Even at the ministerial level geographic information systems has raised interest, both as a mean of making public services better and more effective, and as a field where norwegian industry and consulting companies can be in the front of development.

As Norway is a small country with limited resources of skilled people in the field, the necessity of strong cooperation between organizations in different parts of the country and at different levels, is broadly recognized. What we see, are efforts aiming at a unified strategy

for the implementation of GIS in a very broad sense. I shall try to describe some of these activities in this paper. It is too early to say if these efforts will succeed as we have just started the development, but within the next 2-3 years I think we will have an established pattern to build upon.

## 2. A NATIONAL GIS

Let us first define the settings. By a strategy for a *national geographic information system* I will mean a way of reaching a required infrastructure for the use of a common base of spatial information. That is I want to include the establishment, maintenance and distribution of basic information, applications required for dealing with this information, and industry and services that promote the use of spatial information, including education, R&D, consultants, hardware and software vendors. Some of these several aspects are shown in fig. 1.

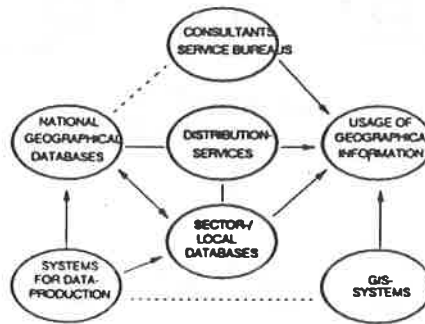


Fig. 1 - Aspects of national GIS

The development of successful implementation of geographic information systems, rely upon many factors, such as

- experienced and competent users
- availability of qualified digital information
- appropriate software and hardware tools

Although this is in no way an exhaustive list, I think the parts mentioned constitute key factors. It is for instance too early to describe organizational changes, or changes of responsibility between different authority levels. It is evident that the introduction of national databases could lead to such changes.

The norwegian strategy consists of four main parts

- establishment of a national information centre
- defining a higher level of coordination - a CommonGIS
- establishment of local and regional centres

- a plan for conversion of information to digital form

In the following we will describe these activities, emphasizing the two first ones.

### 3. THE NATIONAL GEOGRAPHIC INFORMATION CENTRE

The Norwegian Mapping Authority (Statens kartverk) has initiated a project to establish a national centre for storing and distributing geographic information within 1990.

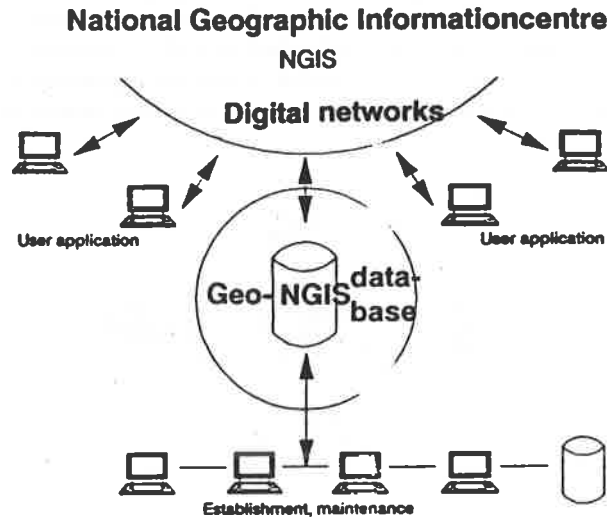


Fig. 2 - .NGIS overview

The concept of a national centre was developed during a pre-study undertaken by the Mapping Authority the late in 1987. We realized that most of our main customers within few years would be using digital methods to accomplish their tasks. E.g. the telecommunication authorities of Norway have decided to equip every of their district offices with solutions from SysScan in a timeframe of three years. Many municipalities are considering to move into digital geographic information - several of them are involved in pilot installations. There are figures showing that more than 50% of the issues in public services at the local level, involves geographic information in some sense. It has been said by independent dp consultants that GIS in the future we be a key to the complete data processing solutions in local government. Vendors are of course foreseeing the opening of a large marketplace for both software and hardware solutions.

We needed a new strategy to be able to meet this development. Up to now we, as most other national agencies, have converted information to digital form map by map. The background of the digitization has often been special projects, e.g. that of establishing a digital terrain model for the DLMS project (Digital Land Mass System - a defence project). This has lead to the use of different systems, and information is stored in several formats. The long-term storage media is magnetic tapes. It was obvious that this situation had to be changed - the

cost of accessing the information for other purposes than the original was too high. Most times a key-person with thorough knowledge of the data has to write an 'ad-hoc' program to extract the wanted information and to reformat it to customer requirements.

In the future the digital information will be a product by itself, not just a digital version of an analogous printed map. And it will even be the most important product we have. But this will only be the case if we can provide a *geographic information system* - that is, structured information that is classified and characterized in several ways and closely connected to attribute data. The structure must be topological, networked, hierarchical or whatever that applies. E.g. there should be relations between the representation of a building digitized from a point in the 1:50 000 map series, and the same digitized as a polygon in the 1:5 000 series and as a record of alphanumeric information in the B-part of our GAB-system (real estates, addresses, buildings).

### 3. 1. The contents of the databases

The centre will store and distribute both alphanumeric and graphic (raster+vector) information in a variety of resolutions (e.g. map scales from 1:5 000 to 1:10 000 000).

The main contents will be.:

- GAB - a new version of our information system for real estates, addresses and buildings (there are approx. 2.4 mill. G- identities, 1.5 mill. A-id's and 0.3 mill. B-id's - buildings from 1983 to now only)
- information based on the economic map series - a series mainly in the scale 1:5 000 of topographic, some land use and real estate information, the information will be provided in both raster and vector formats (there are approx. 30 000 maps in this series)
- information based on the topographic maps in scale 1:50 000 (M711) (727 maps)
- information based on sea maps (approx. 300-400 maps)
- bathymetric information
- digital terrain model based on DLMS-data
- index of names of places (approx. 1 mill. names from M711, additional 3 mill. if we include names from economic maps)
- trig. points - 1. and lower order
- boundary of the nation, counties, municipalities, statistical zones
- small scale base maps (1:1 mill. and less)
- index of data series and literature for environmental data

All information will be stored in a series of homogeneous relational databases. The databases can be viewed individually or together. The storage will be independent of map sheets or other more or less random divisions of the country. The underlying coordinate system will be geographical coordinates, enabling a seamless database covering the whole country. Of course, once a customer order an extract of the information, any relevant coordinate system and projection can be specified. This transformation will be done on the



way to the final product, which is a sequential dataset formatted in our national standard format - SOSI.

The amount of information will gradually increase from about 20 Gb to between 100 and 200 Gb.

### 3. 2. Distribution

Information will be distributed through public and proprietary networks.

We have already a large base of customers connected to *kommunedatasentralene*, a set of 7 regional data centres owned by the municipalities. This network called *KD-nett*, is based on IBM's SNA. It is therefore a necessity to support this kind of communication. Otherwise, also other 'de facto' communications standards will be supported. We expect that a large number of users will have Unix-based workstations - this leads to the support of TCP/IP for instance.

As described below, most transactions related with the system will be extractions of a considerable amount of data from the databases. Today there are obvious limitations to the public telecommunication network in this area. It takes about 30 minutes to transfer 1 megabyte of information based on the use of 9600 bit/s lines which are the most common. This is not satisfactory for a large scale service. But within a couple of years we will have as a regular service the possibility of new ISDN-services (Integrated Services Digital Network) providing 64 kilobits/s and thus reducing the transfer time to 5 minutes in the example above.

While waiting for ISDN, and even broad band communications (2 Mbits/s and higher), we also will support off-line production and distribution of physical media like magnetic tapes, diskettes or optical media.

### 3. 3. The NGIS application solution

It is very important to understand our concept as it differ from the usual approach to GIS. As a national provider of basic, general purpose information we put the emphasis on the storage and distribution of this kind of data. Accordingly, there will be few *user* applications associated with the national centre. The idea is to transfer selected basic information to the user who connects it to information stored locally, and use the appropriate tools for analyses, presentations or whatever the task is. These user applications will run on the users own equipment.

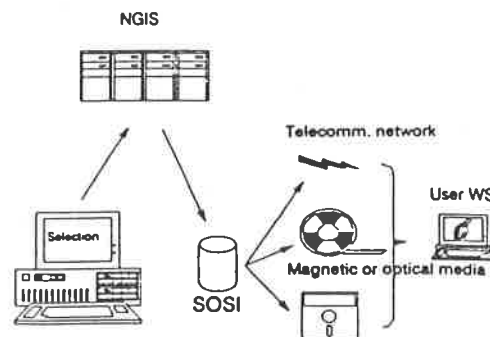


Fig. 3 - How to use NGIS

The NGIS application software will have to contain the following elements :

- a database system for handling geographic information based upon relational database management systems (RDBMS) and a datamodel for this kind of information
- a query module for selecting and extracting data based on several user defined criteria, such as geographic area, resolution/quality of data, thematic layers, and so forth
- a transaction oriented module for updating alphanumeric, or attribute, data (e.g. GAB) - based on 4. generation language tools
- a user-oriented shell, or user interface, above the other modules - perhaps based on techniques related to AI- systems, enabling an easy and flexible user interface with a very low threshold for accessing information

We emphasize the importance of standards. E.g. will SQL be the bottom level interface to the RDBMS and the user interface will be based on windowing techniques like Presentation Manager and/or X-Windows.

Although we will have to provide a central NGIS-application in order to serve all the unintelligent terminals among users, we also initiate the development of workstation-based solution, i.e. solutions where the application runs in the user workstation (OS/2 or Unix-based) and only database-calls is sent to the NGIS- centre. This opens for much more sophisticated user interfaces, and also enables the integration of NGIS information into local applications. Key words here are distributed databases and program-to-program access.

Necessarily these solutions will be developed over a fairly long period, say 3 years, but it is possible to start immediately with a lower ambition.

### 3. 4. Project plans and time-scale

We have decided to establish the centre through three phases :

- Phase 1 - initial period with off-the-shelf software
- Phase 2 - specification of a CommonGIS
- Phase 3 - implementation of specifications - new software

The centre will open this autumn. The two first phases will take place simultaneously - enabling the start of phase 3 late in 1990.

### 4. STANDARDS - SPECIFICATIONS OF A COMMON GIS

Above, we have mentioned the phase-divided approach taken. Here we will describe the activities in phase 2, which are rather interesting as they establish national standards far beyond the exchange format level.

The Norwegian government has established a national program for Information Technology (IT) and a committee (NUIT) to advise the Ministry of Industry in these matters. This committee has pointed out GIS, in a broad sense, as a main field of interest. The overall aims of the program is to develop norwegian IT-industry and to make public services more efficient.

In response to this interest, the Mapping Authority decided not to develop a software solution for NGIS alone, but to develop specification for a common solution covering both national, regional, local and in-house requirements. We have invited a large number of vendors and user organisations to participate in the work. The specifications will be worked out by a group of approximately 15 persons from vendors and consulting companies. They will have to finance their own participation, and will in return have the right to implement the specification and make a product out of it. User organisations will contribute through a reference group.

In phase 3 the Mapping Authority will grant two R&D-contracts to vendors for specific implementation of the specifications, thus giving them a software product that enhance their existing solutions.

By doing this we will achieve three things :

- The Norwegian Mapping Authority will have a new solution
- we will provide new products for norwegian IT-industry
- standardization of solutions for different authority levels

The specifications will consist of four parts :

- a data model for common geographic information
- a database support language
- a user interface for selection and presentation of database content
- a specification of export and import formats - interface formats

There is no doubt that provided this approach is successful, we will have a 'de facto' national standard for storing basic geographic information. It will be nearly impossible for vendors that cannot offer a CGIS-implementation to gain a marketshare, at least in the public market. The benefits are, of course, that the structure of this kind of information will be the same - making an information flow between organizations and different authorities tremendously easier.

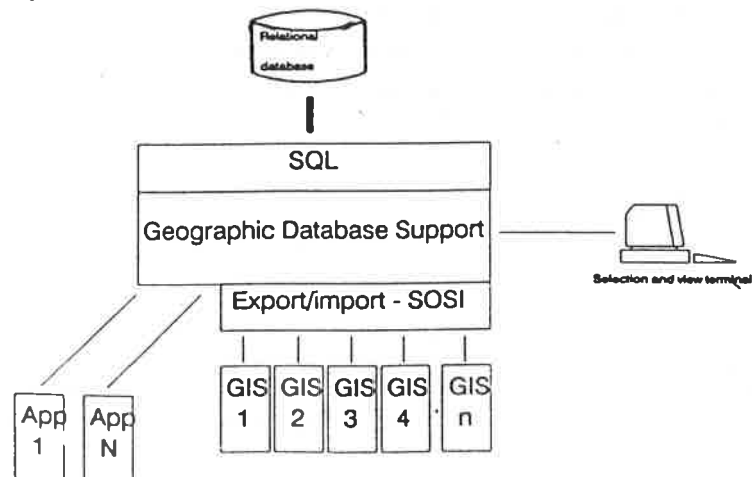


Fig. 4 - Elements of a common GIS

#### 4. 1. A data model for common geographic information

We will develop specifications for a data model for general geographic information. By general we mean information that is common to a large number of users. There must also be mechanisms for connecting to more specific information.

The data model must be able to store both vector and raster data, alphanumeric data, line drawings and images (monochrome and colour). Every object in the database should carry information about quality and date of origin.

The data model must support a 3D-model of the world - and not just a 2D-model of a map as many of todays systems do.

The model must of course be independent of specific database products - the only requirement is that it should be a straightforward way of implementing it by SQL-language in any comprehensive relational database system.

#### 4. 2. A database support language

The purpose of the database support language - or, more correct, geographic database support language - is to provide a higher level interface to the handling of geographic objects than SQL can do.

Consideration should be taken to be able to implement this language under both a host architecture and a server architecture - the latter in order to support distributed applications.

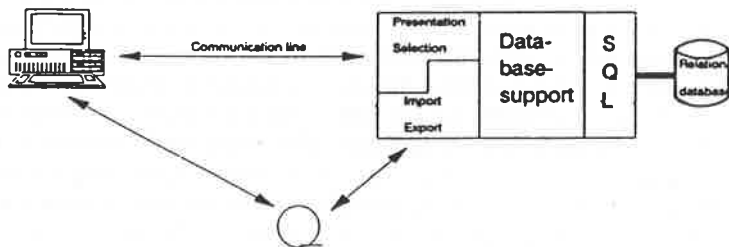


Fig. 5 - Host architecture

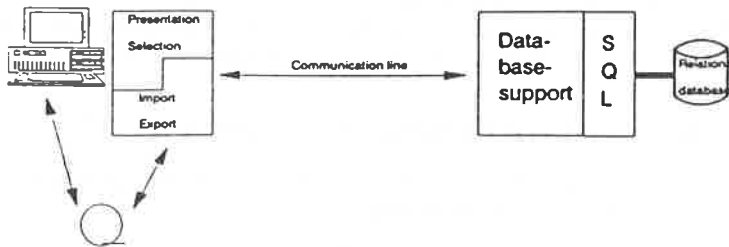


Fig. 6 - Server architecture

### **4.3. A user interface for selection and presentation of database content**

The purpose of specifying a user interface is to assure that every implementation have the same 'look and feel'. This is important in order to obtain the coordination effects we aim at.

It will be specified how you make selections based on different criteria, like geographic area, thematic layer, attribute information etc. At any time it is possible to have a presentation of your current selections - depending on the capabilities of your workstation or terminal. I.e. both simple 'unintelligent' terminals and graphic workstations (vector, raster or vector + raster) will be supported.

As mentioned above, the user interface should follow common trends, enabling e.g. windowing technics. In our invitation we have mentioned X/Windows, OSF (i.e. Motif), Presentation Manager, SAA etc.

### **4.4. A specification of export and import formats - interface formats**

The specifications only describes a common architecture for storing and retrieving geographic information. They do not describe any end-user functions or applications. Export and import formats are the interface between this common database and specific applications as shown in fig. 4. In order to provide all information without loss between the common database and the applications, these formats have to be flexible and powerful. It will be useful to have a set of such formats, especially if the specification shall be of international interest. In Norway we will give our domestic format - SOSI - special attention.

### **4.5. SOSI - A national information interface specification**

As so many other countries, Norway has developed a national format for spatial data. Most people look at this as a standard interchange format, but this is only one purpose, although important. Another way of using the format, is to use it as a *modelling* tool, i.e. as a DBMS-independent tool for modelling the representation of various kinds of geographic information. In the case of NGIS, we are combining these aspects in using SOSI as the primary interface to the national level databases. This means that in order to be able to use NGIS-data, your application system should be able to import SOSI- formatted data. In this way every vendor is at the same starting point, no vendor-dependent system is favoured. This also make SOSI a strategic product for the Mapping Authority- it is the main tool to assure coordination between producers of geographic information.

We are in the lucky position that it seems as SOSI has gained widespread acceptance and there is nobody at the moment questioning the usefulness and importance of SOSI. When, or if, an international standard is developed, and accepted, we will of course consider replacing SOSI.

## **5. REGIONAL CENTRES FOR GEOGRAPHIC INFORMATION**

There will not be a widespread use of GIS unless there are competent people convinced of the benefits to their service or business goals.

To promote user competence, it is necessary to educate both young people and a large number of people who are now using traditional, analog methods.

Unfortunately, there are very few adequate educational offers in the field, even at the university level. And with the current tight public spending, it is little hope that this will change dramatically in the near future. We have to look at other ways of solving the problem.

One way to do this is to establish a system of local or regional centres equipped with end user solutions and the ability to accomplish pilot projects and training of people. These centres could also be a kind of service centres and laboratories dealing with digital geographic information. We have for some months built up such a laboratory within the Mapping Authority, and think it is time to enlarge this experiment. A number of vendors are willing to contribute with hardware and software at reasonable terms (or free).

But there are also other models for such centres. Perhaps the most successful at the moment, is the one called *Geodatasenteret* in Arendal, a small city in the southern part of Norway. This centre is built around equipment and application software and with no regular employees. It is owned by private and public institutions at both local and regional level. The Mapping Authority is also supporting the centre with a minority share. The concept is based on establishing projects with participation from one or several of the owners. They use the equipment in the centre and pay a corresponding part of the operational expenses of the centre. Nothing is purchased for the centre unless there is a guarantee from one or more of the participants that they will cover a certain percentage of the total expenses over a three years period.

This is just one example. We see a lot of similar centres 'popping' up around the country. It is unlikely that all are based on realistic business figures, but it demonstrates belief in the importance of GIS. The Mapping Authority wish to cooperate with and, to a certain extent, support serious attempts to establish this kind of activity - both from the view of our national responsibility in the field, but of course also because it promotes the use of our digital information.

## 6. CONVERSION OF INFORMATION TO DIGITAL FORM

It is quite clear that NGIS alone will demand a much more rapid conversion of information than planned today. As the business idea of NGIS is to provide a highly automated distribution of information as needed by the public and private market, there is a obvious connection between success and availability of information. Too long conversion period will decrease the economic result. This is a fact whether we speak of NGIS or any other organization, private or public : *When the decision to go digital has been taken, the faster you go, the better.*

One effect of the national IT-program may be the establishment of an investment bank for public IT-related demands. The Mapping Authority is looking into the possibilities of using such a bank for funding a heavily increased conversion rate. The main reason is of course the ability to get a more rapid pay-back of the investment.

In addition to the important issue of funding this increased rate, a lot of efforts must be devoted to developing 1) methods for converting data, and 2) new routines for capturing updating information. This represents a challenge to both the industry and the responsible authorities at different levels.

We have recently started a pre-study to explore the possibilities of state-of-the-art pattern recognition methods. The purpose is to find the most economical way to convert existing maps into digital form, and to decide what kind of development that should be undertaken to make these methods even better. As we for instance have 30 000 maps in the scale 1:5000, even small achievements could have large economic implications. The results of such a study, is of course of public interest. Many other organizations have the same problems in converting information as we have.

Based on today's knowledge we will probably use both scanning and manual digitization in the conversion process. As there is a demand for both vector and raster products, it is natural to see scanning as the first part of the conversion. The Defence Mapping Service has ordered the 1:50 000 maps (M711) in raster format for a C<sup>3</sup>I-system (Command, Control and Communication Information System). The off-shore industry has also showed interest in such a product. The Telecommunication Administration has a similar interest in raster products derived from the economic maps - they want to use it as a background, base map in their newly acquired systems. Thus it is quite likely that the first digital product covering the whole, or large parts, of the country will be in raster format.

In parallel to the scanning, it will be necessary to do vectorization and pattern recognition. It seems that the two most demanded features are real estate boundaries and the road network. Especially the real estate boundaries are difficult to establish as the existing maps suffer from inconsistency and bad maintenance.

Small scale base maps, digital terrain model (grid based), contour lines and water system (from M711) are already in digital form and can be loaded into NGIS with (relative) small effort.

## 7. INDUSTRIAL ASPECTS

We have mentioned the national program for information technology. The goal of the IT-program within geographic information is to establish

- norwegian institutions, both private and public, as front users of GIS technology
- norwegian industry and consulting companies as competitive in the international market

Many of the aspects we have discussed in this paper, contribute to the fulfillment of these goals.

There are a lot of ways of achieving an industrial development, the use of governmental R&D-contracts has been one often used method the recent years. The Mapping Authority will continue to support this as one of several tools.

The NGIS-project implies geographic database technology, user interface technology with AI- or expert system-technology, VAN aspects (Value Added Networks) and communication technology (high capacity, ISDN). All of which will be strategic factors in the competition in the future.

A program for conversion of information will contribute to further development of automated techniques, e.g. pattern recognition methods. We feel that norwegian industry is already in the front in this field, but in order to stay in that position, continuous development is necessary.

Even if we will use the national program to strengthen the position of norwegian industry, it is quite clear that also international products will find a market in Norway. It is very unwise to protect norwegian industry against free competition. But we feel that a strong national platform will be beneficial for all vendors in the field.

In order to position norwegian industry in the international market, several private and public companies joined in a common marketing group called *Norway Mapping Group*. This organization will present Norway internationally, and coordinate our marketing efforts. It seems that South-East Asia will be a main area of interest. Beside this, of course large companies like SysScan and, in the future, Norsk Data, will continue to build an internationally working organization.







**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
**MULTIFUNCIONAL**

— SICRUM —

LAND INFORMATION MANAGEMENT SYSTEMS IMPLEMENTATION ISSUES

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LISBOA, PENCHAL-20 a 25 Novembro de 1989

## Land Information Management Systems - Implementation Issues

Nigel Sheath, UK Representative, Commission 3, FIG

### Abstract

This paper reviews a number of requirements which the author considers as being issues in the successful implementation of a Land Information Management System. These issues covering such areas as information analysis, data capture, the role of graphics, standards and corporate commitment are often played down and subsequently become pitfalls that can lead to system failure.

### Introduction

The implementation of a computerised multi-purpose cadastre is a daunting project. The size of the data collection and conversion task, the variety of user demands and the rapidly changing technological issues ensure that it can never seem to be the correct time to take the first step. Once a decision in principle has been made to proceed it is all too easy to move in the direction of least resistance, to disregard the principles of quality for the sake of quantity and to be too easily seduced by the technology.

The long term success and thus future of a multi-purpose cadastre system can only be built on thorough requirements analysis, sound concepts and a quality approach to data capture. If these are adhered to then success is possible, if not then success is unlikely.

This paper attempts to expand on some of the main issues concerning the implementation of a multi-purpose cadastre.

### Data and Information Requirements

The words data and information are often used synonymously but there is nevertheless a basic difference. Data are discrete items or entities that in themselves have no real meaning. Bringing two or more data items together in a particular way can produce information and in principle, as it is the lowest level of division, if the data is incorrect the information attained from that data will also be incorrect. It also follows that to enable the correct information to be attained the correct linked data items must be in place and must be capable of being linked together in a way that provides the information required.

These two basic principles may seem obvious but it is important that they are borne in mind when designing and building any information system. The information requirements must be defined and those requirements analysed to define the data items and the data structure that will allow those information requirements to be met. It is also important to look at the requirements across the whole of the range of uses. From this a data model that meets all of these requirements can be defined and not one that is limited to one or two areas of applications.

This is a most basic description of system analysis but is given to try to stress how important it is to carry out thorough system analysis before embarking on any information system, let alone an extremely complicated and important one as a multi-purpose cadastre.

It is equally important that the data that is converted from paper to digital form or collected conforms to this model and it is essential therefore that this is defined prior to the conversion process. All too often the data conversion is left to one particular department who converts the data to a form that is suitable to the application required within that department. When other users wish to make use of this data it is found that a great deal of effort is required to re-model the data and a number of cases have occurred where it has been easier to re-convert the data instead of going through this process. Time spent at this stage will pay handsome dividends in the future.

All this being said it is also important to realise that information requirements will change over time. With a system such as a computerised multi-purpose cadastre there may in fact be an explosive growth of these requirements at the very outset of its use, whatever prior analysis is done, as users realise the enormous potential in such systems. It is necessary therefore that a flexible approach to overall system design is taken that allows the further development of application sub-systems as time and users require. Care must be taken though to separate out the actual requirements from the 'would be nice' ones.

### The Role of Graphics

The emergence of computer graphics over the last ten years has been one of the catalysts behind the growth of Land Information Systems. The initial application area of computer-aided design and draughting was rapidly exploited to provide digital mapping and map-based information systems. In the last five years systems capable of sophisticated geographic processing have been built in their own right and the market for Land and Geographic Information Systems is in rapid growth.

There is still a tendency though for the graphic qualities of such systems to heavily influence any purchase decision and as graphic power increases this continues to be so. This is a dangerous decision factor to use as good graphics does not equal good data management.

It is important that there is a secure basis for the database design from the outset and that this is separate from any graphic design. If the two are not separate then it is likely that the data will be too closely tied to the graphics to enable the full exploitation of the data in the long term. It must be realised that for a system with as diverse requirements as a multi-purpose cadastre many different types of access and presentation will be required, both graphical and textual, across a range of hardware platforms. It is in fact possible to build a Land Information Management System that has no inherent graphic capabilities but is designed to support a range of graphic or text based application systems and in many ways this is an excellent conceptual basis.

Unfortunately many users and influencers perceive graphic capabilities as essential and thus this often forms the basis of any funding decision.

#### Data Capture

Data conversion from paper to digital form or the collection of new data is by far the largest task when implementing a large Land Information Management System. It is in fact so large that it should be treated as an application in its own right i.e. data conversion systems should be purchased on their data conversion and maintenance capabilities, not on their suitability for building a Land Information Management System. Whilst it may be that the same software and hardware vendor are used for both areas it is the author's view that this need not necessarily be the case. The advent of Open Systems among many vendors and the creation of data exchange standards means that there is no need to be restricted to a single supplier but allows different systems to be purchased that best meet the requirements within a single or a number of areas.

However, as stated above, what is important is to ensure that the data is collected in a form that is suitable for onward use in a large number of application areas and not just suitable for the individual department carrying out the conversion. It is important to realise that the greatest benefits will not necessarily accrue to the department that puts in the most effort, especially at the data conversion stage, and it is essential that there is an awareness of this throughout the organisation.

Another issue that must be tackled at the data conversion stage is data quality. In an overall sense quality must be viewed as conformance to requirements, not purely as goodness or accuracy and thus to ascertain the quality one must again refer to the information and data requirements. Once these have been defined, and part of this definition should be the required quality, then these can be transformed to the conversion process itself. It is often the case that the quality of the paper-based data does not conform to the quality required for a computerised system and any mismatches must be addressed at an early stage.

### Standards

In all the above areas standards must play an important role. An essential part of all the stages covering the implementation of a multi-purpose cadastre is the definition of a whole range of standards that must be adhered to. The very nature of a multi-purpose cadastre mean that data, users, software and hardware will come from a variety of sources and if success is to be achieved them all these need to be in harmony.

Standards and procedures can be defined in a multitude of areas and many, such as system design standards and purchasing procedures, may be pre-set. There are some though that are either inherent to Land Information Systems or must be defined as part of the requirements analysis.

Two of the most important areas of standards definition are data transfer formats and data validation. If data is to be collected and input from a variety of sources it will be necessary to define a format that can handle all data requirements but be flexible enough to allow for new additions over time. Many such formats exist but one which is rapidly gaining recognition both within the United Kingdom and elsewhere is the UK National Transfer format (NFT), version 1.1, and it is recommended that this is studied.

To ensure compatibility of the data from different sources it is necessary that the data is validated for both content and accuracy against defined standards. A major part of this will cover data conversion standards and again such standards exist in a number of countries.

Another important area is the computer software and hardware standards. In the past there has been a pull from computer users for such standards but the proprietary nature of the computer industry has led to little conformance. Today though there has been added to this pull a push effect from within the industry itself and it is fundamental that available standards are studied and conformance to chosen

ones defined in any system purchase projects. These standards cover a number of areas but are brought together within the framework of Open Systems Interconnection (OSI). This embraces system environments and interfaces, human computer interactions (HCI) and language standards as well as system interworking. New graphic standards which are presently emerging are also important for a system where much of the interaction will be via graphics. This is especially so where different application systems from different suppliers may be in place and conformance to X/OPEN standards and the new area within this of "look and feel" standards should be considered.

Overall system implementation will be all the more easy if these standards are considered and defined at an early stage and if these are subsequently adhered to.

### Corporate Commitment

The issues raised above all point to the necessity of ensuring that there is commitment to the development of a Land Information Management System, especially one as diverse as a multi-purpose cadastre, from the very top of the organisation. To ensure that the most cost-effective use is gained from such a system the information requirements must be analysed from many diverse departments and the data collected similarly. If this exercise is to be a success then the terms of reference for it must be endorsed by senior management.

This commitment must continue throughout the data capture and implementation phase. To ensure this continuation it is essential that critical success factors and milestones are defined and agreed as part of the design process, that these are met and that this is reported back in an efficient manner. The trend towards cost-benefit appraisals and shorter term financial reporting make early returns and benefits essential.

This commitment must also continue down through the organisation and time spent on such projects as awareness seminars, workshops and demonstrations to all levels within the hierarchy of the organisation is well spent and is vital to a successful implementation. Unhappy users lead to failed systems.

Finally, an evitable concomitant of computerisation is the need for reorganisation (1). If reorganisation is to be effective it must be managed from the top and again if corporate commitment is lacking this is unlikely to be so.

Overall commitment throughout the organisation is necessary, but commitment from senior management is essential.

### Conclusion

There are many issues in the implementation of a multi-purpose cadastre. This paper has considered a number which the author believes are important and should be considered at an early stage of such an implementation. In no way should it be thought that this has addressed all the issues but hopefully it has supplied a few guidelines that will aid the ultimate of such a system.

1. Dale PF and McLaughlin JD, 1988, Land Information Management, Oxford University Press.







**SEMINARIO INTERNACIONAL**  
**SOBRE**  
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**MULTIFUNCIONAL**

— SICRUM —

PRIVATE SECTOR-MANAGEMENT OF LARGE CADASTRAL PROJECTS

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LISBOA, ANCHAL-20 a 25 Novembro de 1989

# Private Sector Management of Large Cadastral Projects

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## Summary

The requirement for countries to embark on a program of cadastral improvement is generally economically dictated. Increased agricultural efficiency, expanding the tax base and better ownership definition are some of the justifications for such changes in land recordation and subsequent land information bases. Technical and legal requirements take priority over rapid execution and project management is frequently not considered as critical to completion. What is frequently overlooked is that the rapid execution of these projects provides for the early completion of the end product and attainment and benefits of the economic goal.

Contracting such projects with the private sector is not commonplace, since cadastral information and land records are considered ethically the domain of national legal and fiscal agencies.

This need not be the case and by precise contract definition, the private sector can satisfy a government's requirements more rapidly. Exact management of such projects, thereby accelerates the attainment of the economic and financial goals to which such cadastral projects aspire.

This paper deals with the "fast track" management techniques that have recently been used, possibly for the first time, on a large cadastral project. Our activities have traditionally been managed by professional technical executives and staff who have had little time to keep up with advanced management studies and techniques. With space age management technologies available, in the form of relatively cheap software, the viability of such methods becomes more realistic. This opens the door for private sector participation in cadastral projects by firms that recognize management technology as significant to the technical execution. The more rapidly such projects are completed, the quicker the envisaged benefits are realized.

## Introduction

Cadastral projects generally fall into three categories. These are:

- a. Adjudication projects leading to a new system of recording rights and interests to land,
- b. Consolidation projects arising from the need to deal with the problem of multiplicity of parcels, and
- c. Tax related tenure and title projects for completion/updating of the tax base.

In classifying such projects that can be undertaken by commercial organizations, we should not include photogrammetric or other types of base mapping, that are frequently undertaken by the private sector for cadastral purposes, as strictly cadastral projects. Cadastral projects are those that totally address land parcel identification and ownership and can be legal and or fiscal in definition. This does not mean, however, that such commercial mapping projects are excluded from management techniques discussed in this paper.

In categorizing the various projects which lend themselves to private sector contracting, it is desirable to expand those definitions in order that such an international group as this, understands the terminology of this paper.

- a. Adjudication Projects. Such projects have been undertaken to change the method of recording rights and interests to land from one of a systems of deeds registration, with no correlation between the deed and the survey, to a system of land registration under a modified Torrens System. These projects demands that new laws be introduced to the National Statute Books. The compulsory, systematic adjudication through investigation of all claims to land and the production of a finite record of land parcels and all rights and interests thereto is the objective. Such records form the basis of a full legal land registry with state guaranty as to title. These projects are initially completed under a system of general boundaries, as the best and most rapid means of converting to a land registry system. The most successful, in terms of timely completion within budget, was one recently contracted with a private sector company.

- b. Consolidation Projects. These projects have been carried out for many years and have traditionally been undertaken by national agencies within the government of the territory concerned. They frequently arise from the agricultural and economic needs to improve the efficiency of farming, by land owners with scattered multiple parcels and can arise from a national agricultural policy or from local demands from within the particular community and in both cases are compulsory.
  
- c. Tax Appraisal Projects. These projects are generally undertaken in the United States as part of a regional or statewide requirement to update and solidify the local property tax assessment process. These arise out of the lack of a national or regional cadastral system. They are normally associated with a registration of deeds system and the inherently incomplete cadastral picture that results. From their need for accurate land ownership information, title insurance companies in the United States have created their own private "Land Registries". They are thus ideally suited to contracting for this type of project with local property tax assessment agencies of municipal governments.

#### **General Discussion**

All of these three types of projects lend themselves to contracting, as a means of completion. Such agencies frequently do not have the manpower levels and expanding manpower levels on a temporary basis to complete such projects is not practicable. It therefore becomes more viable for such agencies to seek funds for the contracting with the private sector of such work.

The contracting of such work with the private sector should not be undertaken lightly. In-depth investigation by the contracting agency must be undertaken, preferably by an external group. This can be achieved by the use of academic establishments and research institutes who are specialists in this field and can give an independent viewpoint. Some countries have even utilized the expertise of agencies from other countries in order to achieve these studies. This approach has not been restricted to foreign funding aid groups. The purpose of such investigation and study requires that a detailed and precise scope of work for the contractor is produced in order that projects, such as those already mentioned, which have high legal implications, do not become confused. Creating contractor/contracting agency disputes as to contract definitions and requirements. Such studies assist governments in funding independent private sector contracting as being additional to the national agencies' budgets.

Clearly, any group contracting a project wishes to achieve the best possible end product for the least amount of money. An efficient way to achieve this is by selection of a contractor through a system of best technical and management proposal for the project, rather than by a system of low bid award. In order to achieve this, bidding companies must submit a full technical proposal based on the contracting agencies' specification and scope of work for the project. Additionally, the bidding companies should be required to produce a detailed management plan for the execution of the project during the defined project period. The cost and price for a project is then finalized following the selection of the best technically qualified group. The fee for undertaking the full work scope of the contract is negotiated between contractor and contracting agency. Such negotiations must cover all financial expenditures foreseen in undertaking the contract and should not fall into the trap of one side trying to beat down the other side in arriving at the contract price. This, of course, demands that both the contractor and the contracting agency produce an initial guideline budget on which the cost negotiations are based. In this particular regard, the contractor needs to know the proposed period of invoicing and the speed at which those invoices will be paid. In these days of expensive money, this can be a critical factor during the negotiation stage and impact the contractor's overhead and profit return requirements for the project.

Cadastral projects are generally not projects that require high level, state-of-the-art, technical approaches. Certainly, there may be a requirement for a digital end product as opposed to a hardcopy, traditional map and ownership register. These are all well tried and proven established techniques, as are the processes in arriving at the final deliverables. Many cadastral projects have already been undertaken and completed using all of these methods, however, few have been undertaken where the management of the project has been an equal consideration for the execution. Cadastral projects, therefore, are not ones that require a high level of innovative technical skills, but ones that require an expertly designed management approach and plan, and, the ability to direct the execution through to a successful completion. The designing of a management plan for any project demands that a number of known constraints be taken into account. Firstly, the number of articles (parcels) that are the focus of the project is generally not known. The land area defining the project is the most frequently used as the primary progress barometer. Secondly, the fixed time for the project and the fixed not-to-exceed cost of that project must be included in the planning matrix. Thirdly, the manning levels that are to be utilized in undertaking the project similarly form

part of the constraining features pertinent to the planning of the project relative to the other two factors. Thus, in designing the management approach to the project, the designated resource levels and the land project area size, must be the primary criteria in planning and the execution of the project relative to time and budget.

There are, available in the market today, a number of management software packages that can be utilized for various types of projects and these are primarily based on Critical Path Management (CPM) techniques. Some are basic in their technology and others are extremely complexed, and the choice should be left very much to one that meets the requirements of the project and the management team. The choice of such a management program should be made and defined at the proposal stage, at which time, certain of the variables may not be totally known to the proposer. Factors such as difficulty of terrain, terrain access, density of population, time of the year that the work would be carried out, parcel density and gained efficiency of the team achieved during the working of the project are all factors that may not be fully known at the time of proposal. It is therefore recommended that if this is the case, an equal degree of difficulty for the various working sub-sections of the project area be used for the proposed Critical Path Management plan.

Such detailed input into the management plan can easily be a refinement for that plan, once the contract has been awarded and full, detailed planning introduced. The advantage of the CPM is that it can be constantly revised and adjusted in the light of new data as the project proceeds. Thus, if a particular area proves difficult due to circumstances not apparent at the time of degree of difficulty evaluation, such new factors can be included and the degree of difficulty amended, and the time to complete on the Critical Path can be adjusted for that particular area.

In addition to the use of Critical Path Planning and Scheduling, it is necessary to design, prepare and publish a Project Work Plan. A copy must be given to every professional and administrative member of staff, and similarly given to the contracting agency for review and approval. The work plan deals with all aspects of the project from the technical, administrative and management point of view. It is ideally bound in a loose leaf binder so that revisions or additions can be inserted at any time during the project period.

Each aspect of the project technical process must be addressed in the work plan to ensure that all staff members operate under the same daily work guidelines. The work plan similarly contains administrative and management sections so that all staff members can be "au fait" with the administrative running of the project. Additionally, this document contains corporate/project management standing orders, directives and policies. Everything is to be covered, from procurement of equipment and supplies, to safety, accident reporting and accountability and maintenance of vehicles and equipment.

The project work plan must be officially presented to the designated contracting agency representatives at a post contract award meeting at which time operating and procedural aspects of the contract are clarified and the operating procedures for inter-group liaison and reporting are established as an approved method of operations for the project.

During this post award meeting of the project, management and accounting procedures must be fully defined and accepted by the contracting parties. All contractual requirements must be satisfied regarding financial control and reporting utilizing these approved procedural methods.

The contracting company will often require increased manpower at the lower levels to undertake one of the types of cadastral project envisaged. Frequently, it becomes a contract requirement that the contractor train either, personnel to satisfy his own requirements under the contract, or personnel from the contracting agency. Such personnel either expand the resources of the project or enhance the client's work force activities following completion. Similarly, there are start-up activities, which need to be satisfied before the real objectives of the contract scope of work can be met. These include mobilization, procurement of equipment and supplies, publicity if the project is one involving cooperation by members of the land owning public and obtaining of on-site office facilities and logistical support. The start-up activities and training activities, therefore form an integral part of the management planning for the project and must therefore be included in the Critical Path.



### **Critical Path Management (CPM) Typical Phasing**

In designing the CPM, as an Implementation Plan, the project may, for example, be divided into the following distinct phases.

- Phase 1 - Start Up Phase
- Phase 2 - Preliminary Phase
- Phase 3 - Support Services Phase
- Phase 4 - Development of Final Phase System and Personnel Training
- Phase 5 - Project Main Scope of Work Phase
- Phase 6 - Contract Completion, Handover and Demobilization Phase

Phase 1, Start Up Phase, incorporating all those elements necessary to initiate the working aspects of the project. These include and must not be limited to mobilization of personnel, procurement of housing, procurement of office space, recruitment of assistant personnel, procurement of equipment and design of project sub-areas and sections.

Phase 2, Preliminary Phase, incorporating aspects of training locally recruited assistant staff, which may include drafting office technicians, field survey assistants, demarcation assistants and clerical assistants. Additionally, working parties from within the professional staff of the project team can be formed with the object of studying and reviewing local conditions in the light of the degree of difficulty relative to planned work processes. The first two phases are scheduled to be completed within a fixed time frame and must be accomplished on time as critical to the start of Phase 5.

Phase 3, Support Services Phase covers continuous logistical support, procurement of equipment and supplies during the operational life of the project and runs parallel with Phase 5.

Phase 4, Development of Final Phase System and Personnel Training runs parallel with Phase 5. The development of the final system, training of personnel and development of a computerized reporting system is an on-going effort to the end of project.

Phase 5, Project Main Scope of Work Phase demands the most attention in the planning. Many separate work aspects are critical in the progressive completion of the tasks comprising the project.

Phase 6, Contract Completion is self-explanatory and nonetheless needs careful programming.

No management system, no matter how sophisticated, can achieve its aims without regular, accurate progress reporting on a monthly basis. The critical activity of actual time to schedule time attainment is task achieved in relation to the total task time. Therefore areas planned to be covered compared to areas actually covered becomes the primary reporting criteria, against which progress can be measured throughout the project. Additionally, weekly reports can be submitted by each production group listing sub-activities achieved during the previous week, individually, for the project as a whole. This information is considered an approximate weekly progress evaluation for sub-activities to enable a rough week by week assessment to be made and any apparent slow progress looked at closely against schedule requirements.

A full reporting of progress must be made at the end of each month by means of a standardized form, for rapid data entry, within each section of the project. This status is measured and compared to the CPM schedule requirement. Time and budget comparisons of actual vs planned progress, using reporting blocks and their corresponding budgets, against CPM schedule can then be made. Additionally, the CPM allows accurate reporting of project progress against milestone events for the contracting agencies' monitoring of contract compliance in terms of the timed completion. The acceptance of the CPM as the project management tool by the client contracting agency is therefore imperative.

### **Conclusion**

The change from "in house" project completion by public sector to private sector contracting requires a change of philosophy. The justification for such change is the faster realization of the economic goals. The change in the philosophy of the public sector is the recognition that management techniques are as important as technical processes. Private sector production is successful because the cost effectiveness of all aspects is constantly studied. Management has always been the key to successful projects and better management is constantly being sought as the way to more efficient production. The profit motive is not necessarily the prime one that exists for commercial companies, however profit motives provide a bona fide incentive for quick, efficient project completion. Professionalism and commercialism can co-exist.

In contracting cadastral projects to the private sector, these projects ideally should be joint ventures. They can be contracted directly as joint ventures between the private and public sector. If they are not formal joint ventures, they effectively become such through contractual arrangements. The success of contracted projects, in fact, demand joint venture approaches utilizing the best aspects of each sector's philosophies. Private sector management is motivation based and successful private sector contracting requires the motivation of the client, the staff and the recipient beneficiaries through effective communication.

Effective management provides periodic measurements of achievement that motivate production, that, in turn, provides a sense of achievement for project staff. This sense of achievement provides the stimulus for timely completion.



**SEMINARIO INTERNACIONAL**  
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REAL ESTATE INFORMATION AS AN ITEM IN JOINT USE OF  
GEO-INFORMATION, THE FINNISH APPROACH

MATTI VAHALA

F I N L A N D I A

LISBOA, PENCHAL-20 a 25 Novembro de 1989

**REAL ESTATE INFORMATION AS AN ITEM  
IN JOINT USE OF GEO-INFORMATION,  
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**ABSTRACT**

Technical development has led to the computerizing of many registers. Registers including real estate data have been object of this development already from the 60's. The structure of registers for real estate data as well as the responsibility for the maintenance of these registers among many authorities are described.

Users' needs to integrate data from different registers has led into development of methods for the joint use of geo-information. The main ideas of the joint use and the needed standards are introduced in brief. Because of hundreds of decentralized registers in the joint use, a dictionary system is needed in order to find proper data for users' applications. Beside by the dictionary, the joint use is supported by standard software converting the data from different systems to standard interchange form and vice versa.

Real estate boundary mapping which started in 1980 has not yet led to a system where the spatial component is a vital part. But this system will be realized in 1992. In 1996 the whole country will be covered by a real estate information system which can be used jointly with hundreds of other geo-information systems.

## 1. Introduction

In Finland, as in other countries, too, the development of data technology has resulted in many existing registers being transferred to computers. Registers consisting of geo-information have been the objects of similar development. In the data systems, entities have been identified by the aid of identifiers based on the rule of thumb. Most systems have been designed to serve one application or administrative unit only. Positioning has been defined by map sheet number or, in the best cases, by using a reference point with coordinates. These trends have been dominating until quite recently.

The end users collect their data from several systems. As far as there is no common reference system, the integration of digital spatial data is difficult or even impossible. Because of the difficulties in the integration, redundancy of data is common. This has led to problems with updating. The problems have been severe, and in many cases adjustments have been made in order to find solutions to the integration problem.

## 2. Registration of Real Estate Information

The registration of real estate information is decentralized among many authorities. Many of the registers are being kept updated. The most important registers are as follows.

The Land Register is maintained by provincial offices of the National Land Survey (NLS). It covers rural areas with exceptions of state owned areas and some common areas. The most important data in the register are

- . identification code of the mother property
- . identification code of the register unit
- . registration date
- . type of real estate
- . interest in common areas
- . easements (servitudes) and some public restrictions

A register map is updated in accordance with the Land Register.

The Lot Book covers city planned areas. The municipal Real Estate Surveyor is responsible for the maintenance of the register. The data contents are mainly the same as in the Land Register.

The Register for Legally Confirmed Titles is maintained by judicial authorities. The proceedings for legal confirmation of titles is compulsory and the stamp duty for the underlying conveyances is normally 4-6 % of the value of the property.

The Mortgage Register is also maintained by judicial authorities. An entry in the register is possible only with the legal confirmation of the title. The Mortgage Register and the Register for Legally Confirmed Titles

are based on real estates as recorded in the Land Register or in the Lot Book.

Real estate information is registered also in following registers:

- . The Fiscal Cadastre which includes real property list, farm list and maps. The Fiscal Cadastre is maintained at the local tax offices.
- . The Real Estate Market Price Register which is maintained by the NLS.
- . The Farm Register which is maintained by the National Board of Agriculture.

These three last mentioned registers are computerized, but the updating is carried out manually.

#### *Present Developing Activities*

The Land Register and the Lot Book were maintained with manual methods until 1982. Then provisions were revised in order to make the computerisation of the registers possible. A law for establishing the Real Estate Register was issued in 1985. Under this law the rural Land Register and the urban Lot Book are being merged into one formal register.

In 1984 and 1987 the government made principle decisions to establish a computerized Real Estate Data System. This system includes:

- . the Real Estate Register (merged Land Register and Lot Book)
- . the Register for Legally Confirmed Titles
- . the Mortgage Register
- . the Physical Planning Component

The system will be decentralized in principal towns.

The situation with the system is that about 75 % of the Land Register is transferred into the computer, and the percentage of the Lot Book is about 60. The whole country will be covered in 1995. The Physical Planning Component is still under development, and the schedule for its implementation is open.

It is important to notice the lack of map data or the spatial component in the system.

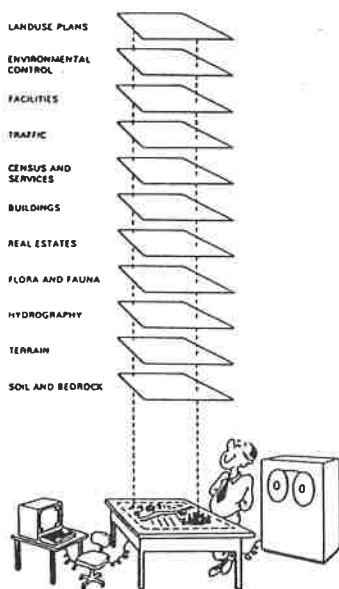
### **3. Development of the Joint Use of Geo-Information**

Ten years ago the use of computers in the map production led to the creation of methods for managing geo-information at the NLS. The aim - besides the needs of map production - was to develop map from a graphical product to an information system. The realization was made in-house. The software got the name FINGIS (FINNish Geographical Information System).

During the developing activity it became obvious to us, and we could proof it, that integration of data from different separate registers is possible by using position of objects as a link instead of identifiers. This led to further investigations of the matter in order to develop the integration of different information systems.

A project to determine the needs for and possibilities of creating the joint use of geographical information systems worked at the National Board of Survey in 1983. Proposals for the development organization, too, was included in the project's task. The project recommended the joint use to be realized on the base of the following ideas:

- . integration is based on decentralized registers
- . the link between objects is position
- . data coming within the sphere of integration consist of all systems able to present their spatial data in standard form; these include systems outside normal map production, e.g. population register
- . in the data interchange representation of data is standardized



This solution has the following advantages:

- . the systems are independent of each other
- . the systems are independent of data contents and identifiers
- . updating can be made with no effect on other systems
- . technical solution used in different systems can vary, and a system can be restructured without



- any repercussions on other systems
- the number of systems is unlimited; new systems can be integrated without altering the others, the only condition being the ability to represent data in standard form
- data redundancy can be minimized

According to the group's recommendations the Ministry of Agriculture and Forestry set up a project (LIS Project) at the beginning of 1985. The tasks of the project were to develop standards for data representation and transfer. Also administrative problems were included in the sphere of the project.

As much as 30 organizations have participated the work. 16 organizations are represented in the leading group and, besides these, 15 other organizations have been involved in the work of the working groups. The practical work of the project is carried out by the National Board of Survey. Now the project has progressed from preliminary studies to testing and implementation of the methods.

THE COMPOSITION OF THE PROJECT TEAMS

	lead	C	P	G	R	T	A	Q	D
Ministry of Agriculture and Forestry	x						a		
Geodetic Institute								q	d
National Board of Agriculture	x						a		
National Board of Forestry	x			r				q	d
Forest Research Institute		c							d
Population Register Centre	x		p				a		d
Ministry of Environment	x	c				r	a	q	d
National Board of Environment and Waters									d
Ministry of Defence	x								
Topographic Service of the Finnish Defence Forces					r				d
Ministry of Finance	x				r	t	a		
National Board of Taxes								a	d
Central Statistical Office of Finland	x	c						a	q
University of Helsinki						g			q
University of Tampere									q
Helsinki University of Technology	x		p	g					
National Board of Public Roads and Waterways						r		q	d
Meteorological Institute									d
Post and Telecommunications							t		q
National Board of Navigation									d
Geological Survey	x		p						d
Technical Research Centre of Finland	x	c		g		t			q
The Association of Finnish Cities	x	c			r	t		q	d
Finnish Municipal Association	x							a	
Union of Finnish Regional Planning Associations			p						q
Finnish State Computer Centre							t		q
The Finnish Association of Consulting Firms	x				r		a		q
Central Forestry Board TAPIO	x					t			d
The Data Centre of Helsinki Metropolitan Area (PTK Tietokeskus)									q
Imatran Voima Ltd.									d
National Board of Survey in Finland	x	c	p	g	r	t	a	q	d

(C) Classification  
(P) Positioning  
(G) Geometry  
(R) Registers  
(T) Data Transfer  
(A) Administration  
(Q) Query Language  
(D) Data Content

#### 4. The Development of Standards and Supporting Services for the Joint Use

The first task was to develop the representation of geometric entities. The defined units for two dimensional vector geometry are:

- point
- line
- area

Points may be units of a line, and lines may be units of a polygon. Different kind of interpolation methods are allowed for lines.

Matrix geometry is bound to the national grid coordinate system. The units of the matrix representation are pixel and matrix.

Three dimensional units will be supported in the future.

Positioning system is essential in the joint use because just the position of the objects is the link between them. The national grid coordinate system have been chosen as the horizontal reference system. The vertical coordinate system is more complicated. The ground in Finland is heaving up continuously which has led to many elevation references. From these N60, the newest one, has been chosen as the vertical reference system.

Positioning accuracy classification is a method for the compatibility estimation. The classification is based on assesment of the metric uncertainty of points and lines. The comparison is made with the geodetic control points.

Semantic classification information is necessary in the joint use for depiction and interpretation of data. A common classification for all the data in the joint use is unrealistic. Several sectors have already long traditions and practical reasons to classify their data on their own way.

For the joint use a uniform method for describing the classifications is developed. Relations between different classifications are described by means of a scheme.

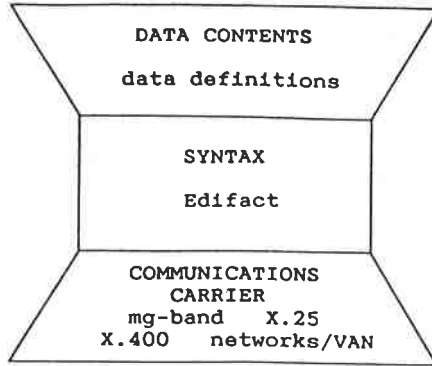
In Data transfer standards are needed to describe the physical form of logically standardized data. The components of data transfer are:

- data contents
- interchange implementation
- transmission method(s).

For the joint use we have chosen EDIFACT (ISO 9735), a very flexible protocol, for interchange implementation. Its significance is that it gives the rules for the presentation of messages to be interchanged. The standard is not originally designed for this kind of applications but our experience has shown its power also in spatial data interhange.

Transmission method to be used is, according to the interim standard, magnetic tape. In practise, also line transmission using X.25 & transmission software or X.400

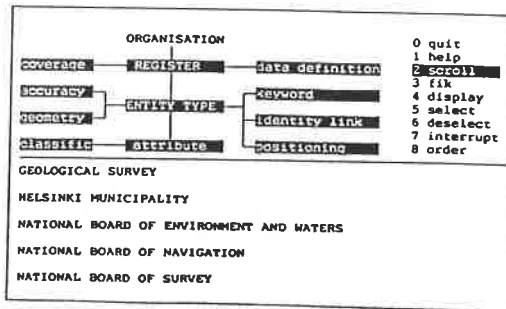
protocols are used.



In our model based on decentralization user may have difficulties in finding right data sources. According to investigations, hundreds of data systems maintained by tens of authorities are available for the joint use in a couple of years. For efficient usage of those systems a dictionary system is compulsory. The geographic data dictionary system includes descriptive information about data in different GIS's. The most important data items in the dictionary are:

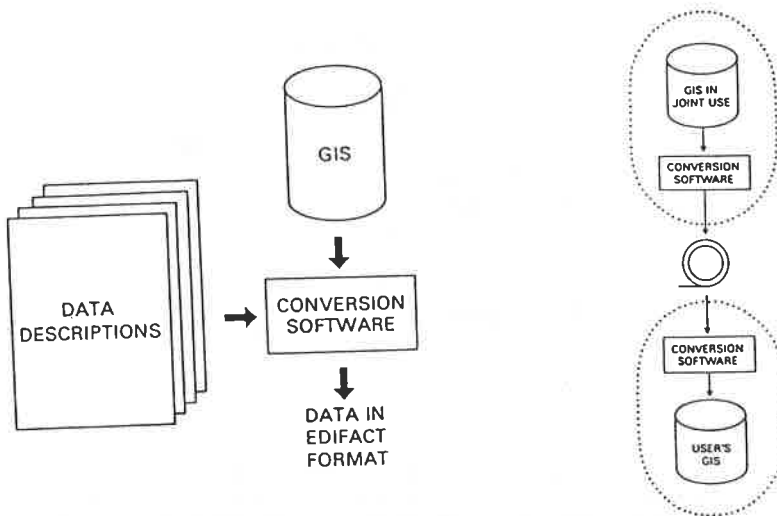
- . register's owner
- . data contents
- . entity types
- . classification of attributes
- . positioning system
- . present areal coverage and plans for future data collection
- . rights and limitations of the use

The dictionary system provides both textual and graphical interfaces.



An example of textual display

For the interchange, data from different systems must be converted to EDIFACT form. When receiving data in EDIFACT form, conversion to every system's own input form must be made. A standard software with which these operations can be eased has been developed. The conversion software needs strict data definitions to manage the data conversion to the EDIFACT structure. The definitions, too, are recorded in the geo-data dictionary. In the user's system the conversion software needs definitions according which the interchanged data can be converted from the EDIFACT structure into the input form of the user's system.



### 5. Present Situation and Experiences in Joint Use of Geo-Information

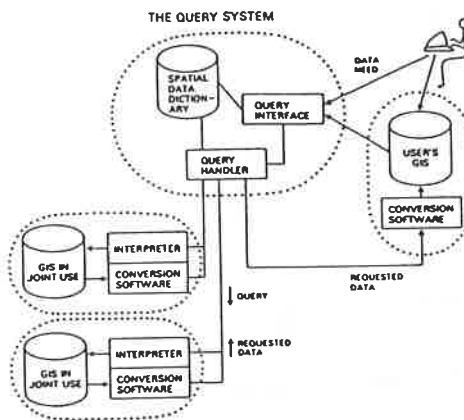
Standards for geometric representation, for positioning and positioning accuracy as well as for data interchange have been on interim level. In the near future the standards will be confirmed. The geo-data dictionary system has been as a prototype. The production version will be brought into operational use at the beginning of 1990. As many as about 40 registers will, be in use via EDIFACT based data transfer then.

It takes from 1 to a few days' work to tailor the conversion software for an information system; then the system can send and receive data in EDIFACT form. Without standards and conversion software it typically takes several weeks to tailor two system so that they can send data from one to another. It is important to recognize that the procedure, must be repeated for every two systems in all combinations.

We have tackled technical problems so far, and solved most of them. Now the most restrictive problems concern

administration. The coordination of data collection, the price of data, copyright and data integrity are problems which need more consideration.

In the beginning data interchange between systems is based on batch processing. Looking ahead, this is absolutely too restrictive. Since 1987 we are developing a query language for queries which can be processed automatically in real time. The schema below describes the structure of the query system under development.



## 6. The Influence of the Joint Use on Different Systems and Activities

The use of position as a link between different objects means that other links are no more necessary. By maintaining only the position of objects the linkage to all other objects is secured.

Recently, when establishing and developing new registers ideas of the joint use have been accepted. The most important influences have concerned forestrial, environmental, physical planning and municipal geo-information systems.

In map production, the joint use has ment needs to bring the map data also in digital form. In order to satisfy this need separate map digitizing has been started beside the digital map production. In first step the activity has aims to produce elevations, hydrography and arable land areas from the Basic Map 1:10,000/1:20,000. Furthermore, it has been under discussion to help other authorities in position determinations.

As a tradition, we have a graphical register map of real estate division. It is based mainly on the Basic Map 1:10 000. In urban areas the scale is larger. In 1980 we started to map real estate boundaries of the Southern Finland in the Base Map 1:5000 process. The Base Map contains an ortho-photo and boundaries, boundary marks and identifiers of real estates in digital form. The mapping of boundary marks is based on partial targeting

of the marks. About 70 % of them are targeted by authorities and volunteer land owners. Later we have widened the work also for the Basic Map production where the working scales in photography and field measurements are half of those used with the Base Map 1:5000 production.

The production speed of the mapping processes is very low compared with urgent need for the data. In order to satisfy these needs we have concluded to digitize also parts of the existing register map. So we should have real estate boundaries with complete coverage of Finland by 1996. This data is necessary in order to have real estate information into the sphere of the joint use of geo-information.

## **7. The Real Estate Data System and the Joint Use of Geo-Information**

The ideas of the Finnish Real Estate Data System are from the 70's. Then it was internationally self-evident that land registers should be widened with other data, e.g. with plans. The integration problems were solved by centralizing the data into one register, and other data was bound to real estate division framework.

The now started mapping and digitizing of real estate boundary data has not yet led to integrating this data into one system with attribute data. This means that the needed spatial data must be collected from one data system and the attribute data from another. The next version of the Real Estate Register is now in planning stage. One objective of the developing activity is to create a system where the spatial and attributive parts are integrated. The new system should be operational in 1992.

To join the Real Estate Register data (spatial and attributive) in the joint use may have many consequences. Many registers are now built up by using real estate information as a link data. When positioning is used as the link there is no need anymore to update the real estate identification. Now the updating is very cumbersome because, e.g., in parcelling-out survey both the new and the old property will get new identifications. This leads to updating of over 100,000 identifiers annually in every system using real estate identifiers.

The Physical Planning Component is still in developing stage. The new situation gives possibilities to realize it independently without using the real estate division as a framework.

## **8. Concluding Remarks**

The model chosen in Finland for the joint use of geo-information is built up in cooperation and consensus with data producers and users. It is important to notice that

the model allows high degree of independency for the data producers. Updating of one system does not have repercussions to other ones. The technics are developing all the time and different data producers can independently buy and instal new systems, restructure them, etc. The only limitation is that the data must be described according to standards when being interchanged. The joint use system is based on data standards, not on special hardware or software.

The data of real estates are needed in very many activities. Typically the data of real estates are only a part of all the needed data. The wide use of computers means that the data are required in digital form. This demand is grownig rapidly when more and more data are available in digital form and new application softwares come into market. The digital real estate data must be compatible with other digital geo-information.

When designing a real estate data system new forms of data usage has to be considered. If a data system is build up to be able to give its data only on lists or on displays, only a part of the possibilities which can be reached today are used. The joint use of geo-information is a new concept which gives tools to integrate real estate data with other geo-information. The integration by some other criteria with the same effectness is now out of sight. Efficient data service requires digital maps to be integrated with attribute data.

Many authorities need good maps in order to carry out the position determination for their data objects. The mapping authorities are experts in position determination. They must be able to help the others. This operation could be made in connection with regular mapping or as an separate procedure. With this the map business is moving from product oriented to data oriented production.



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**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
**MULTIFUNCIONAL**

— SICRUM —

THE COORDINATED INFORMATION SYSTEM APPROACH  
TO URBAN MANAGEMENT AND LAND INFORMATION SYSTEMS

SVEND TROLLEGAARD

DINAMARCA

LISBOA..FUNCHAL-20 a 25 Novembro de 1989

**THE COORDINATED INFORMATION SYSTEM APPROACH  
TO URBAN MANAGEMENT AND LAND INFORMATION SYSTEMS**

by

**Svend Trollegaard  
Commissioner for Coordination and Technology  
Deputy Permanent Under-Secretary of State**

## THE COORDINATED INFORMATION SYSTEM APPROACH TO URBAN MANAGEMENT AND LAND INFORMATION SYSTEMS.

### 1. The concept of coordinated information systems - CIS.

The concept of coordinated information systems is defined as a set of measures that makes it possible to combine and integrate information of different nature and origin for multiple applications and multisector use. The individual user is accordingly able to draw upon registration of information by other individuals or sectors inside or outside his organization and field of operation.

The concept of CIS could provide a framework as well as ways for a cross-sectoral approach for urban policies and management. CIS is also a technical tool. Foremost however the CIS-concept embodies a managerial approach.

The coordinated information system measures include:

- coordinated concepts and definitions of the information registration structures (identifiers)
- a super-structure - possibly organized as a hierarchy - among the physical objects of registration
- a common set of communication standards and networks facilitating the transportability of information and including standards of communication, standards of formats of communication languages and structures etc.
- accessibility to information and registrations

- transparency concerning updating, procedures and quality of registered information.
- measures to secure a wide-spread use of the potentials of the Coordinated Information systems

Adopting the concept of the coordinated information system approach has many advantages.

The approach makes it possible to decentralize the creation and registration of information and thus corresponds to the general trend in management and administration. Moreover it increases the benefit-cost ratio because it facilitates the reuse of information and registration from different institution and bodies.

The coordinated information systems may be used to initiate and support efforts to modernize working procedures and organizational development.

Finally the approach contributes to a strengthening of the decision-making basis for managers and politicians by promotion of the production of key information, statistics and consequence analysis of alternative measures and strategies.

The coordinated Information System approach is of great relevance in the field of urban management and human settlement. Here there is a growing awareness of the importance of organizing and compiling information for the formulation of settlement policies and strategies and all the different functions of public and private character in urban areas. The main reason for the benefits of a coordinated information system approach is to facilitate a holistic approach to the high complexity of activities and actors in the urban areas.

Information concerning urban settlements is partly related to the physical characteristics of land and built-up areas and partly related to the social-economic aspects of the living quarters, the occupants as well as the activity taking place. It also involves information on ownership and tenures and might also incorporate information concerning financial aspects of land and urban development.

The information generated by coordinated information systems is of relevance to the citizens, for the business sector as well as for government at local, regional and central level.

For the government the information generally facilitates the planning and management of land related issues, e.g., land development, land consolidation, land acquisition and land taxation. Moreover urban and housing policy formulation and implementation can draw upon the information. Housing development could for example be promoted through facilitation of housing finance or through distribution of financial and managerial support to housing upgrading and construction.

Utility companies may have large benefits of coordinated information systems for registration and exchange of information concerning of their utility and communication networks.

In many countries the information on hand concerning land and settlements is only to a limited degree organized and structured in a way to facilitate an easy and systematic use. It might be of great advantage to formulate a strategy within the framework of the coordinated information system

approach for organizing the information for a multiple-application and a multi sector-use. Thus the introduction of a coordinated information system approach might facilitate

- the provision of information for decision making,
- the efficiency of administration,
- the facilitating of monitoring- and control-functions,
- the facilitating of decentralisation of management and administration,
- the promotion of planning processes,
- increase the equity of tax and revenue collection
- facilitate the analysis of alternative measures and strategies.

In the field of urban management and land information systems a number of subsystems could be coordinated as to incorporate information in an operational way concerning

- land,
- natural resources,
- building structures,
- roads and other types of infrastructures such as sewage, telecommunication networks,
- land use and physical planning,
- socio-economic data,
- financial data,
- constraint to the use, (land-use, environment protection, preservation, district plans etc.
- administrative and management related data.

The experiences of Denmark of the use of a coordinated information system approach is identified below.

## 2. The Danish experiences and strategies for Coordinated Information Systems.

### 2.1 The administrative organizational structure.

Urban Management and Functioning is very essential to Denmark on the background that the great majority of the population (84 per cent) lives in towns or urban settlements, which in Denmark are defined as continuous settlements with at least 200 inhabitants. The average population density is 119 persons per square kilometer corresponding to a total population of 5,1 million and a total area of app. 43,000 square kilometers. The four largest towns are Copenhagen, Aarhus, Odense and Aalborg and app. 1/4 of the inhabitants lives in the metropolitan region of Copenhagen.

The Danish employment pattern is such that 25 per cent is employed in industry in the broad essence, 15 per cent is in commerce, 15 percent is in the private-service sector, 7 per cent in agriculture and 7 per cent in transport industries. However the largest sector - 31 per cent of the labour force - is directly engaged with the government.

The relative large government sector calls for continuous efforts to improve efficiency and cooperation among government institutions and agencies at all levels. Moreover it makes it very important to pay high attention to the continuous development of public-private partnership.

There are 3 levels of governments administration: central, county and municipal authorities. In 1970 the Danish administrative system underwent a major



structural reform. Counties and municipalities were amalgamated into larger administrative and planning units in order to enhance their administrative capability. At the same time additional power and responsibilities were devolved by central government to county and municipal authorities. Accordingly taxation and budgetary systems were standardized to allow for an overall assessment of the allocation of public finances. By now Denmark has a total of 14 county authorities and 275 municipalities.

Central government has, as a general rule, delegated to county and municipal authorities an increasing degree of administrative responsibility. In the field of urban management and functioning the municipalities form the operative and decision-making authorities. Government costs at the local level is financed partly by local income and property taxes, partly by subsidies and reimbursement from the central government. According to the latter the central government pays a general grant to the municipalities which is divided proportional to the taxbase per capita and calculated requirements of expenditure per capita.

This decentralisation of the operative powers makes it very important for the overall functioning of the government sector to establish and develop administrative and planning systems with nationwide use thus forming an essential part of the overall government modernization programme.

In the field of urban management and functioning there has been a strong trend to facilitate cooperation and coordination. Thus with the aim to implement information technology in an optimal way the municipalities have built up a common datapro-

cessing and developing organization employing app. 1,400 persons - Kommunedata I/S - which forms counterpart to a similar dataprocessing and developing organization jointly owned by the central government and the counties with app. the same amount of staff - Datacentralen I/S.

## 2.2. Trends in the use of information technology in human settlement planning and management.

The development within information technology over the last decade or two has made it possible for planners, administrators etc. in local authorities, regional authorities and national authorities much easier to access or to have possibilities for access to comprehensive data concerning the built-up environment, population, employment, natural resources, environmental conditions etc.

Denmark has over the last decade more and more distinctly pursued a policy of establishment of nation-wide conceal registers for administrative, planning and statistical purposes in different fields. Thus Coordinated Information Systems have formed a significant component of the overall administrative structure. So fare, the Danish approach to Coordinated Information Systems has been the establishment of a network of information sub-systems related to land, the built-up environment and public utilities.

The decentralized administrative structure of the country has made it advantageous to initiate models, integrated systems or planning, urban management, providing and distribution of subsidies, tax-management etc. by a coordinated effort of the Ministry of Housing and Building concerning

all information sub-systems. The result is, that a broad range of applications has been developed either in connection with individual sub-system or through the automatic networking linkage possibilities among sub-systems.

The strategy for the development of Coordinated Information Sub-systems has been one of pragmatism, relying on assessments of the overall economic advantages from the society's point of view based on analysis of multiple-applications used by public agencies related to urban areas, human settlements in general as well as rural areas. Some of the systems have, of course, been modified in accordance with the experience gained over time.

The greatest advantages have been obtained in designing new registrations and computerized systems on a coordinated basis thus relying on a policy of multiple-user and multiple applications. The result is in a policy for establishment and updating of systems rather than of a project or dedicated nature concerning e.g. only a specific system, area or project.

Over the last two decades computerized nation-wide systems, continually updated and covering the most fundamental needs have been established. These systems - cfr. figure 1 - comprise by 1989 the following

**FIGUR 1 THE COORDINATED INFORMATION  
SUBSYSTEMS IN DENMARK BY 1989**

Subsystems	The Technology
The Cadastral Register (Parcel Register)	Computerized
The Cadastral Map base	Partly computerized Partly manual
The Land Registry	Manual
The Municipal Register of Property	Computerized
The Building and Dwelling Register	Computerized
The Register of Plans	Computerized
The Natural Resources Data System	Computerized
The Central Register of Enterprises	Computerized
The Tax Systems (Income and Value added Tax)	Computerized

The fundamental idea is that systems should be so designed and data should be of such a nature that it permits managers, planners, administrators and entrepreneurs from all the various fields engaged with human settlements etc. to access data and thus facilitate planning, collection of supplementary data and in general to strengthen the decision-making basis for human settlements policy-making and implementation.

Examples of the benefits of the Coordinated Information Systems net-work are as follows:

- the carrying through of annual population and housing censuses provided at the national level, for local authorities or even for districts within local authorities
- urban upgrading and renewal informations systems
- energy preservations systems
- energy planning and management systems
- construction license management systems
- property valuation systems
- infrastructure management systems
- building preservations systems
- housing and population forecasting systems
- statistical information related to very many fields within the human settlement field.

The recent development is integration of administrative registers and digital maps providing a number of analytical and management tools which will make it possible to monitor and make an even closer interrelation between the physical and economic planning. This strenghten the performance of urban management as well as planning management of rural areas, natural and environment resources.

An important new trend is also a much closer cooperation and exchange of information between public agencies and the private sector facilitated by the information technology development and integration hereof in the various fields of human settlements.

### 2.3 Prerequisites for the development of the Coordinated Information System Approach.

The awareness of the benefits of the Coordinated Information System Approach is not evident. The reason is that the staff of organizations and agencies do not see it as a natural part of their job to design and implement the use of dataprocessing and management also for the benefit of other institutions, agencies as well as the private sector. Accordingly it is obvious for the staff to develop systems of a project-oriented character.

In recent years the relative decrease in cost for converting manual procedures of administration and planning to computerized systems has proved heavily the process but there seems to be an obvious risk for a too narrow view upon such systems. Heavy focus on technical aspects of hard- and software may lead to wrong decisions concerning the design, structure and implementation of systems. On the basis of the very substantial amount of staff-resources involved in establishing and updating systems the technical orientation in decision-making is in the long run not the best practice.

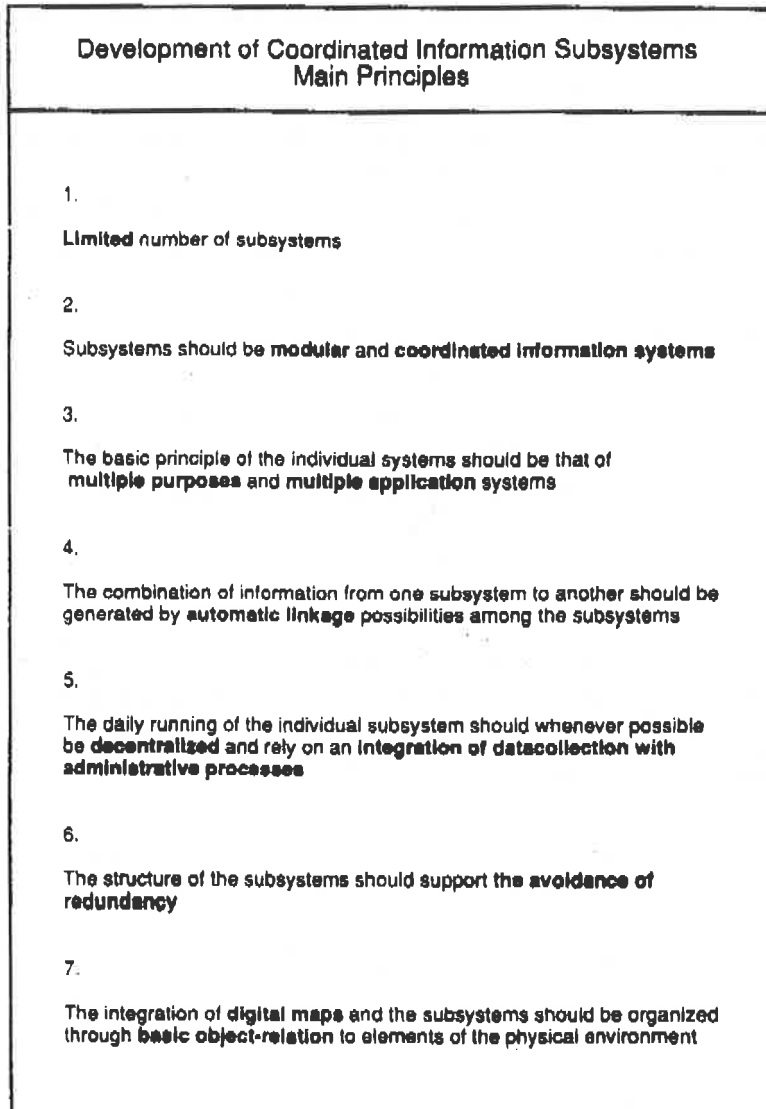
In the light of the substantial external benefits of system development especially for the possible benefit from the society's point of view there seems to be great advantages in promoting a Coordinated Information System Approach.

Among the Ministries in Denmark the Ministry of Housing and Building is the one mostly engaged with the development and running of Urban Management and Land Information Systems. The portfolio of the legislation of the ministry has very heavy impact

on the built-up environment. Substantial financial support is offered to urban upgrading and rehabilitation, improvement of the housing situation by support to housing construction and individual housing subsidies. Moreover the Ministry covers legislation and administrative framework of building legislation and building code, energy conservation measures as well as codes for electricity, natural gas etc. Finally the Ministry also covers the legislation concerning the subdivision of land, the geodetic maps and maritime charts form the legislative basis for transactions in real property and land, for financing of housing and private construction etc. This makes it an integrated task for The Ministry of Housing and Building to catalyze and promote a Coordinated Information System Approach to Urban Management and Functioning.

The Ministry of Housing and Building does not itself run the Coordinated Information subsystems. Instead a Standing Coordination Committee is responsible for setting up guide-lines for information system development, the principles of the current updating procedures, rules of accessibility and development of payment schemes for the sale of information to third parties (e.g. the private sector) and in general for strategic planning and implementation of the CIS-development. The Committee offers advice concerning comprehensive design of the administrative set-up in connection with new legislation.

The main principles for the development of Coordinated Information Subsystems are shown in the figure below





#### 2.4 The Governments Standing Coordination Committee on Data concerning Real Property and of Geographical related nature.

All Coordinated Information systems are supervised by a Standing Coordination Committee of the Government.

The Coordination Committee on Data concerning Real Property concerns land, titles and deeds, real property and building structures, infrastructure and plans. The committee functions on the background of a coordination commitment within the legislation. According to this it is "An obligation of the Minister of Housing and Building to promote such rules or measures that a coordination and simplification of data concerning real property and geographical related information is carried through".

The aim of the coordination committee is thus to coordinate and cooperate all registrations concerning real property pursuing the widest possible applications of the data at the least possible costs of society.

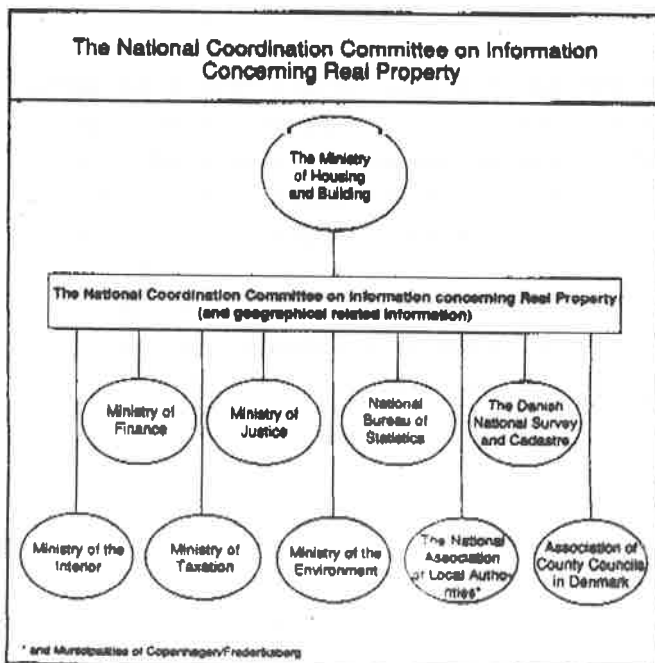
One major task of the coordination committee is to follow the overall development in matters concerning legislation and planning of importance for the applications and development of the data and related systems concerning real property.

The committee has to take account of the development in the technological possibilities in relation to the systems.

Plans and projects concerning the existing land information subsystems or new registrations of a larger volume have to be forwarded to the committee at an early stage with the aim that the committee can decide whether there is need for coordination ~~in the connection with the related parties.~~

The committee moreover has the power to discuss work- and executive plans for the larger registrations projects. The task of the committee is to follow the current registration and exchange of data with the aim of putting forward proposals for increased efficiency.

The committee has to propose possible harmonizations of definitions, identifies and concepts of data within its working fields and to negotiate with the other standing committees. The committee moreover has an advisory function in connection with new legislation and the design of administrative routines. It may arrange hearings and have to send out information including the work- and executive programme.



The parties represented in the standing coordination committee are shown in the figure below:

## 2.5. Experiences of introduction the Coordinated Information System Approach.

### 2.5.1. Harmonization of definitions, identifiers and concepts of data.

Of vital importance for the actual use of information across organizational and sector boarder-lines is a recognition of the benefits of using common concepts and definitions. ~~Normally each producer or~~ user of information has his own opinion of how the most relevant definitions and concepts should be. However in this connection it is important to be very pragmatic. The concepts and definitions concern in the case of urban management systems such physical objects as buildings, street-network, pieces of real property, water, forests etc. These objectives or elements of registration are typically - if not coordinated - defined differently throughout legislation, codes and manuals.

In order to establish stable object-relations among the different elements it is a prerequisite that the different types of elements are defined in a uniformed way. Thus it is for example important that everybody uses the same definition of adresses, their classification and accept that only one body is in principle allowed to define new adresses etc. Simular is the case concerning buildings, cadastral units and geo-codes.

The establishment of concepts and definitions is a cumbersome and difficult task. Here international cooperation might inspire to the necessary work to be undertaken.

In the case of Denmark a common address-system has been developed and is used gradually more and more as the common identifier. Normally the addresses are created within the Building and Dwelling Register. From this register they are automatically delivered to the Central Population Register and from these two registers they are spread to all other systems. More and more also the private sector has realized the benefits of using the common address system.

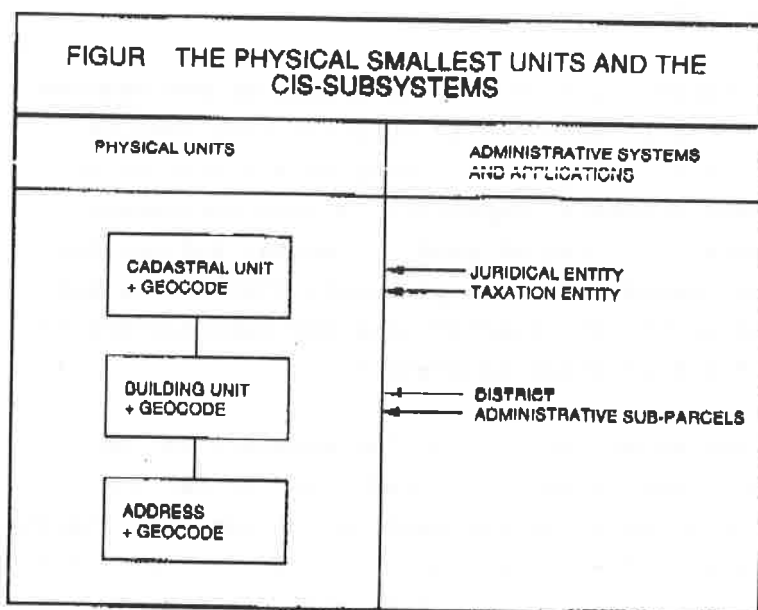
Concerning the cadastral unit and corresponding identifier there has been a number of practical confusion. The individual cadastral unit has its separate geographical position but for many uses (especially when land and buildings differently located are used as "one economic unit") an amalgamated unit by merging different units has been used as an element of registration. This is appropriate for the firm and the tax-collecting (and valuation) authorities but creates severe problems for the use of information to manage the physical pieces of land, buildings, housing, streets etc. Accordingly this "tax-authorities" approach may form an absolute obstacle for the intention to use the information to perform multiple-applications in relation to the physical environment. In relation to urban management thus many applications demands for a precise geographical orientation and not merely the administrative one.

Concerning the geocodes - the coordinates the points, lines or boundaries of areas - a common approach is also intended. Two different coordination systems are however still used and although there exist efficient conversion programmes it is of great relevance within a certain working-field to use if possible the same system.

The benefits of the coordinated address-system are very high. Thus on this basis it has been possible to produce automatically Annual Housing and Population Censuses, that are of great relevance in general as for monitoring the impacts of decisions, planning and the introduction of different policy measures. For a country of the size of Denmark the estimated costs of producing a Housing and Population Census is app. 150 million Danish kroner (at the present exchange rate corresponding to 20 million US \$) if traditional methods of sending out questionnaires is used. The automatic produced census costs app. 1-2 million Danish kroner.

Recently the precise geographical orientation of the individual piece of land, building, address has "overruled" the tax-authority registration approach. Accordingly each building (and address) is re-registered to relate accurately to the physical piece of land, where it is situated. This physical precise relation for all cadastral units is foreseen to have a very dynamic impact on the benefits for all the systems related to urban management. The re-registration is finalized by the end of 1989 and facilitates heavily the introduction of geocodes for all registration elements.

The principal physical objectives within the Danish systems are shown in the figure below.



2.5.2. The acceptance of a general super-structure of systems - the modular approach.

From a scientific point of view the individual systems should consist of coordinated modules. In practice it requires quite a substantial effort to convince and secure this more abstract ideals of modular coordination. The modular coordination concept has many advantages as of establishing the basis for stable relationships among different registers to enable the total network of systems to form the best possible "mirror" of reality.

In Denmark the design of information systems in accordance with the modular coordination approach has turned out to require much attention to be paid to the "smallest-unit" concept and identify or connected.

The smallest unit forms the cranks of the systems and makes it possible to built-up very complex structures using these cranks in a multitude of various contexts. Especially within government agencies, titling of land, financial and capital market mechanisms, tax purposes, ingeneering and other technical oriented uses and applications in the field of urban management.

Another aspect of the modular approach is the identifiers to be introduced - and to get the potential users as customed to the use. The figure below shows the "principal smallest units" cross-references used for the time being in Denmark.

**FIGUR THE 'SMALLEST UNITS' CROSS-REFERENCES**

LAND INFORMATION SUBSYSTEM	PERSON NUMBER	CADASTRE NUMBER	GEOG. COORD.	REAL PROPERTY NUMBER	ADDRESS CODE OF DWELLING AND TRADE UNITS	BUILDING NUMBER	ENTERPRISE NUMBER
THE CADASTRE		⊗	⊗	X			
THE LAND REGISTRY		X					
THE MUNICIPAL PROPERTY REGISTER	(X)	X		⊗	X		X
THE BUILDING AND DWELLING REGISTER		(X)		X	⊗	⊗	
THE CENTRAL POPULATION REGISTER	⊗				X		
THE ENTERPRISE REGISTER					X		X
THE TAX REGISTER	X						⊗
THE NATURAL RESOURCES DATA SYSTEM			⊗				

⊗ RESPONSIBLE SUBSYSTEM FOR DETERMINATION OF IDENTIFICATION  
 X THE IDENTIFICATION IS INTEGRATED IN A MULTI-IDENTIFICATION  
 (X) THE IDENTIFICATION IS INTEGRATED ONLY FOR SPECIAL UNITS

2.5.3 Coordination efforts of communication, standards etc.

In order to secure high transportability of information a common set of communication-standards and network-standards has been developed.



The result is that a number of the nationwide information systems automatically update each other. The automatic updating include new elements of registration and changes in registration for existing elements.

There are great many advantages of this procedure and the intention is to bring the automatic updating processes into an even more widespread use.

Recently action has called for more advanced communication standards concerning communication of geographical information. Here a commonly accepted standard has been developed - the so-called DSFL-standard. The standard has been developed by The Private Institute of Photogrammetry and Surveying. The main characteristic of the communication standard is that it is based on object relations and thus is very operational in the field of urban management, planning and administration. This communication standard is steady developed to cover new areas. The standard is of vital importance for securing that information created by different partners can be merged and handled for other users as if the information was produced by one single system.

Moreover there exist a more General Standard developed by the National Association of Engineers. The two standards form some of technical key-elements for a widespread use of combined digital and administrative information to be used also outside the government agencies as for example among utility companies, private entrepreneurs, consulting firms etc.

Additionally communication and enquiry systems has been developed in such a way that it is possible for the user to choose among various main brands of hardware and software when integrated digital and administrative information is handled. This has the main advantage from a policy point of view that it secure competition among software and hardware developers.

#### 2.5.4 Coordination of accessibility.

A cornerstone for the promotion of a multiple-application and multi-sector use is the establishment of legislation and accessibility codes. This is very relevant in order to secure the very fundamental question of privacy - i.e. the risk that the information systems might invade the privacy of citizens through the huge amount of information that could easily be collected about the individual.

In Denmark - like in many other countries - this task is in the hand of the Data Surveillance Authority. All systems and registers have to follow the demands of the Public Authorities Registers Act. Those rules concern the conditions for registration and privacy safeguards and the term that every individual has a right to be acquainted with the data directly or indirectly concerning him.

In the field of urban management most registrations established concerns the "physical environment only". This direction of system development makes it possible to establish a high degree of networking of information and systems and do not frequently as such involve the risk of invading the citizens privacy. The Ministry of Housing and

Building has received the power to supervise the networking of information from a large range of systems.

#### 2.5.5 Measures to secure a widespread use of the potentials of the Coordinated Information Systems.

The dissemination of the results achieved in the building-up of Coordinated Information Systems has to be taken very serious.

The reasons for this is that the use of information, technology e.g. in field of urban management has many risks and potentials.

Some of the risks are that the introduction of information technology focuses too one-sided upon hardware and software principles and costs. The most heavy part of cost is however related to the human resources involved in establishing and updating the content of systems, the use of application etc.

Another risk is that the introduction of information technology in practice forms only a copy of the hitherto manual procedures only.

The potential of reaching higher orders of benefits is in this way neglected. The hierarchy of orders of benefits for the society of the Coordinated Information System approach is indicated in the figure below.

## BENEFITS FOR SOCIETY

BENEFITS OF 1ST ORDER	INDIVIDUAL
BENEFITS OF 2ND ORDER	MULTI-INDIVIDUALS
BENEFITS OF 3RD ORDER	MULTI- SECTOR
BENEFITS OF 4TH ORDER	MULTI- ORGANISATIONS

- WORK PERFORMANCE
- PROCEDURES
- ORGANISATIONAL DEVELOPMENT
- REVISION OF THE FUNDAMENTAL ISSUES  
(E.G. LEGISLATION IN VARIOUS FIELDS)

It thus has to be realised that the introduction and use of information technology may form a very dynamic conversion factor involving

- development of staff
- alterations in division of work among different groups of staff
- organizational development
- development of new agencies or amalgamation of different agencies and institutions.

In this way the adoption of the coordinated information system approach could form a cornerstone in the overall modernization programme of administra-

tion, planning etc. of the public sector, organizations and agencies as well as improve the basis for public-private partnership.

Accordingly—~~it is important to circulate general~~ and specific information of the systems as well of the specific characteristics of the individual systems.

With respect to training it is important not only to train lower level staff and operators but also to involve intensively the top-level of organizations such as the level of general managers and directors on the background that the introduction and development of the coordinated information system approach is of strategic nature.

#### 2.5.6 New trends in private-public cooperation.

Recently many of the coordinated information sub-systems have been opened to private enterprises and firms subject to the owner of the real property offers permission to access.

The private sectors mostly interested in access and/or mutual sharing of information are the following:

- financing of housing and other capital investment
- lawyers
- firms within the construction sector
- real estate managers and realtors
- public and semi-public utility companies and agencies concerned with infra-structure as of road, sewage, telephone and telecommunication etc.

The new development has called for changes in legislation and codes of accessibility. Moreover a coordinated price-system has been developed. According to this a uniformed price is to be paid irrespective of the amount of information and whether information is derived from one, two, three or four Coordinated Information Subsystems.

The revenue is redistributed to the authorities involved in data creation and maintenance with earmarked amounts of money for improved updating-procedures, improved quality of information and funds for product-development.

The impact of this opening of the systems to third parties may initiate a new era of private-public partnerships involving changes in division of work among firms, agencies etc.

### 3. Near-future perspectives.

The potentials and costs of digital map-oriented systems is the most promising single factor at present in the development.

In the recent five year period the Ministry of Housing and Building has undertaken a number of analytical studies with the aim to create a total networking system concerning the built-up environment.

The concepts is called The Urban Management and Land Information System. The system aims to make it possible to combine digital information with the established administrative registers at a high operational level at low cost for society.

The crux of the coordinated system approach is the establishment of the Cross-Referenceregister. The cross-referenceregister has the advantage that it combines the creation and continually updating of elements from the physical environment with their geographical location.

The elements have been chosen to be the street-network and addresses, the buildings and the cadastral units.

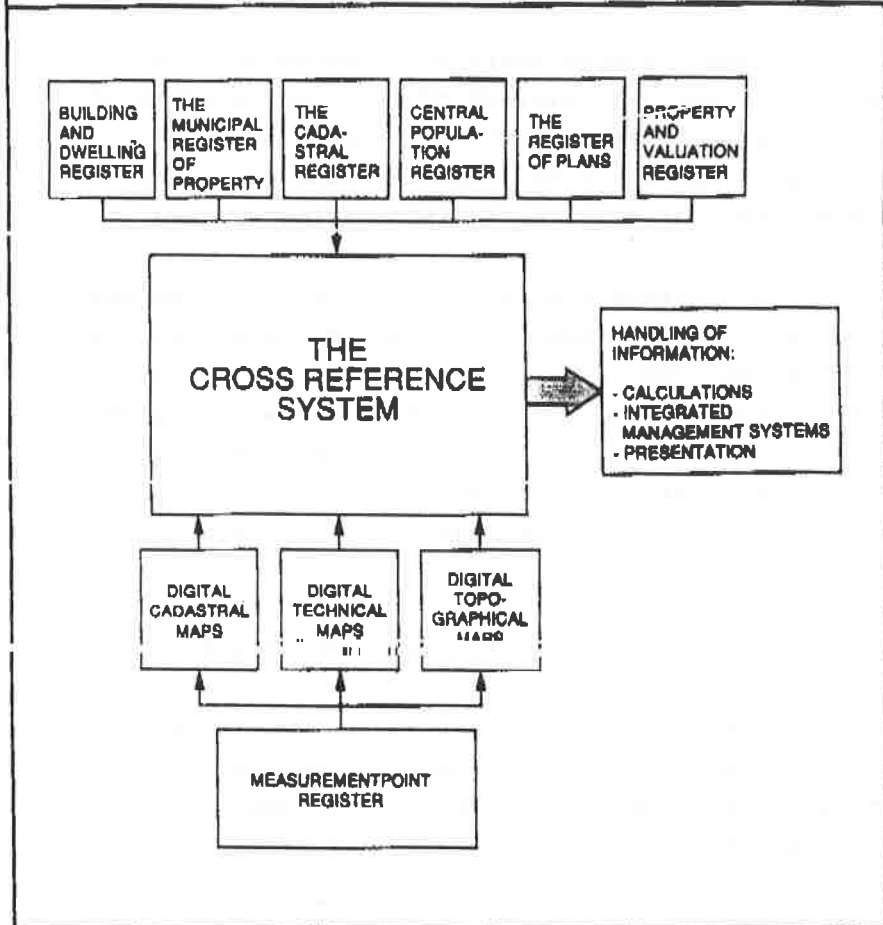
The geographical references is point-oriented geocodes to all addresses. The geographical references to buildings and cadastral units are corner coordinates to the physical boundaries of the surfaces.

The virtue of the cross-reference system is that it secures the functionality and operational aspects concerning handling of information. It thus facilitates the use of information for

- calculation and project handling
- development of integrated management systems
- geographical presentation.

The super-structure of the cross-reference system is shown in the figure below makes it possible to integrate the principal updating procedures of the existing administrative nation-wide register at the technical level without changing the practical work of system operators.

## The Basic Architecture of the Nationwide LIS



The systems makes it possible to secure high accuracy, quality and real-time procedures of information from all systems involved (mutual integrated updating). The digital part of the cross-reference system integrate digital maps of various nature such as

- digital cadastral maps
- digital technical maps



- digital topographical maps  
all based on an uniformed measurement-point register.

It has taken several years to convince all the different parties involved of the high benefits of this approach. At present it is more and more widespread accepted to form the crank of further development of coordinated information systems.

As to the present status of the total Urban Management and Land Information System the municipalities form a very important part. The smooth functioning of the object-relations and identifiers is designed to be a separate project and for the time being all municipalities have obligation to finalize this part of cross-reference register by the end of 1989.

The digital part of the system is developed from different angles. For the time being a quite simple digital topographical map is developed covering non-urban areas (app. 90 per cent of the total area of Denmark). The project comprises all building surfaces, road-network and water. The system is to be completed within 1992.

A systematic introduction of digital cadastral maps is finalized by the end of 1989 covering app. 8 per cent - the whole area of the island Fynen.

Great efforts are made to integrate the municipal technical maps in an operational form into the two named systems, confer the figure below.

## STEERING AND COORDINATION OF DEVELOPMENT OF ADMINISTRATIVE REGISTERS WITH A DIGITAL MAP-SYSTEM

1. STEERING GROUP
2. PROJECTS
  - 2.1 THE FYNEN-PROJECT - 1990  
(8-10 percent national coverage)
  - 2.2 THE OPEN-LAND PROJECT - 1992  
(approx 80 percent national coverage)
  - 2.3 NATIONWIDE DIGITAL CADASTRAL MAPS  
(longer-term project)
3. PROTOTYPE GEO-PROJECTS
4. DISSEMINATION
5. BENEFIT-COST ANALYSIS FOR SOCIETY

The Minister of Housing and Building has focused on the development of efficient updating methods, product development and the organizational aspects of the system which concern cooperation and communication between the central and local authorities on the one side and between the government and the utility companies on the other side. It is the impression, that the establishment methods of digital base-maps are fairly well developed but the continuous integration with administrative data and

systems needs development to promote an operational and functional approach.

Five prototype projects has been identified as of strategic nature and the prototype projects are to be finalized in 1990. The prototype projects covers the following:

Geo 1 Updating procedures coordinated with sub-division of land by private surveyers and the construction license system operated within the municipalities. In this way information concerning buildings, addresses and land are continuously updated

Geo 2 The urban management components of district planning and urban upgrading and renewal with respect to develop efficient tools for decision making and analysis of the consequences of alternative boundaries of districts, as well as alternative approaches to urban upgrading is covered by this prototype project.

The project is coordinated with the statistical products from the National Bureau of Statistics in order to facilitate consequence analysis involving apart from the physical environment the analysis of the economic consequences in relation to demography, business activity etc.

Geo 3 This project covers the more extensive use of information in relation to rural areas.

Geo 4 This prototype project focuses on the development of communication and retrieval facili-

ties between systems of central and local authorities (also for the benefit of private sector parties). The aim is to reduce double-registrations and a smooth functioning of coordination and management between different levels of governments.

Geo 5 This project concerns development of operational systems between government institutes and agencies and the registration undertaken by utility companies of the infrastructure network as gas, electricity, sewage, telecommunication network, district heating etc.

By the finalization of the five prototype-projects the facilities and systems developed will be distributed for the use of all municipalities, counties and utility companies.

The intention with the total project is to form a dynamic impact on the cooperation among different partners especially within urban areas.

The project is initiated on the background of the foreseen huge investment in hardware and software as well as human resources. It is estimated that the total investment will be of a size of app. 10 billion Danish kroner corresponding to app. 1,5 billion US \$ in the course of the 1990'ies.

The perspectives of the project is to introduce advanced information technology realizing the benefits from the society's point of view.

The Coordinated Information System approach is expected substantially to reduce the economic risks involved in the total development.

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**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
**MULTIFUNCIONAL**  
  
— SICRUM —

CADASTRAL SURVEY IN IRELAND

Michael J. Haberlin

REPÚBLICA DA IRLANDA

LISBOA, BUNCHAL-20 a 25 Novembro de 1989



"CADASTRAL SURVEY IN IRELAND"

THE INTERNATIONAL SEMINAR FOR  
URBAN & RURAL CADASTRE

LISBON - NOVEMBER, 1989

Paper presented by  
M.J. Haberlin ARICS

### Historical Background - Principal Triangulation

For fiscal purposes it was decided to produce a series of maps at a scale of 6 inches to the mile in Ireland in 1824. This necessitated the observation of a complete triangulation network for the island.

A link was established between the existing (but un-adjusted) triangulation points in Scotland to provide position, scale and azimuth for the Irish Network. This exercise was carried out by theodolite across the north channel into Northern Ireland. The primary network with its' secondary and tertiary stations was completed by 1848.

Computation of the primary network accepted the provisional co-ordinates of the Scottish stations and adjusted the Irish Network to those. Clarke's adjustment of the British Isles network was not completed until 1858.

These provisional positions for the Irish stations have been maintained for all mapping purposes. (It appears that the provisional co-ordinates were very close to Clarke's adjustment).

Lower order breakdowns were adjusted in county units to the provisional positions for the Irish stations. Each county had, and still has, its' own Cassini projection and county grid, based on foot units to Bar O<sub>1</sub>. This meant in effect that each country had its' own Origin and orientation with no attempt being made to ensure consistency along boundary edges.

About 1900 AD a new series of maps was planned, at a scale of 1:2500 (25 inches to 1 mile), which necessitated the observation of denser secondary and tertiary blocks. These blocks were adjusted in county units and based on the provisional positions for the primary stations. It is possible that this was done to establish a coherent link between the 6 inch and new 25 inch (1:2500) series.

## Retriangulation of Ireland

The new Irish National Grid was based on the Transverse Mercator Projection of Ireland with the following parameters:-

Spheroid:	Airy	a = 6377 563.4m	
		b = 6356 256.9m	
Origin:		Lat: 53° 30' North	
		Long: 8° 00' West	
False Origin:		200 000m West	of true origin
		250 000m South	

Central Meridian Scale Factor of one (S.F. = 1)

The reason for the retriangulation was loss of vital records, bad and lost monumentation, and the inability of the Principal Triangulation to meet modern survey requirements.

Work on the Retriangulation commenced in Northern Ireland (By Ordnance Survey N.I.) in 1950. In 1952, with the completion of the Retriangulation of Great Britain, more equipment and personnel were available and were loaned to O.S.N.I. to observe the first order network. Observations were complete by 1953 and the network was adjusted holding the Clarke 1858 positions of the four prime stations.

The Retriangulation of the Republic was observed between 1962 and 1964. With the advent of the Tellurometer system a scale error of +35 ppm had been detected in the accepted (Clarke 1858) positions of the four fixed Northern Ireland stations. To adjust the Retriangulation of Northern Ireland and the Retriangulation of the Republic into a single unit while retaining the existing large scale mapping of Belfast and eliminating the scale error of the 1952 O.S.N.I. positions an Airy-Hotline scale solution was adopted which introduced the Airy Modified Spheroid as the reference figure for Ireland.

Retriangulation of Ireland Contd.

The adjustment was completed in 1965 defining the Irish National Grid as follows:-

Spheroid: - Airy Modified a = 6377 340.189m  
b = 6356 034.448m

Origin: Lat.: 53° 30' North  
Long.: 8° 00' West

False Origin: 200 000m West  of true origi  
250 000m South

Central Meridian Scale Factor of 1.000 035

The Republic of Ireland implemented the 1965 adjustment and the above values are those currently in use. A further adjustment for all 32 counties (North and Republic) was computed in 1975, this was to upgrade values for internal large scale mapping purposes.

## European Datum (1950) - (E.D.50)

Any discussions of grid or Spheroid would be incomplete without reference to E.D.50. Initially this datum was used to establish a control network for Europe, excluding Great Britain and Ireland. In the 1960's the E.D.50 adjustment was extended to include Great Britain. In 1970 Great Britain carried out a further scientific adjustment of the network (1970 SN values) and these values were further transformed into E.D.50 values. Up to this time Ireland, including Northern Ireland, had not obtained any E.D.50 values for its' national triangulation network. The 1975 scientific adjustment of Irish National Grid was connected to the 1970 (SN) adjustment of Great Britain. E.D.50 values now exist for the first Order Triangulation stations in Ireland and these are compatible with E.D.50 values pertaining for triangulation stations in the U.K.

Co-ordinates are expressed in metres on the International Spheroid, Hayford 1910.

The predominant use of E.D.50 in Ireland is for offshore survey, exploration and development and it is also used to define Median lines.

## WGS 72

The advent of SATNAV made the provision of co-ordinates a little easier in some of the remoter parts of Ireland, even though this required translocation and conversion from the observed WGS 72. It must be understood that the main triangulation was concerned with looking inward and getting the land mapping properly organised. This meant that very often, for offshore activity, stations were not suitably located or indeed even accessible.

## Present State of Cadastre

Ireland, through the Ordnance Survey, produces large scale maps as follows:-

Urban Areas	1:1000
Other Areas	1:2500

In addition the county is covered by a series of 1:10560 (6 inches to 1 mile) mapping sheets. Maps at much smaller scales are produced for travel, recreation etc.

In 1964 a committee set up to advise on mapping requirements recommended that urban areas should be re-surveyed at 1:1000 scale and that the state as a whole should be revised at 1:2500 scale. It was also recommended that these areas be maintained on a continuous revision basis. The programme was agreed in principle and steps were taken to implement this policy.

In addition to the above a 1:5000 scale derived series with contours at 5m intervals was mooted. It now seems that this will not happen but a 1:10000 scale series with contours at 10m intervals will be carried out.

The urban mapping programme (1:1000) is now virtually complete and approximately 25% of the state is revised and currently maintained on a continuous revision basis at 1:2500 scale.

Urban maps and revised 1:2500 scale maps are overlaid with the national grid co-ordinate system, giving printed corner values on each sheet.

Older sheets at 1:2500 scale and 1:10560 scale do not have a grid overlay as they are still based on the county system, however, national grid co-ordinates are available for the corners of each sheet from the Ordnance Survey.

### Present State of Cadastre Contd.

Overall, whilst up-to-date areas are very good, the remainder of the country is poorly mapped. Many structural and development changes have taken place and these are not mapped at all in many instances. The main reason for this is lack of resources, both in finance and personnel.

The upsurge in activity and development in Ireland, particularly since the early 1960's, has resulted in major road developments, large housing estate/industrial estate developments, major changes in land usage and significant movement of population. This has resulted in the loss of many bench marks and also many of the old county triangulation points. It is fair to say that the destruction rate, in some areas, outweighs the replacement rate. According to the Ordnance Survey the density of Bench Marks is about one third of what they would recommend and is actually getting worse.

### Vertical Datum

On the new sheets, both 1:1000 and 1:2500 scales, vertical datum is shown as Malin Datum (new Ordnance datum) based on Mean Sea Level observations at Malin Head. This unites the Republic and North of Ireland on a common datum. Previous datum was Ordnance Datum (Poolbeg) Dublin, approximately 2.7 metres below present datum, this is the datum currently shown on all old (unrevised) series maps, including the 1:10560 series.

New projects tend to use Malin Datum but many people are reluctant to change over because of the lack of continuity in datum in long running projects.

## Organisational Structure

The Ordnance Survey, which was established in the 18th century, is the National Mapping agency for the Republic of Ireland. It is responsible for maintenance and extension of Horizontal and Vertical control throughout the Republic of Ireland. Staff currently consists of approximately 200 people in central office and about 160 people in field offices around the country.

The Ordnance Survey is responsible for a wide range of activities including the following:-

- Large Scale Mapping
- Small Scale Mapping
- Aeronautical Charting
- Aerial Photography
- Commercial Surveying, Mapping & Printing
- Geodetic Surveys
- Archaeology and Place Names

Mapping is the major activity of the Ordnance Survey and long term objectives are based on the 1964 recommendations which were:-  
Establishment of a National Grid for all surveying and mapping activities.

Large scale mapping at:-

- 1:1000 for urban areas.
- 1:2500 for rural and urban areas.
- 1:5000 derived mapping with 5 metre contours for all Ireland.

Small scale mapping for all of Ireland at:-

- 1:25,000
- 1:50,000
- 1:100,000
- 1:250,000
- 1:500,000



Adoption of Mean Sea Level as Height Datum.

Large scale mapping to be a priority.

The Ordnance Survey's mapping activities are confined to mainland with professional advise for hydrographic surveying. They do not in fact have a capability for hydrographic surveying.

The present Director of the Ordnance Survey is an Administer and the immediate subordinate posts of Assistant Director and Deputy Assistant Director are filled by qualified engineers recruited or seconded from the Commissioned ranks of the Corp of Engineers.

The Ordnance Survey comes under the Dept. of Finance.

For full list of maps published by Ordnance Survey see Appendix II.

## Development Trends

Urban areas (population greater than 1000), as previously stated, are mapped at 1:1000 scale, as each area is complete a Field Survey Officer is allocated to that area to keep changes mapped and the sheets up to date. Appendix I.

Large scale mapping at 1:2500 is the next priority. All of Ireland, except for some mountain, moorland and island areas, has 1:2500 scale maps which were completed in the early 1900's. Most of these sheets are still on county grid. Over the coming years these maps will be revised and published on the National Grid. To date approximately 25% - 30% of 16,000 maps at this scale have been revised and published on National Grid. See Appendix III.

One of the difficulties to be faced shortly after the turn of the century will involve the shortage of manpower as most field staff will by then be involved in revision of updated sheets.

Since January 1989 the Ordnance Survey has gone completely digital. All maps are therefore produced from a digital data base. All revisions and updates are input in digital format. Areas that were updated and mapped prior to digitisation are now being scanned into digital format.

The aim is to create two databases as follows:-

Large Scale, 1:2500, data base for cadastral, engineering and planning use.

Small Scale, 1:50000, data base for planning, resource management, tourist and other similar applications.

Ultimately this will lead to a fully coded data base with Geographic Information System capabilities. The main users for such a database would be Utilities, services and Government departments.

### Development Trends Contd.

The Ordnance Survey would like to accelerate the updating and production of 1:2500 and 1:50000 sheets particularly, but suffers from financial constraints leading to shortage of staff.

On the 1:50000 database one sheet is complete with two more going to print in the next 3 - 4 weeks, a further two are nearly ready. This is from a total of 71 sheets and the estimate is that it will take another six to eight years to complete the series.

On the 1:2500 database, at the present rate of progress, all field staff will be occupied with revision by about the year 2005. A significant increase in staff is necessary in the Ordnance Survey for it to meet its' objectives.

### GIS Potential

The digital topographic data bases of the Ordnance Survey, if properly structured, will be a foundation on which all thematic information system of Ireland will be developed.

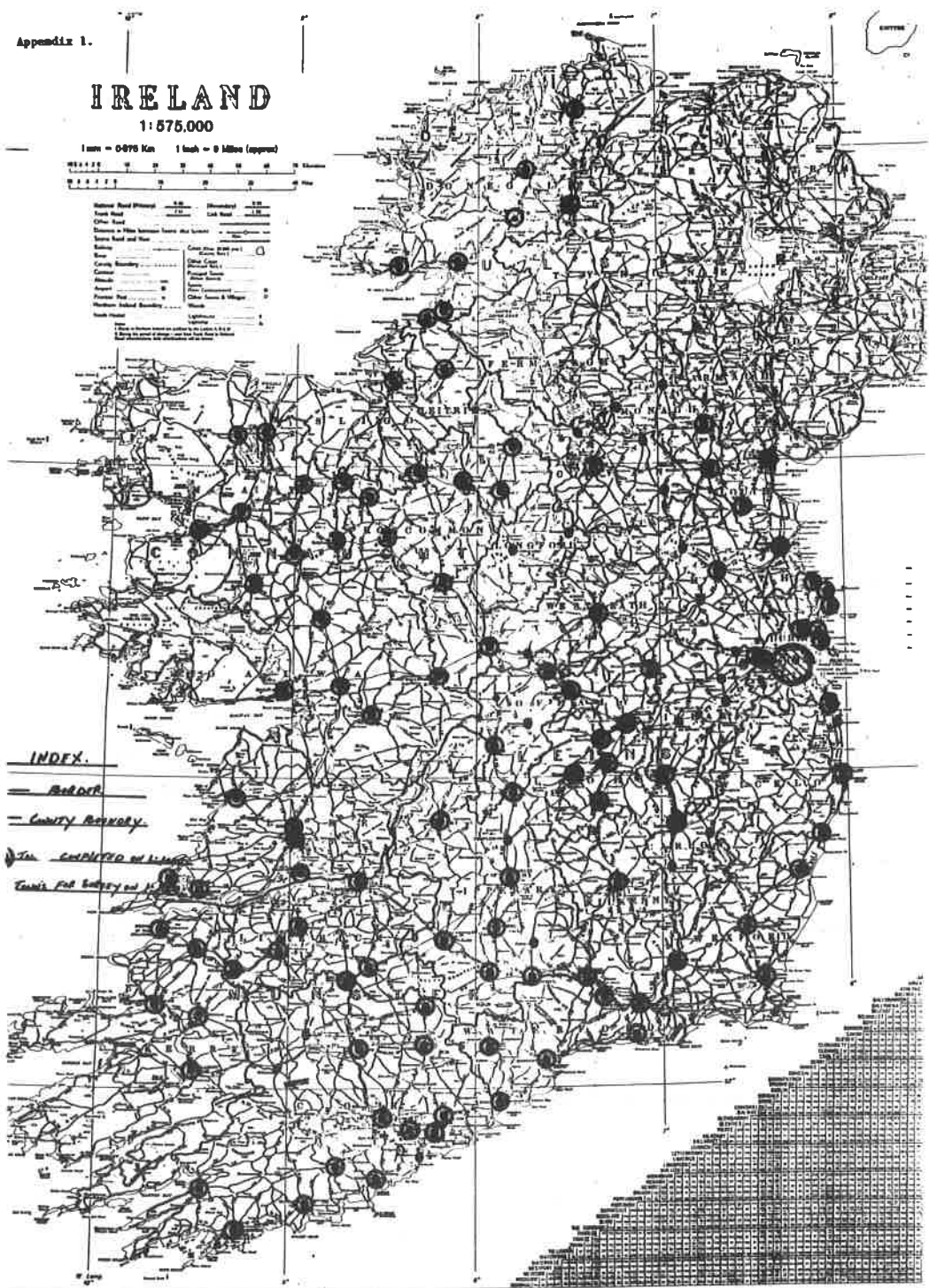
# IRELAND

1:575,000

1 inch = 0.076 Km 1 inch = 0 Miles (approx)



National Road (Primary)	1:25	Secondary	1:10
Town Road	1:15	Local Road	1:10
Other Road	1:10		
Railway & Light Railway	1:15		
Canal	1:15		
County Boundary			
Urban Area			
River			
Lake			
Forest			
Water			
Mountain			
Spot Height			
Lightning			



## INDEX.

- == BORDER
- COUNTY BOUNDARY
- Town
- Capital of County
- Capital of County

Revised and printed by the Ordnance Survey and Published by the Director of the Ordnance Survey (H.M.S.O.)

APPENDIX II

Mapping Sheets presently published by the Ordnance Survey

<u>Scale</u>	<u>Use</u>
1:1000	Large scale urban mapping.
1:2500	Large scale mapping country-wide.
1:10,560	County sheet series.

Users of the above series are Government Departments such as Valuation Office, Land Registry, Local Authorities, the private sector and general public. Maps are available from Ordnance Survey or their agents throughout the country.

1:50,000	Small scale base map for Ireland, resource management.
1:100,000	Resource management.
1:250,000	Basis for tourist maps.
1:500,00	Tourist maps.

Small scale maps are available from Ordnance Survey, tourist offices and many bookshops.



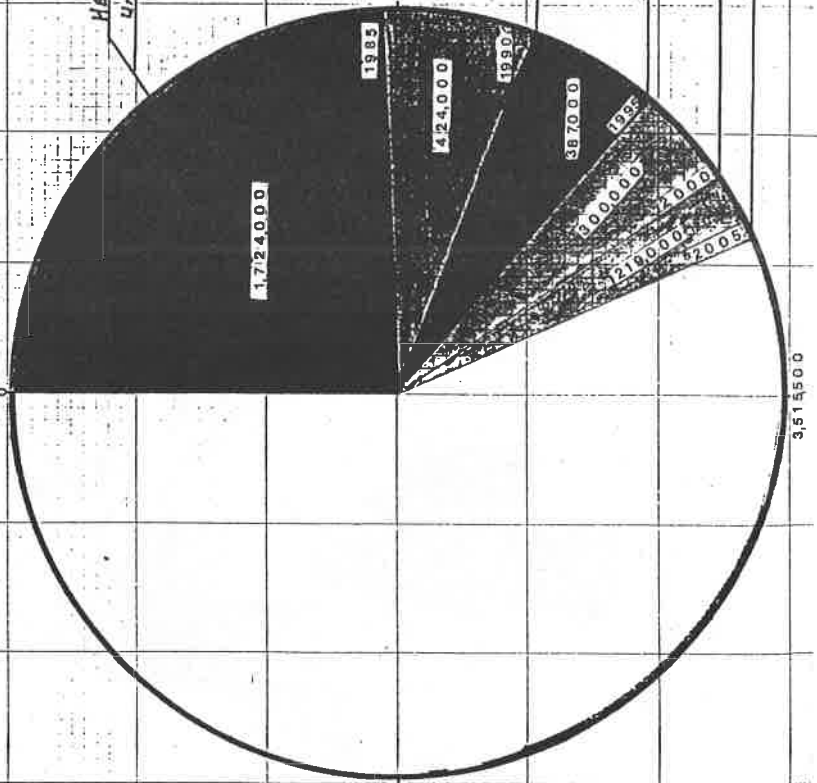
Appendix 111.

AREA of ~~STATE~~ 7,031,000 HECTARES

RURAL REVISION

7,031,000

HECTARES COMPLETED.  
UNDER CONTINUOUS REVISION



5,273,000

2,148,000 HECTARES.

2,553,000 HECTARES.

2,835,000 HECTARES.

3,054,000 HECTARES.

3,514,500



**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
**MULTIFUNCIONAL**  
  
— SICRUM —

LIS AND GIS:  
Working technologies and methodologies at italian  
cadaster.

G. CONIA

ITALIA

LISBÓA... ENCHAL-20 a 25 Novembro de 1989



**SEMINARIO INTERNACIONAL SOBRE CADASTRO  
RUSTICO E URBANO MULTIFUNCIONAL**

**SICRUM**

**LISBON, 20-21 NOVEMBER 1989  
FUNCHAL, 22-25 NOVEMBER 1989**

**LIS AND GIS:  
WORKING TECHNOLOGIES AND METHODOLOGIES  
AT ITALIAN CADASTER**

**G. CONIA, CARTOGRAPHIC GROUP MANAGER  
A. BOTTARO, CARTOGRAPHIC GROUP ASS. MANAGER**

**SOGEI S.p.A. - CADASTER PROJECT  
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TEL. ROMA/54851  
FAX ROMA/5015541  
TELEX 611284 sogei I**

**ABSTRACT:** THIS PAPER DESCRIBES THE EXPERIENCE OF SOGEI S.p.A. IN THE CONSTRUCTION OF L.I.S. AND G.I.S. BASED ON NUMERICAL CADASTRAL CARTOGRAPHY.

### **Introduction**

SOGEI S.p.A. is a company of the FINSIEL Group, the IRI financial corporation for informatics.

The company was established in 1976. In that same year we made our first agreement with the Italian Ministry of Finance, to develop and manage the Tax Information System (Anagrafe Tributaria).

Since then SOGEI S.p.A. has implemented automation projects for the General Directions of Income Tax, Indirected Tax and the Organization of Taxation Services.

The systems that were developed, although independent from one another, constantly exchange information, and so act as one large system: the Information System of the Ministry of Finance.

### **Sogei and the Cadaster Project**

SOGEI and the General Direction of Cadastral Survey (Direzione Generale del Catasto) have been cooperating since 1984.

When SOGEI began computerization, problems with the Cadastral registry were serious enough to raise doubts about the feasibility of such a complex automation project in a reasonably short time.

Both the shortage of time and the extraordinary number of interdisciplinary components to be coordinated could have discouraged taking on the task.

Many requirements were unusual for an informatics-oriented company. For example, activities related to data acquisition, including recovery of backlog documents, are extremely relevant to giving each Cadastral Office a turnkey system to serve the community.

Moreover, the Cadastral Office now stores and handles cartographic material in which the numerical acquisition and updating represent an advanced aspect of the technological scenario.

The need to equip each Cadastral Office, while operating within the constraints of preexistent structures was a particularly demanding task.

These and other activities were carried on along with the daily functioning of the office without causing interruptions in a working process undergoing transformation from traditional and low-technological practices to automated and highly technological ones, unusual enough features for a Public Administration.

Together with the purely technological transformation one should also consider the need for professionally readdressing and converting human resources.

We can now say that the challenge has been met: upgrading the first District Cadastral Office, the Florence pilot Office, was completed in only eighteen months.

Our company has proved itself capable of automating six Cadastral Offices a month. We forecast that we will finish automating 93 District Offices by 1991.

These ambitious targets could not have been reached without the constant dedication of the General Direction of Cadastral Survey and of all the personnel of the offices, both to the setting of the targets themselves and to the supervision of the work.

We firmly believe that credit for success with the Cadaster Project must be attributed to having put together the technical-administrative competence of the Public Administration managers and officers with the specialized technical skills proper to private enterprises.

It should anyway be recognized that Cadaster, which was once seen as an Institution operating in near-collapse conditions and merely capable of offering a conventional product, has stepped up to a status legitimating higher expectations going beyond its institutional tasks. We are referring to the new activities in the fields of environmental control and of the wider field of land management.

The premise on which these new demands are based, is no doubt the availability of a reliable data base on a national scale.

For example, the existence of digital cartography checked for quality by rigorous geometrical and topological tests and by a constant and certified updating, is something that goes beyond merely cadastral applications and that makes itself available for more ambitious uses.

A step in this direction is represented by the choice made when the National Transfer Format of the Ordnance Survey of England was selected to transfer cartographic data to other Organizations. This standard is well known as one of the most widely accepted in Europe today.

An interesting new service is the possibility given local authorities and professional offices to directly transfer data on a magnetic support, and remotely retrieve data from the digital archives of the Offices.

These targets imply a quality leap within the whole automation process, bound to become attractive to the government and to the private markets as well as to actively contribute to the general modernization of society.

### Automation in progress

All Italian Cadastral Offices are equipped with Personal Computers for managing certification of topographic update deeds.

In 1991 every office will process urban and rural property transactions by computer.

Geographic Information Systems for one third of all Cadastral Offices, in addition to the existing Land Information System, will be operational by 1992.

As far as archive acquisition is concerned, all archives containing rural and urban administrative data have been created. Thirty thousand map sheets have been digitized. We have now achieved a rate of 20,000 map sheets per year.





**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
**MULTIFUNCIONAL**

— SICRUM —

POLISH CADASTRE AND ITS EXPECTED DEVELOPMENT

ANDRZEJ HOPFER

POLONIA

LISBOA... ENCHAL-20 a 25 Novembro de 1989

### Polish Cadastre and its Expected Development

Polish cadastre plays an important role in country development, especially in its agriculture. Poland has the area of 312 000 sq km, of which about 60% is under agricultural cultivation. 76% of agriculture area is in hands of private farmers. Private farmers use the agriculture land divided into about 2900 individual holdings, with an average of 5 ha of agriculture land and average number of parcels per holding amounting to 5 i.e. total number of parcels registered by cadastre in Poland amounts to 20 mln. Situation existing according the ownership parcels boundary and area are **continuously** changing. Those changes amounts to 600 000 yearly i.e. 0,2 change per 1 hectar and per 1 year. This very area and situation needs a lot of information and safety, assured by the cadastre.

European cadastral systems have a long tradition and a vast range of scientific literature behind them. Having analyzed particular state systems it can be stated that they are in most cases derived from original systems dating either from the end of the 18th century or from the first half of the 19th century. These systems are characterised by similarities in construction, compilation of information and stages of development.

In most cases the state office for land cadastre originally was set up to register land for the purposes of taxation. So the functions of this state office was to register all land in the state to attribute it to both individuals or land owing associations.

In subsequent years, the work and significance of the cadastre increased so that at present somewhere it is transformed into a land information system.

With the increasing importance of the cadastre there was a corresponding growth of the range of information on land and of the standard of organization and technology of running the cadastre.

The systems working mostly at present, supply a variety of data on the owner and his relationship to the land for the purposes of planning, land management, taxation, statistics, etc.

Modern models of the cadastre are characterised by the following features:

- 1) completeness and up to date nature of information on land and its owner or user,
- 2) adequate accuracy of data,
- 3) univocal character of information regarding the interpretation of data and the uniform nature of cadastral documentation,
- 4) high technical value of documentation (maps and registers),
- 5) efficient operation of the system for data modernization and the reconstruction of cadastral documentation.

A certain traditional model of the cadastre which can be found in national systems to a greater or smaller extent is defined in the above listed features.

Putting aside detailed characteristics of this model one should add that it is distinguished by its high stability. Many factors are responsible for this, the most important amongst them being:  
- structure of the model i.e., the subject of interest being kept within certain limits: landowner, area of interest, time,  
- the relationship to title records,



- the manner of technical interpretation of data on land and its owners based on the application of maps and related with them records,
- constant renewal of the land cadastre.

To control, manage and prepare decisions or carry out prognosis on the treatment of natural resources, present and future needs to obtain information on land are particularly high and even go beyond the possibilities which have been hitherto only the concern of cadastral systems.

All over the world present experience has shown that there exists high influence on the traditional workings of national systems for land cadastre.

The state offices are subject to a constant process of improvement and modernization. These processes cause both changes in models and changes for an improvement of unitary features in the cadastral systems.

Thus, taking into consideration the future development of the land cadastre, the following distinctions should be made:

- processes leading to the transformation of the cadastral systems into state land information systems,
- processes which derive from technological progress and cause technical and organizational changes.

The collection of land cadastre data has, for several years, undergone slow but systematic changes, as have the function which this state office fulfils.

In many national systems further information on land has been added to the traditional model of the cadastre.

Besides the traditional collection of information the following new features were also included:

- data on the value and quality of the soil which plays an important role from the point of view of land conservation,
- temporal and spatial information on land which is important from the point of view town and country planning,
- data on the structure of ownership due to the introduction of a register unit.

Moreover, experiments in organizing "branch cadasters" are also commonly found and have as their principle aim the supply of oriented information usually including:

- the degree of land investment, e.g. building cadastre or cadastre for industrial plants and so on,
- natural resources and conditions for their exploitation supported by examples on registration of mining land or improved land (so called water cadastre) and the like.

For the purposes of planning and consolidation of land property, information on the relationship between owner and its land is gathered separately in addition to existing cadastral information on the structure of land cultivation.

The examples above show that up to now, trends towards modernization move in two principal directions:

1. Development of the traditional model for the cadastre with the aid of new informations and data according to the state economy's level requirements;
2. Building up of new systems of information about land which, to a greater or lesser extent, will be incorporated into the land cadastre operating at present.

As experience has shown this trend in the development of the cadastre proved to be unsatisfactory; in the first case owing to the limitations of how much could be absorbed, in the second case because of the rather strict relationship among branch cadasters.

Contemporary investigations tend to the establishment of national land information systems or rather a data bank which would contain a data collection of land, categorized according to its subject. This data collection would be different from the point of view of its details, degree of accuracy and level of actuality. The building up of such systems is based mainly on the use of computers combined with the most up to date achievements of cartographic works automation. These approaches move towards the building up of an open information system with possible further enlargement in the range of information on land or greater specification of data without necessarily making changes in the system.

Besides the data which is presently contained in the system of the land cadastre, information on geo-topographical characteristics of land, deposition of natural resources, areas exposed to devastation, and reclaimed areas would be included.

Such an approach to the problem throws new light on the cadastre.

The inclusion of the cadastre in a state information system means taking an active role i.e. transformation of data and not as it has been up to now, passive registration of changes that have taken place on the land surface.

The present state on scientific research does not allow for an explicit definition of the structure of such an information system on terrain. Scientific efforts still concentrate on the improvement of a model. The outcome of this research depends not only on the scientific and technological progress in geodesy and surveying but also in electronics, mathematics, sociology and so on.

In information models, which have already been constructed, full utilization of national data on the land cadastral system and ideas and definitions are usually included.

A wide conception of data and information collection would include the following:

- data on the outlay of the plot with surface distribution of the constituent factors (the area of cultivated land and its quality) together with a detailed, surveying description of its location,
- data on the landowner, tenant or user,
- data on technical equipment of the area (water, gas, electricity, etc.),
- data on the building,
- data on the relief of terrain including information about sloping areas,
- data on cultivated areas under threat of disuse and the reasons for this,
- data on areas with soil devastation under the threat of erosion,
- data on areas of cultivated farmland and characteristic of natural environment,
- information on water and climatic conditions,
- data on land and water communications,
- information of an economic and statistical nature.

The list presented above does not of course exhaust every possibility of an information system, neither does it explain the accuracy of such a collection.

It provides with a view of the diversity of such a data collection and the various stock-taking techniques, differences in accuracy and updating which would be required for completion of a collection.

Characterizing the changing trends of cadastral systems, one has not so far mentioned the model approaches formed through technological progress which can be classified as an attempt to gradually work out information systems of a transitory nature.

The following are the basic constructional formulae of this model:

- a) open character of the system i.e. the planning and carrying out of the cadastre in a way which enables the range of information to be gradually enlarged,
- b) satisfying the demands of as many customers as possible;
- c) facilitating the gradual transition from cartographic and descriptive parts to digital documentation,
- d) facilitating the gradual modernization of the cadastre into a national information system.

In any given country the accomplishment of the formulae enumerated above is dependent upon the executive possibilities and available technical means.

Technological progress in the field of surveying and cartography has created a further set of problems when proceeding with the cadastre. It is reflected both in the supplementary surveying and in the renewal of cadastral maps.

In the case of the additional surveying, several modern methods of surveying have been introduced—even for a small area—instead of classical supplementary surveying. Up to date technical constructions of geodesic instruments assure necessary accuracy, as high as was during classical approach. The frequency of changes on the earth's surface and the extent of such changes are at present markedly greater and so demands more effective methods of updating cadastral data. Besides the introduction of quicker and more economical surveying techniques, in supplementary surveying—photogrammetry and remote sensing is found to have a greater application.

The factors discussed above cause the differences between supplementary surveying techniques and the process of renewing cadastral maps to be less extreme. The updating of work in rural land administration or the dynamic changes taking place in urban areas, necessitates the renewal of cadastral documentation in either the whole or parts of a cadastral unit. In many countries - and in Poland as well - there is a need to utilize old maps in the cadastre. These maps may vary in accuracy, scale and content. The use of photogrammetry is indispensable in this type of work. In the process of renewing cadastral maps surveying and administrative operations are also utilized. Such a principle has been introduced for example in Poland where the task of complete integration was carried out on the cadastral documentation. The final effect of this integration also means the renewing of cadastral maps.





**SEMINARIO INTERNACIONAL**  
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— SICRUM —

GEOGRAPHIC INFORMATION SYSTEMS DEVELOPMENT IN IRELAND

MICHAEL J. HABERLIN

REPUBLICA DA IRLANDA

LISBOA... ANCHAL-20 a 25 Novembro de 1989



"GEOGRAPHIC INFORMATION SYSTEMS DEVELOPMENT IN IRELAND"

THE INTERNATIONAL SEMINAR FOR  
URBAN & RURAL CADASTRE

LISBON - NOVEMBER 1989

Paper presented by  
M.J. Haberlin ARICS

## "GEOGRAPHIC INFORMATION SYSTEMS DEVELOPMENT IN IRELAND"

### Introduction

GIS are systems which refer to the storage, retrieval and exchange of information which is locationally specific. This would include data on property, population, infrastructure, services, planning, valuation, soils, land use and other, including recreational, usage.

The need for a Geographic Information System or GIS can be expressed as follows:-

"They (the Government) must have available up-to-date information about the country's economic performance, its' population, its' natural resources, land inventory, infrastructure, wealth and the health of its' living environment. It is a necessary condition for a flourishing nation that access to information be widely available and current." Feasibility Study on the Computerisation of Land/Marine Related Information for the Republic of Ireland.

As can be seen from the foregoing the essential ingredient in any GIS is an adequate database. At this time, in development terms, that means a digital database. Insofar as Ireland is concerned this puts the onus firmly on the Ordnance Survey who are responsible for all mapping in the Republic of Ireland. Even though the Ordnance Survey have already gone over to a digital system it will be some considerable time before a complete system is in operation.

Notwithstanding the above, main centres of population are either digitised or in the process of being digitised. Dublin, by far the largest urban area should be completely digitised (in topographic form) by mid 1992. This does not mean that all data will be digitised, but only that provided by the Ordnance Survey, i.e. topographic base maps.

At this point it is fair to say that computers play a very important role in GIS. Without computers this whole area could not have developed as it has done.

A conceptual model with possible application is shown in Figure 1.

#### Present Position

As a result of the report produced by Canadian consultants in 1966,<sup>1</sup> the later report to the United Kingdom Secretary of State for the Environment of the Committee of Enquiry into the handling of Geographic Information, and the progress of the Cork Joint Utilities an Irish GIS Implementation Project was established in September, 1987.

The object of the Project was to submit to the Minister for Science and Technology a report on GIS by mid 1988.<sup>2</sup> Membership of the Project was from the following:-

- Ordnance Survey Office
- Land Registry
- Cork Joint Utilities
- An Foras Forbartha
- Eolas
- Dublin Corporation

Later additions to the Project were Limerick Corporation, the Local Government Services Board and the Electricity Supply Board. The Project examined GIS under various headings, GIS and Standards, GIS and Finance, GIS and the Computer, GIS Commercial Opportunities and GIS - Implementation and Co-ordination.

Present Position Contd.

The recommendations of the GIS Implementation Project were as follows:-

1. That the Government adopt, as a national policy, the implementation of digital Geographic Information Systems.
2. That the Minister for Science and Technology establish an IGIP Forum, initially for securing agreement on standards in areas such as parcel identification, field surveys, land use codes, etc.
3. That the Forum also have a major role in the promotion of GIS awareness and in advancing its more general application.
4. That the Ordnance Survey accelerate its programme for the conversion of maps to a digital base.
5. That public utilities (Telecom Eireann, Electricity Supply Board, An Bord Gais, etc.) be encouraged to commence the computer-based recording of information with particular emphasis on Dublin.
6. That funding from European or other sources be secured to expedite the implementation of this policy.
7. The international opportunities that digitisation of GIS data represents should be pursued.

In many ways the recommendations made by the Project sum up the current situation by default. By examining what needs to be done one can draw one's own conclusions as to what is not being done.

There are many state or semi-state bodies that have invested in computers and systems that fulfill their own requirements, see Appendix One. However, there are customised for particular uses and are not all necessarily related to a common 'grid' or database.

Problems that need to be addressed in compiling a satisfactory GIS for multi purpose agency work include:-

Standards:

1. Specifications, including accuracy of map information.
2. Accessibility, computer to computer.
3. Communication - systems interworking.
4. Standard Geodetic Parameters.
5. Co-ordinate standards, including accuracies and spheroid used.
6. Cartographic Standards to determine plottable accuracy and an estimate of reliability.
7. Marine - Hydrographic Standards.

Corrections to database material:

A suitable and acceptable format must be available to introduce major area up-dates or corrections to various user agencies. With the adoption of an agreed net-working system this should not be a major problem.

Development of full digital database:

This is paramount to the success of GIS development. In an earlier paper "Cadastral Survey in Ireland" reference was made to the present state of digital mapping. As can be seen from that there is a lot of work to be done before there is a database of sufficient quality to fully integrate with other collected data.

Presently on the 1:1000 scale maps a single point has an accuracy of (RMS) 0.5 metre, on the 1:2500 scale maps this is reduced to (RMS) 2.0 metres (as against the U.K.'s 0.5m). These figures are not compatible with recommended accuracies put forward in the IGIP report, where they are recommending that "three decimal places of a metre should be used to hold co-ordinates."

Requirements of a suitable database:

1. A unified national grid, to anchor the system on a common reference grid.
2. Horizontal and vertical control on a digital database sufficient to support a national reference grid and to satisfy the majority of users.
3. An up-to-date digital property ownership record.
4. An up-to-date digital record of title data for all properties in the Republic.

The above can then be utilised by various agencies to provide a coherent base background for their own requirements. Overlays with various user information can be "layered" to access what particular information the user or client wants, Figure 2. For example, the Electricity Supply Board would be particularly interested in details of its' own network, primarily, with a secondary interest in other services where they overlap on the ground. See Figure 3 "The likely shape of GIS in Ireland" which shows the interaction of the various agencies.

### Cost Effectiveness of GIS

There are many advantages in GIS the prime ones being savings in actual time, savings in duplication and minimum disruption to roads and services by co-ordination of utilities. A typical cost-benefit curve is shown in Figure 4. This shows that major benefits of GIS manifest themselves in years 7 to 8 with a sharp increase in benefit after year 8. It has to be stated that some projects may not have a positive payback period at all.

The cost effectiveness in many instances may be hard to define but where I would see it as being most effective would be in a quick supply of accurate information. Access to information between user services would enable planning to produce a common approach to such items as road openings, provision of services to estates or new development areas and so forth. Road opening, in itself a simple task, must surely be the same in any country, roads closed or restricted to traffic, one-way flows, delays and all the costs and frustrations involved. Dublin is no different to any other capital city, heavy traffic, one-way streets, many road repairs or openings for services and the attendant delays. In fact, just recently a trial run showed that it takes 46 minutes to cross Dublin from North to South, a distance of approximately 11 miles. This state of affairs led to a Dail Committee on Public Expenditure report being highly critical of street openings in Dublin. A suitable GIS could have substantially reduced these openings with interaction between the various utilities and local authorities. This is just one possible example of the system in action.

### Current Developments

The Cork Joint Utilities is the first GIS multi-user project in Ireland. Presently in the planning stages is the development of a joint utility for the Dublin area. It is hoped that European Regional Development funding will be available for the establishment of this project. It is proposed that this utility will also incorporate the cities of Limerick, Waterford, the Borough of Duniaoghaire and the utilities of ESB, Telecom, the Gas Company and of course the various authorities in the Dublin area.

The Implementation of such a utility would be a major step forward in GIS development in Ireland. One party missing from the above list is the Ordnance Survey - they are the key organisation in this projected development. Without a digital database drawn from the digitised topography there is no reference grid on which to hang other data.

The above, whilst covering areas of major population, still leaves a large part of the country not covered where large scale digitisation will probably not take place for some considerable time. It is planned however to digitise existing Ordnance Survey maps of 1:10560 scale, or as they are sometimes referred to as county 6 inch sheets. One must question the decision to digitise from existing sheets of this scale and antiquity. Results of such digitisation are intended primarily to cover ESB, Telecom and Gas networks in the country.

Perhaps undue reference has been made to the utilities and local authorities, there are other, very important, areas in which GIS has a major role to play. These areas are land ownership, land registry, census, urban and rural planning and socio-economic data.



## Current Developments Contd.

Where land ownerships / boundary definition is concerned, for the purposes of registry, there will have to be a major improvement in mapping procedures and accuracies. At present the situation is anomalous with no set standards as regards to site mapping and equally no check on the professional qualifications of those submitting such maps. The Central Statistics Office would benefit enormously from a proper GIS; with access to a national land information system the C.S.O. would be able to relate thematic data such as social, soils, forestry and utilities etc. to the basic data of topography and land ownership, all of which is on the reference grid. This would provide a powerful tool for data analysis.

## Conclusion

An acceptable standard with agreed accuracies should be adopted for all GIS development work. With the existing Irish National Grid a suitable reference grid exists, however, it is not of sufficient quality, even in areas which are currently "gridless" to fulfill the functions as set out in the two reports referred to earlier.

The success of GIS in Ireland will depend on there being leadership from the top (i.e. the Government) down and suitable funding to implement, first of all, an accelerated up-dating and digitisation of Ordnance Survey sheets, and secondly the practical setting-up of GIS.

In the past setting up of committees has not really achieved a lot, it was seen more as a further postponement of the event, whatever it might be. It is significant that in a developed country, in Western Europe in 1989, there is no national charting agency. We still depend on charts produced by the British Admiralty, some of which date to c 1840.

I would like to think that this time we will get it right as the ability, expertise and will is there. We will only do so with full Government backing.

ACKNOWLEDGEMENTS:

1. Feasibility Study on the Computerisation of Land/Marine Related Information for the Republic of Ireland.
2. IGIP "Geographic Information Systems in Ireland", Report to the Minister for Science and Technology by the Irish G.I.S. Implementation Project.

CONCEPTUAL MODEL / APPLICATION

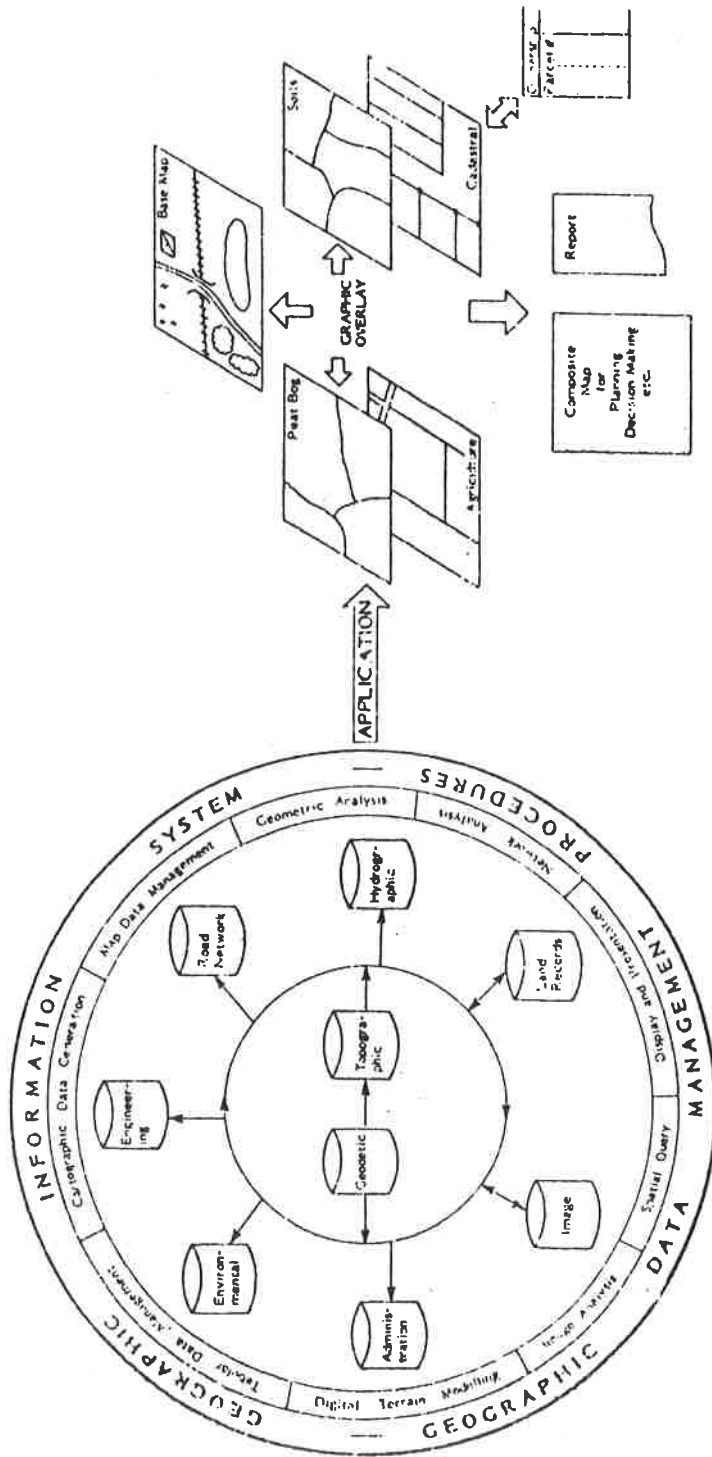
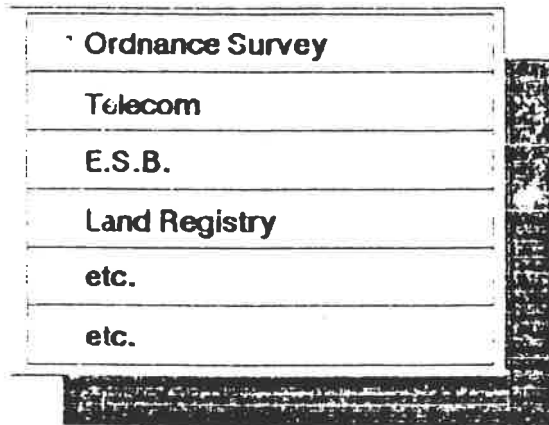


Figure 1 (The Computerisation of Land/Marine Related Information for the Republic of Ireland)

Figure 2



Not a single, massive data bank but .....

a series of separate intercommunicating systems operating within agreed organising principles.

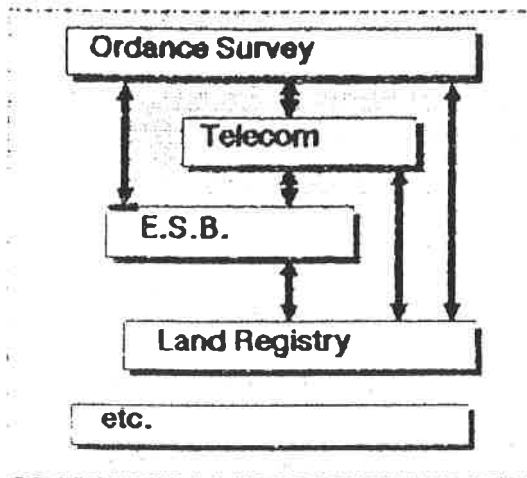


Figure 3

The likely shape of GIS in Ireland

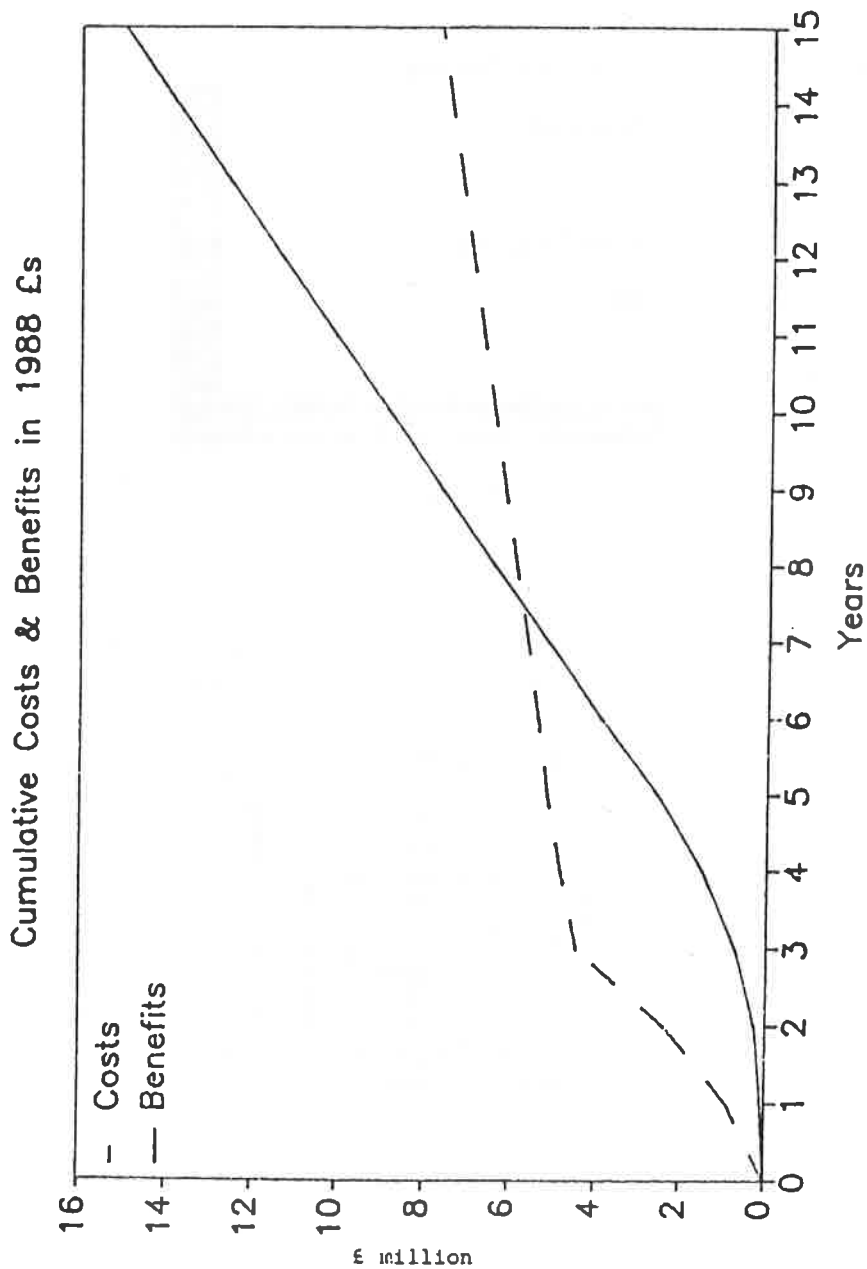


Figure 4

Typical Cost Benefit Curves for GIS

## APPENDIX I

### Some Computerised Systems Currently Operational in Republic of Ireland

#### 1. Ordnance Survey:

Commenced automation of its' Engineering Survey in late 1970's. Has now been a user of Digital Information Systems for 10 years and the following summarises their experiences:-

- (a) All large scale mapping is now digital and the system can provide a variety of maps from a large database. Databases are, however, not yet complete.
- (b) Production has improved by an order of 4:1.
- (c) Costs have improved by 2:1, this is due to techniques employed to digitisation and editing in map production.
- (d) Some software costs can not be foreseen and can be quite high.
- (e) Data input is the single biggest cost.
- (f) User base is small - this is related in no small way to population.
- (g) Lack of appreciation of the efforts involved and the time spent in implementation and training.

#### 2. Land Registry:

At present the database system includes information for the Dublin region and some other areas. To mid '88 approximately 15% of Land Registry folios were on the database system.

3. The Electricity Supply Board (ESB):

The ESB controls 66,000Km of overhead powerlines at 10,000v, and 135,000 transformers to break the voltage down to 220v for normal household use. About 98% of overhead lines are digitised and kept up-to-date.

4. Cork Joint Utility Database Project:

This group was set up in September 1984 and consists of the following:-

Telecom Eireann (National Telephone Company)  
Electricity Supply Board  
Cork Gas Company  
Cork Corporation  
Ordnance Survey

Data capture proper started in 1987 and is now well advanced.

5. Irish Forest Service:

The Irish Forest Service has invested in quite a large GIS set-up. The system is used to store and analyse information on State forest land holdings, roads, soil types, forest crops and harvesting plans. In the future it is planned to use the network analysis facilities which are incorporated in the system to help the forest road and extraction route planning, transport cost minimisation, etc.

6. Bord Na Mona (Irish Turf Board):

Responsible for managing peat resources. Information is digitised using Ordnance Survey 6" maps of the area and other input survey data.

7. Geological Survey of Ireland:

Currently developing a system for the storage and retrieval of geographically located point data, e.g. boreholes and mineral areas. Data will be translated, via a digitiser, into National Grid Co-ordinates and stored on a database. Input will be on 1:10,560 and 1:25,000 scales mainly.

The Geological Survey of Ireland prepares all maps for State Prospecting and Mining licences and leases on 1:20,000 maps and 1" townland index maps where possible. Approximately 40% of the country is covered by Prospecting Licences.

8. Irish Auctioneers and Valuers Institute:

A property information system called LINK has been installed to connect offices of auctioneers throughout the country. LINK is a computer based property listing service designed to help conclude property transactions efficiently and economically .

9. University College Dublin (UCD):

UCD is involved in several projects based on land use and National Resource information and is currently involved in a 2 year contract for the European Commission to develop a National Resource Information System for Ireland. The information system will consist of economic, techno-economic and relevant parameters describing the main characteristics of Irish natural resources including: Energy, minerals, forestry, demography, water resources, air resources and agriculture. Already a computerised system of Forestry and Demographic information has been implemented.



10. Trinity College Dublin (TCD):

There are a number of activities at TCD, some closely linked to campus companies, which are concerned with developing research, teaching and consultancy in the area of GIS. These include: a multidisciplinary research programme in GIS, plans for introducing the teaching of GIS applications and testing of appropriate GIS in tourist information systems and geological consultancy contracts.

11. Vehicle Tracking - Dublin Bus:

Dublin Bus operates an Automatic Vehicle Monitoring system. It is based on a data transmission system using a single set of VHF frequencies, which has been super-imposed on the existing voice control system which uses base stations located in various depots. It is the largest such system in existence and has dramatically improved scheduling and time/mileage lost due to traffic congestion.



**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
**MULTIFUNCIONAL**

— SICRUM —

**ITC EXPERIENCE WITH LIS/CADASTRE COURSES**

**J. KURE - F. AMER**

**(ITC) HOLANDA**

**LISBOA - ANCHAL-20 a 25 Novembro de 1989**

**INTERNATIONAL SEMINAR ON MULTIPURPOSE  
RURAL AND URBAN CADASTRE (SICRUM)  
LISBON, PORTUGAL : 20 - 25 NOVEMBER 1989**

**ITC EXPERIENCE WITH  
LIS/CADASTRE COURSES**

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# ITC Experience with LIS/Cadastral Courses

*J. Kure - F. Amer*

## 1 Introduction

Although the LIS/Cadastral Course is only in its fifth year, the ITC was nevertheless amongst the first educational institutes in the world to introduce formal education programmes in the GIS/LIS field and so it is perhaps appropriate to reflect on the experience gained at an international Seminar such as this.

## 2 Initial Design of GIS/LIS Courses at ITC

The development and promotion of GIS was perhaps quite natural at an institute such as ITC, which since its inception in 1951, has had as its traditional fields of teaching and research, the phases of collection, manipulation and presentation in map form of data related to locations above, on or under the surface of the earth.

Major developments in the early 1960's which lead towards the rise of GIS's were the introduction of digital mapping technology and remote sensing systems. The latter provided digital images that allowed the survey of a multitude of thematic aspects of the earth's surface, but required digital processing.

Digital mapping was initially directed towards speeding up map production and it was not until the mid 1970's that the information perspective began to dawn and that the digital map data was seen to have a value by itself, besides being the data source for the traditional printed map. However, to exploit this newly found value, the traditional map and the relationships seen between map elements with our human brain had to be translated somehow so that they could be handled by a computer. This required that the digital map data be structured and that linkages be established between map elements for specific applications. I.e. information systems were born.

Thus, when the ITC started to design a GIS/LIS training programme in the early 1980's, it was understandably technology oriented, attention being focussed on the selection of systems to collect, store and manipulate digital map and RS imagery data.

Three fields of specialisation were envisaged: cadastral, rural and urban applications of information systems. The specific objectives of the LIS/Cadastral Course, of most interest to this Seminar, were that it would enable the participants to:

manage the design, implementation and maintenance of a cadastral land information system for land registration

- upgrade an existing cadastral information system into a multi-purpose information system
- demonstrate basic knowledge on information systems for local authorities and municipalities, including systems for the management of utilities

The course had a modular structure. The first block of three months was common to the three courses and included lectures in computer programming, basic concepts of GIS, geo-referencing and digital mapping. During the second block of six months, each course works in its application area and participants are trained to operate different software systems, mainly through a series of case studies. The final block of three months is devoted to final projects, carried out with data sets from the participants home countries.

Outside experts were understandably involved in the design and execution of the LIS/Cadastra Course, notably Prof. Henssen of the Cadastral Service and Prof. Bogaerts of the Delft University of Technology.

### 3 External developments that affect training

The external developments that have had the greatest impact on on-going training programmes are the institutional and technical issues affecting survey and mapping agencies. The former deals with the environment within which the agencies have to operate and the latter with the practical execution of survey and mapping programmes.

The technical aspects are the simplest and so will be dealt with first. In brief, organisations are, on the one hand, faced with rapid technological developments in the fields of expert systems, data bases, point positioning systems, satellite technology and image processing. These new integrated tools and techniques are either replacing or at least complementing established technologies in surveying and mapping, but either way they are revolutionising the survey processes through their impact on the traditional disciplines involved and on how the information needs of the user community can best be served.

On the other hand, however, these integrated systems are not only becoming more user friendly but are also becoming more independent as more and more systems become PC-based. A consequence of this is that less time needs to be spent in an educational programme on teaching the theory behind a system or a specific mapping process such as relative orientation. The implication is thus that technology will receive less emphasis and students will only have to be taught how to use systems.

The institutional issues are more complex since they cover the financial issues, the user requirements and the changing role of surveying and mapping agencies in the GIS/LIS environment.

The main financial issue is the economic pressure placed on governments to reduce personnel costs, thus forcing them to embark upon rigorous and penetrating analysis of the activities performed by their departments and the costs incurred in performing them.

The changing user requirements relate to the increasing demand for up-to-date maps and other information products under the pressure of urbanisation, the needs of resource exploitation and management, the development of agriculture, the protection of a livable environment and the need for security and political stability. Coupled to this is the increasing complexity that can be observed in the planning and decision making process and its greater decentralisation (more and more decisions taken at the level where the development takes place), leading to a requirement for more, faster, more current and more-to-the-point information on the one hand, and to more complex types of information (interrelations between information categories, consequences of actions) on the other.

These demands are forcing surveying and mapping agencies to extend their focus towards the supply of geo-information products, including traditional mapping. This requires firstly that agencies become aware of the fact that they are in the information business and not the surveying or mapping business and that they will have to go out and study what users are doing and thereby anticipate what their information needs are or will be. Secondly, national agencies must establish a role for themselves in the "information society" by, for example, acting as a focal point for the establishment of standards, monitoring that these standards are adhered to and coordinating the exchange of information between different systems.

Finally, agencies must be aware that the user community will expect the same efficiency and response to their geo-information queries as they receive in day to day life in telecommunication, banking, etc.

More specifically, national agencies must adjust to these changed circumstances by:

- learning to understand the nature of spatial data which other departments and users require and collect, process into usable information, inter-relate, and employ in the fulfillment of their mandates;
- making available the cadastral, topographic, etc. data in such suitably structured forms that the work of other departments and users is facilitated and their temptation to engage in costly duplication of effort is minimised or preferably avoided.

#### **4 The response of educational programmes to these changes**

In order to remain effective, educational institutes will have to adapt their programmes to the changed circumstances of surveying and mapping agencies in terms of their mandates, their structures, their activities and the tools used.

As far as structures are concerned, ITC has recognised the need for inter-disciplinary activity to solve survey, mapping and geo-information production problems and will enforce this through an integration next year of the disciplines of aerial photography, photogrammetry, cartography, digital remote sensing and computer science in a new Department of Geoinformatics.

Furthermore, in response to this need for integration, the Department of Photogrammetry has completely redesigned its educational programme to meet a new goal of developing leadership in various functions within organisations that are engaged in the production and dissemination of map and geo-information. Of the key functions in such an organisation, the Department has identified the four target groups A, B, C and D shown in the figure for its revised education programme, namely:

- *target group A*  
photogrammetric production unit supervisor, responsible for day to day production and links between units
- *target group B*  
overall production manager, responsible for all aspects of day to day production and technology adaption
- *target group C*  
engineering support and development staff, responsible for the development of new production capabilities and technical support
- *target group D*  
top-executive of survey and mapping organisation, responsible for inception, justification and execution of programme

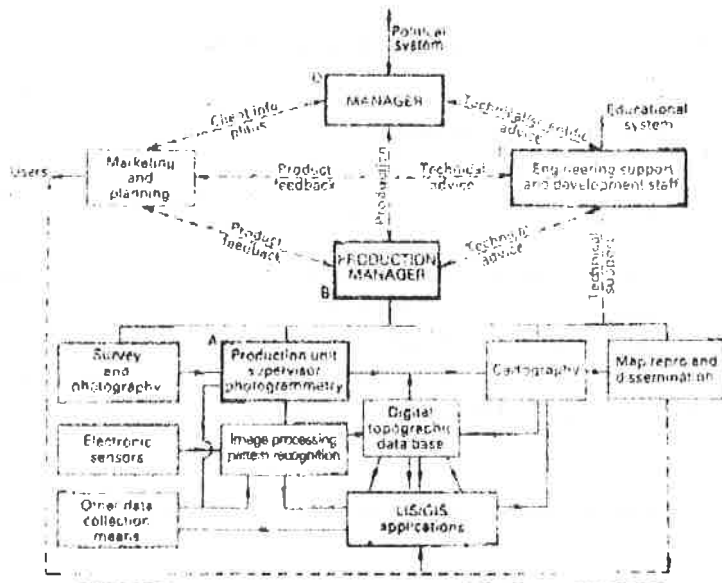


Fig. 1 Model of the key functions in a production organization for map and geo-information, including the major groupings of operations.

As far as the GIS/LIS Courses and especially the Cadastre Course is concerned, the changes that have been incorporated since the first courses were run and which can be verified from the new course programme (enclosed as an annex to this paper) concern mainly the re-orientation of the emphasis of the course from LIS technology to LIS applications. This reduction in the emphasis on technology arises not only from the increased user-friendliness of the integrated systems available nowadays whereby less time is needed in learning how to use them but also from the perception that more attention has to be paid to the methodology of system design, and especially the optimisation of data structures to facilitate the extraction and manipulation of data by different user groups.

Prerequisites for this are that more attention is paid to other GIS/LIS application fields, including urban planning, rural development, etc., and to the identification of users and the analysis of their information requirements.

## 5 Future prospects

The most important prospect is undoubtedly the introduction of an M.Sc. Course in LIS Cadastre next year, this in cooperation with the Delft University of Technology. A further important prospect is that of extending the present programmes towards decision support systems in multi-disciplinary environments. This will obviously also lead to a further integration of the three separate courses, but also requires that considerable effort will have to be spent in developing geo-information theory such that the systems developed can tackle the problems faced in satisfying users information requirements.



# The Cadastral LIS course programme

## The general structure of the course

### Introduction

The course is divided into three main blocks. The second block is however divided in two sub-blocks each of about 11 weeks.

- The quality, efficiency and usefulness of the education process will be evaluated for each block or sub-block. The staff of the Educational Development Centre (EDC) will carry this evaluation with the help of the course participants.

### The first block (9 October - 20 December) is used to give:

- general introduction to the course with its 3 streams;
- general introduction to geographic information systems and the application areas of relevance to the course;
- main components of an information system, data theory, input and output devices and techniques, spatial analysis, future trends;
- basic refresher courses in photogrammetry remote sensing and cartography;
- basic but intensive training in computer handling and operating systems (PC then VAX);
- basic training in flow charts, programming (Fortran);
- introduction to information theory, information analysis and system design;
- data base management systems;
- introduction to cadastral information systems;
- information analysis and data base design case study;
- introduction to georeferencing and digitization;
- land economics;
- computer graphics (will continue in the second block);
- legal cadaster (will continue in the second block)

### The second block (subblock 2A: 2 January - 23 March)

This block is used to give:

- continuation of computer graphics;
- continuation of legal cadastre;
- additional training in using VAX;

- additional training on using photogrammetric equipment;
- position determination systems and cadastral mapping;
- computer graphics, data acquisition and information presentation;
- aspects of physical planning;
- design and implementation of cadastral data bases using different DBMS such as INFORMIX, dBase IV and dBase III;
- UNESCO guide lines for GIS;
- project planning and management workshop.

### **The second block (subblock 2B: 26 March - 8 June)**

This block is used to give:

- property valuation and taxation
- utility information systems
- integration of cadastral information workshop  
introduction to ARC/INFO and dBase software packages
- facility management  
systems review and comparison
- system evaluation and management

During this block great attention is given to the state of art of GIS/LIS in a selected number of countries:

- (AKR) Dutch Cadastral registration system
- (LKI) Dutch Cadastral surveying and mapping system
- Denmark information systems
- Saudi Arabia national cadastral system
- Determination of homogeneous land units for taxation (Colombia)
- Provincial and municipal information system in Canada

Also during this block great attention will be given to literature study and discussion sessions:

- participants will be trained in preparing reports and presentations based on self study of selected topics (e.g. Chouery report-U.K.);
- several guest lecturers will be invited to give lectures and to discuss their experience in GIS/LIS application;
- several study visits will be made to different academic and production organizations in the Netherlands, Denmark, Germany and England.

e. **The third block (11 June - 25 August)**

This block is reserved for the final project where the participants have to demonstrate ability to bring theory into practice.

N.B. All participants are therefore requested to bring relevant material for the final project from their own working environment.

At the end of this period each participant should submit a report and make a presentation. The presentation sessions conclude the third block.

The programme ends in the last week of August 1990 with a diploma ceremony.



**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
**MULTIFUNCIONAL**

— SICRUM —

SIGMA - SISTEMA DE INFORMAÇÃO GEOGRÁFICO DO  
MUNICÍPIO DE ALMADA

INES BEIRA; EDUARDO CAMPELO;  
ANA FERREIRA e VITOR CAMPOS

PORTUGAL

LISBOA... ENCHAL-20 a 25 Novembro de 1989

SEMINARIO INTERNACIONAL SOBRE CADASTRO RUSTICO E URBANO

MULTIFUNCIONAL

Face As Novas Tecnologias

Lisboa e Funchal, 20 a 25 Novembro de 1989

COMUNICAÇÃO

TITULO: O SIGMA - SISTEMA DE INFORMAÇÃO GEOGRAFICO DO MUNICIPIO DE ALMADA

Autores:

Inês Maria Mourinho Beira \*

Eduardo Jorge Santiago Campelo \*\*

Ana Paula Ferreira \*\*\*

Vitor Campos \*\*\*\*

RESUMO

A Comunicação apresenta um Sistema de Informação Geográfica que está a ser desenvolvido pelo Município de Almada e que se destina a apoiar tarefas de planeamento e gestão do solo e dos sistemas técnicos no território da Autarquia.

SUMMARY

This paper describes GIS being developed by the Municipality of Almada, aimed to support land use planning, building control and water supply within its territory.

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## 1. ANTECEDENTES

O desenvolvimento do SIGMA tem origem num trabalho de reestruturação do sistema de leitura e cobrança dos consumos de água que foi iniciado pelos Serviços Municipalizados de Água e Saneamento do Município de Almada (SMAS) em 1985.

A ligação de um edifício ou de um fogo ao sistema público de distribuição de água implica o cumprimento de um conjunto de procedimentos técnico-burocráticos, nomeadamente a passagem da licença de utilização do edifício ou fogo a que é feita a ligação, a celebração de um contrato de fornecimento e o aluguer de um contador.

Os serviços municipais responsáveis pela distribuição de água detêm por essa via, nos seus ficheiros, um apreciável volume de dados sobre o uso e a ocupação do solo, a população e as actividades económicas. Igualmente importante é que essa informação é regularmente actualizada, através da leitura e cobrança dos consumos e da celebração, actualização e rescisão dos contratos de abastecimento.

A compreensão destes factos conduziu naturalmente à ideia de utilizar a informação proveniente da actividade comercial dos SMAS para estabelecer relações úteis do planeamento e à gestão dos sistemas de abastecimento de água.

Tornou-se claro que o sistema de leitura e cobrança constituía uma fonte de informação de grande fiabilidade e de baixo custo, sobretudo quando comparada com as outras fontes tradicionalmente utilizadas para recolher informação sobre o território (censos, inquéritos, levantamentos de vários tipos).

Se adequadamente estruturada e referenciada em termos geográficos, a informação obtida por essa via encerrava potencialidades cujo interesse ultrapassava a esfera do serviço responsável pelo abastecimento de água. Entre os outros utilizadores potenciais dessa informação dentro da administração municipal estavam naturalmente os serviços responsáveis pelo planeamento e pela gestão urbanística.

Data de Setembro de 1985 a primeira reunião entre os técnicos dos SMAS e os técnicos do Departamento de Administração Urbanística da CMA. Até final desse ano procedeu-se a uma recolha de informação sobre a ocupação do solo e a distribuição da população do Concelho. No início de 1986 a questão tinha evoluído para um ponto em que os interlocutores dos dois serviços concluíram do interesse mútuo em "dividir o concelho em áreas homogéneas", formulação ainda vaga mas que apontava já claramente para o estabelecimento de um sistema municipal de referenciação espacial da informação.

A partir de 1987 o trabalho adquiriu um carácter mais regular e objectivo, tendo sido constituído um grupo de trabalho do qual fazem parte os autores da comunicação e Eng. José Ceia, Dr. José Rito, Arq. Veríssimo e Dr Paula Mont. Foi concebido o sistema de informação e fixado o conteúdo das entidades e atributos das bases de dados, trabalho que teve a acessoria do Grupo de Estudos de Urbanismo e Planeamento Municipal do Laboratório Nacional de Engenharia Civil. Procedeu-se á delimitação de duas áreas-piloto para teste do sistema e deu-se início à recolha sistemático de dados nessas áreas.

## 2. O QUE É O SIGMA

O SIGMA - Sistema de Informação Geográfico do Município de Almada é um sistema

de informação de base geográfica que tem por referência territorial a totalidade do Concelho de Almada e que se destina a apoiar a realização das tarefas de planeamento e gestão do uso do solo, dos sistemas técnicos urbanos e dos serviços à comunidade na área do município.

Com o SIGMA a autarquia passa a dispor de um suporte permanente e estável, onde podem ser recolhidos e tornados disponíveis dados estratégicos para a gestão do território do município que sejam produzidos pelos diversos sectores da administração central e local e por outras entidades públicas e privadas com intervenção no Concelho de Almada.

O SIGMA é prioritariamente concebido como um instrumento de gestão global do território do município, destinado a dotar os órgãos políticos da autarquia e os decisores técnicos com a informação estratégica necessária à definição de políticas gerais e ao controle da sua execução.

Complementarmente, o SIGMA deverá ser um instrumento de apoio à realização de tarefas de gestão corrente e à elaboração de estudos e projectos de iniciativa ou de interesse para a autarquia. Esta função poderá ser preenchida quer directamente pelo sistema, através de aplicações desenvolvidas no seu sistema lógico, quer indirectamente, através da ligação com os sistemas que venham a ser desenvolvidos pelos diversos serviços municipais para a realização das tarefas da sua competência específica.

### 3. A ESTRUTURA DO SIGMA

A informação do SIGMA está estruturada em entidades e atributos organizados numa base de dados do tipo relacional.



As entidades que constituem o SIGMA são, nesta fase do seu desenvolvimento, de quatro tipos:

- a. Entidades físicas, que constituem a base de referência espacial da informação. Essas entidades são quatro:

QUARTEIRÃO

UNIDADE FUNDIARIA

EDIFICIO

FOGO

- b. Entidades ligadas ao licenciamento municipal de loteamentos urbanos e de obras particulares;
- c. Entidades ligadas à gestão dos sistemas de abastecimento de água e de drenagem, incluindo quer os elementos físicos desses sistemas quer a informação ligada ao sistema de contratos, leitura e cobrança de consumos
- d. Entidades de apoio ao processo administrativo geral, incluindo a toponímica do concelho e o ficheiro das entidades que têm relações com o município no quadro de processos de licenciamento ou de contratos de abastecimento de água.

Estas entidades são qualificadas por atributos. Distinguem-se três tipos de atributos:

- a. Atributos de identificação: códigos, designações, localização, etc. Constituem o que é abreviadamente conhecido por "cabecinhos" das fichas;
- b. Atributos relativos ao processo administrativo: tipo e natureza dos pareceres e deliberações, datas de apreciação, de parecer e de deliberação natureza e valores dos encargos, ónus, cedências, etc.;
- c. Atributos relativos ao uso e ocupação do solo: número de fogos, número de edifícios, índices, áreas, usos, características dos sistemas técnicos, etc.

#### 4. A REFERENCIAÇÃO ESPACIAL DA INFORMAÇÃO

A necessidade de estabelecer uma referênciação espacial da informação conduziu o grupo de trabalho responsável pelo desenvolvimento do SIGMA ao contacto com o INE e com o projecto BGRE - Base Geográfica de Referênciação Espacial.

As normas e orientações produzidas pelo INE no âmbito do projecto BGRE foram seguidos e aplicados no concelho de Almada, passando a base de referênciação espacial que servirá ao censo de 1991 a constituir também o suporte primário de referênciação do SIGMA. Sobre cartografia do concelho às escalas 1:1000 e 1:2000 foram delimitados os quarteirões (sub-seções estatísticas), no total de cerca de 2000 quarteirões para 10 freguesias. Este trabalho de delimitação foi moroso e obrigou a uma interpretação cuidada, para, por um lado, compatibilizar os critérios definidos pelo INE com a ocupação real do terreno e, por outro, produzir unidades espaciais relevantes do ponto de vista do planeamento e da gestão do território do concelho.

O território do concelho encontra-se pois actualmente dividido em áreas de pequena dimensão, univocamente identificadas por um número de código. Este código de identificação do quarteirão passou a ser utilizado, a par com o número de processo, para referenciar os projectos de loteamento e de obras particulares que são submetidos a licenciamento da autarquia.

A articulação entre o SIGMA e o projecto BGRE (Base Geográfica de Referênciação Espacial) do INE deverá possibilitar ao município de Almada não apenas a utilização mais expedita e flexível da informação censitária produzida pelo INE mas também a combinação da informação censitária com a informação resul-

tante da actividade de planeamento e gestão desenvolvida pelos seus serviços operativos. Dessa combinação deverão resultar notórias vantagens de controlo e actualização da informação entre censos.

Por outro lado, a adopção da BCRE deverá permitir o interface da informação de base municipal com a informação correspondente dos municípios adjacentes, criando condições efectivas para uma utilização no âmbito de acções intermunicipais ou regionais, nomeadamente no quadro da Associação de Municípios do Distrito de Setúbal.

Para além do quarteirão, o SIGMA compreende três outras entidades de referência espacial: a unidade fundiária, o edifício e o fogo. O fogo é referido ao edifício. O edifício é identificado por um número de código, independente do quarteirão em que se situa. Esta opção é justificada pelo facto de os quarteirões estatísticos serem susceptíveis de nova delimitação, sempre que no futuro ocorra qualquer transformação urbanística que, à luz dos critérios que presidiram à actual delimitação, o justifique. A independência dos códigos torna possível fraccionar ou fundir quarteirões existentes sem comprometer a codificação das outras entidades e, portanto sem perder a coerência da informação.

A unidade fundiária é igualmente identificada por um número de código autónomo. Este número de código é posto em relação com três outros elementos de identificação, consoante a natureza da unidade fundiária: elementos dos cadastros, quando se trata de um prédio ou parcela rústica, elementos do registo na conservatória de registo predial no caso dos prédios urbanos e número de processo de licenciamento camarário quando se trata de lotes para construção

constituído ao abrigo de alvarás de loteamento conferidos pela autarquia. Esta diversidade radica nas actuais insuficiências do nosso sistema de cadastro e de registo de propriedade.

Para além da codificação exaustiva dos edifícios existentes, trabalho que implica a actualização dos registos cartográficos, sobretudo nas áreas atingidas pelos loteamentos clandestinos, procedeu-se à sistematização e à codificação da toponímia do concelho.

As bases cartográficas utilizadas pelos serviços foram reelaboradas. As plantas gerais do concelho às escalas 1:1000 e 1:2000 passaram a incluir os limites dos quarteirões e das freguesias e o código de identificação de cada quarteirão.

Distinguiu-se entre a "carta de registo dos processos", já anteriormente utilizada pelos serviços e que passou a incluir os limites de quarteirão e freguesia e respectivos códigos, e uma "carta da situação existente" que para além dessa informação, indica o código dos edifícios existentes, o nome das ruas e os números de policia.

##### 5. O SUPORTE INFORMATICO

O suporte informático em que está a ser desenvolvida o SIGMA está enquadrado num Estudo de Reconfiguração dos Sistemas Informáticos dos Serviços Municipalizados de Almada.

Com base nesse estudo foram feitas opções, referindo aqui as mais significativas para o SIGMA.

O ambiente de trabalho teria que responder às seguintes necessidades:

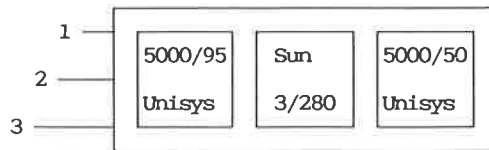
-Sistema Global que garantisse a segurança, controlo e integridade da informação estratégica para a gestão do município.

-Partilha da informação - A actividade dos serviços produz permanentemente novos dados sobre o concelho e altera os dados existentes. Isto significa que há uma INTERDEPENDENCIA entre os vários sectores dentro de cada serviço e entre os técnicos dentro de cada serviço ou sector.

-Garantir o acesso de todos os serviços técnicos e órgãos políticos e a utilização simultânea por diferentes serviços ou órgãos e por diferentes utilizadores em cada um deles.

Face a estas necessidades o SIGMA foi desenvolvido numa BASE DE DADOS RELACIONAL em ambiente UNIX, com a seguinte configuração em rede.

Configuração da rede do Município  
funcionamento em rede ethernet



- 1 - Acesso de todos os sectores da Câmara em linha directa ou através de linha telefónica.
- 2 - Acesso dos Serviços Municipalizados em situação idêntica.
- 3 - Ligação às Juntas de Freguesia por linha telefónica.

## 6. APLICAÇÕES DO SIGMA

Uma vez carregado com dados referentes à totalidade do concelho, o SIGMA terá um leque amplo de aplicações em apoio à actividade desenvolvido pela autarquia no exercício das suas competências administrativas e técnicas.

Uma das possibilidades mais interessantes que o sistema virá trazer à gestão municipal e a elaboração de diagnósticos de situação em tempo real. Por exemplo:

- a. Situação do licenciamento camarário: número de processos entrados, em curso, aprovados no trimestre, no semestre, no ano, etc.
- b. Estado de realização das obras de urbanização e de construção licenciadas
- c. Estatísticas de construção: número de fogos, número de edifícios, total ou por tipo de fogo ou de edifício, licenciados, em construção, concluídos no último trimestre, semestre, ano, etc.;
- d. Informação sobre o tipo de promoção (público, privado ou cooperativo) e a natureza das operações em curso de licenciamento e de realização (nova urbanização ou construção, remodelação ou legalização de construções ou urbanizações ilegais);
- e. Identificação das áreas de solo e das construções que são do domínio privado da CMA ou do domínio privado de outras entidades públicas;
- f. Identificação e quantificação das áreas de cedência a favor do município: áreas já cedidas, a ceder, em que prazo, etc.;
- g. A indicação dos encargos, taxas e ónus: previstos, recebidos, a receber, em que prazo, etc.;
- h. Dinâmica da promoção imobiliária;
- j. Identificação e caracterização dos promotores que operam no concelho.

Esta informação poderá ser obtida para o conjunto do concelho, por freguesia, por área de intervenção urbanística (ZUNOR, perímetro de um plano de urbanização aprovado) ou a qualquer outro escalão territorial julgado relevante para a gestão. Com uma única limitação significativa: a de essas áreas deverem corresponder univocamente à agregação de entidades fundamentais do SIGMA (quarteirão/unidade fundiária/edifício/fogo).

## 7. ALGUMAS REFLEXÕES SOBRE O TRABALHO DESENVOLVIDO

### As insuficiências do sistema de cadastro de propriedade

A unidade fundiária é uma referência fundamental em qualquer sistema de informação de base geográfica. Como foi referido, o SIGMA inclui a unidade fundiária entre as suas entidades fundamentais. Mas essa inclusão é, por ora uma simples "reserva de espaço" no sistema, pois não é possível proceder a uma recolha sistemática e fidedigna dos dados relativos a essa entidade e, sobretudo, mantê-los actualizados. Por diversas razões. Em primeiro lugar porque não existe entre nós um cadastro geométrico da propriedade urbana e porque o cadastro da propriedade rústica está desactualizado, sobretudo nas áreas sujeitas a maiores transformações no passado recente, como é o caso do território do município de Almada. Por outro lado o município, a quem compete o licenciamento das operações de loteamento urbano, não possui informação sobre a titularidade dos prédios e parcelas existentes no seu território e não tem um modo prático e expedito de obter essa informação, nem de a manter actualizada. Para não referir a total impossibilidade de aceder regularmente a informação que lhe permita avaliar da dinâmica dos negócios jurídicos sobre o solo e as construções, geralmente indiciadora de transformações urbanísticas

a que terá que corresponder com apreciações de pedidos de licença de loteamento e de construção e com a prestação de serviços públicos e a construção de equipamentos.

As relações entre a unidade fundiária e as outras entidades do sistema de base de dados encontram-se definidas mas foram temporariamente neutralizadas.

#### O carregamento do sistema

A questão do carregamento dos dados no SIGMA assume uma importância estratégica no quadro da sua operacionalização. Na Câmara Municipal de Almada dão anualmente entrada cerca de 55 pedidos de licença de loteamento e 1476 pedidos de licença de construção, ( dados referentes ao ano de 1988 ) , ampliação ou alteração de edifícios, para além de um numero elevado de pedidos de legalização de construções clandestinas. O arquivo municipal dos processos de licenciamento tem já hoje uma dimensão apreciável e em qualquer momento qualquer processo pode ter de ser consultado para dar satisfação a um requerimento entretanto apresentado à aprovação da autarquia. Coloca-se pois a questão de saber por onde começar a carregar dados. Relativamente às duas áreas-piloto foi decidido que se procederá a um carregamento exaustivo. Esta decisão, que tem implicado um trabalho moroso nos arquivos, serviu para avaliar com maior rigor o tempo necessário para carregar os dados em arquivo. Relativamente ao resto do território do concelho optou-se por começar pelo carregamento dos atributos de identificação dos processos relativos ao ano em curso (1989) e ao ano transacto. Está-se agora a proceder ao carregamento dos atributos relativos ao processo administrativo nos mesmos processos, na sequência do desenvolvimento das aplicações relativas ao controlo de prazos. A partir de Janeiro de 1990 pretende-se proceder ao carregamento directo destes dados logo no acto de tramitação dos processos.

Independentemente das opções que irão ser feitas, o carregamento da informação



será previsivelmente uma das questões-chave da operacionalidade do sistema.

#### O desenvolvimento de aplicações complementares

Os responsáveis pelo município estabeleceram como prioridade absoluta até final de 1989 o controlo automático da tramitação dos pedidos de licenciamento, tendo como objectivo final a emissão automática dos títulos de licença. Nesse sentido foram desenvolvidas aplicações de controlo documental, as quais não fazendo parte do SIGMA, se articulam directamente com ele. Essa articulação traduz-se nomeadamente na transferência para o SIGMA dos dados de síntese resultantes.

#### Cartografia automática e tratamento gráfico da informação

O SIGMA não contempla presentemente nenhum módulo de cartografia automática ou de tratamento gráfico de informação. Esta opção foi tomada quase desde o início do trabalho, com base em duas razões principais : a indefinição existente no que respeita aos sistema de cartografia automática a adoptar a nível nacional e supra-municipal, tendo em atenção nomeadamente a compatibilidade dos sistemas e a melhor rentabilização dos equipamentos, e a maior utilidade imediata das bases de dados qualitativas para a gestão do município. No entanto, esta questão não é ignorada e a incorporação de um módulo gráfico começará a ser desenvolvida em 1990.

## A coerência e unidade dos dados

Ao estabelecer um sistema de informação é imprescindível garantir a coerência e a unidade dos dados. Esse objectivo passa pela definição rigorosa dos conceitos que suportam as entidades e os atributos que constituem as bases de dados. A adopção das normas e recomendações do INE no estabelecimento da base de referenciação espacial do SIGMA constituiu um passo importante nesse sentido. Mas o problema não se extingue aí. Existem confusões e ambiguidades em torno de muitos conceitos utilizados, mesmo os mais comuns : por exemplo, a noção de processo camarário, sendo quotidianamente utilizado pelos serviços não está tão univocamente definida que não dê origem a erros e contradições na atribuição dos respectivos números de entrada.

É no domínio dos conceitos técnicos que se depara com maior falta de rigor. Quando é que uma obra deve ser classificada de ampliação, de reconstrução. Como deve ser medida uma área de implantação. O que é um índice de utilização. Este é um capítulo vasto que reflecte as graves insuficiências do nosso corpo regulamentar relativo ao urbanismo e à construção.

No âmbito do SIGMA e em articulação com um ante-projecto de regulamento municipal de urbanismo e construção, o LNEC propôs um corpo de definições destinado a pacificar este domínio fundamental. Complementarmente propôs a adopção de formulários a preencher pelos requerentes, nos quais serão inscritos os dados qualitativos que caracterizam as operações de loteamento e de construção. Estes formulários servirão para o controlo dos processos e para o carregamento do SIGMA, simplificando esta tarefa.





**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
**MULTIFUNCIONAL**  
**— SICRUM —**

AVALIAÇÃO CADASTRAL - CUSTOS - OPÇÕES

JOSE S MAIA AMARAL

PORTUGAL

LISBOA... ENCHAL-20 a 25 Novembro de 1989

SEMINARIO INTERNACIONAL SOBRE CADASTRO  
RÚSTICO E URBANO MULTIFUNCIONAL (SICRUM)

AVALIAÇÃO CADASTRAL - CUSTOS - OPÇÕES

J. S. MAIA AMARAL  
Nov. 89

## RESUMO

Foca o problema da desactualização das matrizes prediais rústicas e dos impostos cobrados, estimando, especialmente nos distritos cadastrados, os rendimentos fundiários previsíveis se se procedesse às revisões.

Refere ainda os custos dos trabalhos de avaliação cadastral, propondo algumas alterações à metodologia até agora adaptada.

Em abril de 1985, aquando do Dia do I. G. Cadastral, intitulei a palestra que proferi de "Avaliação Cadastral - Um momento de necessária viragem". Quatro anos passaram, e a viragem de mentalidades e de métodos, que então qualifiquei de necessária, não se fez, e é agora imprescindível, se acaso se pretende manter o sector. Tudo se conjuga, parece, para o seu termo no âmbito do I.G.C., se este não demonstrar de forma inequívoca a sua capacidade de resposta à urgência de adaptação à realidade, voltando então a ser sector que já mereceu crédito e louvores.

Os conceitos e comentários desta comunicação não se afastam dos que tive ocasião de expressar em diversos documentos oficiais do I.G.C., especialmente entre 1983 e 1988, data da minha aposentação. Portanto, nada é novo, não estando agora a explanar-me em considerações não coincidentes com as anteriormente propostas. Espero que desta vez, em auditório mais amplo e mais aberto, estas opiniões sejam levados em consideração, se acaso o merecerem.

### 1-Avaliação fiscal da propriedade rústica

No País, a avaliação da propriedade rústica com imediato aproveitamento fiscal, está a cargo de 2 organismos estatais, os quais usam processos de trabalho diferentes, além dos que naturalmente resultam de um ter um suporte cartográfico e o outro fazer uma avaliação que se poderá denominar de descritiva. Estas diferenças, que existem tanto no campo técnico como no processualismo administrativo, têm sido de tal modo intransponíveis, que na Comissão da Reforma Fiscal os 2 processos de organização da matriz predial foram tratados independentemente.

Não interessa neste momento aprofundar as diferenças existentes, embora se entenda que os processos de trabalho têm de ser semelhantes, o que se conseguirá após discussão em conjunto, de modo desinibido e ao mesmo nível. Nem o processo do I.G.C. é rigoroso, incontestável ou até científico, como já bastas vezes ouvimos, nem as normas da D.G.C.I. são erróneas, expeditas ou visando exclusivamente o aumento de tributação, como também muitas vezes se diz. Neste aspecto de colaboração entre as 2 Direcções Gerais, não queremos deixar de anotar o envio pela D.G.C.I. ao I.G.C. em 1986, das Tarifas de 3 concelhos, para conhecimento e comentário. Nunca houve solicitação em sentido inverso.

A grande diferença reside na existência ou não de base cartográfica, a qual imprime maior rigor na definição das áreas e permite uma mais perfeita identificação e busca dos prédios. De uma maneira geral, qualquer deles faz a estimativa da matéria colectável do prédio organizando uma tabela das rendas fundiárias para cada qualidade e classe existente no concelho, aplicando esse

rendimento unitario as parcelas das diferentes qualidades e classes. No entanto, o processualismo adoptado é que é diverso, com reflexos nos custos, como mais adiante exporemos.

## 2-A propriedade rústica e o imposto

Até a entrada em vigor da Lei 1/79, era o Estado o beneficiário directo dos impostos arrecadados, que posteriormente os geria em todo o território nacional. A Constituição actual lançou as bases de uma nova distribuição e gestão dos impostos, o que foi regulamentado pela Lei das Finanças Locais e por outros preceitos legais que se seguiram na mesma linha de orientação.

Por estas disposições legais, o imposto que mais directamente nos interessa - contribuição predial rústica - assim como o imposto de siza, o imposto sobre sucessões e doações e o imposto de mais valia, além de outros passam a constituir receita das Autarquias, continuando a ser o Estado o ente encarregado da estimativa da matéria colectável e da cobrança dos impostos.

Esta dualidade de atribuições, em que um recebe o que o outro determina, ainda não deu origem a grandes atritos ou reivindicações formais por parte das Autarquias, resultantes da inequívoca desactualização das matrizes, com reflexos nas receitas arrecadadas.

Para se conseguir uma das mais importantes características que a tributação deve satisfazer - a perequação do imposto a nível local e nacional, independentemente do tipo de imposto em causa - entendemos que deve ser o Estado a definir os critérios a aplicar e ser também ele o responsável pelas operações de avaliação da massa colectável, podendo, no entanto, endossar a sua execução sob determinadas regras.

O rendimento colectável inscrito da propriedade rústica e urbana totalizava em 1983 e para o continente, 58 714 084 contos, cabendo a propriedade rústica 3 617 550 contos, ou seja, 6.2% do total, embora em muitos concelhos de características marcadamente rústicas, atinja valores relativos de 70% e 80%.

Por distritos, essa percentagem é :

AVEIRO	——	6.87%	LEIRIA	----	9.91%
BEJA	——	38.89%	LISBOA	----	1.14%
BRAGA	——	6.08%	PORTALEGRE	----	38.24%
BRAGANCA	——	20.37%	PORTO	----	1.58%
C. BRANCO	——	12.51%	SANTAREM	----	17.15%
COIMBRA	----	8.77%	SETÚBAL	----	3.74%
ÉVORA	----	29.16%	V. CASTELO	----	12.97%
FARO	----	5.49%	VILA REAL	----	18.07%
GUARDA	----	25.11%	UISEU	----	21.12%



Em Anexos IA a IE, se apresentam os rendimentos colectáveis rústicos e urbanos inscritos em 1983 no continente, por concelhos dos distritos totalmente submetidos a cadastro geométrico.

Em trabalho que tive oportunidade de fazer em 1986, procurou-se estimar quanto a matéria colectável rústica está desfasada da previsível, mesmo partindo do princípio que não havia alteração da composição cultural inscrita, o que levou a uma previsão inferior à realidade. Trata-se portanto, de um desfasamento resultante exclusivamente da desactualização dos rendimentos fundiários unitários ou tarifa.

Mesmo assim, se constata que a matéria colectável está francamente desactualizada.

DISTRITO	R.C.RÚSTICO INSCRITO - 1983 (CONTOS)	R.C.R.PREVISÍVEL (CONTOS)	AUMENTO DE R.C.R. (CONTOS)
Aveiro	175.006	1.100.589	925.583
Beja	269.748	4.492.022	4.222.274
Braga	170.637	892.846	722.209
Bragança	125.703	1.615.137	1.489.434
C. Branco	120.316	1.373.652	1.253.336
Coimbra	189.986	1.167.346	977.360
Évora	255.598	3.595.908	3.340.310
Faro	203.061	1.347.727	1.144.666
Guarda	185.979	1.128.050	942.071
Leiria	191.977	1.124.834	932.857
Lisboa a)	214.486	2.490.657	2.276.171
Portalegre	260.202	2.993.308	2.733.106
Porto a)	149.900	769.149	619.249
Santarém	333.911	1.846.863	1.512.952
Setúbal a)	190.110	2.347.145	2.157.035
V. Castelo	104.745	524.978	420.233
V. Real	133.676	985.820	852.144
Viseu	282.889	1.541.779	1.258.890
	3.557.930	31.337.810	27.779.880

a) Não foram considerados concelhos predominantemente urbanos

Para os concelhos dos distritos completamente cadastrados, eliminando os predominantemente urbanos, e com as ressalvas anteriores, os níveis de desactualização das matrizes prediais rústicas, são os que constam nos Anexos II A a II E.

A diminuição do rendimento colectável não se reflecte somente no imposto predial, mas também nos impostos com este relacionados, nomeadamente o imposto de siza e o imposto sobre sucessões e doações.

Por outro lado, um baixo imposto predial não incentiva a um aproveitamento integral da propriedade, já que o encargo anual pela sua posse não tem relevância.

Como se verifica não é risonha a situação da avaliação fiscal da propriedade rústica em geral, muito especialmente no que respeita à que assenta em base geométrica.

Uma retrospectiva necessariamente sucinta dos últimos anos é sintomática da curva de rentabilidade do cadastro, com períodos altos e épocas de limitada eficácia, estas com graves consequências na credibilidade externa do Organismo e, o mais grave, com repercussões no interesse posto pelos seus executores.

Na década de 60, entregaram-se 47 concelhos, sendo 25 de revisão e 22 respeitando a concelhos novos. Na década de 70, este caudal bastante aceitável com os meios de que então se dispunha, baixou para 13 concelhos, dos quais 9 na 1.ª metade da década. No período de 1980 - 1984 entregaram-se 14 concelhos, alguns deles iniciados há muitos anos e, conseqüentemente, desactualizados quanto à composição cultural dos prédios e dos rendimentos.

No que se refere a custos de execução estes são de tal modo elevados que, numa rápida visão do problema, se chega a pensar se será lógico continuar a dar primazia, dentro do I.G.C., à avaliação cadastral. Diz-se muitas vezes que o cadastro da propriedade rústica, além da sua finalidade fiscal, é um elemento de apoio em outras actividades, mas há que distinguir. Esse apoio é inegavelmente real no que respeita à planta cadastral, sendo de diminuto interesse no campo da avaliação. Só conheço um caso em que os rendimentos cadastrais foram aproveitados para fim diferente do fiscal, mas, por se não ter querido ou sabido interpretá-los convenientemente, criou situações de flagrante injustiça relativa.

### 3-METODOLOGIA

Embora a partir de 1970 o imposto predial rústico passe a incidir sobre o valor fundiário, na base do imposto continua a estar o rendimento fundiário. Por isso se continuará a discutir se esse rendimento deve ser o real e efectivo ou o presumível e possível.

Não havendo mecanismos desincentivadores do abandono ou mau uso do solo e capacidade técnica e logística para definir e mensurar de modo sistemático e indiscutível estas situações, não parece viável a tributação do rendimento efectivo. Por outro lado, não havendo escrituração individual digna de crédito, a determinação da justeza do rendimento declarado ou atribuído, terá de

assentar em um rendimento previsível, adaptado às características de cada prédio. Buscando-se o rendimento real, a sua avaliação ou a apreciação do rendimento declarado tem de se processar caso a caso, o que acarreta inconvenientes de diversa ordem, quando se pretende uma tributação comparativamente justa.

Também se levanta muitas vezes a dúvida se o rendimento presumível deve ser em função da capacidade produtiva do solo, independentemente das benfeitorias existentes, se aquele rendimento que pode ser auferido através dos aproveitamentos culturais existentes. A primeira hipótese - tributação em função da capacidade intrínseca do solo -, poderá, sem grande inconveniente ser adoptada em grandes áreas de países novos, onde o solo se apresenta no aspecto natural e em que a intervenção do Homem, tanto no que respeita às modificações intrínsecas do solo como na inclusão de benfeitorias, é nulo ou de reduzida repercussão. Em regiões ou países em que o esforço do Homem se constata em vários níveis, quase sempre reflexo da falta de Terra, o solo e a capacidade produtiva deixa de ter o peso decisivo que muitos julgam poder imputar-lhe. Aliás, em zonas em que a agricultura se apresenta com uma elevada dinâmica, o solo, por si só, é de somenos importância na valoração. Mesmo não falando em outros agentes modificadores da rentabilidade média do terreno, nomeadamente clima, exposição, disponibilidade de água, declive, pedregosidade, camada arável, proximidade de centros consumidores e de apoio, alguns destes factores determinantes da capacidade de uso do solo, é notável a influência do Homem que consegue pelo seu trabalho, por vezes secular e coímatante e pelo seu engenho e capacidade técnica, obter, quase arrancar, rendimentos não esperados. Estou-me a lembrar da rentabilidade das areias da Agucadoura... da Póvoa de Varzim e das Gafanhas ou até do Montijo e da Moita, comparando-a com a obtida nas areias de Grândola, de Alcácer do Sal, etc.. Cada vez a rentabilidade do solo e da exploração vale mais pelo que se lhe incorpora e pela tecnologia utilizada, que pelo que lhe é dado por bênção de Deus.

No actual processo de estimativa dos rendimentos fundiários para fins fiscaes, a capacidade do solo é no entanto factor ponderado e com um peso bem marcado. A primeira divisão da área a avaliar, desde a definição da parcela Tipo à tarifa, passando pela distribuição parcelar, é por qualidades ou aproveitamentos culturais e talvez seja esta compartimentação, visível na planta, que fica retida no espírito de alguns contestatários do método, que normalmente mais não aprofundam.

Em uma segunda divisão da área a valorar - a fase de classificação - procede-se em cada parcela já qualificada, à sua fragmentação em função da rentabilidade possível, que é efectuada em

função da capacidade produtiva do solo, especialmente quando se trata de culturas de ciclo económico temporário: nas culturas de rendimentos perpétuos, já que a tributação deve abarcar um período de tempo muito limitado relativamente à sua durabilidade económica, a capacidade de uso do solo tem menor preponderância, ainda que continue a ser de interesse.

Como contestação ao método usado, ouvimos também por vezes afirmar que o parcelamento deveria ter em conta a capacidade produtiva do solo, não só na sua rentabilidade, se isento de qualquer benfeitoria, mas também na sua aptidão para determinados aproveitamentos culturais, devendo concomitantemente a tarifa e o rendimento ser calculado em função desse aproveitamento ideal. Não sabemos a quem deveria ser cometida esta função. Se a técnicos dos serviços oficiais de agricultura (solos, extensão rural, investigação, etc. etc.) isolados ou em grupos de trabalho, se a técnicos do fisco. De qualquer modo, ocorre perguntar quem se responsabilizaria pelos investimentos inerentes a esse aproveitamento dito ideal e se o Estado, como mandatário desses técnicos, chamava a si as consequências de um eventual desaire do empreendimento, por razões de ordem técnica, económica ou de impossível comercialização dos produtos obtidos.

Estes tipos de contestação ao processo de estimativa dos rendimentos da propriedade rústica não são de agora. Já A.J. Avila a eles se referia em 1848 no seu "Relatório sobre o Cadastro" e cíclicamente vêm à liça.

### 3-CUSTOS - Metodologia a adoptar

Muitas das normas que satisfizeram a avaliação cadastral em provincias de grande propriedade e de tipo de exploração estática e em época técnica e economicamente estabilizada, deixaram de cumprir cabalmente nas outras regiões que se seguiram. No momento em que se estão a cadastrar zonas de pequena e mínima propriedade, em que a parcela cadastral em muitos casos não tem significado, com grande variedade de qualidades culturais e em época e em regiões onde normalmente as culturas e as operações culturais não acontecem do modo generalizado que era uso em outras regiões e épocas, há que parar e olhar para a frente e tão abertamente quanto for possível, discutir e aceitar sugestões que visam a melhoria da qualidade e do custo do executado. As alterações a fazer, que alguns consideram dispensáveis e até prejudiciais e revolucionárias, por lhes perturbarem o "Status quo" em que têm vivido, não são mais que a adequação à realidade, a que não podem nem devem fechar os olhos. os ouvidos e a boca, como os 3 macaquinhos, ou enterrar a cabeça na areia.

Tem-se procurado dar às operações de avaliação cadastral um cariz tecnicista puro, ou melhor pseudo puro, totalmente divorciado de uma finalidade imediata, atitude que tem tido repercussão no modo como se continuam a processar as operações cadastrais. O sistema tem-se mantido inalterável desde sempre, não servindo o cadastro da propriedade rústica, e com um custo e uma morosidade que tem dado aso a que a acção do I.G.C. seja contestada e com razão, deve-se confessar.

Também a diminuição do tempo de trabalho de campo, que passou de 8 a 10 meses/ano para os ridículos 40 dias/ano, tem tido naturalmente reflexos no custo das operações de avaliação. Donde resultou esta situação e quem é o culpado? O Organismo ou o Estado?

Se se quiser continuar a fazer avaliação cadastral, há que inverter a situação. Em trabalho apresentado em 1986 tive ocasião de estimar os reflexos desta diminuição do período de trabalho de campo, calculando os custos por hectare para aqueles 2 casos.

	40 dias	9 meses
Tarifas	204\$	170\$
Distribuição	2 375\$	941\$
Desenho	2 084\$	618\$
TOTAL	4 663\$	1 729\$

Estas importâncias não incluem a reclamação e o eventual trabalho de desenho dela resultante.

Admitindo-se uma renda fundiária média ponderada de 3 000\$00/ha, ou seja, uma tributação de 420\$00/ha, no caso de um 19. cadastro, são precisos 11 anos para pagar só as despesas de avaliação. Se compararmos estes custos com os conseguidos na D.G.C.I., que em 1983 rondavam os 200\$00/ha, encontra-se talvez a razão das dotações de que se queixa o I.G.C..

Pode-se argumentar que no caso da avaliação sobre uma base geométrica é impossível conseguir custos semelhantes aos observados na D.G.C.I., já que se trata de um cadastro descritivo, não havendo despesas com o desenho do parcelamento e medição de áreas de prédios, parcelas, zonas sociais, etc.. No entanto, como contrapartida há que salientar que o trabalho de campo é mais moroso, decorrente da necessidade de proceder à medição de prédios e parcelas. Os 2 métodos de trabalho devem aproximar-se quanto a custos e veracidade dos resultados, sendo de frisar que o maior movimento de aproximação compete ao I.G.C..

Ao comparar estes 2 custos, pretende-se fundamentalmente que se tome consciência do problema e se tirem as ilacões necessárias que levam à revisão de algumas operações cadastrais e do modo como elas se executam. Não se pode continuar a usar processos irrealistas, só com o argumento de que têm servido e assim está legislado.

Enfim, temos hoje um cadastro que só cobre 52.5 % do País e 15.7 % do número total de prédios, caro e desactualizado quanto ao pormenor topográfico, à estrutura fundiária, à composição cultural e também no que respeita ao rendimento e valor fundiários. Não é um cadastro digno de confiança, sendo um cadastro morto e portanto inexistente.

É necessário mantê-lo vivo, actualizado, através de revisões gerais periódicas de todas ou algumas das suas fases, e proceder constantemente à sua conservação com base nas comunicações feitas por proprietários e entidades, referentes a alterações de estremas e da composição cultural.

No que concerne a revisões, foram até hoje revistas 25 concelhos na década de 60, estando em 1989 a ser revista um concelho, o de Reguengos de Monsaraz. Era no campo das revisões que as Delegações Regionais teriam uma acção de grande interesse, se acaso estas tivessem sido criadas nos locais apropriados e não espalhados segundo um critério que se não vislumbra.

Em trabalho apresentado em 1986 e em que tive a colaboração da Engã. T. Agrária Diva Matos, chegou-se à conclusão que revisões

dezenais dos distritos de Beja, Évora, Lisboa, Portalegre e Setúbal podiam ser levadas a cabo, de modo constante e sistemático, com o reduzido pessoal do Quadro que segue:

Distrito	Engºs.	Engºs.	Desenhadores
	Agrónomos	Agrários	
Beja	1	2.2	4.4
Évora	1	1.8	3.6
Lisboa	1	2.8	5.6
Portalegre	1	1.8	3.6
Setúbal	1	1.4	2.8
	5	10.0	20.0

As contrapartidas financeiras (custos/aumento de tributação), mesmo admitindo, o que não é verdade, que não houve alterações na composição cultural, são de tal ordem que a actualização seria paga por si própria. Ter-se-ia um cadastro que'daria prestígio ao I.G.C. e poderia, então, servir de apoio real aos mais diversos planos de desenvolvimento e estudos.

Districtos	Custo Anual da revisão (contos)	Aumento de Tributação (contos)	Contabilidade
	1	2	3=2:1
Beja	7 919	590 891	74 62
Evora	6 804	467 712	68 75
Lisboa a)	9 592	318 707	33 23
Portalegre	6 804	382 534	56 23
Setúbal	5 688	301 894	53 08

a) Foram excluidos concelhos de características urbanas

Quanto à conservação pontual do cadastro, a situação é semelhante. Estão aguardando resolução dezenas de milhar de pedidos e declarações de alterações, com graves inconvenientes para os interessados que veem, anos após anos, adiada a divisão de prédios, a alteração de cultura, etc., impedindo-os de regularizar a titularidade dos prédios e cerceando muitas vezes o acesso a programas de financiamento.

Como sabemos que o Eng<sup>o</sup>. Serra Mendes vai focar alguns aspectos da metodologia adaptada na avaliação cadastral, apontando, por certo, algumas soluções, resta-nos referir de modo sucinto algumas causas de demoras excessivas.

Continuam-se a organizar Quadros de Qualificação e Classificação e Quadros de Tarifas, o que acarreta um processo administrativo excessivamente longo.

No que respeita aos Q.Q. e classificações, estes continuam a ser elaborados partindo do princípio que a um escalonamento de produções, referidas a um produto único, corresponde um escalonamento



semelhante de rendas fundiárias, o que nem sempre acontece. Esta correlação produção/rendimento acontecia na zona alentejana com as culturas então generalizadamente usadas. O Q.Q. e classificação, ou melhor, os assuntos a versar nesses Quadros, devem-se quase resumir a uma listagem completa de parcelas tipo e à sua caracterização exaustiva, suficientemente justificada, o que raramente consta nos Quadros.

No momento actual e especialmente nas zonas em que agora se trabalha, deixou de haver uma quase generalizada sequência de culturas, de operações culturais e de meios e produtos aplicados, a que o Alentejo e as épocas de estabilidade nos habituaram.

Deste modo, a apresentação de contas aparentemente minuciosas usadas nos Q. Tarifas, que deveriam retratar a exploração mais generalizada, fica sujeita a críticas em regra fundamentadas, pois tais contas raramente coincidem com uma sequência generalizada de operações e meios. A apresentação de contas por grupos de factores, além de seguirem a norma corrente em outros organismos com, pelo menos, igual credibilidade, permitiriam rápidas e correctas actualizações de tarifas.

A elaboração de contas de cultura para tipificar todas as classes de produção, podem muitas vezes ser substituídas por contas de classes limite, com interpolação para classes intermédias, ou até extrapolação. O recurso à extrapolação é perfeitamente justificável quando os Quadros se referem a uma Região Homogénea, figura considerada como desprestigiante e propiciadora da degradação do rigor...

Também a distribuição parcelar pode ser simplificada sem cometer erros de apreciação. Poder-se-á lançar mão de diversas normas que vão desde a eliminação de elevado número de parcelas, com reflexos no custo desta fase e da fase de desenho, à distribuição por manchas ou explorações tipo.

Face aos elevados custos da avaliação cadastral, ocorre questionar se a execução desta não poderá ser endossada a empresas privadas especializadas, ficando o I.G.C. com funções fiscalizadoras.

Esta sugestão é muitas vezes liminarmente recusada com o argumento de que a avaliação tem um cunho subjectivo e que as empresas têm tendência a diminuir a qualidade do executado. Daí poderia resultar trabalho mal feito, por causas fortuitas ou premeditadas. É sabido que com um caderno de encargos bem elaborado e com uma fiscalização competente tecnicamente, rigorosa e honesta, não há empresa que se queira sujeitar à repetição de trabalho incorrecto e as muitas por erros e atrasos de entrega.

Também o trabalho do I.G.C. se não for fiscalizado, de modo directo ou indirecto, está sujeito a erros fortuitos ou premeditados. O Organismo não pode, em boa verdade, garantir a boa e

honestidade da qualidade do que executa.

A avaliação cadastral no I.G.C. sempre foi executada por técnicos especializados, por razões que ressaltam da sua formação académica, embora com custos elevados. Será esta a solução única possível? Não poderia a Escola de Formação e Aperfeiçoamento do I.G.C. criar cursos de louvados regionais que se encarregariam de certas fases da avaliação cadastral? Não estará implícita na recusa desta solução, aliás adoptada na D.G.C.I., uma defesa obstinada de pergaminhos académicos?

Termino pedindo que se não veja "neste arrazoado um sentimento de frustrações. Preferimos que seja de esperança ou talvez de frustração ainda esperancosa", como escrevi em 1986.

RENDIMENTOS COLECTÁVEIS

ANEXO IA

1983

DISTRITO . . . . . BEJA, . . . . .

CONCELHOS	REND. COLECTÁVEL RUSTICO INSCRITO (ESC.)		REND. COLECTÁVEL URBANO INSCRITO (ESC.)		REND. COLECTÁVEL TOTAL INSCRITO (ESC.)	PERCENT. DO REND. COLECT. RUSTICO EM RELAÇÃO AO REND. COL. TOTAL (%)
	1	2	3	4		
ALJUSTREL		15.869.469	21.569.036	37.438.505	42,39	
ALMODOVAR		10.487.120	12.754.393	23.241.513	45,12	
ALVITO		8.168.218	5.561.424	13.729.642	59,49	
BARRANCOS		2.843.971	1.954.064	4.798.035	59,27	
BEJA		45.456.263	186.492.510	231.948.773	19,59	
CASTRO VERDE		7.862.743	15.174.828	23.037.571	34,13	
CUBA		7.323.615	12.104.064	19.427.679	37,69	
FRERREIRA DO ALENTEJO		23.059.451	15.493.744	38.553.195	59,81	
MÉRTOLA		11.750.932	13.320.151	25.071.083	46,87	
MOURA		41.022.542	50.110.384	91.132.926	45,01	
ODMIRA		30.438.199	47.657.664	78.095.863	38,97	
OURIQUE		13.118.635	9.135.377	22.254.012	58,94	
SERPA		40.670.413	17.119.213	57.789.626	70,37	
VIDIGUEIRA		11.676.565	15.374.265	27.050.830	43,16	
TOTALS		269.748.136	423.821.117	693.569.253		

RENDIMENTOS COLECTÁVEIS

1983

DISTRITO DE ÉVORA

CONCELHOS	REND. COLECTÁVEL RUSTICO INSCRITO (ESC.)		REND. COLECTÁVEL URBANO INSCRITO (ESC.)		REND. COLECTÁVEL TOTAL INSCRITO (ESC.)	PERCENT. DO REND. COLECT. RUSTICO EM RELAÇÃO AO REND. COL. TOTAL (%)
	1	2	3	4		
ALANDROAL		11.833.660	9.092.969	20.926.629	56,54	
ARRAIÓLOS		16.937.884	13.643.062	30.580.946	55,38	
BORBA		9.671.157	23.950.189	33.621.346	28,76	
ESTREMÓZ		24.167.765	51.971.811	76.139.576	31,74	
ÉVORA		17.147.930	311.654.996	328.802.926	5,21	
MONTOMOR-O-NOVO		67.271.116	52.271.814	119.542.930	56,27	
MORA		26.519.248	18.501.593	45.020.841	58,90	
MÓURÃO		5.725.534	5.177.024	10.902.558	52,51	
PORTEL		15.861.457	9.820.643	25.682.100	61,76	
REDONDO		13.226.475	19.822.015	33.048.490	40,02	
REGUENGO MONSARAZ		11.653.617	29.623.147	41.276.764	28,23	
VENDAS NOVAS		13.576.898	37.695.594	51.272.492	26,47	
VIANA DO ALENTEJO		12.101.352	12.100.829	24.202.181	50,00	
VILA VIÇOSA		9.903.545	50.372.088	60.275.633	16,43	
TOTAIS		255.597.638	645.697.774	901.295.412		

RENDIMENTOS COLECTÁVEIS

1983

DISTRITO . F. LISBOA

CONCELHOS	REND. COLECTÁVEL			REND. COLECTÁVEL TOTAL INSCRITO (ESC.)	PERCENT. DO REND. COLECT. RUSTICO EM RELAÇÃO AO REND. COL. TOTAL (%)
	RUSTICO INSCRITO (ESC.)	URBANO INSCRITO (ESC.)	URBANO INSCRITO (ESC.)		
1	2	3	4	5	
ALENQUER	29.667.075	86.026.382	115.693.457	25,64	
AMADORA	-	-	-	-	
ARRUDA DOS VINHO	9.369.530	42.768.243	52.137.773	17,97	
AZAMBUJA	21.887.853	75.750.530	97.638.383	22,41	
CADAVAL	15.644.290	32.850.516	48.494.806	32,25	
CASCAIS	2.237.277	1.802.170.783	1.804.408.060	0,12	
LISBOA	-	-	-	-	
LOURES	15.888.057	1.774.118.839	1.790.006.896	0,88	
LOURINHÃ	17.891.722	60.530.949	78.422.671	22,81	
MAFRA	18.401.949	266.154.234	284.556.183	6,46	
OEIRAS	1.958.826	1.828.118.067	1.830.076.893	0,10	
SINTRA	19.918.216	2.445.933.142	2.465.851.358	0,80	
SOBRAL MONTE AGRAÇO	5.993.862	30.123.027	36.116.889	16,59	
TORRES VEDRAS	48.965.378	283.774.508	332.739.886	14,71	
VILA FRANCA DE XIRA	26.795.701	622.811.077	649.606.778	4,12	
TOTAIS	234.619.736	9.358.130.297	9.585.750.033		

RENDIMENTOS COLECTÁVEIS

1983

ANEXO I-D

DISTRITO DE PORTALEGRE...

CONCELHOS	REND. COLECTÁVEL RUSTICO INSCRITO (ESC.)		REND. COLECTÁVEL URBANO INSCRITO (ESC.)		REND. COLECTÁVEL TOTAL INSCRITO (ESC.)	PERCENT. DO REND. COLECT. RUSTICO EM RELAÇÃO AO REND. COL. TOTAL (%)
	2	3	4	5		
ALTER DO CHÃO	15.710.436	10.489.584	26.200.020	59,96		
ARRONCHES	10.553.337	6.880.845	17.434.182	60,53		
AVIZ	33.491.889	9.258.501	42.750.390	78,34		
CAMPO MAIOR	14.264.462	20.510.041	34.774.503	41,01		
CASTELO DE VIDE	7.183.087	17.465.786	24.648.873	29,14		
CRATO	14.118.538	9.934.432	24.052.970	58,69		
ELVAS	27.605.157	92.592.895	120.198.052	22,96		
FRONTEIRA	11.323.477	6.776.746	18.100.223	62,55		
GAVIAO	9.454.184	8.756.274	18.210.458	51,91		
MARVÃO	6.094.657	7.353.922	13.448.579	45,31		
MONFORTE	13.289.314	7.187.381	20.476.695	64,89		
NISA	15.423.377	26.424.841	41.848.218	36,85		
PONTE DE SÓR	38.151.732	88.083.275	126.235.007	30,22		
PORTALEGRE	24.216.539	130.138.804	154.355.343	15,68		
SOUSEL	19.322.281	14.809.047	34.131.328	56,61		
<b>TOTAIS</b>	<b>260.111.467</b>	<b>456.662.374</b>	<b>716.864.841</b>			

RENDIMENTOS COLECTÁVEIS

1983

DISTRITO . . . : SETÚBAL . . . . .

CONCELHOS	REND. COLECTÁVEL RUSTICO INSCRITO (ESC.)		REND. COLECTÁVEL URBANO INSCRITO (ESC.)		REND. COLECTÁVEL TOTAL INSCRITO (ESC.)	PERCENT. DO REND. COLECT. RUSTICO EM RELAÇÃO AO REND. COL. TOTAL (%)
	1	2	3	4		
ALCÁÇER DO SAL		52.138.480	44.218.332	96.356.812	54,10	
ALCOCHETE		6.140.891	56.304.277	62.445.168	9,83	
ALMADA		13.362.698	1.382.736.227	1.396.098.925	0,95	
BARREIRO		2.761.474	1.028.429.506	1.031.190.980	0,26	
GRÂNDOLA		21.604.125	92.413.446	114.017.571	18,94	
MOITA		3.424.007	353.995.974	357.419.981	0,95	
MONTIJO		16.210.571	230.309.681	246.520.252	6,57	
PALMELA		41.971.234	247.702.546	289.673.780	14,48	
SANTIAGO DO CACÉM		37.511.639	224.574.013	262.085.652	14,31	
SEIXAL		6.738.770	932.900.885	939.639.655	0,71	
SESIMBRA		7.988.095	227.050.717	235.038.812	3,39	
SETÚBAL		-	-	-	-	
SINES		6.544.891	139.250.179	145.795.070	4,48	
TOTALS		216.396.875	49.588.555.783	5.176.282.658		

AUMENTO DE TRIBUTAÇÃO

DISTRITO ... BEJA .....

CONCELHOS	REND. COLECT. INICIO DO CAD. (CONTOS)	REND. COLECT. 1983 (CONTOS)	COEFICIENTE DE ACTUALIZAÇÃO	REND. COLECT. PREVISIVEL (CONTOS)	AUMENTO REND. COLECT. (CONTOS)	AUMENTO TRIBUTAÇÃO (CONTOS)
	2	3		5 = 2 x 4	6 = 5 - 3	7 = 6 x 0,14
ALMODOVAR	8.591	10.487		178.778	168.291	23.560
BARRANCOS	2.236	2.844		46.531	43.687	6.116
C. VERDE	7.503	7.863	20,81	156.137	148.274	20.758
MÉRTOLA	9.503	11.751		197.757	186.006	26.040
ODMIRA	27.730	30.438		577.061	546.623	76.527
OURIQUE	10.946	13.119		227.786	214.667	30.053
ALJUSTREL	12.399	15.869		241.160	225.291	31.540
ALVITO	6.365	8.168		123.799	115.631	16.188
BEJA	41.680	45.456		810.676	755.220	107.130
CUBA	5.955	7.324		115.824	108.500	15.190
F. ALENTEJO	18.354	23.059	19,45	356.985	333.926	46.749
MOURA	33.513	41.023		651.827	610.804	85.512
SERPA	32.643	40.670		634.906	594.236	83.193
VIDIGUEIRA	8.803	11.677		171.218	159.541	22.335
TOTAIS	226.221	269.748		4.690.445 <sub>4</sub>	4.220.697	590.891



AUMENTO DE TRIBUTAÇÃO

DISTRITO . . . . . ÉVORA . . . . .

CONCELHOS	REND. COLECT. INICIO DO CAD. (CONTOS)	REND. COLECT. 1983 (CONTOS)	COEFICIENTE DE ACTUALIZAÇÃO	REND. COLECT. PREVISIVEL (CONTOS)	AUMENTO REND. COLECT. (CONTOS)	AUMENTO TRIBUTAÇÃO (CONTOS)
	2	3				
ESTREMOZ	19.728	24.167		380.630	356.463	49.904
BORBA	7.679	9.671	15.75	152.318	142.647	19.970
VILA VIÇOSA	7.909	9.903		155.972	146.069	20.449
MONTEMOR-O-NOVO	52.967	67.271	14.05	744.186	676.915	94.768
V. NOVAS	10.110	13.576		142.045	128.469	17.985
ALANDROAL	9.433	11.834		214.884	203.050	20.527
ÉVORA	23.643	17.148		538.588	521.440	73.002
PORTEL	8.524	15.861	22.78	194.177	178.316	24.964
REDONDO	7.146	13.226		162.786	149.560	20.938
REGUENGOS MONSARAZ	6.424	11.654		146.339	134.685	18.856
VIANA DO ALENTEJO	6.380	12.101		145.336	133.235	18.653
MOURÃO	5.725	5.725	13.86	79.349	73.624	10.307
ARRAIÓLOS	9.057	16.938		173.623	156.685	21.936
MORA	19.102	26.519	19,17	366.185	339.666	47.553
TOTAIS	193.827	255.594		3.596.418	3.340.824	467.712

AUMENTO DE TRIBUTAÇÃO

DISTRITO . . . LISBOA . . . . .

CONCELHOS	REND. COLECT. INICIO DO CAD. (CONTOS)	REND. COLECT. 1983 (CONTOS)	COEFICIENTE DE AJUSTAZAÇÃO	REND. COLECT. PREVISIVEL (CONTOS)	AUMENTO REND. COLECT. (CONTOS)	AUMENTO TRIBUTAÇÃO (CONTOS)
	2	3		4	5 = 2 x 4	6 = 5 - 3
LOURINHA	14.604	17.892		169.114	151.222	21.171
CADAVAL	15.575	15.644		180.359	164.715	23.060
T. VEDRAS	40.105	48.965	11,58	464.416	415.451	58.163
ALENQUER	29.728	29.667		344.250	314.583	44.042
SOBRAL M. AGRAÇO	4.961	5.994		57.448	51.454	7.204
ARRUDA VINHOS	8.590	9.370		99.472	90.102	12.614
SINTRA	16.336	19.918	8,02	131.015	111.097	15.554
MAFRA	9.948	18.402	26,30	261.632	243.230	34.052
AZAMBUJA	22.042	21.888		387.278	365.390	51.155
V.F. XIRA	22.540	26.796	17,57	396.028	369.232	51.692
CASCAIS	-	-	-	-	-	-
OEIRAS	-	-	-	-	-	-
LISBOA	-	-	-	-	-	-
LOURES	-	-	-	-	-	-
AMADORA	-	-	-	-	-	-
<b>TOTAIS</b>	<b>184.429</b>	<b>214.486</b>		<b>2.491.012</b>	<b>2.276.476</b>	<b>318.707</b>

AUMENTO DE TRIBUTAÇÃO

DISTRITO . . . PORTALEGRE . . . . .

CONCELHOS	REND. COLECT. INICIO DO CAD. (CONTOS)	REND. COLECT. 1983 (CONTOS)	COEFICIENTE DE ACTUALIZAÇÃO	REND. COLECT. PREVISIVEL (CONTOS)	AUMENTO REND. COLECT. (CONTOS)	AUMENTO TRIBUTAÇÃO (CONTOS)
	2	3	4	5 = 2 x 4	6 = 5 - 3	7 = 6 x 0,14
NISA	12.078	15.423	17,89	216.075	200.652	28.091
GAVIÃO	7.789	9.454		139.345	129.891	18.185
CASTELO DE VIDE	5.824	7.183	15,74	91.670	84.487	11.828
MARVÃO	4.995	6.095		78.621	72.526	10.154
PORTALEGRE	19.385	24.217		240.762	216.545	30.316
CRATO	10.778	14.119	12,42	133.863	119.744	16.764
ALTER DE CHÃO	11.695	15.710		145.252	129.542	18.136
MONFÓRTE	10.394	13.289	14,90	154.871	141.582	19.821
ARRONCHES	8.449	10.553		125.890	115.337	16.147
ELVAS	22.075	27.605	16,04	354.083	326.478	45.707
CAMPO MAIOR	11.310	14.264		181.412	167.148	23.401
FRONTEIRA	8.877	11.323	13,20	117.176	105.853	14.819
LOUSEL	14.204	19.322		187.493	168.171	23.544

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CONCELHOS	REND. COLECT. INICIO DO CAD. (CONTOS)	REND. COLECT. 1983 (CONTOS)	COEFICIENTE DE ACTUALIZAÇÃO	REND. COLECT. PREVISIVEL (CONTOS)	AUMENTO REND. COLECT. (CONTOS)	AUMENTO TRIBUTAÇÃO (CONTOS)
	2	3	4	5 = 2 x 4	6 = 5 - 3	7 = 6 x 0,14
PONTE DE SOR	29.568	38.152		438.789	400.637	56.089
AVIS	26.098	33.492	14,84	387.294	353.802	49.532
TOTAIS	203.519	260.201		2.992.596	2.732.395	332.534

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DISTRITO DE SETÚBAL.....

CONCELHOS	2	3	4	5	6	7
	REND. COLECT. INÍCIO DO CAD. (CONTOS)	REND. COLECT. 1983 (CONTOS)		COEFICIENTE DE ACTUALIZAÇÃO		
1	2	3	4	5 = 2 x 4	6 = 5 - 3	7 = 6 x 0,14
ALCACER DE SAL	51.382	52.138		639.706	587.568	82.260
GRANDOLA	19.537	21.604	12.45	243.236	221.632	31.028
SANTIAGO CACÉM	39.669	37.512		493.879	456.367	63.891
SINES	5.192	6.545		64.640	58.095	8.133
ALCOCHETE	6.156	6.141		78.366	72.225	10.112
MONTIJO	16.663	16.211	12.73	212.120	195.909	27.427
PALMELA	42.051	41.971		535.309	493.338	69.067
SESIMBRA	6.225	7.988		79.244	71.256	9.976
ALMADA	-	-		-	-	-
SEIXAL	-	-		-	-	-
MOITA	-	-		-	-	-
BARREIRO	-	-		-	-	-
SETÚBAL	-	-		-	-	-
TOTAIS	186.875	190.110		2.346.500	2.162.390	301.894



SEMINARIO INTERNACIONAL  
SOBRE  
CADASTRO RUSTICO E URBANO  
MULTIFUNCIONAL

— SICRUM —

UM SISTEMA DE INFORMAÇÃO GEOGRÁFICA  
APLICADO À ESTRUTURAÇÃO FUNDIÁRIA

Ana Paula Adelino / Luis Lopes

Eng. Agrónoma

Tec. Informático

PORTUGAL

LISBOA./FUNCHAL-29 a 25 Novembro de 1989

## UM SISTEMA DE INFORMAÇÃO GEOGRÁFICA APLICADO À ESTRUTURAÇÃO FUNDIÁRIA

### A GEOGRAPHIC INFORMATION SYSTEM APPLIED TO LAND USE RENEWAL

Ana Paula T. Neves Adelino (\*)

Luis F. Figueiredo Lopes (\*\*)

#### Sumário:

Visando o estudo e implementação de acções no âmbito da estruturação fundiária numa área do Barlavento Algarvio, apresenta-se nesta comunicação a metodologia desenvolvida na criação dum Sistema de Informação Geográfica que integra o Cadastro Rústico existente, a Cartografia Temática de Ocupação Actual do Solo, as Redes Viária e Hidrográfica. A manipulação conjunta destes níveis de informação permite obter cartografias derivadas, utilizando técnicas de comparação e "overlay", e indicadores específicos, indispensáveis às acções de estruturação.

#### Abstract:

In view of the study and implementation of plans within the sector of land restructuring in an area situated on Algarve's Westcoast, it is presented in this report, the methodology used in the development of a Geographic Information System (GIS) which integrates already existing Cadastral Surveys, Thematic Mapping of Present Land Use, Route and Hidrographic Networks. The joint manipulation of these levels of information permits one to obtain derived maps, using comparison techniques, overlays and specific indicators indispensable to land use renewal plans.

#### 1 - INTRODUÇÃO

No âmbito do "Estudo de Estruturação Fundiária numa área de 5 000ha do Barlavento Algarvio"<sup>(1)</sup>, tem vindo a ser criado um Sistema de Informação Geográfica que visa dotar o Projecto de Regadios do Algarve de uma base de planeamento, para fazer face às necessárias acções de estruturação fundiária e outros projectos de alteração de infraestruturas hidráulicas, viária e de drenagem.

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(\*\*) Técnico Informático da GEOMETRAL, S.A.

(1) Projecto em execução pelo Agrupamento CORA-GEOMETRAL para a Direcção Geral de Hidráulica e Engenharia Agrícola

## 2 - A CARTOGRAFIA TEMÁTICA E O SIG

O Sistema de Informação Geográfica desenvolvido para este projecto, integra cinco temáticas distintas:

### Cadastro Rústico

Informação digitalizada a partir das secções cadastrais do Instituto Geográfico e Cadastral.

### Ocupação do Solo (Agrícola, Florestal e Social), Rede Viária, Rede Hidrográfica, Pocos, Tanques e Furos

Informação obtida por fotointerpretação de fotografia aérea 1986/87, validação de campo e rectificação utilizando como base cartográfica o ortofotomapa, e posterior digitalização

As saídas gráficas desta informação são fornecidas em cartas transparentes ou a cores, à escala pretendida, ou em ficheiros para manipulação em microcomputador.

Associada à Cartografia Temática, foi elaborada uma base de dados que, além de conter a informação presente nas fichas cadastrais, inclui um inventário das áreas com as diferentes ocupações do solo e uma caracterização e quantificação das Redes Viária e Hidrográfica.

Toda esta informação, armazenada em suporte magnético e geograficamente referenciada, é possível de cruzamentos que dão origem a um vasto número de listagens e indicadores que caracterizam a estrutura fundiária existente.

No tocante a listagens por proprietário e por prédio, associam-se-lhes os seguintes atributos:

- Número do prédio na secção cadastral
- Número do prédio na matriz cadastral
- Freguesia
- Ortofotomapa
- Morada do proprietário
- Local do prédio
- Número de contribuinte
- Beneficências
- Área do prédio
- Área total dos prédios por proprietário



No que respeita a indicadores, envolvendo prédios e proprietários, são exemplos o Índice de dispersão por prédios, o Número e percentagem de prédios encravados, o Número e percentagem de proprietários de prédio único, o Número de proprietários por escalão de área, etc.

Quanto a indicadores que caracterizam as infraestruturas existentes, mencionam-se o Comprimento e Área total de caminhos, a Densidade de caminhos por hectare e o Comprimento total da rede hidrográfica.

### 3 - A SELECÇÃO DO SISTEMA INFORMÁTICO

Colocaram-se diversas opções na selecção de um sistema informático que pudesse processar toda esta informação gráfica e alfanumérica de uma forma integrada.

A selecção de um dos vários Sistemas de Informação Geográfica (GIS) existentes actualmente no mercado, implicaria a utilização de equipamento informático específico e quase a ele exclusivamente dedicado, em que a configuração mínima seria um PC/386 com écran e placa gráfica de alta resolução, disco rígido da ordem dos 100MB, memória central superior a 4MB e ainda coprocessador aritmético, elevada velocidade de relógio, etc.

Mesmo utilizando este "Super microcomputador", as velocidades de acesso à informação por vezes não satisfazem as necessidades dos utilizadores, pelo que a esmagadora maioria destes Sistemas são instalados em Estações de Trabalho (Workstation).

Além de "pesados", estes programas são muito completos, excedendo bastante as nossas necessidades, além de exigirem uma maior especialização por parte dos operadores.

Tendo em conta todas estas exigências, optámos por utilizar um sistema que corre em microcomputadores, com configurações menos complexas e que utiliza, como base, dois softwares considerados standard nos respectivos mercados: o DBASE III Plus como base de dados alfanumérica, é o AUTOCAD como base gráfica. Para facilitar a captação da informação alfanumérica para o ficheiro DBASE, desenvolvemos um simples programa em CLIPPER que além de possibilitar a portabilidade para vários computadores pessoais com as mais simples configurações, tornou possível ainda, a utilização de operadores menos familiarizados com sistemas informáticos.

Por fim, para conseguir a integração da informação alfanumérica com a gráfica, desenvolvemos uma aplicação em CLIPPER, que além de executar as buscas, listagens e cálculos estatísticos sobre a base de dados alfanumérica já referidos, faz também a ligação a uma série de rotinas desenvolvidas em AUTOLISP, que controlam a base gráfica.

#### CONCLUSÃO

A Cartografia Temática e respectiva Base de Dados alfanumérica, constituindo informação georeferenciada, em suporte magnético, de rápida e fácil consulta, cruzamento e actualização, mostrou-se uma ferramenta indispensável aos técnicos e outros responsáveis, não só para o presente estudo de estruturação fundiária, mas também para outras acções de planeamento e gestão do território.

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SEMINARIO INTERNACIONAL  
SOBRE  
CADASTRO RUSTICO E URBANO  
MULTIFUNCIONAL  
- SICRUM -

A CONTRIBUIÇÃO ACTUAL DA INDÚSTRIA CARTOGRÁFICA  
PORTUGUESA NOS ÂMBITOS TÉCNICO E DE CAPACIDA-  
DE DE PRODUÇÃO PARA A REALIZAÇÃO E RENOVAÇÃO  
DOS CADASTROS RÚSTICO E URBANOS NACIONAIS.

António Silva e Castro  
Tenente Coronel

PORTUGAL

LISEOA./FUNCHAL-20 a 25 Novembro de 1989

A CONTRIBUIÇÃO ACTUAL DA INDÚSTRIA CARTOGRÁFICA PORTUGUESA NOS ÂMBITOS TÉCNICO E DE CAPACIDADE DE PRODUÇÃO  
PARA A REALIZAÇÃO E RENOVAÇÃO DOS CADASTROS RÚSTICO E URBANO NACIONAIS

THE PRESENT CONTRIBUTION OF THE PORTUGUESE MAPPING INDUSTRY IN TERMS OF TECHNICAL AND PRODUCTION CAPACITY  
FOR THE MAKING AND RENEWAL OF NATIONAL URBAN AND RURAL CADASTRES

António Silva e Castro (\*)

Sumário:

A frequência com que o sector mais avançado da indústria cartográfica está a ser solicitado para a execução de trabalhos de cadastro rústico e urbano em território nacional levou ao desenvolvimento de filosofias e metodologias modernas as quais, embora distintas das oficiais, garantem a todo o momento a compatibilidade da diversificada informação gerada no país.

Referimos nesta comunicação o recurso intensivo às tecnologias de cartografia numérica e desenho automático, bem como a sistemática implementação em Portugal dos Sistemas de Informação Geográfica para a gestão do Cadastro. Salienta-se de igual modo o novo Sistema de Referência Espacial que poderá substituir ou complementar de modo extremamente prático, o clássico método da referência cadastral do IGC.

Abstract:

Because frequently the most advanced sector of the mapping industry is requested for the making of rural and urban cadastres within national territory, it gave way to the development of new philosophies and modern methodologies, though each are distinct from the oficial, guarantee at any moment the compatibility of the diverse information generated in the country. It is refered in this work, the intensive appeal to the technologies of numerical mapping and automatic plotting, as well as to the sistematic implementation in Portugal of the Geographic Information Systems for cadastral management. Equally prominent is the new spacial Reference System for property registration, which could substitute or complement in an extremely more practical way, the classical cadastral reference still in use in Portugal.

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\* Vice Presidente da GEOMETRAL, SA

Vogal da Comissão de Atlas do Ambiente

Secretário da Associação Portuguesa de Fotogrametria e Detecção Remota

Desde há anos que o sector privado da produção cartográfica nacional tem vindo a ser solicitado para a realização pontual de trabalhos de cadastro geométrico da propriedade rústica, basicamente relacionado com os projectos e implantação de estradas e auto-estradas e, mais recentemente, para a concretização de projectos de grandes dimensões como foi o caso da provável área para o novo Aeroporto de Lisboa nas quais está praticamente envolvido todo o Concelho onde o mesmo virá a ficar instalado.

Mais recentemente e com vista ao suporte de vários projectos de estruturação fundiária foi a indústria privada, mais especificamente a GEOMETRAL, chamada a informatizar parte do cadastro existente no Barlavento e Sotavento Algarvio quer nos seus aspectos gráficos quer em termos de informação relacional que passaram a ficar igualmente registados em ficheiros manuseáveis em computador sob a forma alfanumérica.

Nesta última tarefa, todo o trabalho se limitou à digitalização da informação existente, embora alguma se verificasse algo desactualizada, apenas tendo sido acrescentado em cada caso, nova informação de interesse para a desenvolvimento do próprio projecto.

Contudo, para áreas destituídas de informação do IGC, este tipo de cadastro tem sido integralmente realizado pelas empresas, contando-se já por dezenas de milhares de hectare as áreas cobertas por cadastro geométrico da propriedade e respectivas avaliações que, oficialmente, sustentaram as acções de expropriação necessárias à implantação dos diversos projectos de rodovias, linhas de alta tensão e outros.

Obviamente que, desde há cerca de 4 anos, todos os trabalhos de cadastro de raiz ou a sua simples organização, têm sido realizados por métodos informáticos, quer no âmbito da aquisição de dados quer ainda na sua gestão, nomeadamente, através da constituição do Sistemas de Informação Geográfica específicos.

Um exemplo de um trabalho deste tipo realizado recentemente na área do Barlavento Algarvio em que igualmente foi cruzado um vasto conjunto de informação temática, é apresentado na comunicação de Eng.º Ana Paulo Adelino da GEOMETRAL.

As metodologias utilizadas e desenvolvidas especificamente para o projecto em causa e que recorreram às tecnologias digitais mais modernas, foram contudo adaptadas às especificações da entidade governamental interessada.

Com vista a apoiar a realização do cadastro da propriedade rústica nas áreas centro e norte do país e para resposta às primeiras solicitações de cadastro urbano no país, a GEOMETRAL tem em desenvolvimento e ensaio, técnicas de produção cartográfica e de recolha e processamento de informação cadastral, capazes de poderem corresponder à urgência que agora nos vai ser pedida para a sua realização.

No caso do cadastro geométrico da propriedade rústica, nomeadamente para apoio dos inventários olivícola e vitícola nacionais, irão ser utilizadas técnicas de fotografia aérea e de restituição analítica de alta capacidade, bem como o recurso à foto interpretação de elevada discriminação.

De referir que, na área a norte do Tejo existem 82,5% das explorações agrícolas nacionais cobrindo praticamente a mesma área da região sul. Em média, a área de cada exploração a norte é de 3,5ha contra 17,6ha na região Sul.

Admite-se por este facto a necessidade de melhorar as metodologias de trabalho para que se possa corresponder a tão grande tarefa em tempo oportuno ou seja, entre os próximos 5 e 10 anos.

Antecipando a uma metodologia de referenciação espacial das propriedades que virá futuramente a ser utilizada em associação com o tradicional número do prédio na matriz cadastral, a GEOMETRAL propôs já ao Ministério da Agricultura e às Comunidades a utilização do designado "centróide" constituído por uma transformação das coordenadas militares que conduzem à localização de qualquer ponto ao nível do metro.

Constituindo um sistema de características topológicas, a cada centróide apenas corresponde um determinado polígono o que permite uma fácil e rápida busca, quer com origem no referido centróide quer com origem no número da matriz.

Por outro lado, a criação de uma base de dados relacional gráfica/alfanumérica, possibilita o avanço cadastral com base na referenciação pelo centróide ao qual será associado, quando determinado, o número cadastral por parte da entidade responsável governamental ou autárquica.

A cartografia é apresentada sob a forma de folhas cobrindo 25 secções com a área de 1ha e a que se dá o nome de Matriz gráfica. Corresponde à escala 1:1 000, a uma dimensão de 50x50cm, à qual está associado uma legenda em que é inserida a designação do concelho e igualmente as coordenadas constantes para a região ao

nível de centena e da dezena de quilómetros e ainda as coordenadas da origem da secção ou seja do canto inferior esquerdo.

Um programa informático específico permite a busca, extracção e manipulação desta informação cadastral de forma extremamente rápida: cerca de 100 matriculas gráficas no período de 1 a 3 minutos.

O programa informático (Busca no interior de um polígono) permite a busca por polígonos ou por círculos de interesse, produzindo igualmente a saída de listas e tabelas ou quadros com os atributos relativos a cada centróide e/ou número cadastral considerado.

Como qualquer sistema informatizado, permite a actualização constante da informação gráfica e alfanumérica associada. A listagem de centróides, não possuindo qualquer ordem consecutiva, é facilmente alterada cada vez que se verificam divisões ou emparcelamentos dos propriedades pois apenas se acrescentam ou eliminam números de centroides correspondentes a novas coordenadas de pontos ou eliminação e possível substituição de centroides desnecessários.

Este sistema complementar de identificação da propriedade rústica se bem que possua as óbvias vantagens características da informática, nomeadamente a rapidez de trabalho, a fácil actualização e a eliminação dos normais erros humanos, mas contém igualmente algumas limitações.

Na realidade, a precisão da localização a nível do metro implica a definição dos prédios e parcelas com maior cuidado, podendo haver diferenças ligeiras entre os cálculos de posições e áreas por meios informáticos e no campo, e obrigando por isso a certas operações complementares quando um prédio é dividido por acidentes naturais, ou artificiais como rios, ribeiras, estradas, etc. Finalmente alguns problemas podem surgir quando várias copropriedades indivisas possuem o mesmo centróide. Vários destes problemas terão ainda que ser resolvidos. Contudo o tempo previsto até à necessidade das suas aplicações irá permitir a sua solução oportuna.

O contacto que mantemos com entidades estrangeiras que já há vários anos utilizam esta metodologia irá possibilitar em Portugal uma aplicação já isenta de alguns destes problemas.



As características deste novo tipo de referenciación espacial a utilizar para incremento da produção cadastral, em nada altera, apenas complementa, a referenciación cadastral tradicional existente ou que venha a ser atribuída a todo o momento em qualquer área do país.

Os esforços que a GEOMETRAL está a realizar neste campo foram já reconhecidos e aceites pelo Ministério da Agricultura e pela CEE em Bruxelas e, a aplicação da referenciación por centróides, irá certamente ser ensaiada pela primeira vez na execução do Inventário Olivícola Nacional, quer nas áreas destituídas ainda hoje de cadastro rústico, quer nas áreas já contempladas com esta fonte imprescindível de informação qualquer que sejam as empresas ou consórcios de empresas que o venham a realizar.

A sua aplicação experimental noutros tipos de trabalhos cadastrais em execução irão obviamente conduzir a obtenção de conhecimentos e de soluções práticas que, naturalmente, serão divulgados oportunamente.

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**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
**MULTIFUNCIONAL**  
**— SICRUM —**

O CADASTRO E O REGISTO PREDIAL

RAUL L. MARQUES COELHO

PORTUGAL

LISBOA., FUNCHAL-20 a 25 Novembro de 1989

**SEMINARIO INTERNACIONAL  
SOBRE CADASTRO RÚSTICO E URBANO MULTIFUNCIONAL**

Lisboa e Funchal, 20 a 25 de Novembro de 1989

Tema 13

**O CADASTRO E O REGISTO PREDIAL**

Raul L. Marques Coelho

**SUMARIO:** O prédio como objecto do registo predial. A interdependência do registo predial e do cadastro dos prédios rústicos e urbanos. Breve resenha histórica das relações entre o registo predial e o cadastro imobiliário em Portugal. Regime das relações entre as matrizes e o registo predial no direito positivo português. Apreciação crítica do regime vigente. Quadro ideal de correlação entre o cadastro e o registo predial. Conclusões. **ABSTRACT.**

1. O prédio como objecto do registo predial

A problemática da descrição é essencial para a seriedade e credibilidade do sistema do REGISTO PREDIAL, que se destina a dar publicidade à situação jurídica dos prédios (Artº 1º do CRP).

A descrição, que deve reflectir a identificação do prédio (artº 71º, nº 2 do CRP), e ser distinta para cada um deles, tem sido e continua a ser o calcanhar de Aquiles do nosso sistema de registo predial.

Assentando o registo predial na descrição, que deve individualizar o prédio, objecto do registo, é óbvio que a confiança na coincidência entre a realidade existente e a descrição predial condiciona a credibilidade do sistema.

Ora, presentemente, os prédios projectam-se no REGISTO PREDIAL mediante uma descrição rudimentar, que quase nunca se ajusta à realidade, antes se apoia em meras declarações dos interessados, ao

extremo de se poder levar ao registo prédios que não existam na realidade, os chamados prédios "fantasmas". E de se poder afirmar que, por via de regra, quer as medidas quer as confrontações que figuram nos dados registrais só excepcionalmente correspondem às que o imóvel tem na verdade.

Por outro lado, até há pouco, por mais que o conservador do registo predial se esmerasse nas buscas, era raro obter-se a certeza de que um prédio se encontrava descrito, quando, estando-o de facto, havia interesse em obter uma certidão negativa.

A indagação para tanto necessária efectuava-se primacialmente com recurso a elementos pessoais - os possuidores e antepossuidores dos prédios - constantes de verbetes pessoais e, em regra, só depois aos elementos objectivos de identificação dos imóveis, dada a falta de correcta ordenação dos existentes.

## 2. A interdependência do registo predial e do cadastro dos prédios rústicos e urbanos

Sendo o REGISTO PREDIAL o registo onde se faz constar a situação jurídica dos bens imóveis, ou seja, dos direitos sobre os mesmos, com todos os seus elementos, extensão e condições;

e o CADASTRO o registo onde se faz constar o facto da existência física do imóvel, com a indicação da sua natureza, situação, medidas e confrontações,

a interdependência do registo predial e do cadastro surge como óbvia necessidade.

O CADASTRO, na sua essência, deve ser unicamente a representação gráfica dos imóveis; o seu objecto único e básico é individualizar e dar a conhecer a existência física dos mesmos.

O REGISTO PREDIAL é a representação jurídica dos bens imóveis e dos direitos reais sobre eles impostos; tem por objecto a publicidade dos actos e contratos relativos à propriedades e aos restantes direitos reais sobre os ditos bens.

Não obstante terem o REGISTO e o CADASTRO fins tão diferentes, é indispensável que exista entre eles perfeita coordenação, exacta correspondência quanto ao sujeito e ao objecto de ambas as instituições.

A este respeito, o CADASTRO, cumprindo o seu fim essencial, declara que um determinado prédio existe, tem realidade física e quais são as suas características de situação, medida superficial e confrontações, e com estas mesmas circunstâncias deve figurar no REGISTO PREDIAL.

Assim sendo, existe coordenação entre o REGISTO e o CADASTRO, quanto ao objecto de ambas as instituições e este será para aquele de uma utilidade essencialíssima.

Em troca, o REGISTO deve fornecer ao CADASTRO, com rigorosa exactidão jurídica, o nome, apelidos e circunstâncias pessoais do proprietário ou possuidor do imóvel, posto o que, existirá correspondência entre as duas instituições a respeito do sujeito das mesmas.

### 3. Breve resenha histórica das relações entre o registo predial e o cadastro imobiliário em Portugal

Até à publicação do Código do Registo Predial de 1928 nenhuma relação institucional existia entre o sistema de registo predial português e qualquer CADASTRO, mesmo rudimentar.

Este diploma estabeleceu a obrigatoriedade de mencionar na descrição o número do prédio na matriz, rústica ou urbana, e, no caso de ainda nela não estar inscrito, a declaração de que fora feita a participação para o ser.

Nenhuma coordenação, pois, entre as duas instituições; apenas uma relação, de sentido único, entre a descrição e a matriz, visando exclusivamente a cobrança de impostos, não a perfeição dos sistemas, nem a correspondência entre as duas instituições, matriz e descrição predial.

Mas o legislador português não permaneceu totalmente desatento à problemática da descrição predial e, em 1956, deu um passo importante, embora não decisivo, no sentido da harmonização entre a descrição predial e o CADASTRO GEOMÉTRICO DA PROPRIEDADE, ao criar o registo obrigatório em conjugação com o cadastro geométrico da propriedade (Lei 2049 e Decreto-Lei nº 40603, de 18 de Maio de 1956).

O sistema instituído ficou, porém, muito aquém das necessidades. Antes de mais, porque o cadastro geométrico da propriedade avançou muito lentamente na cobertura do território nacional. Até o presente não foi levantado, ao que cremos, o cadastro geométrico de mais de uma quarta parte do território nacional. Depois, porque não funcionou a reciprocidade da comunicação entre os dois sistemas, na medida em que as alterações de situação jurídica que os prédios iam sofrendo no registo predial não foram absorvidas pelo cadastro. Finalmente pelas dificuldades sentidas na própria conservação do cadastro realizado.

Esta situação vigorou até à publicação do Código de 1959, que manteve, embora com carácter transitório, a dualidade de regimes: *registo facultativo*, vigente na generalidade do território e *registo obrigatório*. O Código integrou na economia geral do diploma o regime da obrigatoriedade estabelecido no referido Decreto-Lei nº 40603, cujo domínio de aplicação se manteve circunscrito aos concelhos sob regime cadastral, ficando porém, prevista na lei a conversão do regime de registo facultativo em registo obrigatório à medida que, em cada concelho, se fosse organizando o cadastro geométrico da propriedade.

Situação que se manteve com a publicação do Código do Registo Predial de 1967, aprovado pelo Decreto-Lei nº 47611, de 28 de Março de 1967.

O Código do Registo Predial de 1983, aprovado pelo Decreto-Lei nº 305/83, de 29 de Junho, mas que não chegou a entrar em vigor, ao instituir a obrigatoriedade indirecta do registo predial, por via da exigência da legitimação prévia dos direitos em sede de titulação dos actos de transmissão ou oneração de imóveis (artº 20º) e ao exigir a conjugação do registo e das matrizes prediais quanto aos prédios urbanos e aos rústicos situados nos concelhos onde vigorasse o cadastro geométrico (artigos 32º, 33º e 34º), deu mais um passo, importante, no sentido da conformação da descrição com a realidade.

Estabelecia-se nesses preceitos a completa harmonização entre a matriz e os prédios urbanos bem como os rústicos situados nos concelhos onde vigorasse o cadastro geométrico. Mas quanto aos prédios rústicos situados em concelhos onde ele não se encontrasse em vigor, a conjugação era restrita aos números dos artigos matriciais e suas alterações e à área dos prédios.

Disponha-se ainda que as repartições de finanças deviam comunicar às competentes conservatórias do registo predial, até ao último dia de cada mês, todas as modificações que, no mês anterior, tivessem sido efectuadas nas matrizes.

Finalmente, proibia-se, fora dos casos de urgência comprovada, que se lavrassem títulos extrajudiciais respeitantes a factos sujeitos a registo, sem que se mostrasse assegurada a harmonização entre a descrição e a inscrição matricial do prédio.

O Código do Registo Predial de 1984, embora mantendo a obrigatoriedade indirecta do registo predial, por via da exigência da legitimação prévia dos direitos em sede de titulação dos actos de transmissão ou oneração de direitos sobre imóveis (artº 9º do CRP), bem como a obrigatoriedade da conjugação entre a inscrição matricial e a descrição predial, deu um passo atrás na conjugação entre a matriz e a descrição predial, ao dispensar as repartições de finanças de comunicar as alterações introduzidas na matriz, como se exigia no nº 1 do artº 33º do Código de 1983.

E a pouca segurança que oferecem as matrizes urbanas, elaboradas por comissões a que falecem meios de apoio para um rigoroso trabalho de identificação física e jurídica dos prédios urbanos, retira a indispensável confiança nos dados que faculta para essa harmonização.

Urge, pois, criar as condições para que o cadastro geométrico da propriedade atinja a totalidade do território nacional, elaborar o cadastro urbano, ficando ambos em perfeita coordenação com o registo predial.

Sem este essencial apoio, o REGISTO PREDIAL não poderá cumprir, integralmente e com o grau de certeza exigido pela segurança do comércio jurídico imobiliário, a sua função de dar publicidade à situação jurídica dos prédios, com vista àquela segurança.

#### 4. Regime das relações entre as matrizes e o registo predial vigente no direito positivo português

As matrizes são rústicas e urbanas, distinguindo-se as primeiras em cadastrais e não cadastrais.

As relações entre elas e a descrição predial variam consoante a sua natureza, observando-se para as matrizes urbanas e para as cadastrais um regime diverso do estabelecido para as rústicas não cadastrais.

A matéria encontra-se regulada nos artigos 28º, 29º e 30º do Código do Registo Predial.

Segundo estes preceitos, os prédios rústicos situados nos concelhos onde vigore o cadastro geométrico e os prédios urbanos não podem ser descritos, nem actualizadas as respectivas descrições, em contradição com a correspondente inscrição matricial ou com o pedido da sua rectificação.

Na descrição dos prédios rústicos ainda não submetidos ao cadastro geométrico, a exigência da harmonização é limitada aos números dos artigos matriciais e suas alterações e à área dos prédios.

É, contudo, dispensada a harmonização quanto à área se a diferença entre a descrição e a inscrição não exceder, em relação à área maior, 10% nos prédios rústicos e 5% nos prédios urbanos ou terrenos para construção.

Em caso de substituição das matrizes, as repartições de finanças devem comunicar às conservatórias do registo predial a impossibilidade de ser certificada a correspondência entre os artigos matriciais relativos a todos os prédios do concelho ou de uma ou mais freguesias.

Em tais casos, a prova da correspondência matricial, se não resultar dos documentos apresentados, pode ser suprida por declaração complementar dos interessados.

Nos títulos respeitantes a factos sujeitos a registo, a identificação dos prédios não pode ser feita em contradição com a inscrição na matriz, nos termos acima enunciados.

##### 5. Apreciação crítica do regime vigente

O regime das relações entre a matriz e a descrição predial não satisfaz totalmente a necessidade sentida pelo registo predial de se apoiar num verdadeiro CADASTRO RÚSTICO E URBANO, pois só em medida muito limitada o consegue - apenas quanto aos prédios rústicos situados nos concelhos onde vigore o cadastro geométrico da propriedade.

Quanto aos restantes prédios - os urbanos e os rústicos situados nos outros concelhos - as matrizes existentes não contêm dados inteiramente fiáveis: muitas delas são antigas e referem elementos desactualizados, tendo sido elaboradas, por vezes, com base em informações incompletas ou incorrectas. Nelas, as áreas indicadas para os prédios foram, muitas vezes, obtidas por métodos inadequados, pelo que raramente coincidem com a realidade.



Acresce que as finalidades das duas instituições são inteiramente distintas, pois enquanto uma, o registo predial se destina a dar publicidade à situação jurídica dos prédios com vista à segurança do comércio jurídico imobiliário, a matriz tem por fim, essencialmente, assegurar a cobrança dos impostos. Perante objectivos tão diversos, a completa harmonização entre ambos afigura-se irrealizável, o que a prática, aliás, tem vindo a demonstrar.

Por outro lado, a conjugação, nos termos legislados é demasiado burocratizante, exigindo dos interessados e dos serviços do registo predial a satisfação de exigências cuja contrapartida em segurança para o registo é discutível.

## **6. Quadro ideal de correlação entre o cadastro de bens imóveis e o registo predial**

6.1. Cadastro urbano e cadastro geométrico rústico, abrangendo a totalidade do território nacional.

Impõe-se, efectivamente, a criação de um cadastro de bens imóveis que integre o universo dos prédios situados no território nacional, tanto rústicos como urbanos, elaborado de harmonia com critérios científicos, designadamente geométricos, com recurso a tecnologias avançadas de levantamento topográfico e sua reprodução gráfica.

6.2. Cadastro elaborado em colaboração com os serviços do registo predial e de outras entidades interessadas.

O prédio, além se constituir uma realidade física, é também uma realidade jurídica, moldada por critérios normativos. O conceito de propriedade age sobre a realidade solo e desta interacção resulta a figura do prédio rústico.

O cadastro não pode, por consequência, abstrair da existência de proprietário para o prédio, essencial para a definição concreta do mapa cadastral.

Este conhecimento deverá basear-se, sempre que possível, na situação jurídica dos prédios e terá de ser fornecido ao cadastro pelos serviços do registo predial.

6.3. Cadastro puramente descritivo, contendo a indicação da situação do prédio com referência às suas coordenadas geográficas;

O nome do proprietário do prédio, bem como o seu valor fiscal devem ser indiferentes para o cadastro, que, assim, revestirá a natureza de puro instrumento técnico, com o máximo de objectividade, ao dispor dos diversos serviços a que interesse conhecer os elementos que faculta e que deles se servirão para a obtenção dos seus fins específicos.

6.4. Coincidência permanente entre a identificação cadastral e a descrição predial.

Uma vez elaborado o cadastro, a sua conservação, ou seja a manutenção da coincidência entre a realidade, o cadastro e o registo predial, exige que não possa introduzir-se alteração na descrição sem que esta seja comunicada e levada ao cadastro e vice-versa.

6.5. Proibição de identificação dos prédios nos títulos em contradição com a identificação cadastral e com a descrição predial.

É óbvia a necessidade de impedir legalmente que, nos títulos dos actos de transmissão ou oneração de bens imóveis, estes sejam descritos em contradição com a descrição, coincidente com a identificação cadastral.

Em caso de alteração superveniente, haverá que, previamente, introduzir a modificação em ambas as instituições.

6.6. Indicação dos titulares do direito de propriedade dos prédios fornecida exclusivamente pelos serviços do registo predial;

6.7. Alterações ao cadastro apenas admissíveis por comunicação dos serviços do registo predial;

6.8. Existência de uma Comissão Permanente de Conservação do Cadastro.

Afigura-se que a coordenação das relações entre o cadastro e o registo predial exige o funcionamento de uma Comissão Permanente que esclareça as inúmeras dúvidas que, naturalmente, hão-de surgir na sua execução e resolva os eventuais questões que se levantem entre os dois institutos no exercício das respectivas funções.

## 7. CONCLUSÕES

I - Impõe-se a criação de um cadastro que integre o universo dos prédios situados no território nacional, tanto rústicos como urbanos.

II- O cadastro deve ser elaborado com a colaboração das várias entidades interessadas no seu funcionamento, designadamente as que coordenam o registo predial.

III- O cadastro deve conter primordialmente os elementos de identificação física dos prédios e só acessoriamente outros elementos como o proprietário e o valor fiscal.

IV- O cadastro assim elaborado deve manter-se actualizado, com a introdução das alterações também levadas à descrição predial e apenas estas.

#### 8. Abstract

The real property as object of land registration. Interdependence between the land registration and Ordnance Survey map. Brief historical notes of the relations between the land registration system and the survey of the immovable property in Portugal. The system of the relations between the fiscal registration and the land registration in the Portuguese law. Critics about prevailing system. The ideal scheme of the corelation between land registration and Ordnance Survey map. Conclusions.

Cascais, 30 de Outubro de 1989



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Conservador do Registo Predial





**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
**MULTIFUNCIONAL**  
  
**- SICRUM -**

**O CADASTRO E A CARTOGRAFIA NA  
GESTÃO DA INFORMAÇÃO FLORESTAL**

**COUCELO, F. e CARVALHO, J.L.**

**PORTUGAL**

**LISBOA./FUNCHAL-20 a 25 Novembro de 1989**

## R E S U M O

Os Sistemas de Informação Geográficos possibilitam grandes melhorias na gestão florestal em relação à cartografia tradicional.

No entanto a informação básica do território, como o seja o cadastro ou a topografia, ainda não é possível de obter em formato digital. Torna-se pois fundamental avançar neste domínio e estabelecer protocolos de colaboração entre as principais entidades envolvidas neste processo.

## S U M M A R Y

The Geographical Information Systems (GIS) can provide an important improvement in forestry management in comparison with the traditional cartography.

However we can not dispose yet in digital format of the fundamental information of Portugal, such as the cadastral or the topographic survey. So it is fundamental to go ahead in this domain and establish co-operation protocols among the main entities related with this process.

## O CADASTRO E A CARTOGRAFIA NA GESTÃO DA INFORMAÇÃO FLORESTAL

Nas últimas décadas o avanço verificado nas tecnologias de informação nomeadamente nos sistemas que permitem o tratamento da informação em formato vectorial modificou de forma profunda os métodos de trabalho das empresas e indústrias florestais.

Assim, desde o aparecimento dos produtos CAD de representação vectorial de informação digitalizada até aos actuais sistemas de informação geográfica G.I.S., em que a informação vectorial está associada a atributos de classificação e referenciada geograficamente, muitos são os sistemas actualmente existentes, todos eles comungando de um objectivo comum, permitir aos seus utilizadores gerir a sua informação com processos dinâmicos de representação espacial que assegurem uma gestão racional dos recursos em análise.

A Direcção Florestal da Portucel, não se podendo alhear de tal situação efectuou recentemente a aquisição do seu sistema de informação geográfico assim como do equipamento necessário ao arranque dos trabalhos que permitam a curto prazo possuir um maior e melhor conhecimento do seu património florestal.



Deste modo instalou-se no corrente ano o sistema ArcInfo, o qual pela sua funcionalidade irá permitir enveredar por novos métodos de gestão do património florestal da empresa.

Ao iniciarmos a nossa preparação neste tipo de tecnologia sabíamos das dificuldades com que iríamos ser confrontados seja no estudo do software seja no acesso à informação.

Se no momento presente podemos afirmar que o software ArcInfo não representa obstáculo de maior à implementação do nosso sistema o mesmo já não podemos afirmar relativamente à informação disponível.

Dado que todo o nosso trabalho reside na transferência de dados florestais nomeadamente os limites das propriedades da empresa, sua rede divisional assim como a ocupação florestal inicial e suas transformações ao longo do tempo, seria forçoso que ao iniciarmos os trabalhos de digitalização analisássemos qual o suporte de base mais adequado e que nos garantisse rigor na informação transferida.

Quando efectuámos um levantamento das diferentes hipóteses chegámos à conclusão que o melhor suporte seria a digitalização através de ortofotomapas 1:10 000 nas zonas em que a empresa possuía maior implantação. Pelo que iniciamos todo um conjunto de contactos com a entidade responsável pela sua execução no território o Instituto Geográfico e Cadastral.

A desactualização deste tipo de suporte assim como a sua ineficiente cobertura actual do território levou-nos a encetar com o I.G.C. uma primeira colaboração nomeadamente a cobertura aerofotográfica 1:33 000 de Zona da Idanha-a-Nova durante o presente ano para completar uma das poucas Zonas onde a informação existente em ortofotomapas se pode considerar actualizada (1988).

E óbvio que este primeiro trabalho é uma gota de água nas necessidades reais do País em ortofotomapas e particularmente nas nossas.

O ano de 1990 está à porta e parece-me perfeitamente possível continuar no mesmo espírito de colaboração em outras zonas e regiões do território que pela sua importância florestal também nos são importantes no contexto da indústria que somos.

Porém julgamos que o espírito de colaboração agora iniciado deveria abranger frentes de informação mais vastas no sentido de que as entidades oficiais que são responsáveis pela sua produção e actualização enveredassem pela sua disponibilização ao público em suporte magnético que evitasse o dispêndio de recursos humanos e financeiros que indirectamente penalizam o País.

Assim em nosso entender e com as salvaguardas necessárias, os serviços cartográficos do exército e Instituto Geográfico e Cadastral que actualmente já dispõem de tecnologia suficiente à cedência de informação em formato digital deveriam eleger os níveis de informação que não comprometam ou não permitam por parte dos utentes abusos de utilização tomando a breve prazo essa decisão de todo importante para a melhor, gestão e análise dos recursos do território.

De igual modo outros organismos oficiais actualmente responsáveis pela elaboração e actualização da carta de capacidade de uso dos solos assim como da carta dos solos ou até da carta geológica do território deviam avançar na sua produção, actualização e distribuição em suporte diferente do actual.

Parece-nos por outro lado que as diferentes entidades oficiais responsáveis pela produção de informação de base e temática do território deveriam em conjunto, e ouvindo os actuais e potenciais utilizadores da informação, e elegerem os níveis de informação importantes no momento presente estabelecendo prazos e tarefas evitando de algum modo a duplicação de trabalho.

A nossa empresa não irá cruzar os braços e efectuará todos os esforços para que algum imobilismo actual se transforme na dinâmica necessária a todos os que hoje e no futuro se preocupam com o conhecimento da informação.

Há alguns anos que executámos internamente a implantação manual do cadastro existente em algumas regiões do País, com mais potencial florestal, sobre a carta militar 1:25 000, o que nos permitiu em conjugação com a Carta de Capacidade de Uso dos Solos e a Carta Agro-Florestal desencadear acções de prospecção de terrenos.

Esta acção surgiu num momento em que por compromissos assumidos com o Estado, nos empenhámos na execução do Projecto Florestal Português - Banco Mundial.

Contabilizar o tempo gasto neste trabalho está ao alcance de todos, mas julgamos que actualmente, se a tal tarefa fossemos de novo obrigados, a metodologia em tudo seria diferente.

Com os meios tecnológicos actuais não parece difícil possuir a informação do cadastro em formato digital, assim como da Carta de Capacidade de Uso do Solo ou outras cartas temáticas, aliás outros Países de superfície muito superior a Portugal já o fizeram para o seu espaço físico.

O que está apenas em jogo é o custo-benefício da produção dessa informação em formato digital.

As vantagens da utilização de Sistemas de Informação Geográfica tidas em relação à tradicional produção cartográfica são a possibilidade de combinar várias fontes (fotografia aérea, imagem satélite, etc), manipulação mais fácil e mais rápida da informação, possibilidades de modelação e simulação e apresentação dos resultados em diferentes tipos de suporte (papel, video, etc). Se pensarmos na diversidade de entidades públicas e de agentes económicos privados que interferem no processo de ordenamento do território e na dificuldade de harmonizar os interesses de cada um, compreenderemos que seria razão suficiente para justificar as novas metodologias. Os sistemas de informação geográfica permitem a quem desenvolve actividades fundiárias reunir diferentes níveis temáticos, como seja o cadastro da propriedade rústica, a carta topográfica (planimetria e altimetria), cartas hidrográficas, da classe do declive, de ocupação do solo, etc e dos respectivos atributos de classificação.

Sendo este conhecimento instrumento indispensável para uma correcta gestão da utilização e ocupação do solo, é de todo impossível responder em tempo útil e com rigor às naturais preocupações de um desenvolvimento equilibrado, sem utilização de meios que integrem grande diversidade de informação para mais que se trata de um processo dinâmico cada vez mais complexo.

Parece-nos pois tarefa urgente por um lado disponibilizar a informação já existente em formato digital, na posse das instituições públicas, a um mais vasto conjunto de utilizadores, e por outro lado estender a todo o território nacional a produção da informação básica a cargo das instituições competentes.





**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
**MULTIFUNCIONAL**  
  
**— SICRUM —**

THE WHY'S, WHAT FOR'S AND HOW'S OF SICRUM

ELVINO DIAS DUARTE

PORTUGAL

**LISBOA./FUNCHAL-20 a 25 Novembro de 1989**



## S I C R U M

WHY?  
POR QUÊ?

WHAT FOR?  
PARA QUÊ?

HOW?  
COMO?

ELVINO DIAS DUARTE, IGC(P)

### ABSTRATO

Entre tantos e tão aliciantes tópicos do tema em debate, que constituem um desafio a quem directa ou indirectamente está envolvido na problemática cadastral, optámos por uma reflexão - ligeira, por indisponibilidade de tempo - sobre as razões e finalidades que nos levaram a propor, em Fevereiro de 1988, o Seminário Internacional que agora, finalmente, se transforma em realidade.

E fazemo-lo directamente em Inglês, porquanto a própria metodologia adoptada para o desenvolvimento do Programa de Trabalhos, impõe - como aliás nos foi expressamente pedido - que se transmita aos muitos especialistas que vão estar entre nós, oriundos dos quatro cantos da Europa, uma mensagem sobre a problemática do cadastro em Portugal, (e inerente cartografia de suporte), por forma a fornecer-lhes, à partida, para reflexão, algumas ideias básicas sobre as nossas realidades e a melhor forma de condução dos trabalhos, e a alcançarem-se os objectivos que constituem a essência do SICRUM.

Pelas razões apontadas, que são imperativas, e por falta de tempo, ser-me-á consentida a redacção da primeira versão, directamente em Inglês, na medida em que os participantes nacionais conhecem já em maior ou menor grau a situação destas actividades no País, e bem assim os grandes problemas enfrentados.

Apresentar-se-á em tempo oportuno, naturalmente, a versão traduzida deste texto, em língua portuguesa, mas infelizmente, dado estarmos a uma semana do SICRUM esta só poderá ser distribuída posteriormente.

### ABSTRACT

Having been responsible for the idea of launching this International Seminar, in February 1988, and complying with some specific requests I felt that, instead of presenting a technical paper on one or more of the most interesting and relevant topics under reflection, it would be more advantageous to write a few lines on the "why's", "what for's" and "how's" of this International Meeting, so that our distinguished colleagues and friends - who will have no immediate access to the several specialized technical papers presented by Portuguese participants - can focuss their sharp attention on the local realities and, this way, come forward with more practical oriented recommendations and proposals.

I apologize for the rather general overall picture given and to some lack of order, due to tight time limitations. And I do it in international English, which allows us to come up with some new words and expressions. I apologize for that to our colleague Mr. Nigel Sheath and others from English speaking countries.

I hope to be able this way, any how, to pass on this message directly to all non Portuguese speaking participants.

I have to emphasize, first of all, that I am not an expert in cadastre as such. But there are nowadays less and less experts covering such a broad area, which implies, increasingly, team-work expertise.

All my 3 decades of professional activities have been strongly related to mapping in general, in different latitudes and at all scale levels and almost for every specific application, cadastre obviously included.

And these jobs and activities have taught me from the early beginning, that being mapping a support for development, the producer must constantly adapt himself to the specific requirements of the main users, that is, we must necessarily try to supply them the cartographic (and cadastral) data in the form most suited to their studies and projects. And this standing is nowadays a must, since we entered the digital era of communication.

May I, in this standing, not only spare you the effort of many specialized questions I will not be able to answer, but, also, be allowed to produce the following rather general comments.

#### I - WHY SICRUM?

##### **Main problems and issues in Portugal**

In nowadays fast moving world, professionals are often confronted with sudden changes in technologies, which imply a constant effort in professional up-dating at all levels. And this is special true in mapping and cadastral activities.

After nearly 4 decades of very stable methodologies, where the stereomodel provided an excellent source for most metric data acquisition, through analogue stereoplotters, (once computer technologies solved one of the bottle-necks of the aerial surveys - aerial triangulation), digital technologies became more and more an indispensable tool for acquisition, processing and management of increasing volumes of cartographic data. These technologies having invaded all areas, provide us with the capacity to acquire and merge data coming from several sources- terrestrial, airborne or spatial. That is, according to the specific problems to be solved we are able, I would say, we must be able to take advantage of the most adequate solutions.

These technologies are becoming increasingly suited to produce both base cartographic and thematic data.

That is, the same material source can be used to obtain simultaneously topographic and thematic map outputs, which were for decades of the responsibility of different and quiet independent organizations.

- This capacity has led more and more to the set up of LIS and GIS systems. But this new philosophy imposes a completely new approach which, for very well-known and fundamental reasons, passes through real joint-ventures, involving producers and users, to ensure the necessary compatibility and a favorable relationship costs/benefits. Speaking about cadastre we enter necessarily in the area of LIS. That is why several technical papers will be presented on this issue.
- No doubt, very deep changes have to be rapidly introduced in our cartographic and cadastral structures, if we want to face the challenge successfully. The cadastral activities, in Portugal, until nearly 2 decades ago, followed up the current development, but, it has to be recognized that the changes introduced later on in the existing structures were only minor and superficial ones, and did not correspond at all to a new thinking, neither took full advantage of the possibilities of some technologies, to enable a reply to the ever increasing demands and to the enormous volume of work ahead.
- This situation has been realized, and that is why, after the tragic disappearance of the former Director General of IGCCP last March, in a car accident, the Government decided to look for a deep reorganization of the cadastral and mapping activities, which will have, there is no doubt, a strong impact, not only at IGC(P), but in other existing structures.
- Consequently, this Seminar, although suggested almost two years ago, will be held on a most favorable occasion, to promptly assist the decision-makers with the most sound and reliable proposals. The problems in Portugal are quite acute, so we will try to point out some, in order to enable the non-Portuguese speaking European experts, to come up with more concrete proposals. We indeed expect and sincerely thank the best cooperation of all of you.

## II - WHAT FOR'S

### 1 - Present status

Like in many other European Countries land property is quiet subdivided in Portugal.

For a population under 11 million and an area of approximately 89.00 Sq.km., the number of plots is over 11 millions.

The figures included in the following tables show the present situation of the rural cadastre in Portugal:

MAINLAND	AREA COVERED BY CADASTRE		AREA WITHOUT CADASTRE	
	Northern Region	Southern Region	Northern Region	Southern Region
Surf. in ha	111.764	4.479.215	3.300.586	981.482
Nr. of Municipalities	5	110	140	20
Nr. of counties	81	679	2 550	538
Nr. of parcels	193.242	1.220.098	8.206.117	1.173.210

AUTONOMOUS REGIONS	AZORES	%	MADEIRA	%
Area with cadastre	59.562	23	31.970	41
Area without cadastre	183.124	77	45.950	59
	236.686	100	77.920	100

The density of the property varies from South to North, as can be illustrated by the following average plot sizes:

Region	Surface	Map scales used
Algarve.....	1.0 ha	1/2 000
Alentejo.....	11.0 ha	1/5 000
Central Regions.....	0.7 ha	1/2 000
Northern Regions.....	0.5 ha	1/1 000 - 1/2 000
Azores and Madeira.....	0.5 ha	1/500 - 1/1 000

On the other hand, like in all Mediterranean Countries, forest coverage is scarce and short in the South and dense and tall in the Northern areas, which means that the methodologies used in the South do not mean at all that they are recommended for the Northern Regions. Not to speak of Azores or Madeira. You will certainly be impressed with the extreme relieved landscape of Madeira and how the inhabitants are well adapted to the environment and take the best advantage of every tiny piece of soil.

- The cartographic base map for cadastre was in the earlier years carried out by topographic ground surveys. In the late forties photogrammetric methods were introduced. Since the early eighties ortophotomapping has been used, mainly in the Algarve Region. As this region is quite open and the tree coverage is rather scarce and meaningless, the advantages were obvious, both in the identification of property boundaries and land evaluation, although stereophotointerpretation techniques were not yet fully used for land use classification. Some doubts have however to be arisen, as far as the use of ortophotomaps for cadastre. As a matter of fact most of the Central and Northern areas to be cadastred are forested areas or with a lot of scattered tall trees, which hide a lot of important details. On the other hand the present process of digitizing the identified boundaries from the ortophotomap image, means that one is losing, at the very beginning, the best advantage of digital technologies, which is the preservation of the high accuracy provided on data acquired both from the stereo-model and ground measurements with electronic total stations. That is, we use the stereomodel to produce a graphic output - the ortophotomap - and then end up with data acquired through a non-stable graphic output. And we know what accuracy means in terms of costs and benefits, namely for the later re-definition of cadastral property. We would like you to think of these issues and put forward your comments, as far as your judgment's best opinion. In urban geometric cadastre almost everything has to be done. Nevertheless, all the urban centers with a population of more than 2 500 inhabitants have already photogrammetric maps in scales between 1/1 000 and 1/2 000. Consequently, a formidable task is ahead and justifies by itself a lot of concern and the main reason for your presence here.

## 2 - EXISTING CADASTRAL STRUCTURE

IGC(P) - Instituto Geográfico e Cadastral, is responsible for two areas:

**GEOGRAPHIC** - Covering mapping in medium and small scales.

**CADASTRAL** - Covering cadastral activities.

Besides the Photogrammetric Department, which is responsible for the execution of the large scale cartographic support, and Geo-Cadastral Informatic Center, which is responsible for all digital applications, there are two specific Departments in this area.

**GEOMETRIC CADASTRE DEPT.** - Responsible for the survey of boundaries, area measurements, identification of the land-owners and up-dating of cadastral maps. It is subdivided in two Divisions:

- Cadastral Surveys and Up-Dating
- Topographic Surveys

Besides the cadastral activities this Department also cooperates in other tasks, viz the survey of administrative boundaries.

This Department has a staff of approximately 70, including 6 administrative employees.

**AGRONOMIC CADASTRE DEPT.** - Is responsible for land evaluation for tax purposes and planning.

It is subdivided in two Divisions.

- Studies and Bases for Evaluation.
- Evaluation and Conservation.

It has a staff of approximately 75, including 7 in the administrative area (75/7).

Besides these two central Departments, IGC(P) has nine Regional Offices:

- two located in the Autonomous Regions of Azores and Madeira, with a staff of approximately 40, six being administrative employees.
- seven in the mainland, distributed from South to North.

In the Regions where cadastre already exists, the staff is approximately 35/7 and in the other five the staff is approximately 20 to 25/5 to 6 being administrative employees.

- Besides a rather low number of staff engaged in these activities, it must be said that, as a consequence of rather tight budget restrictions, this staff- mostly intended for field operations- saw their period of field work reduced from an usual nine months period, to just one month.
- Due to an ever increasing demand of cadastral data for real-otment and land consolidation projects, as well as for thematic cadastre (example: olive trees and vineyards) and infrastructures, several departments have to solve their own needs, through direct execution or resorting to public tenders
- It also must be said that large scale mapping of urban areas for town planning, which was formerly carried out on a rather efficient basis, through coordination by the Department of Urban Planning and Territorial Management, as a consequence of the enlarged financial autonomy of the Municipalities, is now being carried out directly on a Municipal basis, which arises a serious concern, since there is no coordination and, therefore, there is a total lack of normalization of standards and technical specifications, with heavy costs in the future.

It must be said that the majority of the municipalities have no prepared staff to supervise these map works, increasingly of digital nature.

- This situation is expected to improve in the near future, with the recent set-up by the Government of a new "Conselho Nacional de Cartografia" (National Board of Cartography).
- The Municipalities, through recent Regional Financial regulations, became directly involved and interested in the revenues of rural and urban taxation. That is, they are nowadays mostly interested in speeding up the urban and rural cadastre of their geographic spaces - which up to now they only needed and required for planning - as it became an importante source of revenue.

Having in mind the enormous amount of work to be urgently carried out in the Portuguese cadastre, and taking into consideration that this is a task that implies a full land sweeping, the solution, which is not at all original, will have to pass, one way or the other, through:

- A central structure responsible for the execution of some of the works but, first of all, with commitments in the area of professional education, establishment of standards, specifications and regulations in all areas, public tenders, fiscalization, and management of the data having in mind the specific requirements of the main users. It is not advisable to increase the staff of IGC(P) to cope with this task.
- The full involvement of the private sector, according to national programme, able to respond gradually to scheduled priorities. This involvement will have to pass through an adequate professional preparation of the staff to be engaged in the cadastral activities.
- The establishment in the near future of the Chartered Surveyor Profession, to ensure the set up to regional bureaus for cadastral up-dating.
- The set up of a large number of regional offices, with the direct involvement and engagement of the Municipalities and other local structures, covering geographic areas, larger or smaller, according to the density of the population and the amount of data to be surveyed, that is, smaller in the urban areas and larger in the rural regions.
- Since the country is subdivided in several regions, where all planning is supervised by Comissões de Coordenação Regional (Regional Coordination Comissions), it seems desirable that each of these administrative unities coordinates the different offices operating in the Region.

- Integration and management of all the data at central and regional levels.
- Promotion and participation in the establishment of Land Information Systems, starting with the groups of Municipalities in the called Great Lisbon and Oporto Areas, as it seems advisable, having in mind the volume of data, the availability of resources and, first of all, the real need and the benefits and advantages.
- A constant dialogue with the main users, including necessarily Land Registry.

These are some ideas, to start with, just intended to assist and promote discussion.

### 3 - OTHER ISSUES

#### 3.1 - Professional Education

This is a major issue which deserves special attention, as no evolution will succeed if not supported by an up dated and qualified professional education.

**University level** - In Portugal the Faculties of Sciences and Technology of the three former Universities - Oporto, Coimbra and Lisbon, - provide specific 5 years courses in Geographic Sciences in Surveying and Mapping, called "Engenheiro-Geógrafo", and their curricula are roughly the same.

Having in mind the demand of up-dated professionals and the cost of equipment, would it not be advisable based on your country's experience to have different and specific themes taught at each Faculty?

For instance: Geodesy/Cartography, Photogrammetry and Remote Sensing?

At present, many graduates have to go abroad to follow specific post-graduate courses, in areas like Photogrammetry, Digital Mapping, LIS/GIS, Cadastre, Remote Sensing, otherwise they are not prepared to become fully engaged in these technologies.

**Professional level** - No doubt, the survival of our Old Continent depends upon a strong and joint effort in high standard professional education at all levels, and in applied research, as it is happening now in joint European and Community successful projects.

For historical reasons Europe has very close links with all the African, Latin-America and many Asian Countries, and there are no communication problems, since our languages are spoken in those countries.

Being mapping and cadastre a fundamental tool for their most needed development, European countries should try to have, no doubt, a common approach on this issue of assistance in technical education. Amongst others, France, UK, FRG, Spain are playing a most important



role in cooperations on the area of professional education, through very well established schools. Also Portugal has a Professional School for Surveying, Cartography and Photogrammetry, attended not only by local students, but also by an increasing number of students, coming from African Portuguese Speaking Countries. This School has reached a stage that indeed requires, and demands, a great support from national entities, with responsibilities in the areas of Education, Cooperation and Employment, and should be open to cooperation with other European Institutions, as the assistance to African Students should pass through 3 levels:

- Elementary Courses in the respective Countries
- Professional Courses in Portugal attended by the most promising students
- Short courses in other European Schools, in some specific fields and disciplines.

## **.2 LAND REGISTRY**

Our cadastre regulation has to be adapted in order to ensure a most needed dynamic support of Land Registry.

This is an issue, where we expect to benefit from the experience of many European Experts. The fact that there has been quite a positive reaction and support from the professionals of the area of Land Registry, is the best proof that they are aware of the advantage and need of a full support of the geometric cadastral data to their Land Registry operations.

We sincerely hope that a most positive dialogue and exchange of points of view will enable and provide the guide lines for the implementation of the best practical solutions.

## **3.3 CHARTERED SURVEYORS**

As referred earlier, it does not yet exist in Portugal the profession of "Geomètre-Expert" or "Chartered Surveyor", which is really badly needed. It must be said that this profession (Agrimensores Ajuramentados) existed in Africa, before the independence of the African Portuguese Speaking Countries, where it played an important role in the local cadastral activities.

In this area we will certainly count and benefit from the assistance of FIG and the experience of the well-known "Ordre des Géomètres-Experts", the "Royal Institute of Chartered Surveyors", the "Irish Society of Chartered Surveyors" and the German Professional Organization Association, here represented.

### **III - HOW'S**

1. The ever increasing number of themes and disciplines in the multipurpose cadastral activities poses rather complex problems to the staff involved in management and to the decision-makers, as technologies are rather fast growing creatures, so full attention must be paid to a large quantity of parameters.

Thus, the periodic exchange of experiences and informations it is nowadays essential for all high level professionals and managers, responsible for cadastral activities, so that we can, at every moment, benefit from the experience of others, avoiding failures and proceeding faster and sounder, enabling us to provide each time faster and more reliable information to all users, at lower costs. This common thinking has been the main reason for this Seminar. We expect to benefit enormously from your experience, but we are also sure that everyone will learn and benefit as well in higher or lesser degree. At the same time we hope that the broader and closer professional contacts generated by this meeting, will promote, in the near future, more direct and specific cooperation and exchange of information.

## **2. SICRUM is subdivided in two periods.**

### **2.1 - First period, to be held in Lisbon**

It has been planned for the first two days (Nov. 20,21), in order to allow the presentation and discussion of presented and invited technical papers, covering, as far as possible, all the main areas and topics of the Seminar, aiming at three major targets:

2.1.1 - To enable a large number of Portuguese professionals and managers, engaged or responsible for cadastral activities, and the main users, both from the government and private sectors, to listen to the experiences, methodologies and state of development of cadastre in many european countries, benefiting as well from useful professional contacts with well known experts.

2.1.2 - To provide as well a get-together of Portuguese responsables for the main government organization and entities, from education, to producers of cadastral and cartographic data, to users, with emphasis to agriculture, town planning, taxation and land registry, in order to develop a desirable new thinking of cooperation and concertation of common interests, towards a real coordination of efforts and investments.

2.1.3 - To enable all our colleagues coming from abroad to get a global picture of the present situation of cadastral activities in Portugal, undispensible for the success of the second period.

### **2.2 - Second period, to be held in Funchal**

2.2.1 - This is indeed the most relevant and fundamental part of the Seminar, and will be held during 3 1/2 days (Nov. 22 to 25)

The strategy adopted, of sessions by Working Groups, intends to provide both an occasion and the atmosphere for a deep reflection on the different phases of the cadastral process, focussing the experience gained in the different countries and benefiting from the scientific background of most respected expert participants.

2.2.2 - Needless to say the final definition and formation of the Working Groups can only be fixed, according to the number and expertise of the participants. This is the task expecting all the participants of the second period, during the first session, next Nov. 22, Tuesday morning. We count on several concrete proposals from excellent connoisseurs amongst us, to achieve this goal.

2.2.3 - The total number of participants in this second period will be around 120, with the following distribution:

European participants (excluding Portuguese speaking)	-----29
Participants from the 6 Portuguese Speaking Countries (Angola, Brasil, Cape Vert, Guiné Bissau, Mozambique and S. Tomé e Príncipe	-----11
Portuguese (including the Organizing Committee)	-----74

The professional background of the Portuguese Participants has the following distribution:

Municipalities	-----23%
Cadastral and cartography	-----18%
Private sector	-----18%
Land Registry	-----15%
Fiscal area	-----10%
Agriculture area	-----6%
Communications	-----6%
Universities	-----4%

The countries represented at this International meeting are: Denmark, Finland, France, German F.R, Ireland, Italy, The Netherlands, Northern Ireland, Portugal, Spain, Sweden, Switzerland, Turkey, United Kingdom, and, from the Portuguese Speaking area, Angola, Brazil, Cape Vert Islands, Guinea-Bissau, Mozambique, S. Tomé and Prince, and Portugal, which amounts to 21 countries.

2.2.4 - From the above figures, and having in mind that it will not be advisable to have more than 10-12 persons per W.G., we will have, most probably, to enlarge the envisaged number of seven, may be setting-up Sub W.G.'s. We count with the suggestion of the participants, in order to quickly arrive to the best structure and therefore to the best success, with the least effort.

2.2.5 - Each Working Group will appoint a Chairman and a Secretary. In order to enable the gradual connection of the recommendations of the different Working Groups, into a final global proposal, covering all areas, it might be advisable to appoint two or three experienced participants, as roving coordinators of different Working Groups.

**We hope, this way, to arrive to a most realistic and sound global proposal, covering all phases, including organizational structure for dinamization of the cadastral activities in Portugal, based on the most successful experiences and benefiting from new technologies.**

Please feel always free to contact the Organizing Committee, anytime, any place, whenever you need, either to be assisted or assist us.

Lisbon, 1989, Nov. 08.





**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
**MULTIFUNCIONAL**  
  
— SICRUM —

A PROBLEMATICA DO CADASTRO GEOMETRICO  
DA PROPRIEDADE RUSTICA EM PORTUGAL:  
SUA EVOLUÇÃO; PERSPECTIVAS E OPÇÕES INADIÁVEIS

MÁRIO SILVA FALCÃO

PORTUGAL

LISBOA... NCHAL-20 a 25 Novembro de 1989

SEMINÁRIO INTERNACIONAL SOBRE CADASTRO  
RÚSTICO E URBANO MULTIFUNCIONAL (SICRUM)

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**SUMÁRIO:** Começando por apresentar de um modo sucinto a evolução histórica do cadastro geométrico da propriedade rústica em Portugal, o autor passa em revista os custos respectivos, os resultados obtidos e as metodologias utilizadas, no continente e regiões autónomas. Seguidamente, propõe a análise das opções consideradas inadiáveis, que passam pela definição dos objectivos prioritários a respeitar, e uma verdadeira descentralização da execução do cadastro que, por iniciativa das autarquias locais interessadas, passaria a ser entregue a empresas especializadas onde e quando se tornasse mais urgente. Para o efeito, haveria que contar com o apoio logístico, a orientação normalizadora e a fiscalização do actual IGC, transformado em Instituto Geográfico Nacional.

**ABSTRACT:** Starting with a short presentation of the development of the cadastre of the rustic property in Portugal, the author reviews its costs, the results already achieved and the methodologies used, in the Continent and the Azores and Madeira Archipelagoes. In the second part, he proposes the analysis of the undelayable options, under his point of view. These options are concerned with the definition of the main objectives, and a real decentralization of its accomplishment, made by private companies under the initiative of the municipalities. To do so, the IGC would provide logistical support, standardization and control, through its transformation in National Geographic Institute.

## 1. A EVOLUÇÃO DO CADASTRO GEOMÉTRICO EM PORTUGAL

É muito difícil, se não impossível, localizar no tempo as primeiras preocupações dos governantes de todos os países com o cadastro da propriedade e a sua mais adequada caracterização.

Inserido num relatório dos trabalhos executados pelo Conselho de Cadastro entre 2 de Agosto de 1926 (data da sua instituição) e 31 de Dezembro de 1928, depara-se-nos um interessantíssimo capítulo dedicado à origem e história do Cadastro, cuja leitura aconselhamos a todos os estudiosos deste tema. Começando por apresentar como o mais antigo documento cadastral conhecido um fragmento do Cadastro da Chaldeia, remontando ao tempo de Bur-Gin, rei de Ur (2 400 anos antes de Cristo), existente no Museu de Londres, aquele relatório descreve exaustivamente as várias fases por que passou o cadastro ao longo dos anos e as experiências e resultados havidos nas várias zonas do Globo, terminando pela apresentação de conclusões bem estruturadas.

No nosso País, cedo se reconheceu que a identificação descritiva dos prédios não era suficiente e que a elaboração de tombo com base geométrica representava um recurso preferencial, o que não impediu que dificuldades várias, financeiras e técnicas, viessem a retardar a opção considerada mais apropriada. Na sua "Memória sobre o modo de fazer tombo", editada em 1806 pela Real Imprensa da Universidade de Coimbra, ao justificar a necessidade da publicação, o desembargador Luiz Gonzaga de Carvalho e Brito afirma que "quanto mais livros de tombo e papeis antigos eu lia, tanto mais me convenia que era necessário buscar novo caminho, porque não achava geralmente nos escritos antigos mais do que confusão, desarranjo e defeitos ainda em pontos essenciais".

Num excelente e completo trabalho intitulado "O cadastro geométrico da propriedade rústica do País", publicado em 1960 no volume IV do "Boletim do Instituto Geográfico e Cadastral" pelo seu director-geral de então, major engenheiro Adelino Paes Clemente, esclarece-se, com referência ao ano de 1801, que "existiam tombo, alguns compreendendo plantas cadastrais, mandados elaborar por Casas possuidoras de importantes domínios territoriais, com o fim de conhecerem perfeitamente os seus bens ou servirem, em parte, a projectos de melhoramentos". E acrescenta que o funcionário do Instituto e erudito historiador, Capitão Gastão de Matos, encontrou na Biblioteca Pública Municipal do Porto, Biblioteca Municipal de Torres Vedras, Arquivo Nacional da Torre do Tombo e Arquivo Histórico do Ministério das Finanças, alguns tombo, levantamentos e plantas cadastrais com datas compreendidas entre 1765 e 1787, de autores vários e finalidades diversas.

A estes casos podemos juntar ainda os de algumas espécies dispersas, com intenções cadastrais, existentes na rica Mapoteca do I.G.C., como a "CARTA TOPOGRAPHICA./ dos Salgados, e sapaes da parte Oriental da Cidade de Tavira, que são capazes só para Marinhãs, divididas/estas com o seu competente numero de talhos, e com os seus compe-



tentes viveiros e depozitos/tirada por ordem/do Illm<sup>o</sup>. e Exm<sup>o</sup>. Senhor D. Jozé Francisco da Costa e Souza/Armador Mor de Sua Mag.<sup>e</sup>, Governador, e Cap.<sup>am</sup> General Deste Reyno do Algarve/pelos/Sargento mor Joze de Sande Vasconcellos, e o Cap.<sup>am</sup> Joze Carlos Mardel. Aos 9 de Outubro de 1773".

Em termos legislativos, o alvará régio, com força de lei, de 9 de Junho de 1801, é o primeiro documento de que se tem conhecimento, relacionado com o cadastro geométrico. Dada a importância histórica de que se reveste, transcrevem-se de seguida algumas das suas determinações: "Que em cada huma das Comarcas destes Reynos haja hum Mathematico, que seja o Cosmografo della, não somente para a execução da Carta Topographica da mesma Comarca de baixo da Direcção da Administração, que se acha, estabelecida para a Carta Geografica e Corografica destes Reynos: mas tão bem para decidir de Plano todas as duvidas, que se excitarem sobre limites, Servidoens, Caminhos Logradouros, Bens dos Conselhos, e outros objectos de semelhante natureza; .... Ordeno que cada hum dos referidos Cosmografos haja de dar principio ao seu Exercício pela formação de hum livro..... Alem do referido Livro deverá formalizar outro de Cartas Particulares, também em Ponto Mayor, em que se descreverão, e configurem todas as Herdades, Quintas, Prazos, Fazendas, e outros Bens, assim Ruraes, como urbanos, com suas demenções, e demarcaçoens, actuaes, conforme pertencem, e as possuem os seus diferentes Proprietários. Tão bem deverá formalizar outro Livro, que servirá de Registo Geral, e no qual se registem os titulos de cada hum dos Possuidores das respectivas Propriedades, que serão obrigados a fazê-lo assim sob pena de lhes serem aprehendidos os rendimentos dellas emquanto não os registarem, e serem applicados para as Obras Publicas da Comarca".

Seguia-se a tramitação exigível nas transferências de propriedade.

Talvez devido à carência de técnicos, nada garante que tais medidas hajam sido respeitadas. Segundo Gastão de Matos, apenas duas nomeações de cosmógrafos se teriam efectuado ao abrigo daquele alvará, para as comarcas de Setúbal e Tavira.

Só assim se tornou possível que, em 1832, com o restabelecimento de impostos medievais, os concelhos fossem autorizados a sobrecarregar os trabalhadores rurais com contribuições injustas e abusivas, não obstante a oposição de Mousinho da Silveira.

De qualquer modo, algo se foi no entanto executando no campo da representação geométrica das propriedades. Prova-o, por exemplo, a carta topográfica e cadastral dos arredores de Lisboa na escala 1:10 000, constituída por 12 folhas manuscritas a traço e aguarela, com várias dimensões, levantada entre 1841 e 1843 pelo tenente engenheiro José Conrado Carlos de Chelmicki e outros operadores da Comissão dos Trabalhos Geodésicos do Reino, carta esta também existente na Mapoteca do I.G.C..

Após a publicação, em 1845, do "Regulamento Geral para a Repartição das Contribui-

ções Directas no Continente do Reino", o conselheiro António José d'Ávila, que nesse mesmo ano havia estudado localmente os cadastros em vigor nos reinos italianos, é encarregado, por decreto de 8 de Novembro de 1846, de presidir a uma "comissão sobre o cadastro", com o objectivo de "investigar, colligir e coordenar nos países mais adiantados na sciência administrativa os trabalhos, esclarecimentos e materiais preparatórios, que forem indispensaveis, e por ventura necessários e mais adequados para a formação e progressivo aperfeiçoamento de um Cadastro Geral do Reino, estudando e comparando entre si os diversos métodos e serviços das operações cadastrais".

Entretanto, e como curiosidade, referiremos que o levantamento das massas camponesas conhecido como "revolta minhota da Maria da Fonte, ocorrido em Abril de 1846, teve como causa próxima a introdução de medidas relacionadas com o cadastro não geométrico da propriedade rústica. Com efeito, e segundo Luz Soriano, "aos próprios contribuintes se impunha a formal obrigação de denunciarem os seus haveres e os seus rendimentos, distribuindo-se-lhes para este fim uns mapas, que também eram obrigados a preencher, mapas aos quais o povo dava o nome de "papeletas da ladroeira" e cujos dizeres muito pouca gente entendia". Daí nasceu a desconfiança de que era intenção do Governo conhecer deste modo o valor dos pequenos prédios rurais, para os vender aos ingleses, e a consequente revolta popular.

Com data de 18 de Setembro de 1847, o conselheiro, ministro e Secretário de Estado honorário, António José d'Ávila entrega finalmente um bem fundamentado relatório doutrinário que serviu de base a outro meticoloso estudo do conselheiro Francisco António Fernandes da Silva Ferrão, vogal da "Comissão do Cadastro Parcelar Topográfico do Reino", criado por decreto publicado no "Diário do Governo" nº. 212, de 7 de Setembro de 1848. Entre outras figuras de relevo, aquela Comissão incluiu Filipe Folque e Fontes Pereira de Melo.

Assinale-se a propósito que, em 1929, as fases então adoptadas na execução e conservação do Cadastro correspondiam ainda às regras ali enunciadas pelo Conselheiro Silva Ferrão.

Não obstante o seu fracasso inicial, foram as propostas apresentadas, em 1911, pelos deputados Brito Camacho e José Relvas e, em 1920, pelos ministros Joaquim Ribeiro e António da Fonseca, que provocaram, em Janeiro de 1924, a publicação de uma portaria nomeando uma comissão encarregada de elaborar as bases do Cadastro, reunindo-se deste modo as condições para a criação do Instituto Geográfico e Cadastral, através do decreto nº. 12764 de 22 de Novembro de 1926. Desde aí, todas as operações do cadastro rústico do País passaram a ser executadas exclusivamente por este Organismo.

No que se refere à metodologia utilizada nos levantamentos efectuados no continente, e com uma pequena margem de erro, sucederam-se no IGC as seguintes fases dominantes:

- 1ª. - Levantamento a clássico, com alidades taqueométricas sobre pranchetas, de 1926 a 1961;
- 2ª. - Levantamento a clássico, com taqueómetros, de 1945 a 1961;
- 3ª. - Estereorestituição fotogramétrica, com completamento taqueométrico, de 1961 a 1982;
- 4ª. - Ortofotogrametria, com completamento gráfico e/ou taqueométrico, a partir de 1980.

Relativamente à Madeira, iniciaram-se levantamentos a clássico, com taqueómetros, em 1950, e efectuou-se completamento taqueométrico da estereorestituição fotogramétrica a partir de 1965.

Nos Açores, estas mesmas fases tiveram os seus inícios em 1953 e 1962, respectivamente.

Como se vê, verificou-se por vezes, por motivos perfeitamente descortináveis, a sobreposição parcial de alguns dos períodos atrás assinalados.

## 2. AS PERSPECTIVAS DO CADASTRO GEOMÉTRICO EM PORTUGAL

Todo o período já decorrido após o início da elaboração do Cadastro da propriedade rústica em Portugal não foi suficiente para lhe retirar as suas reais potencialidades. Pelo contrário, poder-se-á até concluir ter vindo a ser gradualmente, mais sentida a necessidade de uma inequívoca e completa definição dos prédios rurais, que possa servir de base a estudos e aplicações de ordem económica, social, estatística e jurídica. É certo que no âmbito da tríplice finalidade directa do cadastro se tem assistido a um decréscimo de interesse da sua componente fiscal, largamente compensada por maiores exigências nos aspectos fundiários e técnicos. Mas tal não invalida que, hoje como ontem, os governantes devam continuar a preocupar-se com a rápida construção de um cadastro polivalente. Como já Filipe Folque afirmava em meados do século passado, "he inquestionavel que o Cadastro, a Topografia e a Estatística são os três grandes elementos da Sciencia de governar, delles derivam o conhecimento dos factos, que he fundamento do verdadeiro saber; por consequência, he da rigorosa obrigação de um governo que se chama ilustrado, de um governo próprio do grande século em que vivemos, estabelecer incessantemente estes meios governativos".

Por isso há que reflectir, mas bem, de modo a que tarefa tão importante como a do cadastro possa ser executada nos moldes e condições mais apropriados, tendo em vista o indispensável aumento de produção e consequente justificação das verbas des-

pendidas. E passados que vão 61 anos sobre o início da execução sistemática do ca dastro da propriedade rústica em Portugal, dispõe-se já de elementos que permitem perspectivar, com bases suficientemente fiáveis, a correspondente evolução e analisar aspectos específicos, tais como princípios orientadores, custos e rendimentos, metodologias, obstáculos encontrados, etc.. É o que procuraremos fazer, dentro das compreensíveis limitações impostas às comunicações apresentadas a este Simpósio.

Começemos então pelo continente que cobre, como se sabe, uma área de 8 867 300 hectares. Destes, apenas 4 664 204 estavam cadastrados em Dezembro de 1988, o que corresponde a 52,6% e a uma média de execução anual da ordem dos 76 462 ha.

Embora extremamente desolador, este valor é no entanto menos assustador do que aquele que se obteria se considerássemos os números de prédios cadastrados (1 441 518, num total de 10 629 250). Na melhor das hipóteses, concluir-se-ia daqui que, sem alteração de metodologias operatórias e mantendo os meios orçamentais e humanos até agora colocados à disposição do I.G.C., seria necessário um período nunca inferior a 55 anos para se completar em Portugal continental o seu primeiro cadastro geométrico da propriedade rústica.

Faz-se notar que, não obstante se terem adoptado sistematicamente para este ca dastro as escalas 1:2 000 ou 1:5 000, consoante a maior ou menor fragmentação da propriedade, os valores anteriores incluem também os elementos das primeiras campanhas, efectuadas na escala 1:2 500, sucessivamente nos concelhos de Mafra, Moga-douro, Mesão Frio, Lamego, Santa Marta de Penaguião e Peso da Régua.

Extravassando os limites de Portugal continental, recordemos agora que, na região autónoma da Madeira, estavam já concluídos em Dezembro de 1988 os trabalhos de ca dastro nos 4239 ha da ilha de Porto Santo e em 27 731 hectares dos 73 623 que cobrem a ilha da Madeira. Sabendo-se que nem os 1409 ha das ilhas Desertas nem os 277 ha das ilhas Selvagens (também ligadas administrativamente a esta região autó-noma) merecem interesse cadastral, conclui-se que falta cadastrar 45 892 ha, o que corresponde a 57,7% da área total. Com base na verificada média anual executória da ordem dos 841 ha e em condicionalismos análogos aos que se referiram para o ca so do continente, pode prever-se que nunca antes do ano 2042 a região autónoma da Madeira estaria completamente cadastrada. Importa no entanto estabelecer desde já algumas diferenciações nas características destes trabalhos no continente e na ilha da Madeira, que conhecemos bem. Face à extraordinária divisão da propriedade rústica, foi aqui necessário efectuar por vezes implantações na escala 1:500. As escalas adoptadas para os levantamentos são 1:1 000 e 1:5 000 (nas regiões de maiores altitudes) e não se espera vir a encontrar grandes variações no regime di-

mensional da propriedade, como igualmente há que continuar a contar com uma acentuada orografia, tão bela quanto agressiva, que não deixará de exigir aos operadores de campo aquele esforço abnegado e ingente que têm mantido ao longo de quase 40 anos, tornando-os credores do nosso muito respeito e maior admiração.

Resta passar em revista a situação presente do Cadastro na região autónoma dos Açores que, como se sabe, compreende nove ilhas com uma extensão total de 236 687 hectares. Não considerando as fases dos trabalhos em curso nas ilhas Graciosa e de Santa Maria, apenas 35 616 ha dos 85 676 que cobrem a ilha de S. Miguel estavam cadastrados em Dezembro de 1988, o que corresponde a 15,0% da área total do arquipélago e a uma média anual aproximada de 1 017 ha executados. Somos pois levados a inferir que a manutenção das técnicas operatórias utilizadas e dos recursos até hoje disponíveis imporiam nesta região autónoma um período superior a 198 anos para a conclusão do cadastro geométrico da sua propriedade rústica, onde as escalas adoptadas têm sido 1:2 000 e 1:5 000 nas ilhas de S. Miguel e de Santa Maria e 1:1 000 na ilha Graciosa. De qualquer modo, não podemos deixar de mencionar aqui também as dificuldades próprias de um terreno de natureza vulcânica, em especial as características grotas, que por vezes se deparam aos operadores de campo.

Apresentada muito sinteticamente a situação actual do cadastro da propriedade rústica em Portugal, referir-se-á agora a evolução das mais influentes técnicas empregadas, começando naturalmente pelo equipamento topográfico, que tem vindo a sofrer uma substituição gradual da sua eficaz concepção mecânico-óptica original pelos recursos prodigiosos da electrónica.

Cada vez mais funcionais e precisos, os chamados teodolitos informáticos viabilizam as estações topográficas totais de hoje, que podem facilitar e reduzir o trabalho de gabinete, não conseguindo no entanto, como se desejaria, aumentar sensivelmente o rendimento das operações de campo, de todas as mais dispendiosas.

Mas foi sobretudo nas aplicações distanciométricas que as novas tecnologias encontraram os seus maiores êxitos, criando meios poderosos que viriam de certo modo revolucionar os trabalhos topográficos, a que emprestaram maior celeridade e acréscimo notável no rigor das medições. São prova disso as profundas alterações que os distanciómetros introduziram no apoio de campo do I.G.C., onde as clássicas e morosas figuras da triangulação cadastral foram sendo quase totalmente substituídas por métodos de poligonação ou irradiação, a partir dos vértices da rede geodésica, com economia de tempo, reforço da precisão e aumento da capacidade operativa.

Ferramenta poderosa em variadíssimos domínios, cada vez mais alargados, também na construção do cadastro geométrico da propriedade a Fotogrametria tem exercido uma acção notável, que de modo algum se pode considerar esgotada. A ela se deve a disponibilidade sempre acrescida de meios executórios poderosos, que urge continuar a

aproveitar capazmente, sob pena de se retardar a conclusão de prementes e onerosas tarefas cadastrais, de campo e gabinete. Poderemos ficar com uma imagem suficientemente nítida das dimensões do desenvolvimento entretanto sofrido pelo material fotogramétrico se compararmos alguns dos equipamentos patentes no Museu do I.G.C. - o autocartógrafo Hugershoff construído pela firma Heide em 1913 ( que após ter servido "na indústria privada foi cedido ao Instituto, depois de 1936, onde não chegou a produzir trabalho útil") e o aerocartógrafo Hugershoff - Wolf fabricado em 1926 pela mesma casa Heide, que "foi adquirido por uma empresa privada nos anos 20 e, a esta, pelo Instituto cerca de 1930" - com os actuais e sofisticados modelos do equipamento responsável pela triangulação aérea e respectiva compensação e aquisição e processamento de dados na ortofotocartografia a cargo do I.G.C., como o estereorestituidor analítico ACL/NOVA 4 X/TA2 apresentado pela firma Wild em 1980 no Congresso Internacional de Fotogrametria.

Finalmente, há que realçar o papel importante que a Informática tem vindo a desempenhar no desenho, armazenamento, arquivo e exploração dos elementos cadastrais. Efectuar o tratamento destes dados à revelia dos meios informáticos, não obstante os avultados custos de aquisição e manutenção do seu equipamento, seria hoje efeitos tanto ou mais desastrosos que os resultantes da opção feita em 1932 na execução do cadastro do Baixo Alentejo, ao recorrer exclusivamente a processos clássicos de levantamento, em detrimento das metodologias fotogramétricas, e que o dignou os já célebres e contundentes comentários do general Norton de Matos ao artigo escrito em 1934, no Vol. I do Boletim do I.G.C. pelo general Viriato da Fonseca, que aí defendia o critério utilizado. Mas não se infira daqui que acreditamos na auto-suficiência da Informática como órgão orientador das técnicas ou actividades cadastrais, face à sua natureza predominantemente executora e extraordinária dependência dos elementos a recolher no campo.

### 3. OPÇÕES INADIÁVEIS

Perante o panorama que acabámos de descrever, há que repensar profundamente sobre os verdadeiros objectivos que o cadastro geométrico da propriedade rústica hoje se deve perseguir. É esta a primeira e mais urgente opção a fazer, que pode e deve ser encontrada no presente Seminário.

Mais concretamente, consideremos algumas das questões que se impõe sejam resolvidas sem demora:

3.1. Tendo em conta o montante dos custos e as consequentes variações dos períodos executórios, interessa continuar a associar o Cadastro à construção de uma carta geral do País em grande escala ou importa antes prosseguir com um cadastro inventarial e fiscal? Num caso e noutro a quem deve competir a elaboração dos respectivos trabalhos? Ao I.G.C., como até agora, ou a entidades e empresas para tal vocacionadas?

Ninguém desconhece que sobre as operações cadastrais impendem pesados custos, até hoje suportados pelas verbas atribuídas ao I.G.C.. No período decorrido entre 1981 e 1988 (do qual conseguimos elementos), para uma dotação total de 5 220 070 contos, o Cadastro despendeu 1 656 098 contos (31,7%), verba esta já afectada das receitas provenientes da venda dos produtos próprios e que não inclui os vencimentos do pessoal do quadro. Em 1988, ano a que correspondeu um maior esforço de reapetrechamento, especialmente no sector informático, de 1 114 527 contos da dotação global do Instituto, 702 086 (63%) foram absorvidos pelo Cadastro, para além das remunerações atrás referidas. E no entanto não se tornou então possível prolongar as campanhas para além de cerca de 40 dias úteis, ainda reduzidos em 1989, o que traduz à evidência um ruinoso "aproveitamento" dos obrigatórios encargos remuneratórios e uma pausa inadmissível no desenvolvimento dos trabalhos de campo, fundamentais em organismos com as características do I.G.C.. Como já vão longe os anos de 50 e 60, em que as campanhas tinham geralmente início em Abril ou Maio, só terminando no último dia de Novembro !

A gravidade da situação actual torna-se mais patente se atentarmos em que, dos 671 funcionários existentes em Abril de 1988 no quadro de pessoal do I.G.C., 367 (54,7%) estavam directamente ligados a trabalhos cadastrais, de campo e gabinete, e como tal dependentes da duração das campanhas. Mas observando agora os gráficos anexos da distribuição actual dos funcionários do I.G.C. pelos seus vários departamentos e das correspondentes dotações entre 1981 e 1988 (e neste último ano), pode concluir-se que o drama da inoperância do Cadastro é ainda mais extenso, na medida em que se vem reflectindo no atrofiamiento de sectores vitais e exclusivos da Instituição (casos da Geodesia, Cartografia e mesmo Fotogrametria), e na inviabilização de acções de investigação científica, com espaço próprio em todos os Institutos. E para que não se pense que só agora estes problemas são equacionados, passamos a transcrever o que o então distinto técnico do I.G.C., engenheiro Amílcar de Melo, em artigo sob o título "Projecto de Rede de Nivelamento de Alta Precisão para Portugal", publicado na "Revista de Engenharia Militar", escrevia em 1957 relativamente aos trabalhos de gravimetria, indispensável complemento dos nivelamentos de precisão: "Eles foram..... iniciados há mais de 25 anos, e dos resultados colhidos no campo nada se continua a saber, nem sequer mesmo se as observações colhidas são aproveitáveis, ou não, e porque o não são. Estes trabalhos, de altíssima precisão, e de transcendente técnica, são efectuados com uma classe de aparelhos, os pêndulos absolutos de Sterneck... Em 1938 regressaram da Alemanha os pêndulos que ali haviam ido para a determinação das constantes. Com esta aparelhagem já em 1926 e 1928 haviam trabalhado dois ilustres oficiais engenheiros.... Até hoje os pêndulos continuam votados ao esquecimento, talvez porque os seus resultados não influem directamente na avaliação da propriedade urbana ou rústica, único incentivo do Cadastro Geométrico da Propriedade, com fim puramente tributário".

Conhecendo-se por outro lado as extraordinárias carências cartográficas sentidas pelas autarquias, quer de plantas em grande escala que lhes permitam o lançamento de planos urbanísticos, projectos de saneamento, estudos hidrográficos e outros; quer dum cadastro actualizado (que até lhes pode criar receitas fiscais), parece-nos ser do maior interesse prosseguir e acelerar a sua execução, de preferência conjunta, em prejuízo dum mero cadastro inventarial e fiscal. Mas julgamos igualmente que, com o alargamento de competências do poder local, associado à desalentadora evolução dos trabalhos cadastrais entre nós, é chegada a altura de, também em Portugal se descentralizar com verdade a execução e a conservação do cadastro da propriedade e da cartografia (não necessariamente impressa) em grandes escalas. Afigura-se-nos ser esta, talvez, a única medida que poderá apressar a conclusão das operações em curso, a efectuar quando e onde se tornar mais urgente, abandonando-se pois, finalmente, preocupações de continuidade geográfica no seu desenvolvimento. De resto, foram soluções deste género que se adoptaram com êxito na Europa a que pertencemos, onde a quase totalidade dos seus Institutos Geográficos e Cadastrais deram lugar a modernos e eficientes Institutos Geográficos Nacionais, com uma participação activa, útil e prestigiante na vida científica dos respectivos países.

3.2. Admitindo a eventual descentralização do cadastro, que papel poderia ficar reservado ao I.G.C. ?

Nesta hipótese, já atrás encarada, consideramos indispensável a existência de um órgão centralizador a nível nacional que tenha como principais funções a coordenação de todos os trabalhos cadastrais, a que forneceria o necessário apoio logístico e a orientação normalizadora (incluindo a precisão operacional), fiscalizando a sua execução e conseqüente conservação. Parece-nos que, para tal efeito, dificilmente se encontraria organismo mais vocacionado que o actual I.G.C. (ou futuro Instituto Geográfico Nacional) e suas delegações regionais, apesar das deficientes condições em que tem vindo a laborar, nomeadamente no que se refere aos recursos humanos e às insuficientíssimas, inadequadas e dispersas instalações. E vem a propósito realçar a acção importante que, com os objectivos atrás discriminados, a actual Escola de Formação e Aperfeiçoamento do I.G.C. poderia vir a assumir na formação de todos os técnicos interessados no Cadastro, mas sem que o seu funcionamento interferisse com a prossecução das actividades próprias deste Instituto.

3.3. Com fundamento na longa experiência já havida no I.G.C., considera-se suficiente um cadastro exclusivamente topográfico ou torna-se indispensável completá-lo com uma avaliação agronómica ? Neste último caso, interessa mais adoptar critérios baseados no patente aproveitamento cultural dos terrenos ou, pelo contrário, deve prevalecer uma classificação mais ligada à qualidade de cada solo ?



Incluindo-nos no grupo decerto mais numeroso dos que consideram insuficiente um cadastro exclusivamente topográfico, começámos por admitir que a avaliação cadastral poderia assentar apenas na Carta dos Solos e Carta da Capacidade de Uso dos Solos, quando existentes.

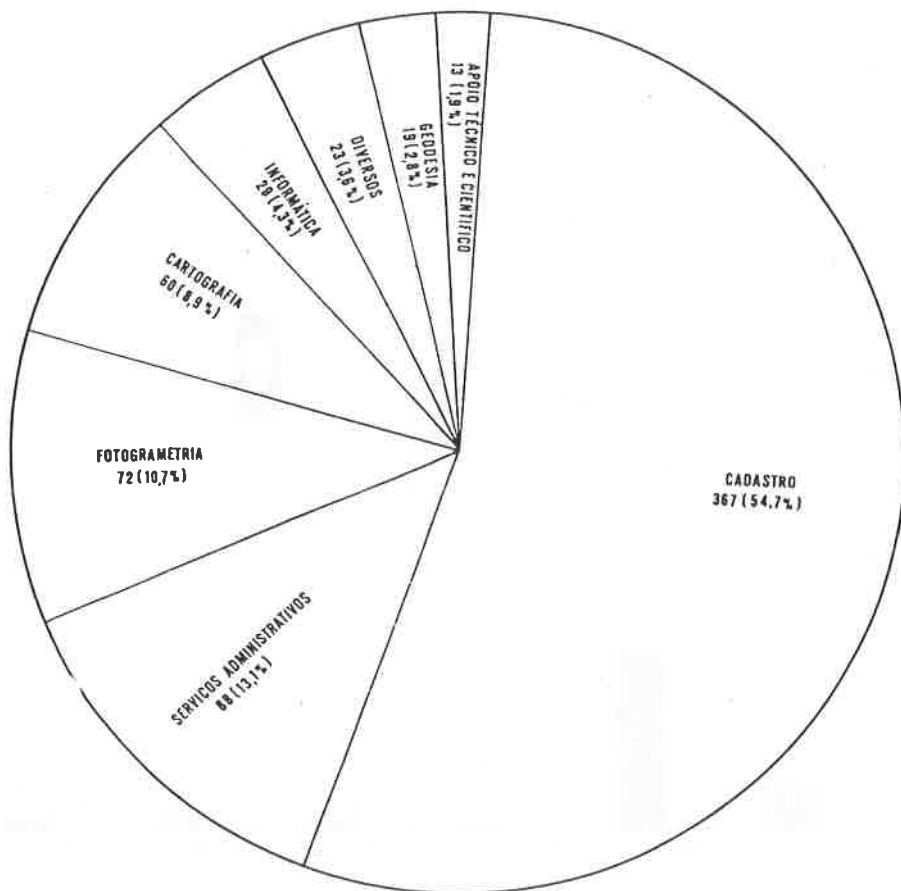
Com efeito, havíamos lido no nº. 4 de 1984 da "Revista do Instituto Geográfico e Cadastral" um interessante ensaio da autoria do engenheiro agrónomo J.S.Maia Amaral, onde este chegou à conclusão de que, nos concelhos do distrito de Beja, se verifica um curioso paralelismo entre os índices da capacidade de uso do solo e de identificação cultural (indicador baseado em mão-de-obra/ha, bovinos/ha, tractores/100 ha, adubos/ha). Sucede no entanto que tivemos posterior acesso a outro trabalho onde o mesmo autor afirma que "a tributação em função da capacidade intrínseca do solo poderá, sem grandes inconvenientes, ser adoptado em grandes áreas de países novos, onde o solo se apresenta no estado natural e em que a intervenção do Homem .... é nula ou de reduzida répercussão.... Em zonas em que a agricultura se apresenta com uma elevada dinâmica, o solo, por si só, é de somenos importância na valoração. Mesmo não falando em outros agentes modificadores da rentabilidade média do terreno, nomeadamente clima, disponibilidade de água, declive, pedregosidade, camada arável, proximidade de centros consumidores e de apoio, alguns destes factores determinantes da capacidade de uso do solo, é notável a influência do Homem que consegue pelo seu trabalho, por vezes secular e colmatante, e pelo seu engenho e capacidade técnica, obter, quase arrancar, rendimentos não esperados.... Cada vez a rentabilidade do solo e da exploração vale mais pelo que se lhe incorpora e pela tecnologia utilizada, que pelo que lhe é dado por benção de Deus".

Parece-nos assim mais sensato aguardar que os técnicos especialistas, engenheiros e agrónomos do I.G.C., discutam abertamente esta questão, procurando em qualquer dos casos reduzir a duração das operações de avaliação por adopção dos meios mais adequados, que poderão englobar eventualmente o recurso a técnicas de fotointerpretação.

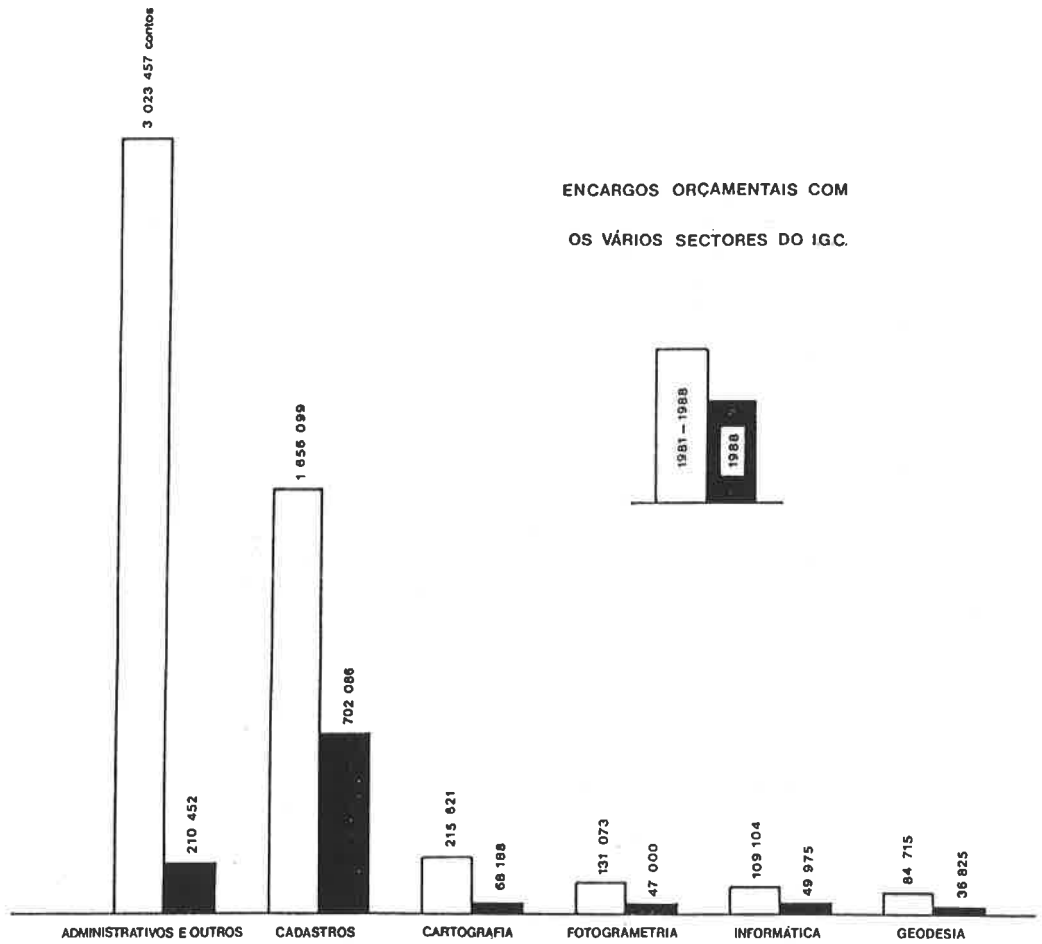
#### 4. NOTAS FINAIS

A utilização de ortofotomapas no continente, enquanto for possível, exige como se sabe cuidados especiais relacionados com a indesejável alterabilidade dimensional do suporte das provas fotográficas, parcialmente ultrapassáveis com o registo informático alfanumérico.

No caso especial da Madeira, julgamos que a descentralização da execução e da conservação do cadastro geométrico da propriedade rústica poderia ser substituída com vantagem por um suficiente reforço rejuvenescedor dos operadores de campo, da delegação regional do IGC, cujas idades médias têm vindo a crescer continuamente na última vintena de anos, e um aumento correspondente do pessoal de gabinete.



ENCARGOS ORÇAMENTAIS COM  
OS VÁRIOS SECTORES DO IGC.





**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
**MULTIFUNCIONAL**  
**- SICRUM -**

SISTEMA INTEGRADO DE GESTAO DE INFORMACOES CADASTRAIS

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P O R T U G A L

LISBOA... ONCHAL-20 a 25 Novembro de 1989

# SISTEMA INTEGRADO DE GESTÃO DAS INFORMAÇÕES CADASTRAIS

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## SISTEMA INTEGRADO DE GESTÃO DAS INFORMAÇÕES CADASTRAIS

### INTRODUÇÃO

O cadastro em Portugal tem tido uma vocação eminentemente fiscal e como tal, não se tem dado a devida importância à cobertura do País por uma carta cadastral com precisão geométrica.

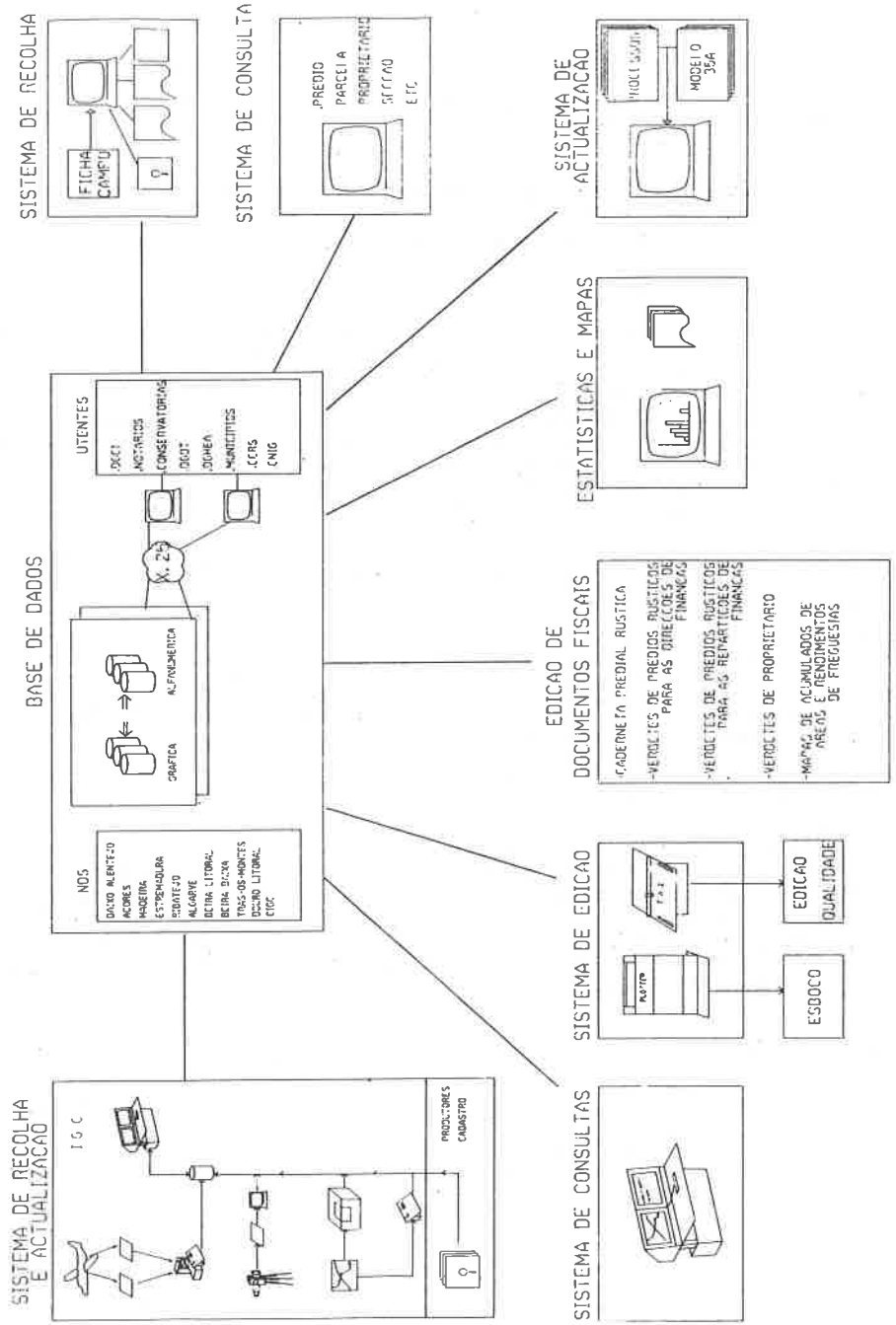
O cadastro deverá ainda:

- Ter, uma missão jurídica de perfeita identificação física das propriedades, dos reais proprietários e respectivos direitos.
- Responder às preocupações crescentes de ordenamento regional e municipal que implicam um conhecimento geográfico físico de pormenor, com vista ao estudo da estrutura fundiária, ao emparcelamento, ao levantamento das redes de infraestruturas, etc.
- Ter uma estrutura tal, que seja considerado de facto um standard das estruturas de informações geográficas a grande escala.

O cadastro que preconizamos é pois um cadastro multifuncional de componente alfanumérica e gráfica, cujo custo de produção e manutenção não pode ser medido apenas pelas suas vantagens fiscais, mas também e principalmente pelos inúmeros serviços que pode prestar, incluindo benefícios induzidos que são dificilmente quantificáveis.

A gestão da enorme massa de dados, que este tipo de Cadastro implica e que estão em permanente evolução, só é possível recorrendo a processos informáticos. Com este artigo, fruto da nossa experiência no CIGC, pretendemos apresentar uma solução de informatização, que permita tornar o Cadastro uma ferramenta com utilidade para a Administração Pública e para as entidades privadas, na modernização do país.

S.I.G.I.C. - SISTEMA INTEGRADO DE GESTAO DAS INFORMACOES CAUAS IRAIS



# SISTEMA INTEGRADO DE GESTÃO DAS INFORMAÇÕES CADASTRAIS

## A INFORMATIZAÇÃO DO CADASTRO

### 1 - Componente Alfanumérica

#### 1.0 - Antecedentes

A informatização do Cadastro começou a ser encarada nos finais dos anos 70. No respeitante aos dados alfanuméricos, a iniciativa partiu do IGC que desenvolveu um sistema de recolha e validação das informações cadastrais. Este sistema, instalado inicialmente nos Serviços Mecanográficos do Ministério das Finanças e transferido mais tarde para o Centro de Informática do IGC (1983), permitia a produção das cadernetas prediais a entregar aos proprietários, de verbetes para as Repartições e Direcções de Finanças e de algumas estatísticas. O sistema não apresentava qualquer solução para manter actualizadas as informações recolhidas; por esta razão, o que chegou até nós foi um depósito de bandas magnéticas cujas características, já obsoletas, não permitem sequer a sua reutilização.

#### 1.1 - Base de Dados - subsistema alfanumérico

O grande atraso na produção de cadastro, agravado pela desactualização em que caía o que estava produzido, tornava urgente a criação de um banco de dados em suporte magnético que permitisse a actualização permanente, a edição de documentos, a consulta, e a produção de estatísticas.

Várias opções de fundo podiam no entanto ser consideradas:

Centralização VS Descentralização  
Funções em tempo-real VS Funções deferidas  
Funções centrais VS Funções locais  
SGBD relacional VS SGBD em rede

Para além das opções de fundo respeitantes à organização da informação e dos procedimentos, havia que tomar opções quanto ao próprio conteúdo da Base de Dados.

Uma Base de Dados de vocação multifuncional, deveria dotar-se com um conjunto de informações capazes de vir a satisfazer um largo espectro de utilizadores, para além da Direcção Geral das Contribuições e Impostos. Por outro lado, o I.G.C. não podia responsabilizar-se pela produção e manutenção de informações que se afastassem do seu âmbito de acção.

Todas estas questões foram ponderadas com a participação de representantes de organismos, potenciais utilizadores.



## SISTEMA INTEGRADO DE GESTÃO DAS INFORMAÇÕES CADASTRAIS

Foi feita uma primeira experiência utilizando um software de gestão de Bases de Dados relacionais e concluiu-se que para volumes de dados consideráveis, como é o caso, os tempos de resposta ainda estão longe de atingirem as performances aceitáveis, tendo-se optado finalmente por um modelo em rede, que se considera satisfazer os requisitos necessários.

### 1.2 - Características gerais da solução proposta

#### Gestão Descentralizada

Apesar de haver uma centralização dos dados, optou-se por uma gestão descentralizada dos mesmos.

A partir de terminais locais os agentes terão a possibilidade de executar todas as operações de carácter permanente, nomeadamente:

- .Actualizações resultantes de processos de reclamação administrativa
- .Alterações a nomes e moradas (constantes nas relações Mod.35-A)
- .Edição de extractos
- .Consultas
- .Pesquisas

Os dados ficarão centralizados em um ou mais centros, que se responsabilizarão pelos tratamentos com carácter periódico, como sejam:

- .Edição maciça de avisos de pagamento da Contribuição Autárquica
- .Actualizações aos valores tributáveis
- .Estatísticas

ou com carácter esporádico, como sejam:

- .Reestruturações provenientes de alterações à divisão administrativa
- .Fornecimento de informações várias, designadamente para concessão de empréstimos, para controle de declarações dos contribuintes, etc.

## SISTEMA INTEGRADO DE GESTÃO DAS INFORMAÇÕES CADASTRAIS

### Tratamentos em tempo real

Todas as consultas feitas à Base de Dados reflectirão a situação de momento. Todas as actualizações reflectir-se-ão de imediato na Base de Dados.

Esta filosofia dará uma grande autonomia aos centros locais, diminuirá consideravelmente a burocracia e melhorará a prestação deste serviço público.

### Manutenção de um histórico

Será possível consultar as situações precedentes relativamente a determinado prédio ou proprietário, com indicação das causas da alteração, do documento que lhe deu origem e do agente responsável pela alteração.

## 1.3 - Implementação do Projecto

### Solução informática

A opção tomada relativamente à organização e gestão dos dados alfanuméricos foi a de uma estrutura cadastral.

Inicialmente, e enquanto o volume de dados o permitir, a Base de Dados será uma única, localizada no CIGC.

As Delegações Regionais, ficarão ligadas ao CIGC pela rede pública de comunicação de dados (TELEPAC P). Localmente estarão equipadas com sistemas que permitirão a sua definição como nós do sistema transaccional, reduzindo o tráfego na rede apenas aos dados indispensáveis e permitindo que a capacidade de processamento local seja utilizada em outras aplicações.

## SISTEMA INTEGRADO DE GESTÃO DAS INFORMAÇÕES CADASTRAIS

### 2 - Componente gráfica

#### 2.0 - Antecedentes

Nos princípios dos anos 70 o IGC iniciou a implementação de uma linha de produção de Ortofotomapas com o objectivo de suportar os trabalhos relativos ao Cadastro fiscal, permitir a execução de tarefas no âmbito do ordenamento e planeamento regionais.

Relativamente à Cartografia numérica, foram dados os primeiros passos com a aquisição, em 1980, de uma estação gráfica interactiva e, posteriormente, de 3 subsistemas de digitalização, os quais vieram a ser instalados no CIGC e em 2 Delegações Regionais (Santarém e Faro).

Os dados recolhidos localmente para disquete eram posteriormente transferidos para a estação gráfica, onde era possível realizar:

- Correções
- Recolha de atributos alfanuméricos
- Consultas
- Impressões

Um conjunto de situações levaram ao abandono deste projecto, que terminou sem nunca ter entrado na linha de produção, a saber:

- Não foi dado apoio financeiro à execução do projecto
- Não foi criado um circuito de manutenção
- Não foi implementada a impressão com rigor cartográfico
- Não foi estabelecida uma ligação à componente alfanumérica
- A informação recolhida representa menos de 0,5% do total
- O projecto perdeu oportunidade tecnológica

#### 2.1 - Base de Dados - subsistema gráfico

Para o subsistema gráfico da Base de Dados, foi definido como principal objectivo a optimização dos circuitos de recolha e actualização da informação gráfica, que permitirão a criação de uma Cartografia digital a grande escala, multifuncional e de fácil manutenção, sem detrimento da linha de produção dos ortofotomapas.

## SISTEMA INTEGRADO DE GESTÃO DAS INFORMAÇÕES CADASTRAIS

A integração com a informação alfanumérica é outro dos objectivos desta Base de Dados, facto que irá garantir uma maior consistência à informação e evitar uma duplicação da mesma, quer em termos de recolha, quer em termos de gestão.

Pretende-se ainda, com este sistema, vir a recuperar toda a informação digitalizada, dado que a informação gráfica é facilmente referenciada de forma unívoca, e as alterações são significativamente menores do que as ocorridas sobre a informação alfanumérica.

A Base de Dados deverá conter ainda, a informação e a simbologia devidamente normalizadas, que permita o seu uso em vários sistemas de informação geográfica. Esta normalização deverá ser levada a cabo pelos organismos potenciais utilizadores e aprovada como standard pelo Conselho Nacional de Cartografia, de modo a que, este subsistema possa vir a fornecer a carta base para as grandes escalas.

Por fim este sistema deverá suportar em todos os nós da rede, a realização de:

- Consultas e impressões
- Transferência de informação com diversos utentes

### 2.2 - Características gerais da solução proposta

Com vista a implementar uma solução que cumprisse os objectivos atrás descritos, foram definidas para a componente gráfica do sistema as seguintes funções:

#### Recolha e actualização da informação

A informação gráfica é caracterizada pela sua total independência e pela complexidade da sua manipulação, o que torna praticamente irrealizável a execução das funções de consulta e actualização em acesso remoto, pelo que se optou pela seguinte solução:

#### Centralmente

Será feita a recolha das cartas existentes, utilizando meios de digitalização automática e manual.

A partir de meios fotogramétricos, ligados em rede ao sistema gráfico, serão recolhidas as informações altimétricas e planimétricas.

## SISTEMA INTEGRADO DE GESTÃO DAS INFORMAÇÕES CADASTRAIS

Será feita a integração de ficheiros gráficos de diversas proveniências, desde que respeitem as normas aprovadas para o efeito.

### Localmente

Far-se-á a digitalização de cartas existentes.

Será feita a actualização das cartas existentes, a partir da recolha de campo, utilizando estações totais.

A actualização/correção de cartas já digitalizadas far-se-á através de estações gráficas.

### Consultas

O sistema permitirá consultar localmente a Base de Dados através da informação gráfica e obter as informações alfanuméricas associadas a uma determinada unidade geográfica e vice-versa.

Por exemplo:

- a) Obter em evidência gráfica os prédios rústicos de área inferior a 4 ha, destinados ao cultivo da vinha, na freguesia do Vale de Santarém.
- b) Obter os nomes e moradas dos proprietários, dos prédios confinantes com o leito do rio Almonda, na freguesia da Ribeira Branca.

### Impressões

Qualquer resultado obtido por diferentes critérios de selecção poderá ser impresso localmente em diversos níveis de precisão e de qualidade, através de:

- Plotter rápido
- Mesa de Desenho
- Plotter óptico
- etc.

dependendo apenas das disponibilidades e das necessidades do momento.

## SISTEMA INTEGRADO DE GESTÃO DAS INFORMAÇÕES CADASTRAIS

### Transferências com o exterior

- Deverá ser estudada uma estrutura de dados capaz de vir a oferecer características de portabilidade, de forma a permitir a transferência de informações entre o Instituto Geográfico e Cadastral e os potenciais utilizadores.

### Integração

O sistema irá dispor de procedimentos para integrar a informação proveniente, não só de diferentes processos de recolha:

- Estação Total
- Estereorestituição
- Digitalização

mas também, a partir de várias entidades produtoras.

## SISTEMA INTEGRADO DE GESTÃO DAS INFORMAÇÕES CADASTRAIS

### 3 - Conclusão:

#### 3.1 - Estratégia a adoptar

O estabelecimento de um Sistema de Cadastro Multifuncional deve passar em primeiro lugar, por uma análise funcional exaustiva, com a participação activa dos principais produtores e potenciais utilizadores.

Deve ainda especificar, de uma forma clara, a estratégia a adoptar para o cumprimento dos objectivos gerais, que não deverá descurar os seguintes aspectos:

- 1º Constituição de uma comissão que reunirá representantes dos potenciais utentes desta informação.
- 2º Levantamento dos recursos e da informação existentes.
- 3º Levantamento das necessidades dos utilizadores.
- 4º Estudo da integração das componentes Fiscal, Jurídica e Topográfica num único sistema de informação.
- 5º Caracterização do mapa-base topográfico (Sistema de projecção, escala, simbologia, etc.)
- 6º Definição de normas técnicas específicas para a digitalização, a serem seguidas pelos produtores de cadastro (Bitolas de precisão, estrutura dos dados, etc.)
- 7º Estabelecimento de mecanismos para controle de qualidade, e normalização.
- 8º Definição de protocolos de transferência de informações com organismos utilizadores.
- 9º Definição criteriosa de regras para a manutenção e consulta do sistema.
- 10º Aprovação de uma Lei Orgânica que confira suporte legal aos Núcleos de Informática das Delegações Regionais do IGC e que garanta uma descentralização real.
- 11º Estudo de uma proposta conducente à simplificação e aligeiramento das informações cadastrais, que o actual quadro legal não permite.

## SISTEMA INTEGRADO DE GESTÃO DAS INFORMAÇÕES CADASTRAIS

- 12º Proposta de um plano director para implementação definitiva do sistema, que defina um programa de execução sobre uma região piloto de modo a permitir a breve prazo, uma avaliação profunda dos tempos de execução, de recursos necessários e do grau de comunicabilidade da informação entre organismos produtores e/ou utilizadores do sistema.

### 3.2 - Dimensionamento da rede

Considerando, por hipótese, que o levantamento cadastral se desenvolverá a um ritmo superior à capacidade de recolha instalada, o dimensionamento da rede informática do I.G.C., deverá ser concebido de acordo o horizonte temporal pretendido para a completa constituição da Base de Dados.

Com a finalidade de ilustrar os níveis de investimento referidos, arriscamos a apresentação de uma estimativa a 6 anos feita com base nos volumes espectados.



## SISTEMA INTEGRADO DE GESTÃO DAS INFORMAÇÕES CADASTRAIS

SOLUÇÃO COM A CAPACIDADE ACTUAL

DADOS	EQUIPAMENTO EXISTENTE		CAPACIDADE DE PRODUÇÃO	TEMPO ESTIMADO
	CENTRAL	REGIONAL (10 DELEG.)		
Nº FREGUESIAS - 4158	ALFANUMÉRICO	ALFANUMÉRICA	ALFANUMÉRICA	70 ANOS
Nº PRÉDIOS RÚSTICOS - 11,3 MILHÕES URBANOS - 4,0 *	1 VAX 8350 CPU DE 2,3 MIPS MEMÓRIA CENTRAL - 12MB 30 TERMINAIS 1 IMPRESSORA 1200 LPM CAPACIDADE DISCO - 2GB	10 VAX 2000 CPU DE 0,8 MIPS MEMÓRIA CENTRAL - 4MB DISCO - 110 MB 3 TERMINAIS 1 IMPRESSORA	60 FREGUESIAS/ANO	
VOLUMES ESTIMADOS:				
BD ALFANUMÉRICA RÚSTICO - 15 GB URBANO - 6 GB	GRÁFICO	GRÁFICO	GRÁFICA	200 ANOS
BD GRÁFICA RÚSTICO - 30 GB URBANO - —	1 I200 CPU DE 1,2 MIPS MEMÓRIA CENTRAL - 9MB CAPACIDADE DISCO - 1GB 2 ESTAÇÃO GRÁFICA 1 SCANNER/PLOTTER	2 MESAS DIGITALIZAÇÃO	19 FREGUESIA/ANO	

SOLUÇÃO A 6 ANOS

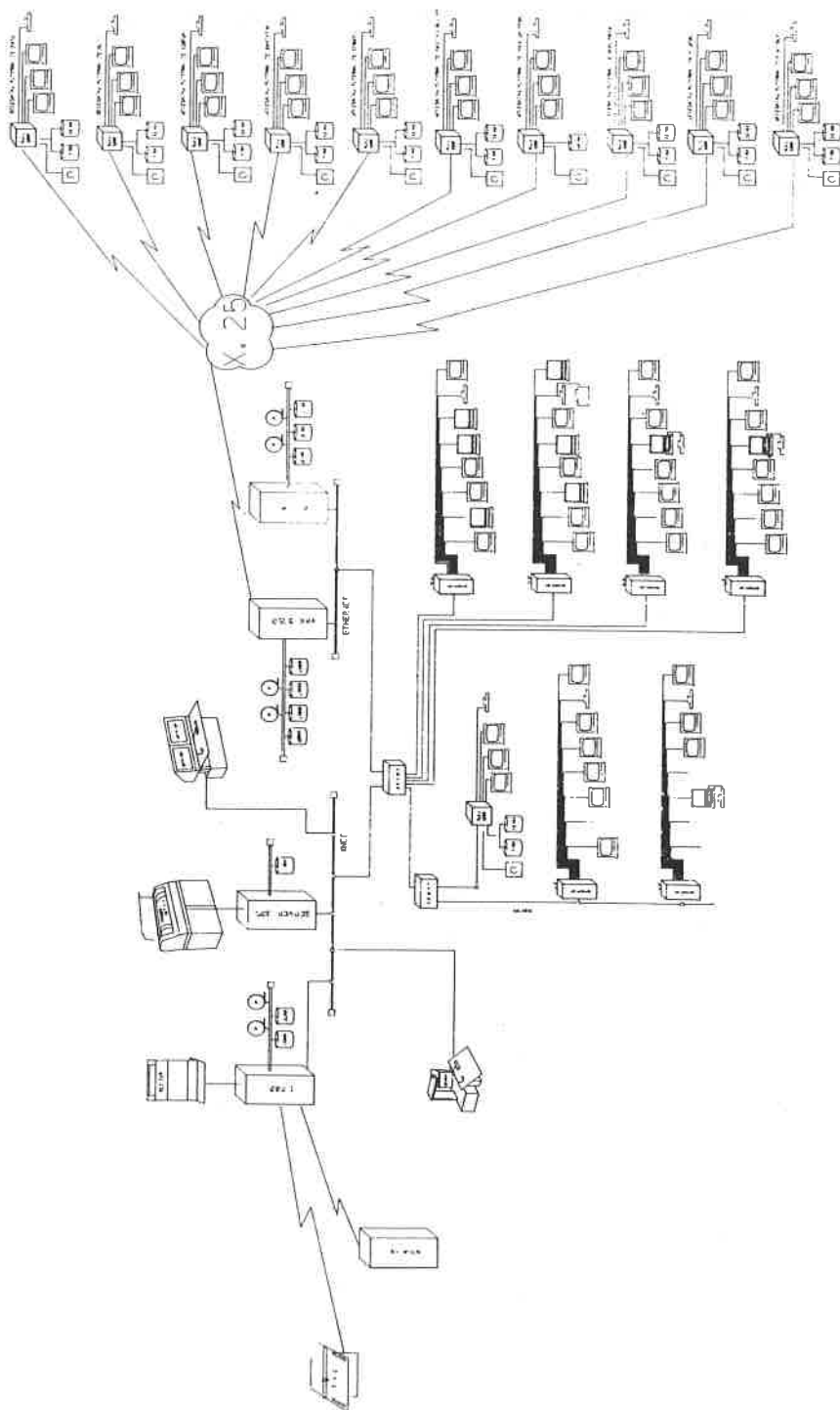
EQUIPAMENTO A ADQUIRIR		CAPACIDADE DE PRODUÇÃO	INVESTIMENTO EQU. (MILHARES CONTOS)	OPERADORES
CENTRAL	REGIONAL (20 DELEGAÇÕES)			
ALFANUMÉRICA 1 CPU DE 10 MIPS MEM. CENTRAL - 256MB CAPACIDADE EM DISCO - 25GB 120 TERMINAIS CPU ± 10 MIPS	ALFANUMÉRICO 20 X $\left[ \begin{array}{l} 1 \text{ CPU DE 2 MIPS} \\ \text{MEM. CENTRAL 8MG} \\ \text{CAPACIDADE DISCO 1GB} \\ 12 \text{ TERMINAIS} \\ 3 \text{ IMPRESSORAS} \end{array} \right.$	RECOLHA E CONSERVAÇÃO 900 FREGUESIAS/ANO	350 A)-	480
GRÁFICO 1 CPU DE 5 MIPS MEM. CENTRAL - 16 MG CAPACIDADE EM DISCO - 10GB 6 ESTAÇÕES ANALÍTICAS 3 ESTAÇÕES GRÁFICAS 6 TERMINAIS FOTOG.	GRÁFICO 20 X $\left[ \begin{array}{l} 6 \text{ MESAS DIGITALIZAD.} \\ 1 \text{ ESTAÇÃO GRÁFICA} \\ 5 \text{ ESTAÇÃO TOTAIS} \end{array} \right.$	RECOLHA 850 FREGUESIAS/ANO	750 A)-	140

A)- A PREÇOS ACTUAIS

## SISTEMA INTEGRADO DE GESTÃO DAS INFORMAÇÕES CADASTRAIS

Numa solução da desconcentração da produção de cadastro, com vista a acelerar a completa cobertura do país, caberá ao IGC um papel disciplinador, que pode passar pelo fornecimento de software de recolha, compatível com equipamentos de grande divulgação

CONFIGURACAO DA REDE INFORMATICA  
DO  
INSTITUTO GEOGRAFICO E CADASTRAL





SEMINARIO INTERNACIONAL  
SOBRE  
CADASTRO RUSTICO E URBANO  
MULTIFUNCIONAL  
- SICRUM -

O CADASTRO E O REGISTO PREDIAL: SUA CONCORDÂNCIA  
BREVES APONTAMENTOS

JOSÉ AUGUSTO MOUTEIRA GUERREIRO

PORTUGAL

LISBOA... ENCHAL-20 a 25 Novembro de 1989

## CADASTRE AND LAND-REGISTER — THEIR HARMONY

### Generic Remarks

#### SUMMARY

- 1- Introduction to the subject — generic elements
- 2- Land-Register and his cadastral support
- 3- Some remarks about the history of the Cadastre
- 4- The independence of the Cadastre
- 5- The cadastral purpose of the property topographic identification
- 6- The delay in the enforce of the Cadastre
- 7- The co-ordination Cadastre — Land Register
- 8- The consonance with the Cadastre and the map created by the Land-Register
- 9- The desirable correction of the cadastral legislation
- 10- The indispensable improvement in the interconnection of the cadastral and land-register Departments.

Comunicação apresentada por: Dr. José Augusto G. Mouteira Guerreiro  
( Conservador do Registo Predial )

Grupo de trabalho nº 5 - - - - - Comunicação sobre o ponto nº 13

TÍTULO: CADASTRO E REGISTO PREDIAL - SUA CONCORDÂNCIA

Breves Apontamentos

SUMÁRIO:

- 1- Introdução ao tema - princípios genéricos
- 2- Registo de base real e seu suporte cadastral .
- 3- Alguns apontamentos sobre a história do Cadastro
- 4- A independência do Cadastro
- 5- A finalidade cadastral de identificação topográfica do prédio
- 6- A demora na entrada em vigor do Cadastro Geométrico
- 7- A coordenação Cadastro-Registo
- 8- A harmonização e os mecanismos instituídos pelo Registo
- 9- A desejável resposta da legislação cadastral
- 10- O necessário aperfeiçoamento na inter-ligação dos Serviços cadastrais e registrais.

CADASTRO E REGISTO PREDIAL - SUA CONCORDÂNCIA

BREVES APONTAMENTOS

1 - Princípio do registo predial reconhecido como um dos fundamentais é o da especialidade, no qual se inscreve a necessária determinação, precisa e objectiva, do prédio.

Como seu natural corolário, emerge a regra da unidade descritiva, na sua dupla vertente: de um lado à descrição predial deve corresponder um só prédio e, do outro, a cada imóvel pertencerá uma descrição própria e distinta das demais.

O prédio é, assim, tomado como a base sobre a qual hão-de recair os direitos que se pretendam inscrever. (1)

Deste modo, a sua correcta identificação torna-se indispensável à própria veracidade dos direitos inscritos.

Se estes viessem a incidir sobre um outro prédio, sobre objecto distinto, a realidade acabaria por ser tabularmente falseada.

Por isso, deve ser sobre a base, o alicerce do prédio, que se constrói o edifício registral, visto que é a partir dele que se publicitam os direitos e se dá segurança do comércio jurídico imobiliário.

2 - Daí que, já há muito, se tenha reconhecido que o chamado sistema de fôlio real — que se funda no prédio e a ele faz reportar os direitos — seja aquele que melhor prossegue a finalidade do registo (2).

O prédio deve, pois, ser a primeira realidade a ter em conta e a verificação da sua identidade "constitui ponto fulcral da actividade qualificadora do Conservador", tal como se concluiu no Encontro Nacional de Conservadores que se realizou em 1984, logo após a entrada em vigor do actual Código do Registo Predial (3)

Também aí se reconheceu que o Cadastro representa "o meio, por excelência, de garantir ao registo a exactidão do seu suporte físico" (4).

O Cadastro é, assim, na generalidade dos sistemas de registo predial, nomeadamente europeus, a base indispensável para se poder comprovar a identificação física e a própria existência dos prédios, objecto dos direitos que se querem inscrever.

Dissemos na generalidade porque há alguns raros países — como é o caso da Austrália e da Irlanda do Norte — onde há serviços de registo que dispõem de técnicos, topógrafos e agrimensores, encarregados de investigar e comprovar os dados materiais do prédio, exigindo-se também que uma planta deste figure entre os suportes documentais do registo (5).

Todavia, estes casos de excepção, radicados numa bem diversa tradição jurídica, não invalidam — porque, como se vê, antes confirmam — a afirmação de que a base topográfica-cadastral constitui o indispensável sustentáculo na definição da identidade do prédio.

3 - Por isso que a falta de um cadastro actualizado, cobrindo a totalidade do território, tenha sido sempre motivo de profundo e generalizado lamentar por parte da Doutrina (6).

Além disso, desde os primórdios históricos, nomeadamente da nossa Civilização Ocidental, se tem sentido a necessidade de delimitar a terra para a sua utilização e apropriação.

No direito romano pre-justiniano mediante o cerimonial solene da limitatio, delimitavam-se os campos — os "agri limitati", porções de terreno que eram medidas pelos agrimensores, marcando os seus limites com sinais externos e que (ao contrário dos "agri arcifinales", pertencentes ao "ager publicus") desse modo os tornavam susceptíveis de apropriação individual, de propriedade privada (7).



Pode dizer-se que o Cadastro, como descrição física das propriedades, com o seu rendimento calculado para fins tributários, surgiu no princípio do Império Romano, precisamente com César, tendo levado 25 anos a concluir-se, não obstante distinguir minuciosamente as espécies de terreno, as construções e até o número de escravos que aí, trabalhavam (8).

Renovado e actualizado primeiramente em períodos de cinco anos, veio depois de Adriano, a sê-lo somente <sup>em</sup> ciclos de quinze anos.

Representou uma bastante completa relação de todos os prédios para cobrança do "tributum soli" feita com base nas declarações dos seus proprietários e mediante a inspecção dos responsáveis pela cobrança dos impostos (9).

As transmissões de propriedade eram também inscritas no Cadastro, cujas renovações periódicas garantiam a sua fidelidade.

Na Idade Média, perdeu em alguns territórios o sistema cadastral romano, embora restringida a sua importância ao aspecto senhorial e eclesiástico. Todavia, foi então que surgiu a denominação que viria a ficar consagrada: o Cadastro (10).

É, porém, já na época contemporânea que se vão realizar trabalhos topográficos, sob a direcção de institutos geográficos com finalidade própria - civil, social e económica - independente dos aspectos puramente tributários, ainda que se prossigam, também, estes objectivos, embora de um modo não exclusivo.

4- Chegamos aqui a um ponto importante que desejamos focar: o da pretendida independência do cadastro.

Num notável relatório feito em 1982 pelos Drs. Rocheta Gomes e Gonçalves Marques e que a Revista da Associação dos Conservadores publicou (11), é precisamente focado que na visita efectuada a algumas Conservatórias em França, Alemanha e Luxemburgo, se verificou que os serviços cadastrais actuavam com independência tanto dos fiscais como dos registrais.

Além, disso como nesse mesmo relatório se escreveu, "nos serviços notariais e de registo visitados não se concebia, sequer, que fosse possível celebrar um acto jurídico sobre imóvel, desligado de uma rigorosa referência cadastral, úni-

ca forma de acreditar a existência e identidade física do prédio" (12).

Os serviços do Cadastro possuíam os seus próprios recursos e estruturas locais, autónomas e operantes.

Efectivamente, não é como o recurso às chamadas "comissões de avaliação", nomeadas sem técnicos e "ad hoc" para cada concelho ou bairro, que se pode estruturar, de um modo sério e credível, a indispensável base cadastral.

De facto, essas comissões, usualmente compostas pelos chamados "louvados" — homens que em muitos locais vão fazendo uma quase institucionalizada procuradoria — não são controladas nem apoiadas por topógrafos ou geómetras, nem obedecem aos mínimos critérios científicos.

Têm apenas uma ligação às repartições de finanças porque, entre nós, se tem pensado — para citar um conhecido fiscalista — "que a avaliação dos prédios está em derradeira análise ao serviço do próprio imposto" (13).

Por isso, dentro desta perspectiva, como dizia esse Autor, é lógico ou imperativo até, que a avaliação da propriedade seja algo que se situe "na esfera de superintendência" da administração fiscal (14).

5—Esta é uma visão que, tendo sido a do Fisco, se acha, de facto, inadequada às concepções actuais e que, como se sabe, já há muito se acham implantadas na generalidade dos países civilizados, nomeadamente da Europa Comunitária.

Ainda que as motivações tributárias se inscrevam entre as que normalmente resultam da actividade cadastral, os verdadeiros fins desta em muito ultrapassam esses limitados intuitos fiscalistas.

Na verdade, o Cadastro prossegue também objectivos civis, administrativos, sociais, económicos e jurídicos que não é lícito menosprezar.

Os seus dados, desde que estatisticamente exactos, podem e devem servir de orientação à própria política urbanística, social, agrícola e do ordenamento territorial e económico da Nação. Constitui um verdadeiro tomo da riqueza fundiária do país.

No que respeita à vertente jurídico-registral, convirá mais uma vez

frisar que sem uma indispensável base cadastral não pode haver bom funcionamento de qualquer sistema de registo que não disponha, ele próprio, de serviços topográficos.

Como dizia Roca Sastre, "os princípios hipotecários giram à volta da entidade prédio sendo este o elemento principal do direito imobiliário" (15). E acrescentava, citando Campuzano: o prédio é a unidade fundamental permanente e estável, sendo, dos três elementos que integram a relação jurídica imobiliária, "o mais permanente e invariável, já que se alteram e extinguem os direitos, mudam os proprietários, mas o prédio, ainda que sofra alterações maiores ou menores, conserva inmutável a sua essência constitutiva" (16).

As matrizes não cadastrais, porque organizadas com meros objectivos tributários e na base de ultrapassadas e empíricas avaliações, não têm possibilidade de dar resposta à necessária identificação topográfica dos prédios.

Diremos mesmo que é discutível o esforço financeiro que vai ser feito com a informatização das matrizes, previsto no recente Decreto-Lei nº. 216/89, de 1 de Julho, se os próprios dados por elas fornecidos não merecem crédito e antes frequentemente induzem em erro pela sua notória imprecisão e inexactidão. Contam-se até histórias lamentáveis, mas que se afirmam verdadeiras, de inscrições matriciais (nomeadamente na zona do grande Porto) derivadas de avaliações e medições feitas à mesa do café.

Parece, deste modo, que seria bem mais proveitoso que se dotassem os serviços cadastrais dos meios adequados a um rápido desempenho da sua prestimosa e necessária função.

6 - Lembramos há pouco que na época de César, foi feito um inventário cadastral de todas as propriedades do Império Romano em 25 anos.

Nós, neste pequeno território e na época da "Terceira Vaga", com o apoio técnico próprio do século, durante mais de 40 anos, ainda não tivemos hipótese de concluir as operações cadastrais de metade dos prédios deste pequeno país!

Efectivamente, desde que, em 1 de Janeiro de 1944, foi instituído o cadastro geométrico no concelho de Mafra, vem-se inaugurando paulatinamente, em ou-

tros concelhos — mas com uma lentidão incompatível com a importância deste Serviço e com o desejável progresso das instituições por ele servidas.

7 - É obvio que, de entre estas, uma das mais importantes é precisamente o Registo Predial, visto que, como se referiu, lhe fornece a base topográfica da caracterização física do prédio e até a prova da sua existência.

Daí que esses dados físicos, constantes da descrição, devam estar coordenados como os que são fornecidos pelo cadastro e que os elementos jurídicos que deste constam - como seja a designação de proprietários ou titulares de outros direitos reais - devam também corresponder aos que o Registo indica.

É assim que a harmonização entre Cadastro e Registo tem constituído preocupação dos legisladores: em Espanha, por exemplo, já há vários anos se podia afirmar que todas as leis que foram promulgadas sobre o Cadastro incluíam preceitos relativos à coordenação com o Registo (17).

Assim também em outros países (18) mas, entre nós, parece que tal preocupação não tem tido o devido eco nas leis cadastrais.

É certo que só ao Registo pertence a importantíssima função de publicitar os direitos, defendendo e garantindo a segurança do comércio jurídico imobiliário.

Mas, para que essa sua alta função possa ser eficientemente cumprida, principalmente no que respeita à veracidade das transmissões imobiliárias - mesmo ao nível das futuras relações com a Europa Comunitária - é indispensável que exista a certeza quanto à identificação física do prédio, que só o Cadastro deve dar (19)

As principais fraudes têm surgido com prédios "inventados" (20), que através do primarismo nas avaliações puderam ser inscritos na matriz, não se sabe muito bem como.

Daí que a culpa desta situação não pertença à legislação registral, mas sim à cadastral.

8 - Foi com o Decreto-Lei nº 36.505, de 11 de Setembro de 1947, que pela primeira vez se estabeleceu a obrigatoriedade da descrição no registo predial dos prédios compreendidos no cadastro geométrico da propriedade rústica.

Posteriormente, os Códigos do Registo Predial passaram a incluir algumas normas no sentido de coactivamente se impor o registo das transmissões prediais ocorridas nos concelhos já submetidos a esse regime.

Na restante parte do país a situação era diversa, não existindo preceitos dirigidos à harmonização entre os dados cadastrais e registrais, nem tão-pouco visando assegurar genericamente a legitimação dos direitos sobre imóveis.

Só com a publicação do Decreto-Lei nº 305/83, de 29 de Junho, que aprovou o Código do Registo Predial, iniciando uma ampla reforma do nosso sistema, se deu conteúdo legal a um conjunto de normas especificamente dirigidas, para todo o país, à conjugação do Registo com os dados cadastrais, que, como é sabido, são, entre nós, os constantes das matrizes prediais.

Esta inovação foi seguida pelo actual Código, em vigor desde 1 de Outubro de 1984, no qual se dedica toda a 1ª secção do capítulo 3º do 2º Título à matéria da "conjugação do registo e das matrizes prediais"

Em face da realidade que temos, de a maior parte dos concelhos do país estar ainda por cadastrar, parece que a lei registral terá ido tão longe quanto possível, ao estabelecer a necessidade de uma completa harmonização entre a descrição predial e a matriz urbana e a rústica onde já vigore o cadastro geométrico e ao exigir, nas restantes, a concordância com os números dos artigos e com a área dos prédios.

A experiência diz-nos também que muitos dos problemas que aos utentes diariamente se deparam em matéria de registo predial são, em última análise, derivados da imprecisão matricial, nomeadamente no que respeita à área dos prédios.

O Código estabeleceu, todavia, alguns mecanismos para obviar às mais frequentes dificuldades que poderiam surgir: por um lado, permitiu que a harmonização se estabelecesse não apenas com a inscrição matricial mas, alternativamente, "com o pedido da sua rectificação ou alteração" (21).

Quer dizer que não é necessário aguardar a rectificação da própria matriz - nem tal, como se sabe e é superfluo acentuar - seria viável.

Basta que o Interessado faça aquele pedido e junte o respectivo duplicado (22).

Por outro lado, se o problema surgir a um terceiro, interessado no registo, mas carecendo de legitimidade para efectuar o pedido de rectificação matricial, a lei veio permitir que simplesmente faça "prova de que deu conhecimento à repartição de finanças da omissão ou alteração ou do erro existente" (23).

9 - Todas estas regras e caminhos, facultados ao registante para que, em última análise, se alcance o enunciado objectivo da conjugação da matriz com o registo, correm o risco de ficar inoperantes e frutados até, se os serviços encarregados da ordenação matricial não derem, por seu turno, o devido andamento aqueles pedidos de alteração e rectificação.

Dáí que, se afigure correcto propor que, ao importante passo já dado pelo Código do Registo Predial no sentido da referida harmonização, venha a corresponder idêntico movimento por parte da legislação cadastral, para que a desejada coordenação não permaneça letra morta.

Na verdade, arriscar-nos-emos a que assim aconteça se o Cadastro não assumir plenamente a sua função e não curar das indicações que lhe são dadas pelo Registo — num duplo sentido: tanto face às alterações descritivas sofridas pelos prédios, cuja exactidão deverá localmente comprovar, como sobretudo pelas afirmações de natureza jurídica, que não devem divergir das que o Registo contém (24). É, porém, verdade que tais afirmações se devem limitar ao mínimo, atenta a diferente função das duas instituições e sabido que não é ao Cadastro que incumbe publicitar os direitos reais sobre os imóveis, mas sim ao Registo (25).

O Cadastro terá sempre, num sentido profundo, de ser juridicamente neutro, pois não lhe pertence nem deve pertencer a definição da relação jurídica imobiliária. Contudo, as referências que nessa esfera tiver de conter — como é o caso da indicação dos proprietários — não poderão, à luz da própria lógica do Ordenamento Jurídico, ser diferentes das que o Registo, de uma forma autêntica, e "erga omnes" publicita.

10 - É certo que para o citado e importante objectivo da conjugação Registo-Cadastro pode decididamente contribuir o aperfeiçoamento dos Serviços cadastrais — que se augura como realidade próxima — e também a sua informatização, conjugada com a do Registo Predial.

É importante que, tão rapidamente quanto possível, se comecem a utilizar as novas tecnologias, designadamente no que se refere ao tratamento informático dos dados cadastrais e por forma a que estes se venham a conectar com os registrais.

Poderá ser que, então, um eficiente inter-relacionamento se venha a tornar realidade.

Estê é um desiderato já há muito conseguido em vários países (26).

Entre nós ainda não. Mas é urgente que deixe de haver este imobilismo e — perdoe-se a ousadia — um certo menosprezo pelo Cadastro que o leve a considerar fundamentalmente instrumento ao serviço dos meros fins tributários. Aliás, a este respeito, até se pode pensar que benéfico poderia ser (e perdoe-se mais uma vez a frontalidade) nem sequer haver actualização cadastral. É que, em muitas zonas, principalmente do minifúndio, os pequenos lavradores ainda vão subsistindo e cultivando seus campos porque os valores matriciais estão bastante desactualizados.

Os pesados encargos tributários sobre a propriedade rústica, emergentes da actualização dos valores, podem levar ao abandono das terras, como tem sucedido em épocas decadentes da História. O "tributum soli" é, de facto, um doloroso imposto, de mau augúrio, que sempre tem sido justamente detestado pelo Povo.

Mas, como se acentuou, é muito diversa a função do Cadastro — incontestavelmente mais nobre e ampla.

O que é preciso é que haja os meios, a vontade política e a capacidade de execução que permitam vencer a situação actual.

Efectivamente, se forem reestruturados e recuperados os Serviços cadastrais, com cobertura local em todo o país, estabelecendo-se a necessária correspondência com o Registo, por certo muito se avançará neste importante domínio, contribuindo para assegurar a certeza das transacções imobiliárias, incentivando-as, e, no fundo, fazendo acreditar e dinamizar a própria riqueza territorial da Nação.

## N O T A S

1 - É esta a orientação de "todo o sistema de Registo de desenvolvimento técnico" -Cf Roca Sastre", "Derecho Hipotecário", 5ª ed., II, pag.59.e M. Wolf "Derecho de Cosas", I (Tomo III do "Tratado"), 3ª ed. pag.167 e seg.

2 - Cf. Roca Saste, op. cit. pag. 60. Cf. ainda conclusão 10ª do 1º Congresso Internacional de Direito Registral, que aprovou a "Carta de Buenos Aires" e sua recomendação VI sobre "Técnicas de registo" in Boletim de Informação do CINDER, nº 1, 1 982, pags. 37 e 40, tendo-se repetido idêntica recomendação no 2º Congresso, de Madrid, (pags. 52 do mesmo Boletim).

3- Cf. "Regesta", 1 985, nº 62, pag.128 e seg.

4- idem, parte da 7ª conclusão.

5- Cf. J.M.Garcia Garcia, "Derecho Inmobiliário Registral o Hipotecario", Tomo I, pag. 426 e o estudo de Luis Fernandez del Pozo in Revista Critica de Derecho Inmobiliario, nº 590, pag. 63 e segs. (nomeadamente pag. 72).

6- Cf. Roca Sastre, op. cit. II, pag. 58 e segs. e III pag.778 e segs., e Lopes Cardoso "O Cadastro e o Registo Predial", publicado na "Revista de Notariado e Registo Predial", ano 20º pag. 177 e segs.

7- Cf.o estudo de Pérez Cánovas in "Revista Crítica de Derecho Inmobiliario, ano LXIV,nº 586, pag. 735 e 736 e bibliografia aí citada.

8- Vide, Roca Sastre, op. cit. III pag. 769 e seg.

9- idem, pag. 770

10- idem , pag. 771

11- Cf. "Regesta", 1 982, nº 31, pags. 217 e segs.

12- idem, pag.224

13- Cf.A.M. Cardoso Mota, "A Contribuição Predial e o Imposto sobre a Indústria Agrícola",5ª ed.,pag. 264.

14- idem, pag.264 e 265.



15- Op. cit., II, pag. 60.

16- idem, pag.60.

17- Cf., Roca Sastre, III, pag. 780. Este Autor, num estudo sobre a reforma da lei registral espanhola, publicado pela "Revista de Direito Registral" do CINDER, nº 15, 1 988, pag. 19 e segs., propunha também que o Título 1º da futura lei registral tratasse "do prédio, sua matrícula e modificações e da coordenação do Registo e do Cadastro" (pag.22 e seg).

18- Cf., o citado Relatório, publicado na Regesta nº 31, pag. 217 e segs. e J.M.Garcia Garcia, op. cit.: entre outras, vide pag. 350 (França) pag. 397 (Alemanha) pag. 407 (Suíça) e pag. 412(Austria).

19- É ele que dá "uma base objectiva aos direitos reais", na incisiva expressão de Lopes Cardoso (op.cit., pag.180).

20- A protecção registral não pode, então, funcionar.

Suponha-se o caso — que lembrava Seabra de Magalhaes — do credor hipotecário que esperava ter "o seu crédito garantido por uma quinta, quando o prédio hipotecado não passa de um pequeníssimo quintal ou, pior ainda, nem sequer passa do texto descritivo..."(Estudos de Registo Predial, pag.67).

21-Art.28º, nº 1, in fine do Código do Registo Predial.

22- Nº 2 do art. 32º do referido Código.

23-Nº 4 do art.30º do mesmo Código.

24- Francisco Corral Dueñas, na sua tese de doutoramento, "El Registro de la Propiedad y la Legislacion Social Agraria" (Madrid, 1 977) diz que "se as mudanças cadastrais, tal como a lei manda, fossem sempre precedidas da inscrição registral dos actos jurídicos que as produzem, teríamos encontrado um meio enormemente efectivo para impedir a sapa dissolvente do documento privado" (pags. 114 e 115).

25- Cf. Lacruz Berdejo e Sancho Rebullida, em "Derecho Inmobiliario Registral" ( 1 968) a pag. 68, escreveram: "a delimitação de competências

entre Cadastro e Registo deve realizar-se, então, na base de que as afirmações jurídicas do Cadastro, que idealmente deveriam receber-se do Registo (e só no indispensável para o seu trabalho da explicação de factos) são sempre subsidiárias das registraes" (o sublinhado é nosso)

26- Vide nota 18.





SEMINARIO INTERNACIONAL  
SOBRE  
CADASTRO RUSTICO E URBANO  
MULTIFUNCIONAL

- SICRUM -

SITUAÇÃO DO CADASTRO RUSTICO EM PORTUGAL

DIMAS A. D. VEIGAS  
ANTONIO M. C. MARCELINO

PORTUGAL

LISBOA - ENCHAL-20 a 25 Novembro de 1989

SEMINÁRIO INTERNACIONAL SOBRE CADASTRO  
RÚSTICO E URBANO MULTIFUNCIONAL (SICRUM)

LISBOA E FUNCHAL, 20 A 21 E 22 A 25 DE NOVEMBRO DE 1989

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A SITUAÇÃO DO CADASTRO RÚSTICO EM PORTUGAL

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**SUMÁRIO:** A traços largos referem-se os Organismos que têm interferido no cadastro da propriedade rústica, desde que em Portugal foram iniciados e depois implementados os trabalhos nesta área de actividade. Alude-se a diversa legislação que estruturou o I.G.C. Referem-se sucintamente os métodos usados na execução das plantas em escala grande, para com mais pormenor os referir na área da avaliação cadastral. Assinala-se a actual situação dos trabalhos. Diz-se da necessidade de os governantes serem sensibilizados para se levar por diante a conclusão do cadastro em Portugal a curto prazo.

**ABSTRACT:** The authors present an explanation about the evolution of the cadastre of the rural propriety in Portugal, the principal services responsible for it and the most important legal diplomas concerned to. They describe, first shortly, the methodologies used to obtain the large scale maps and, then, develop the methodology used in land valuation for cadastral purposes. They propose the governmental analysis of the options to conclude the portuguese cadastre in a short time.

## 1 - INTRODUÇÃO

Podemos entender o Cadastro da propriedade como um inventário exaustivo e permanente, descritivo e avaliatorio de determinada região.

Em Portugal, o cadastro da propriedade rústica tem vindo a ser executado por dois processos:

O primeiro, tradicional e apenas descritivo, tem sido executado pela Direcção Geral das Contribuições e Impostos (D.G.C.I.).

O segundo, geométrico, elaborado com base em plantas cadastrais a escala conveniente, possui maiores diversidade e rigor de informação. É da responsabilidade técnica do Instituto Geográfico e Cadastral, que entrega os elementos à D.G.C.I. para substituição do cadastro descritivo.

Embora o objectivo principal seja o da tributação fiscal, o cadastro geométrico da propriedade rústica foi entendido desde o início como tendo finalidades e utilizações mais vastas e mais importantes que aquela.

Assim, o mesmo assenta em base cartográfica com precisão adequada à escala definida de acordo com a divisão predial, proporciona pormenorizada e diversificada informação agro-cadastral e fornece consideráveis elementos para a elaboração de cartas temáticas, para além de muitos outros fins.

Elementos económicos podem actualmente ser conseguidos através do cadastro geométrico, destacando-se:

- Preços de factores de produção e de produtos agrícolas e sua evolução em dada região.
- Análise macroscópica das necessidades de recursos humanos, defini -

ção regional de "plafonds" de crédito, viabilidade de investimentos de reestruturação, etc.

- Consumos de factores de produção e peso relativo dos mesmos.

- Mão de obra empregada nas diferentes operações culturais, nº de horas de trabalho de máquinas, quantidade de adubos e outros fertilizantes consumidos, sementes e pesticidas utilizados, estimativa do capital necessário à exploração, produções unitárias, rendimentos líquidos de cada cultura, etc.

- Determinação de margens brutas e outros indicadores económicos.

- Elementos relativos à forma de exploração, tipo e regime de propriedade, nº de proprietários, nº de prédios rústicos e mistos e sua determinação por classes de áreas, áreas não cultivadas, etc.

Muitos destes elementos podem ser precioso auxílio dos empresários agrícolas, na contabilidade e planeamento das actividades das suas explorações e na gestão dos recursos disponíveis.

Por outro lado, os dados e documentos elaborados pelos organismos de cadastro servem como elemento importante para juridicamente fundamentar o registo correcto dos prédios rústicos, simplificam os problemas de transmissão, ajudam em tribunal a resolução de demandas ou acordos, etc.

São usados também e com frequência, para o estabelecimento de infraestruturas várias pelas Autarquias, J.A.E., BRISA, E.D.P. e outras entidades, em projectos de emparcelamento e de desenvolvimento regional e local, no ordenamento de território, etc.

Em termos de receita autárquica podemos referir que, por exemplo, em sete concelhos onde recentemente passou a vigorar o regime de cadastro geométrico, o rendimento tributável rústico passou de 136 000 contos para cerca de 1 100 000 contos. Em concelhos nitidamente rurais ela tem uma contribuição importante nas finanças da autarquia.

A conservação cadastral tem sido implementada por duas formas:

- resolução de processos de reclamação administrativa, instruídos nas Repartições de Finanças a requerimento dos proprietários e enviados ao I.G.C. para emissão de parecer. Processos de reclamação administrativa podem ser iniciados no I.G.C., quando se detectarem alterações, quer na forma ou aproveitamento dos prédios.



É um processo continuado e pontual

- A revisão cadastral, é um processo periódico e global, abrangendo um concelho ou região homogénea, podendo o I.G.C. de cinco em cinco anos, p~~o~~ por e executar a sua realização.

— " —

Com o desenvolvimento dos meios informáticos no I.G.C. e a melhoria dos sistemas, quer de campo quer de gabinete, de recolha de elementos, já hoje podemos ter acesso mais rápido a informação relativa à utilização do terreno pelos diferentes aproveitamentos de espécies culturais, seus níveis de produtividade e respectivas áreas, valor tributável ou valor patrimonial dos prédios rústicos (permitindo avançar-se para uma Bolsa de Terras).

A Base de Dados Alfanumérica entrou este ano em fase de produção, estando a ser carregada com dados provenientes dos núcleos de recolha existentes em cada uma das Delegações Regionais e que estão ligados ao equipamento central da Sede, na rede pública de dados.

A Base de dados Gráfica do cadastro está a ser desenvolvida, prevendo-se a sua futura ligação à Base de Dados Alfanumérica na identificação dos prédios.

Quanto ao sistema informático da conservação cadastral, está a ser feito o levantamento dos circuitos das informações.

## 2 - EVOLUÇÃO

### 2.1 - Legislação

#### 2.1.1 - Tentativas iniciais

Como refere A. Paes Clemente no Boletim do Instituto Geográfico e Cadastral, volume IV, "o cadastro geométrico da propriedade rústica do país é uma velha aspiração da nossa Administração Pública.

A mais antiga disposição legal em que se lhe faz referência é, de nosso conhecimento, o alvará com força de lei de 9 de Junho de 1801...."

- Por decreto de 8 de Novembro de 1846, o Conselheiro António José d'Ávila foi encarregado de uma "comissão sobre o cadastro" para formação e progressivo aperfeiçoamento de um Cadastro Geral do Reino, após investigação e estudo noutros países.

- Em 30 de Agosto de 1848 foi criada a "Comissão do Cadastro Parcelar Topográfico do Reino".

Entretanto, os meios disponíveis foram concentrados no levantamento de uma carta, na escala 1:100 000, trabalhos coordenados pelo Professor Filipe Folque. Ficou o cadastro geométrico a aguardar melhor oportunidade, tendo em sua substituição sido organizadas matrizes prediais descritivas.

#### 2.1.2 - Fases de desenvolvimento e reformas fiscais

- Em 1911, Brito Camacho e José Relvas apresentam na Assembleia Nacional Constituinte uma proposta de lei no sentido da dinamização do cadastro, que seria parcelar, uniforme, elaborar-se-ia por freguesia. Teria as finalidades:

- a) A identificação da propriedade imobiliária rústica.
- b) Ao lançamento da contribuição predial rústica.
- c) À remodelação do regime da propriedade predial rústica.
- d) Ao levantamento da carta em grande escala do país.

Não passou de proposta.

Nova tentativa foi feita em 1920 pelos Ministros Joaquim Ribeiro e António da Fonseca, que também não vingou.

- Em 1921 era publicado o Decreto Nº 7873 criando o "serviço de cadastro rural geométrico" junto da Direcção Geral das Contribuições e Impostos. Nele se referia que o cadastro seria "parcelar e uniforme, fundado na medição e determinação da propriedade". Não se destinava a servir de base à carta do país em grande escala, mas visava apenas fins fiscais, era descontínuo e a avaliação dos prédios era feita por método directo.

Como refere Paes Clemente, tratava-se de um sistema que se "deveria

dénominar «recuo cadastral» pois ou evita ou retarda a execução de um bom cadastro de fins múltiplos...."

- Em Janeiro de 1924 era publicada uma portaria nomeando uma Comissão, para apresentar "as bases em que deve assentar o cadastro geométrico da propriedade rústica".

- Do trabalho dessa Comissão, com ligeiras modificações resultou o D. L. Nº 11859 (1926/07/02) que autorizou o Governo a proceder à organização do cadastro. Em 13 de Agosto é criado o Conselho de Cadastro. Em 1926/11/22, pelo D. L. Nº 12764, organizam-se os Serviços a cargo da Administração Geral dos Trabalhos Geodésicos, Topográficos e Cadastrais que se passam a designar por Instituto Geográfico e Cadastral.

- O Decreto Nº 14162 de 25 de Agosto de 1927 serve de base à avaliação cadastral, introduzindo em Portugal o processo de avaliação indirecta e estabelecendo os seus regulamentos.

O Cadastro tem como principais atributos, o ser geométrico (baseia-se em planta topográfica ou fotográfica à escala), parcelar (a avaliação dos rendimentos incide sobre porções contínuas e homogéneas de cada prédio) e indirecto (a avaliação é feita com base em quadros de Qualificação e Classificação e de Tarifas e por comparação com parcelas tipo de cada uma classes culturais).

Com o desenvolvimento dos trabalhos, tornou-se necessário promover alterações ao mesmo, facto que conduziu à publicação do decreto Nº 20974 de 1932/02/29.

A prática de vinte anos levou a que se racionalizasse a organização dos serviços de avaliação do cadastro geométrico da propriedade rústica, tendo, para o efeito, sido promulgado o D.L. Nº 36505 de 1947/09/11, onde se introduziram alterações no sentido de metodizar, simplificar e abreviar a actividade dos organismos intervenientes nos serviços de avaliação cadastral.

- Constituem estes três diplomas a base para em 1963/07/01 ser promulgado pelo D.L. Nº 45104, o Código da Contribuição Predial e do Imposto sobre a Industria Agrícola, no âmbito da reforma fiscal então em curso.

No seu preâmbulo afirma-se "... foi sempre com olhos atentos à situação e perspectivas da agricultura que se reformou a legislação em vigor.

Não se esqueceu, na verdade, que muitas das nossas terras penosamente sustentam os proprietários que as trabalham, como não se esqueceu que a lavoura

enfrenta hoje uma crise de falta de braços..."

- Em 20 de Janeiro de 1977 o D.L. Nº 27/77 estabelece a reorganização do I.G.C. e aprovando a sua Lei Orgânica.

- Alterações pontuais foram sendo efectuadas no Código da Contribuição Predial enquanto que em 1980 o Instituto Geográfico e Cadastral, através do Decreto-Lei Nº 513/80 de 28 de Outubro, vê revista a sua Lei Orgânica. Nela se prevê que em todo o território nacional o I.G.C. tem as atribuições de estudar, promover, executar, coordenar e acompanhar as medidas e acções a desenvolver em vários campos, nomeadamente o do cadastro, rústico e urbano.

- O D.L. Nº 143/82 de 26 de Abril atribui ao I.G.C. a competência exclusiva para a elaboração e conservação de toda a cartografia básica para a construção da Carta Cadastral do País, nos seus aspectos geométricos e de avaliação.

- O D.L. Nº 154/82 de 5 de Maio introduz novas alterações ao CCPIIA e onde, entre outras medidas, se estabelece que a matriz rústica será elaborada pelo I.G.C. em duas fases distintas e sucessivas, a inventarial e fiscal e a geométrica de precisão.

### 2.1.3 - A reforma fiscal em curso

Nestes últimos anos tem o Governo vindo a promover diversas iniciativas no âmbito da Reforma Fiscal.

- pelo D.L. Nº 442-C/88 de 30 de Novembro é aprovado o Código da Contribuição Autárquica para entrar em vigor em 1 de Janeiro de 1989, constituindo um complemento em relação à instituição dos impostos sobre o rendimento de pessoas singulares (IRS) e de pessoas colectivas (IRC).

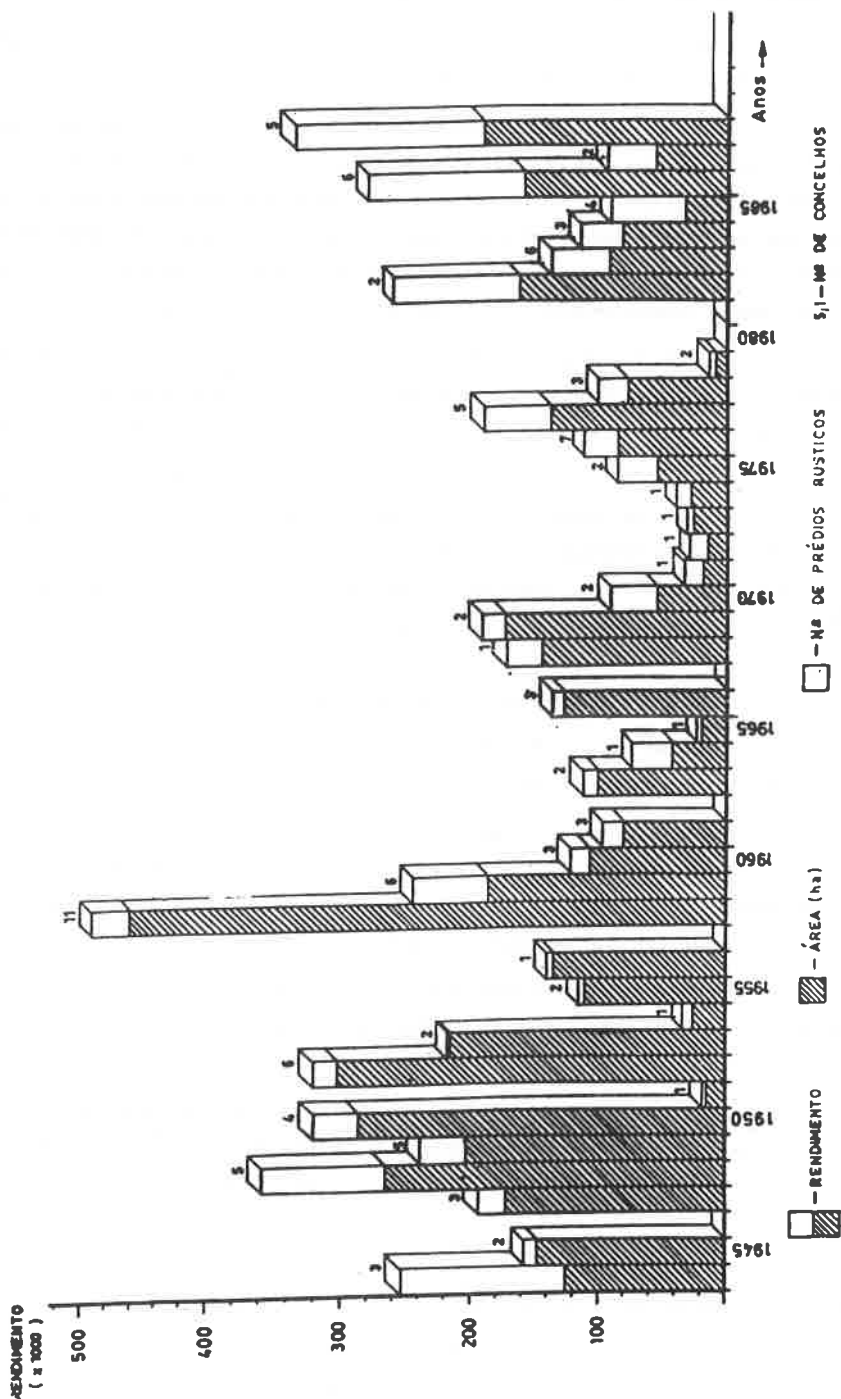
- A Contribuição Autárquica constitui uma fonte de receita fiscal das autarquias e incide sobre o valor tributável dos prédios situados no território de cada município.

Está previsto neste diploma novo sistema de avaliação dos prédios rústicos e urbanos, a publicar brevemente num Código de Avaliação, assim como as normas relativas à organização e conservação das matrizes cadastrais constarão de um diploma especial.

Enquanto tal não acontece, continua em vigor o expresso sobre estas matérias no Código da Contribuição Predial.

- Entretanto, em Outubro de 89, encontra-se constituída uma Comissão para, a curto prazo, proceder à reestruturação do I.G.C.

I.G.C. — CONCELHOS ENTRADOS EM REGIME DE CADASTRO  
 ANÁLISE EVOLUTIVA DOS RENDIMENTOS DE TRABALHO (ÁREA • PRÉDIOS)



## 2.2. - Desenvolvimento da execução do cadastro

### 2.2.1. - Primeiro Cadastro

Como atrás referimos, em 1801 começou a ganhar forma legal a intenção da realização do Cadastro em Portugal.

Em 1852 e após vicissitudes várias, abandonou-se a ideia de um cadastro geométrico e criou-se a contribuição predial com base numa "matriz predial" descritiva.

E alguns levantamentos cadastrais foram sendo efectuados em zonas limitadas, normalmente ligadas a projectos de grandes obras públicas.

Retomada a iniciativa da execução do cadastro geométrico e como ensaio para o levantamento cadastral do País foi em 1893 efectuado o levantamento na escala de 1:2 500 de cerca de 600 ha na zona de Frielas e em 1895 a 1897 foram levantados na mesma escala 3 670 ha, nas margens do Tejo pertencentes aos Concelhos de Vila Franca e Loures.

Só a partir dos anos de 1926/1927 é que o Governo destina um crédito especial para a organização do cadastro da propriedade rústica e se estrutura o Instituto Geográfico e Cadastral.

Os anos de 1927 a 1929 destinaram-se a treinar pessoal e a criar e ensaiar metodologias de trabalho.

Até finais de 1940 estavam levantados 363 500 ha, respeitantes a 12 Concelhos e os trabalhos de avaliação cadastral estavam efectuados em cinco Concelhos correspondendo a cerca de 267.000 ha. Destes, quatro estavam prontos para entrar em regime de cadastro mas tal aconteceu somente em 1944 com os Concelhos de Cuba, Mogadouro e Mafra.

O gráfico anexo mostra a evolução da entrada de Concelhos em regime de cadastro, fazendo-se o destaque dos componentes área e número de prédios rústicos e mistos.

Verificamos que, no período de 1944 - 1960, por força de os serviços terem sido dotados de consideráveis meios económicos, materiais e humanos ( de campo e gabinete), se procedeu ao avanço das operações cadastrais.

Os trabalhos processaram-se em duas zonas, no Alentejo e em Concelhos limítrofes de Lisboa.

Na Madeira e Açores o desenvolvimento das acções ocorreu por volta de 1950.

Deste modo, foram neste período entregues à Direcção Geral das Contribuições e Impostos 55 Concelhos com uma área de 2 699 876 ha, contendo 489 332 prédios rústicos.

De 1961 a 1980 ficaram concluídos mais 38 Concelhos, representando 1 140 262 ha, com 339 218 prédios rústicos.

No período de 1981 a 1988 entraram em regime de cadastro 28 Concelhos com 747 128 ha e 537 560 prédios rústicos e mistos.

Encontram-se actualmente, em diversas fases de execução cadastral, doze Concelhos (dos quais dois em revisão final) pertencendo seis ao Continente, dois à R.A. Açores e 4 à R.A. da Madeira.

Faltam cadastrar 168 Concelhos, com área total de 4 217 772 ha e possuindo cerca de 9 400 000 prédios rústicos.

Estes elementos encontram-se condensados no quadro seguinte.

Os meios económicos e de apoio aos trabalhos de campo têm, nestes últimos anos, vindo a reduzir-se, conforme se pode constatar pelo gráfico de dias médios de campo que cada técnico utilizou em trabalhos de distribuição parcelar.

É um dos aspectos a merecer reflexão profunda.

Por outro lado tem o I.G.C. vindo a apostar na maior rapidez de execução do cadastro, sem perda de qualidade do mesmo. E assim promoveu diversas acções de formação e reciclagem dos seus técnicos, nomeadamente, cursos de fotointerpretação, desenho, informática e conservação e introduziu novos meios e métodos de trabalho.

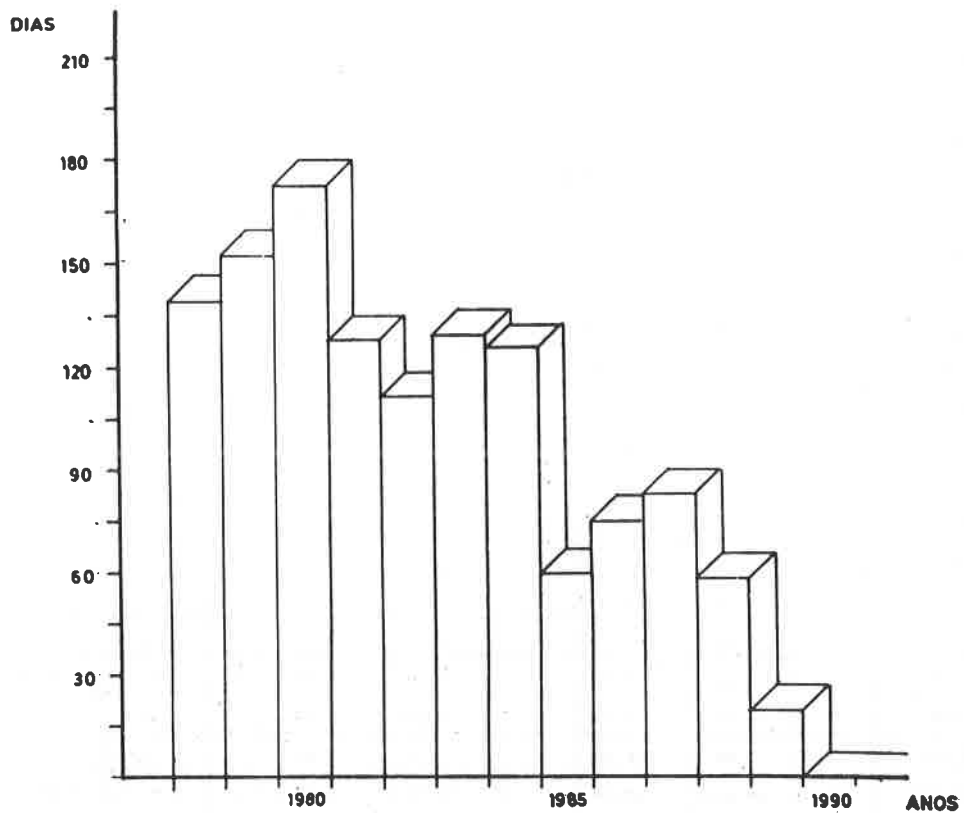
A utilização de ortofotomapas conjugada com a fotointerpretação tem-se revelado medida que permite maior rapidez de execução dos trabalhos de campo em algumas zonas com menor cobertura vegetal, atingindo-se já níveis de produtividade 80 a 100% acima dos habituais, com perspectivas de, em futuro próximo, esses valores serem largamente ultrapassados.

CENSO MÚNICIPAL - SITUAÇÃO NO PAÍS (1999)

DISTRITO	Concelhos em regime de Cadastro			Concelhos em execução			Concelhos por cadastros		
	Conce- lhos(Nº)	Área (ha)	Nº de Prédios	Conce- lhos(Nº)	Área (ha)	Nº de Prédios	Conce- lhos(Nº)	Área (ha)	Nº de Prédios
Aveiro	-	-	-	-	-	-	10	270.971	913.006
Beja	14	1.022.311,8	32.722	-	-	-	-	-	-
Braga	-	-	-	-	-	-	13	260.531	643.936
Bragança	1	75.790,0	94.060	-	-	-	11	564.161	1.004.660
Castelo Branco	4	373.010,5	171.902	-	-	-	7	267.781	422.773
Coimbra	-	-	-	-	-	-	17	397.149	1.155.445
Évora	14	739.340,0	44.376	-	-	-	-	-	-
Faro	12	200.569,0	130.275	3	133.767	117.692	1	76.513	80.659
Guarda	-	-	-	-	-	-	14	554.002	662.059
Leiria	4	30.051	30.035	2	60.193	105.306	10	243.821	704.774
Lisboa	14	275.708,6	211.626	-	-	-	-	-	-
Portalegre	15	606.444,1	77.065	-	-	-	/	-	-
Porto	-	-	-	-	-	-	17	234.146	432.200
Santarém	20	627.400,6	307.821	1	41.650	129.637	-	-	-
Setúbal	13	506.419,0	46.574	-	-	-	-	-	-
Viana do Castelo	-	-	-	-	-	-	10	221.033	753.829
Vila Real	3	19.295	44.630	-	-	-	11	411.534	715.212
Viseu	1	16.071	54.543	-	-	-	23	404.406	1.537.172
<b>SUB TOTAL</b>	<b>116</b>	<b>4.600.978,6</b>	<b>1.413.340</b>	<b>6</b>	<b>343.610</b>	<b>352.636</b>	<b>163</b>	<b>4.030.280</b>	<b>9.020.604</b>
R.A. Açores	4	63.662	90.000	2	11.161	± 20.300	13	130.614	± 303.200
R.A. Madeira	6	32.000	30.779	4	31.600	± 70.200	2	16.900	± 30.300
<b>SUB TOTAL</b>	<b>0</b>	<b>95.662</b>	<b>120.779</b>	<b>6</b>	<b>42.761</b>	<b>± 90.500</b>	<b>15</b>	<b>147.514</b>	<b>± 333.500</b>
<b>TOTAL PAÍS</b>	<b>124</b>	<b>4.696.640,6</b>	<b>1.534.119</b>	<b>12</b>	<b>386.371</b>	<b>+43.136</b>	<b>178</b>	<b>4.217.772</b>	<b>±9.354.104</b>



### DISTRIBUIÇÃO PARCELAR - Dias de campo por técnico



### 2.2.2. - Conservação cadastral

- Os técnicos de formação agronómica e topográfica colocados na Sede e nas Delegações Regionais do I.G.C. têm procedido continuamente à informação de processos de reclamação administrativa, mas os meios disponíveis, quer nas Repartições de Finanças quer no I.G.C., não são suficientes para anualmente darem satisfação a todos os processos, existindo nos dois serviços um número considerável a aguardar resolução.

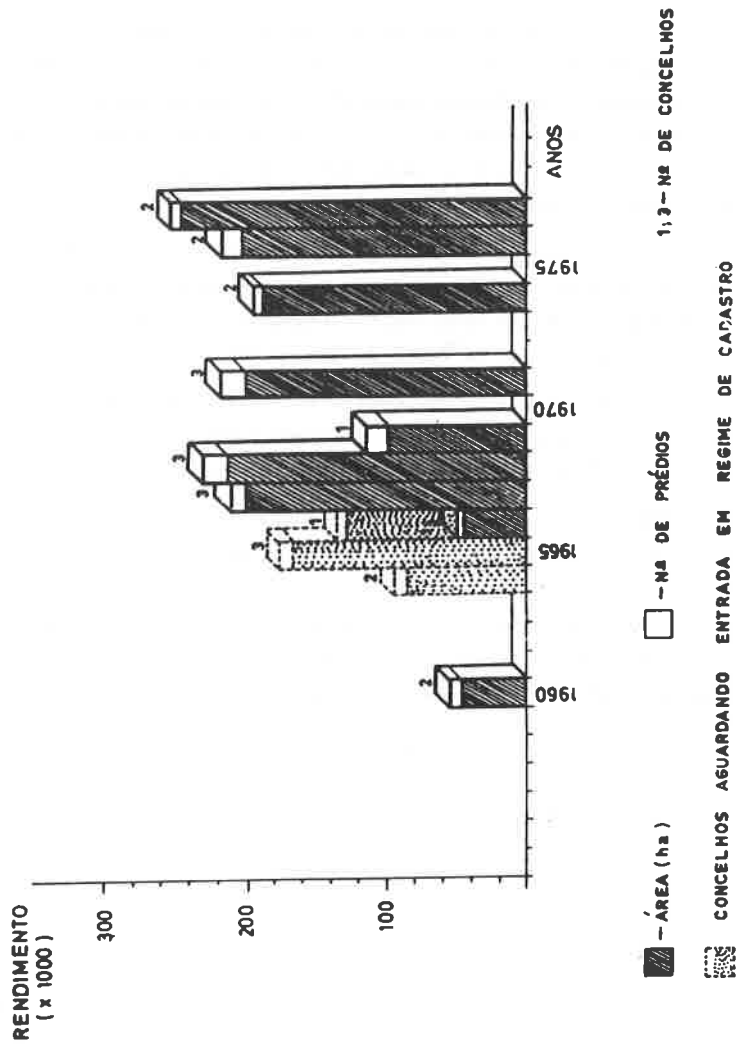
Atento a esta problemática, procurou o falecido Director Geral do I.G.C., Eng<sup>o</sup> Rui Galeano Barata Pinto, propôr a aprovação de legislação conducente à criação da figura "Perito Cadastral" e também neste sentido, foi ministrado na Escola do I.G.C. um curso de formação desses técnicos.

- Relativamente às revisões cadastrais a entrada em vigor dos primeiros Concelhos ocorreu em 1960; entre 1964 e 1966 foram entregues à D.G.C.I. seis Concelhos do Distrito de Évora que não chegaram a entrar em regime de cadastro.

Até 1977 foram concluídos e entregues à D.G.C.I. 19 Concelhos pertencentes aos Distritos de Beja (14) Évora (1) e Setúbal (4).

No momento presente encontram-se em conclusão os trabalhos de revisão dos Concelhos de Ponta Delgada e Reguengos de Monsaraz, este com participação nas despesas por parte da Câmara Municipal.

# I.G.C. — REVISÕES CADASTRAIS — Áreas + Prédios dos Concelhos Revistos



### 3 - ORGANIZAÇÃO DO CADASTRO

Por certo outras comunicações abordarão em pormenor a organização e execução do cadastro em Portugal.

Deste modo apresentá-lo-emos somente de forma esquemática e referiremos alguns aspectos sobre a elaboração das plantas cadastrais (matrizes e secções) e sobre a avaliação da propriedade.

Cronologicamente, a planta cadastral começou por ser obtida por levantamento à prancheta na escala 1:5 000<sup>e 1:2 500</sup> no Continente por técnicos militares, para a partir de 1943/45 o método clássico taqueométrico ganhar impulso e a este reorrestituição começou a ser utilizada.

A partir de 1950 a fotogrametria passa a ter utilização sistemática nos levantamentos cadastrais com incremento a partir de 1961 no Continente e Nos Açores. As plantas eram obtidas à escala 1:2 000.

Nalgumas zonas da Madeira, utilizaram-se as escalas de 1:1 000 e 1:500.

Recorreu-se também à fotogrametria terrestre.

Foram utilizados dois métodos para a obtenção da planta, sendo um o do reconhecimento prévio em fotografias ampliadas, completamente topográfico e restituição final baseada naquele reconhecimento, no outro processo o trabalho iniciava-se pela restituição dos elementos visíveis no par estereoscópico seguindo-se o reconhecimento e completamente taqueométrico efectuados sobre cópias da restituição.

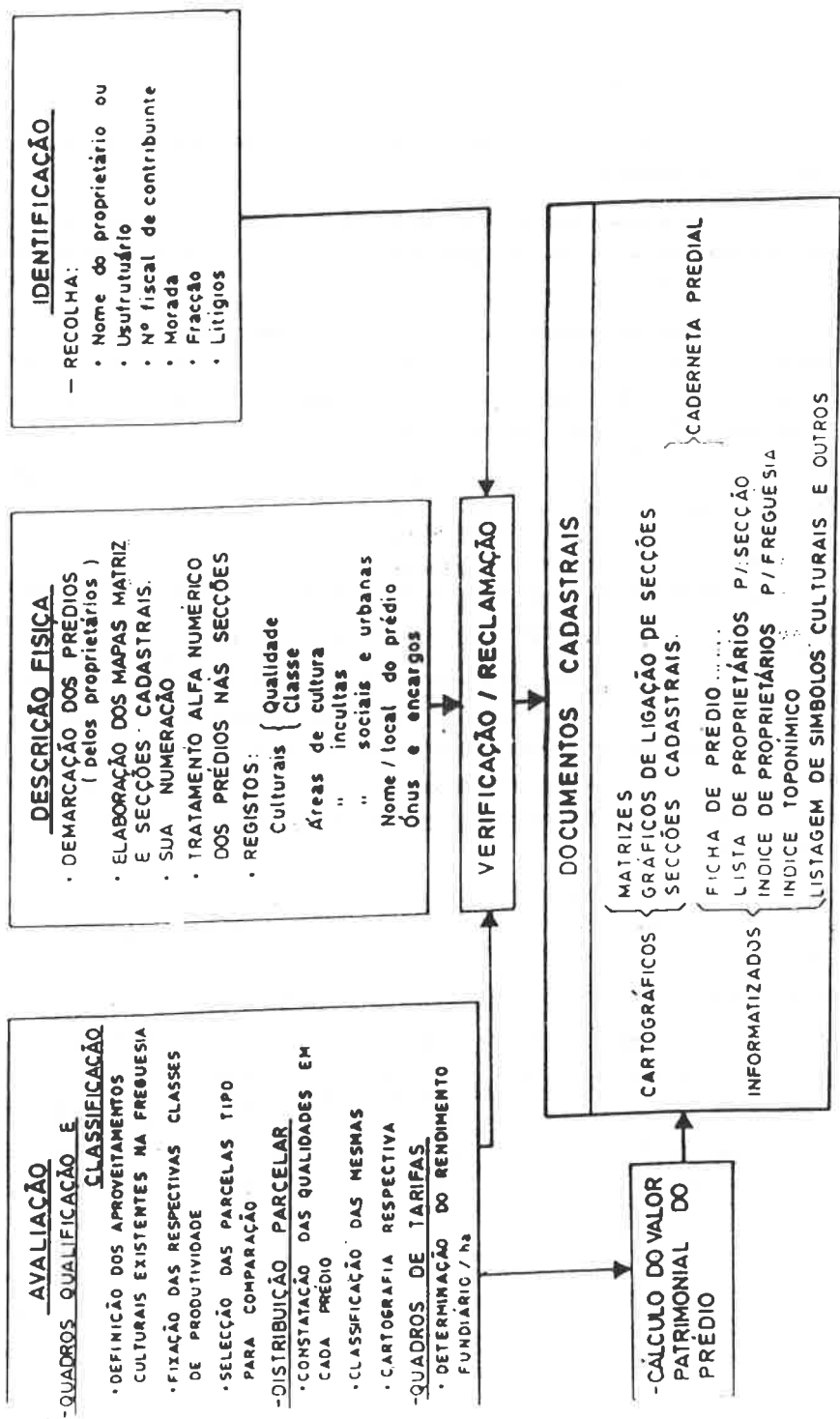
Presentemente, no Sul do País tem sido utilizados mapas obtidos a partir da ortoprojecção de fotografias aéreas, (ortofotomapas) seguindo-se-lhe o reconhecimento e implantação dos marcos limitantes dos prédios e identificação dos respectivos proprietários ou usufrutuários.

Esta demarcação é efectuada pelos proprietários, fornecendo o I.G.C. apoio na divulgação das normas a que a mesma deve obedecer.

As secções cadastrais são constituídas a partir da planta matriz obtida do levantamento, que é seccionada de modo a que os seus limites acompanhem sempre extremas de prédios e freguesias, sendo portanto plantas com conjuntos de prédios inteiros.

Secções cadastrais ou ortofotomapas são em seguida utilizados por técnicos de formação agronómica nos seus trabalhos de avaliação cadastral, que constam essencialmente do seguinte:

## ESQUEMA DE ORGANIZAÇÃO DO CADASTRO



a) Organização dos quadros de qualificação e classificação, isto é, definição pelo presidente da Junta Cadastral Concelhia de colaboração com os vogais e para cada freguesia, dos aproveitamentos agrícolas com interesse económico (qualidades) e determinação dos respectivos graus de produtividade (classes). São seleccionadas parcelas - tipo para cada classe, que servirão de comparação nos trabalhos seguintes.

b) Distribuição Parcelar - com base naqueles quadros e parcelas - tipo são determinados, parcelados e registados, na planta e em fichas de prédio, os aproveitamentos agrícolas e suas classes, construções, parcelas urbanas e sociais nome ou local, onus ou encargos respeitantes a cada prédio rústico ou misto.

c) Elaboração de Quadros de Tarifas

Para cada qualificação cultural e classe é determinado o rendimento fundiário por ha, através de contas de cultura.

É este rendimento fundiário que serve, ainda hoje, ao cálculo do valor tributável dos prédios rústicos. É um tema que irá sofrer muito em breve uma reestruturação no âmbito da reforma fiscal por força da aprovação de um Código de Avaliações.

d) Verificação - Reclamação

Todos os elementos assim recolhidos são postos a verificação por parte dos proprietários interessados que, não concordando, podem dos mesmos reclamar para a Junta Cadastral Concelhia ou para o Conselho de Cadastro, órgão decisório superior.

O Conselho de Cadastro emite acordão sobre os quadros de Qualificação Classificação e de Tarifas.

e) Documentos cadastrais

Terminados aqueles trabalhos, os elementos respeitantes aos prédios rústicos são tratados nas Delegações Regionais do I.G.C. por um sistema que faz recolha, validação, consulta e edição das informações que vão estando disponíveis. Irão constituir uma Base de Dados Alfanuméricos (em fase de produção) e uma Base de Dados Gráfica do Cadastro (em estudo) que será ligada à anterior.

Os elementos gráficos e alfanuméricos de cada Concelho são entregues à Direcção Geral das Contribuições e Impostos que fornece aos proprietários uma caderneta predial respeitante a cada um dos prédios de que é detentor.

Haveria necessidade de recrutar pessoal de gabinete (desenho, registo de dados, etc) ou estabelecer contratos com empresas ligadas ao sector de forma a processarem em tempo útil, todos os elementos recolhidos no campo.

#### 4 - PERSPECTIVAS

Pelo atrás exposto, um volume considerável de trabalho, encontra-se por realizar; a sua conclusão a breve prazo implica vontade política, dotação de meios e apoios diversos.

É difícil fazermos futurismo numa altura em que se perspectivam alterações mais ou menos profundas por força de acções tão importantes como a Reestruturação do I.G.C., a próxima publicação do Código de Avaliações, a regulamentação sobre as matrizes ou o desenvolvimento da aplicação de novas tecnologias.

Importante é que politicamente se defina que cadastro se pretende, se multifuncional ou puramente fiscal, se com base geométrica ou não, se prioritariamente o urbano ou conjuntamente o urbano e o rústico, que organismos (públicos privados ou mistos) e com que meios.

Para a execução do cadastro de uma certa região, duas componentes são importantes, a cartográfica e a de avaliação. Tradicionalmente elas têm sido conduzidas pelo mesmo organismo, o I.G.C., assentes num trinómio de serviços, Geodésia - Fotogrametria e Cadastro (Geométrico e Agrónómico).

Esta solução, ou outra qualquer, pode existir desde que haja garantia de qualidade de produção e cumprimento de normas e calendários.

Mas achamos que, por se tratar de matéria muito sensível, a definição dos critérios a adoptar na definição do valor patrimonial dos prédios e a execução das correspondentes operações de avaliação, devem competir ao Estado.

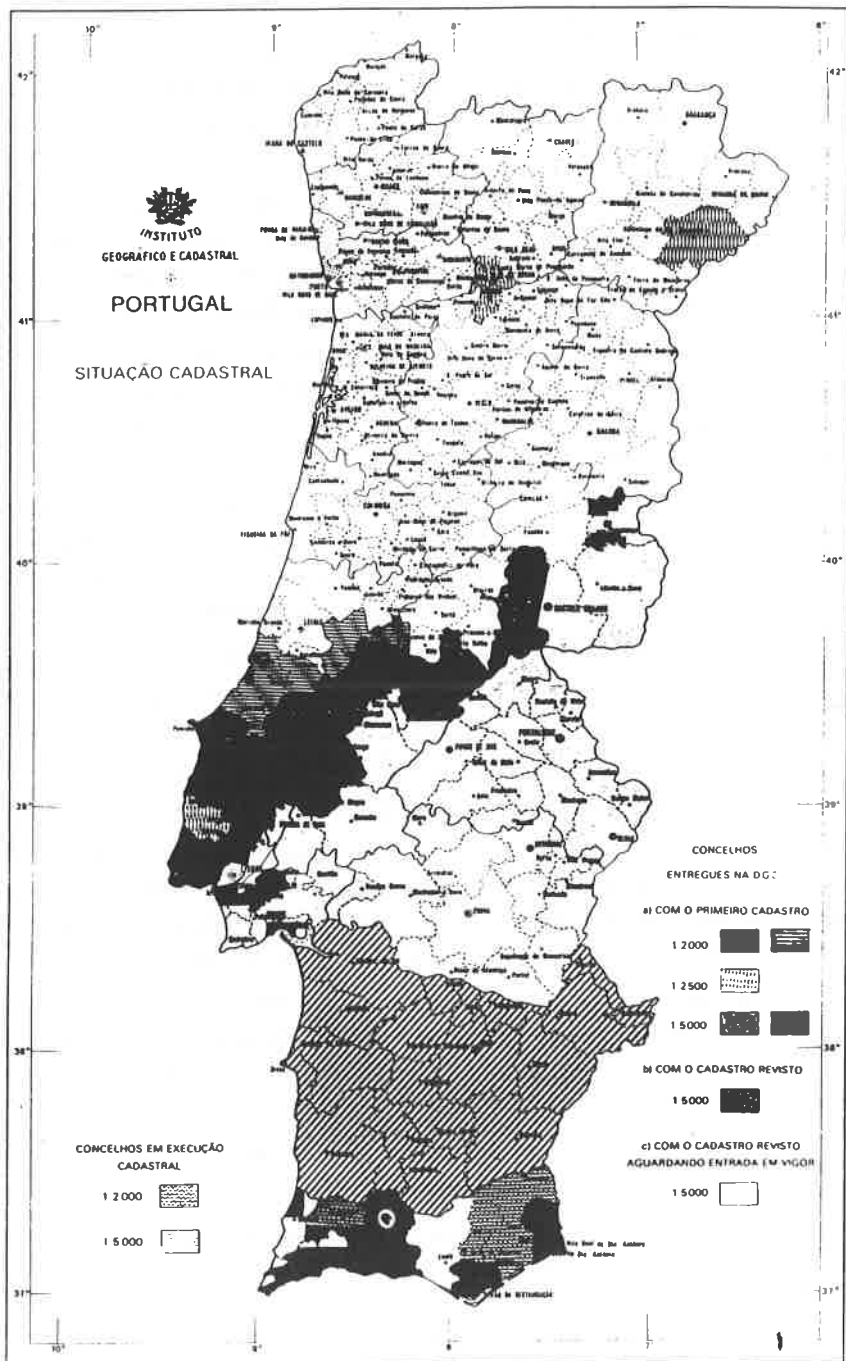
Obtidas as plantas cadastrais, e se os serviços de avaliação fossem dotados de suficientes meios humanos e materiais, admitimos como possível que os mesmos desenvolvessem e concluíssem os trabalhos de campo de avaliação cadastral da parte do País que falta cadastrar, num prazo de cinco anos.

Para tal, teriam que ser dotados de mais 150 técnicos para distribuição parcelar que desenvolveriam trabalho de campo, durante nove meses por ano e que teriam à disposição meios logísticos (viaturas), equipamentos e materiais de apoio suficientes.

Seriam submetidos a acções de formação no campo da avaliação - distribuição, fotointerpretação e informática.

Os mesmos técnicos seriam depois utilizados nas operações de conservação, prevendo-se revisões periódicas de cinco em cinco anos.







INSTITUTO

GEOGRÁFICO E CADASTRAL

# ILHA DE S. MIGUEL

SITUAÇÃO CADASTRAL

ESCALA 1:250 000



... EM EXECUÇÃO

CONCELHOS EM EXECUÇÃO

CADASTRAL

1:2000

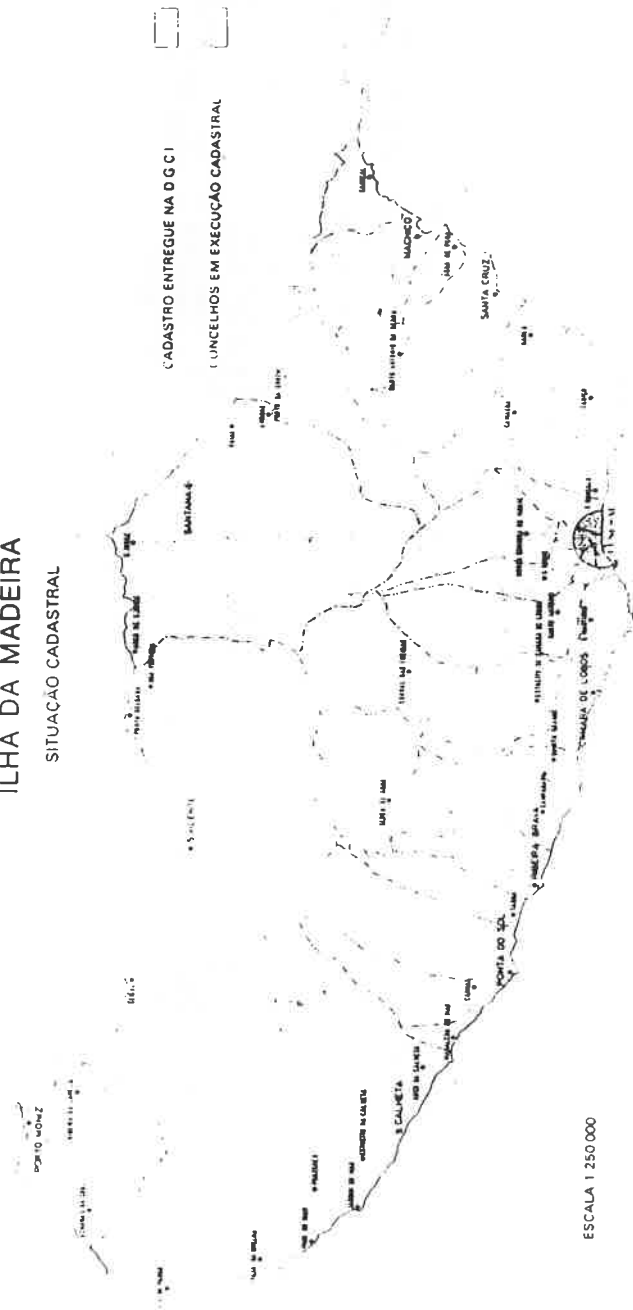
1:5000



INSTITUTO  
GEOGRÁFICO E CADASTRAL

## ILHA DA MADEIRA

SITUAÇÃO CADASTRAL



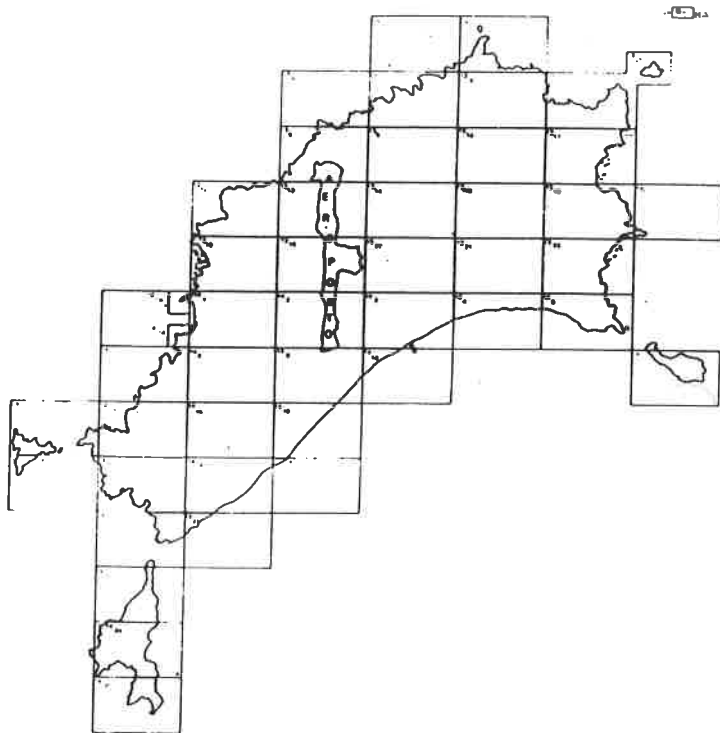
ESCALA 1 250 000



## ILHA DO PORTO SANTO

DESIGNAÇÃO DAS PLANTAS TOPOGRÁFICO - CADASTRAIS

NA ESCALA 1:2000



CADASTRO JÁ ENTREGUE NA D. G. C. I.

ESCALA 1:100000





**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
**MULTIFUNCIONAL**

— SICRUM —

O CADASTRO DA PROPRIEDADE RÚSTICA  
ORGANISMOS - RELAÇÕES INTERNACIONAIS

Dimas Augusto D. Veigas  
António M. Cruz Marcelino

PORTUGAL

LISBOA... ANCHAL-20 a 25 Novembro de 1989

**SEMINÁRIO INTERNACIONAL SOBRE CADASTRO  
RUSTICO E URBANO MULTIFUNCIONAL (SICRUM)**

**(LISBOA E FUNCHAL, 20 a 25 DE NOVEMBRO DE 1989)**

**O CADASTRO DA PROPRIEDADE RUSTICA  
ORGANISMOS - RELAÇÕES INSTITUCIONAIS**

**Dimas Augusto Dias Veigas**

**António Marques da Cruz Marcelino**

SEMINÁRIO INTERNACIONAL SOBRE CADASTRO  
RÚSTICO E URBANO MULTIFUNCIONAL (SICRUM)

O CADASTRO DA PROPRIEDADE RÚSTICA  
ORGANISMOS - RELAÇÕES INSTITUCIONAIS

DIMAS A. D. VEIGAS

ANTONIO M. C. MARCELINO

SUMÁRIO: O Instituto Geográfico e Cadastral é, a nível nacional, o responsável pela elaboração do cadastro geométrico da propriedade rústica. Diversos organismos e entidades participam na sua execução. Diversos são os utilizadores dos elementos que o cadastro disponibiliza e variadas as suas utilizações. Interessa corrigir algumas deficiências e melhorar as relações entre os produtores e os utilizadores do cadastro. Tendo a tributação como finalidade imediata, o cadastro tem proporcionado utilização que interessa desenvolver. Em particular refere-se a necessidade de a componente jurídica ser desenvolvida de forma a que ultrapasse a mera presunção de propriedade de que possui.

ABSTRACT: The Instituto Geográfico e Cadastral is, in Portugal, responsible for the setting up of the "geometric cadastre of propriety". Several organizations contribute for the assessment of the national cadastre. Along the years the cadastre has been helping a great number of users on a large range of applications. It's important to correct some faults and improve the relations between the producer and the users. If the taxation has been the motivation for the building up of the cadastre, however more attention should be given regarding its use full applications. At the end, a suggestion is made of a stronger participation of cadastral elements on the process of land registration in order to be more than a mere presumption of rights.



1 - Pela sua lei orgânica compete exclusivamente ao I.G.C. a organização em todo o País do cadastro com base cartográfica, da propriedade rústica.

Do mesmo, o utilizador directo é a Direcção Geral das Contribuições e Impostos, responsável pela sua guarda e conservação.

Este organismo, com os elementos que o cadastro contém, procede à determinação e colecta da Contribuição Predial Autárquica, que incide sobre o valor patrimonial dos prédios, sendo as Autarquias Locais os principais beneficiários deste imposto.

O primeiro cadastro de uma dada região administrativa elabora-se a partir de situações de facto, que se procuram conciliar, na medida do possível, com situações de direito. Os elementos cadastrais servem, em primeira análise, para determinar perante a Administração Central quem é o responsável pela contribuição predial.

Já na fase da conservação cadastal, qualquer modificação no prédio só é sancionada perante a apresentação de documentação que titule o direito da mesma, por exemplo, escritura de compra e venda ou de habilitação de herdeiros ou partilhas, registo na Conservatória do Registo Predial, etc.

Os dados e documentos elaborados pelos organismos de cadastro (cader-neta predial, secção cadastral, etc) servem como elemento importante para o registo concreto dos prédios ou como documento auxiliar de prova em demandas ou conciliação no foro judicial.

Também as autarquias e outros organismos oficiais e privados se servem dos elementos cadastrais no estabelecimento dos seus projectos de desenvolvimento regional e local, no estabelecimento de redes de infraestruturas, de estatística agrícola, em cadastros específicos (como o da vinha, o olivícola, o frutícola, etc.).

Muitas dessas entidades colaboram com os organismos do cadastro no estabelecimento e na sua conservação, enviando periodicamente ao I.G.C., elementos e informações sobre alteração da situação dos prédios em que tenham tido intervenção.

Como vemos, diversas são as instituições que directa ou indirectamente são beneficiários, utilizadoras ou interventoras no cadastro, permitindo-nos destacar entre elas:

- I.G.C.
- D.G.C.I.
- Proprietários ou representantes legais
- Câmaras Municipais, Associações de Municípios
- Junta Autónoma das Estradas
- BRISA
- E.D.P.
- Conservatórias do Registo Predial
- Cartórios e Secretarias Notariais
- Tribunais Judiciais
- Advogados, Solicitadores
- Ministério da Agricultura Pescas e Alimentação
- Universidades
- etc.

Existe uma relação biunívoca entre o organismo produtor do cadastro e os destinatários, utilizadores ou beneficiários do mesmo.

Assim o cadastro possibilita aos proprietários a correcta identificação dos seus prédios que, por sua vez são obrigados a demarcar e manter actualizada a demarcação dos respectivos prédios e a comunicar todas as alterações que tenham sido produzidas nos mesmos.

As autarquias, actualmente as principais beneficiárias da contribuição predial, devem por outro lado, enviar à Repartição de Finanças respectivas os dados de que disponham relativamente a alvarás de loteamento, projectos e licenças de construção, licenças de demolição e de obras, e outros dados relevantes para uma eficaz fiscalização.

Também os serviços da administração central, os concessionários de serviços públicos e as autarquias locais, deverão comunicar ao I.G.C., trimestralmente, todos os factos de que tenham tido intervenção e que impliquem alterações nos mapas parcelares.

Os serviços centrais e regionais do MAPA são utilizadores das plantas cadastrais e dos elementos estatísticos e económicos referentes aos prédios rústicos e seus aproveitamentos agrícolas, mas prestam também variada colaboração nomeadamente na elaboração dos Quadros de Qualificação, Classificação e de Tarifas, que adiante abordamos.

Por vezes, algumas incompreensões ou diferente interpretação, provocam situações de retracção no relacionamento das instituições. Por exemplo:

- Se na fase de conservação o I.G.C. e a Repartição de Finanças só anuem e sancionam respectivamente a divisão de um prédio após apresentação de escritura notarial ou registo na Conservatória, e se, por seu lado, os Notários e Conservadores só celebram escritura ou registo da divisão após apresentação de caderneta predial actualizada, então está-se caído num impasse de que o proprietário não consegue sair.

- Se se realiza uma escritura de divisão não respeitando a unidade de cultura, p.e., o I.G.C. ver-se-á obrigado a propor acção de anulação da mesma, se lhe chegar antes de expirar o prazo previsto no Código Civil (3 anos).

- Com escrituras feitas com elementos identificadores dos prédios que não coincidem com os inscritos no cadastro (p.e. áreas diferentes), têm os proprietários dificuldades no seu registo nas Conservatórias.

- A definição pouco clara do que é prédio urbano e logradouro urbano pode provocar interpretações diversas.

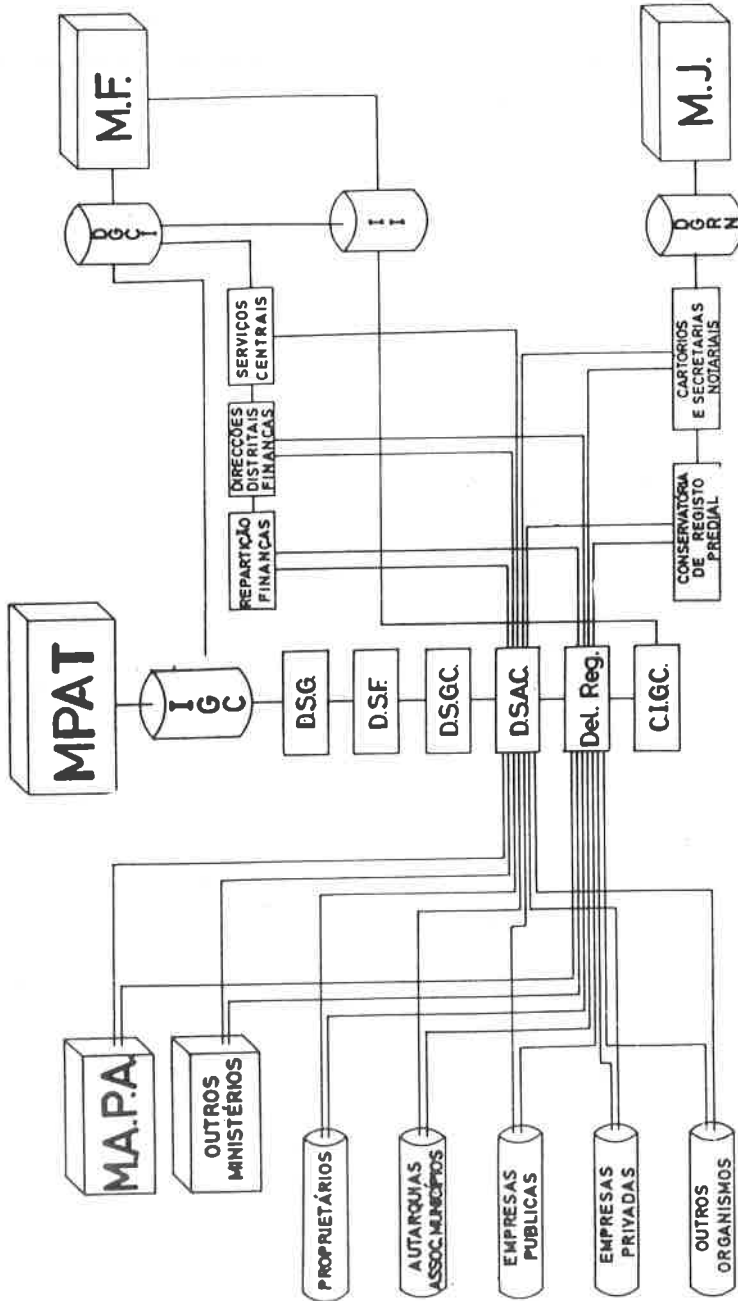
- Outro exemplo, pelo Código da Contribuição Autárquica são também considerados urbanos os terrenos que os titulares tenham declarado no título aquisitivo como destinados a construção. Este tipo de declaração de intenção, qualquer um as pode fazer, e então corre-se o risco de (em sentido figurado) se transformar todo o país num urbano, "acabando" a Reserva Agrícola Nacional.

Estas e outras situações merecem atenção e análise cuidada.

O gráfico anexo permite-nos estabelecer o enquadramento global entre o I.G.C. (e em especial a Direcção dos Serviços Agronómicos do Cadastro e as Delegações Regionais) e as instituições mais directamente ligadas ao cadastro.

Referiremos em seguida alguns aspectos ligados às relações institucionais entre alguns destes organismos e o I.G.C.

# CADASTRO GEOMÉTRICO RELACIONAMENTO INSTITUCIONAL ( ENQUADRAMENTO GLOBAL )



## LEGENDA

MPAT - Ministério de Planeamento e de Administração do Território  
 I.O.C. - Instituto Geográfico e Cadastral  
 D.S.F. - Direcção de Serviços de Geodésia  
 D.S.A.C. - Direcção de Serviços de Fotogrametria  
 D.S.G.C. - Direcção de Serviços Geométricos de Cadastro  
 Del. Reg. - Direcção Regional de Registos e Cartórios  
 C.I.G.C. - Centro de Informática Geocadastral

M.F. - Ministério das Finanças  
 D.O.C.I. - Direcção Geral das Contribuições e Impostos  
 I.I. - Instituto de Informática

M.A.P.A. - Ministério da Agricultura, Pesca e Alimentação

M.J. - Ministério da Justiça  
 D.G.R.N. - Direcção Geral dos Registos e Notariado

2 - A Direcção Geral das Contribuições e Impostos (D.G.C.I.) em termos fiscais é o primeiro e principal intermediário entre o organismo responsável pela organização do cadastro geométrico (I.G.C.) e os utilizadores ou beneficiários do mesmo.

Todo o trabalho base é executado pelo I.G.C., através de diversas fases e operações. Logo que as mesmas se forem tornando definitivas, os elementos cadastrais (mapas parcelares da freguesia, quadro dos símbolos que designam a qualificação, quadros de tarifas e preços utilizados para a sua elaboração) serão fornecidos à D.G.C.I. a fim de ser elaborada a matriz cadastral rústica.

Os elementos alfanuméricos de todos os prédios (designação cadastral, nome e residência dos respectivos titulares, localização ou nome do prédio, ónus e encargos, parcelas com seu número de ordem, qualidade e classe de cultura e área) são registados em banda magnética e enviados ao Instituto de Informática do Ministério das Finanças para serem passadas as respectivas cadernetas prediais.

A partir da altura em que determinado concelho entra em regime de cadastro, a D.G.C.I. transforma-se em guarda e conservadora das matrizes cadastrais prestando o I.G.C. apoio técnico e pronunciando-se nas acções que impliquem alteração do mapa parcelar (conservação cadastral).

Para se manter actualizado o cadastro há em Portugal dois métodos, o da resolução de processos de reclamação administrativa e o da revisão periódica dos registos cadastrais.

Quanto ao primeiro, os processos são organizados nas Repartições de Finanças a partir de requerimento inicial dos proprietários interessados que vem juntar documentação julgada necessária, ou no I.G.C. quando este detectar quaisquer alterações na forma e composição dos prédios.

As Repartições de Finanças devem fazer uma primeira análise da situação, confirmar a demarcação correcta do prédio e outros elementos relevantes, enviando posteriormente o processo (se for caso disso) para o I.G.C. para análise e emissão de parecer, regressando àquelas para resolução final e sua comunicação ao interessado.

Por vezes esses processos chegam ao I.G.C. deficientemente instruídos ou informados, sendo devolvidos muitas vezes por insuficiente ou total falta de demarcação dos prédios, a revelar dificuldades que as Repartições de Finanças têm em fazer deslocar aos locais funcionários seus, ou não tendo pessoal e meios suficientes para a sua análise, o que também acontece com o I.G.C., provocando acumulação dos mesmos à espera de melhor oportunidade, com os inegáveis inconvenientes para os contribuintes.

Parece-nos ser um assunto a merecer reflexão e procura de soluções para melhor resposta.

3 - Fiscalmente são os órgãos do poder local (Autarquias) os beneficiários directos da instituição do regime de cadastro nos respectivos municípios, constituindo a contribuição predial, hoje autárquica, um dos componentes das finanças locais.

Embora a receita resultante da contribuição da propriedade rústica tenha em geral uma importância menor quando comparada com a urbana ou a industrial, nos concelhos de vocação nitidamente rústica ou agrícola ela constitui uma verba não desprezível nas finanças da autarquia, ainda mais se nos lembrarmos que incidindo sobre o valor patrimonial dos prédios podem existir outras receitas, para além da contribuição predial mais importantes que ela, como sejam as resultantes da sisa, das sucessões e doações, etc.

Mas, uma cobertura planimétrica e altimétrica da área concelhia, um manancial de informação sobre prédios rústicos, distribuição cultural (carta agrícola) áreas respectivas, localizações das principais vias de comunicação, proprietários e sua identificação, ficam disponíveis para as autarquias podem fazer avançar com mais rapidez e facilidade os seus planos directores, os seus projectos de desenvolvimento e urbanização, de estabelecimento de infraes

truturas e para cooperar com os seus municípes na satisfação de questões relacionadas com terrenos e na demarcação do seu território administrativo.

É significativo que a maioria, senão a totalidade, das Câmaras Municipais onde vigora o regime de cadastro geométrico, adquiriu ao I.G.C. cópias de todas as matrizes cadastrais do Concelho, ficando com uma cobertura, a gran de escala, do seu território, a preço simbólico.

A acção das Autarquias não se resume só em utilizar ou beneficiar dos elementos do cadastro. Estas são também intervenientes no mesmo. E assim é que têm representante seu na Junta Cadastral Concelhia, órgão composto por cinco membros, responsável pela organização dos Quadros de Qualificação e Clas sificação (aproveitamentos culturais e suas classes de mérito) e dos Quadros de Tarifas (rendimentos fundiários obtidos naqueles aproveitamentos culturais, e que são a base do imposto predial) e na resolução de eventuais reclamações apresentadas pelos proprietários sobre os elementos cadastrais.

Mas também as Câmaras Municipais têm acção directa quando enviam men salmente à Repartição de Finanças respectiva os dados relativos a alvarás de loteamento, projectos e licenças de construção ou demolição, etc ou quando comunicam trimestralmente ao I.G.C., todos os factos que causadores de altera - ções dos mapas parcelares, em que tenham tido intervenção.

E foram já estabelecidos protocolos de cooperação entre o I.G.C. e algumas Câmaras Municipais no sentido da revisão dos elementos do cadastro, e estão a decorrer conversações com outras autarquias no mesmo sentido. Achamos ser um campo a desenvolver, dados os benefícios que o mesmo confere.

4 - São os proprietários intervenientes directos no cadastro e estabelecem uma relação estreita com os organismos encarregados da sua elaboração e conservação.

Participam directamente quando efectuam a demarcação dos seus pré - dios rústicos ou quando comparecem às convocações - reclamação para análise, e crítica do trabalho efectuado pelo I.G.C., podendo reclamar para a Junta Ca dastral Concelhia da planta cadastral e do registo da distribuição parcelar e



recorrendo para o Conselho de Cadastro (orgão decisório superior) das deliberações da junta.

De igual modo, são intervenientes directos quando comunicam as alterações ocorridas na forma e composição dos seus prédios, ou quando procuram obter junto do I.G.C. ou D.G.C.I. elementos cadastrais relativos aos mesmos, ou não concordando, apresentar reclamação.

E participam também na execução quando têm representantes seus no Conselho de Cadastro e na Junta Cadastral Concelhia e também quando participam em reuniões e contactos informais desta Junta ou dos técnicos do I.G.C., prestando e recebendo esclarecimentos e informações relacionados com metodologias e finalidades da execução do cadastro.

Beneficiam de uma identificação e descrição gráficas e alfanuméricas dos prédios inscritos em seu nome, têm acesso às mesmas e adquirem documentos (Cadernetas prediais) que, para efeitos tributários, lhes conferem presunção de propriedade.

5 - No Ministério da Justiça, podemos destacar os serviços centrais de registo predial (Direcção Geral dos Registos e Notariado) e os órgãos locais (Conservatória do Registo Predial e Cartórios e Secretarias Notariais).

É o Notário um "Oficial público encarregado de lavrar documentos e conferir autenticidade aos actos praticados por entidades neles interessados, enquanto que o Conservador de registos é um "Oficial público encarregado de inscrever nos competentes livros, todos os actos sujeitos a registo".

Como refere o Dr. Sérgio Martins Araújo, são registados todos os actos constitutivos, aquisitivos, modificativos ou extintivos dos direitos reais que incidem sobre os prédios, nomeadamente:

- Constituição, reconhecimento, aquisição ou modificação aos direitos de propriedade, usufruto, uso e habitação, superfície ou serviço;
- Contrato promessa de alienação ou oneração de direitos reais;

- Hipoteca, penhora ou arrestos;
- Ónus ou encargos;

Todo o acto de registo tem como suporte o documento que o titula; exarado pelo oficial público competente (notário, tribunal ou outra entidade judicial ou administrativa).

O processo de registo é formado por um conjunto de acções, umas principais, a descrição e a inscrição e outros secundários ou acessórios, os averbamentos à descrição e à inscrição.

Hoje é fundamentalmente na acção de descrição que os elementos cadastrais, postos à disposição pelo I.G.C.são de grande utilidade. Tem ela a finalidade da identificação física, económica e fiscal do prédio.

Mas seria de toda a conveniência que os mesmos tivessem maior importância no acto de inscrição, que visa fundamentalmente definir a situação jurídica dos prédios.

Não há dúvida que a função jurídica de um cadastro se justifica plenamente, devendo constituir um dos seus mais importantes objectivos, mas em Portugal o registo cadastral e documentação dele derivada (caderneta predial) ainda só constituem uma presunção de direito, não conferindo a titularidade do mesmo.

Tal facto é devido a que aquando da elaboração do cadastro, os elementos recolhidos no campo retratam situações de facto, sem recurso a prova documental, embora já constituam alguma presunção de direito, pois as diversas operações cadastrais são rodeadas de grande publicidade e a maioria dos elementos são colocados à apreciação e reclamação dos proprietários interessados.

Todas as modificações posteriores ocorridas nos prédios; de titularidade, de forma ou de conteúdo, são comunicadas ao I.G.C. e para se concretizarem, têm que ser baseadas em documentos (escrituras notariais ou outros actos com valor jurídico). Deste modo, os registos cadastrais adquirem, ou desenvolvem ao longo do tempo, valor jurídico, passando a constituir uma forte presunção de direito.

6 - Outras relações institucionais podem ser destacadas:

- O Ministério da Agricultura, Pecuária e Alimentação participa directamente na organização do cadastro através de representante seu na Junta Cadastral Concelhia atrás referida bem como no órgão de instância superior que é o Conselho de Cadastro, e indirectamente na colaboração que sempre tem prestado aos técnicos do I.G.C. que a solicitam.

Acordos de cooperação existem entre os dois organismos, nomeadamente no campo de acção de emparcelamento, implementação de regadios, arborização, avaliações, etc.

Está o MAPA empenhado na identificação em carta das áreas da Reserva Agrícola Nacional. As Cartas dos Solos e de Capacidade de Uso estão publicadas em escala pouco apropriada para, em nosso entender, servirem perfeitamente os objectivos da Reserva Agrícola Nacional. Parece-nos que os elementos cadastrais poderão ajudar nesse campo.

- Advogados, solicitadores e outras entidades têm-se servido dos elementos cadastrais na resolução dos problemas e projectos dos seus constituintes ou clientes.

- Diversos organismos, (BRISA, JAE, EDP, EPAL, etc, são utilizadores dos elementos cadastrais e devem participar ao I.G.C. as alterações nos prédios rústicos em que tiveram intervenção.

- Empresas privadas podem ter uma participação maior, quer em algumas fases da execução do cadastro, quer na utilização dos seus elementos, embora actualmente alguns deles não possam estar disponíveis a todos os eventuais interessados.



**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
**MULTIFUNCIONAL**  
  
- SICRUM -

CONSERVAÇÃO DE CADASTRO - PROBLEMAS E PERSPECTIVAS

CARLOS FILIPE JORGE DE MELO

PORTUGAL

LISBOA, PINHAL-20 a 25 Novembro de 1989

TEMA I

CONSERVAÇÃO DE CADASTRO - Problemas e perspectivas

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Algarve do I.G.Cadastral

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NOVEMBRO 1989

CONSERVAÇÃO DE CADASTRO - Problemas e Perspectivas

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RESUMO:

Não basta executar um cadastro geométrico, é forçoso prever os meios que possibilitem a sua permanente actualização.

A conservação do cadastro faz ressaltar, por um lado as dificuldades burocráticas para os utilizadores ao terem de circular pelas várias instituições envolvidas na identificação, taxagem e actualização dos prédios, e por outro lado reforçam a convicção na necessidade de se evoluir para um Cadastro Jurídico.

ABSTRACT:

It's not enough to make a Geometrical Cadastre, we must foresee the means that allow the it's permanent updating.

Cadastre maintenance shows, on one hand, the user's bureaucratic difficulties when forced to pass through the several institutions involved on identification, taxation and updating of parcels, on the other it reinforces the conviction on the necessity of evolution towards a Juridic Cadastre.

Habitualmente entre nós dá-se um grande ênfase aos aspectos relacionados com os métodos a utilizar para a implementação do cadastro em todo o território nacional. De facto trata-se de uma tarefa essencial para a qual é forçoso que se disponibilizem os recursos indispensáveis. Todavia não basta pensar-se em cobrir o país com um cadastro geométrico e descurar-se a necessidade de o manter permanentemente actualizado sob pena do seu interesse vir a ser progressivamente reduzido pela diminuição do seu valor informativo.

Em Portugal, apenas tem sido executado o cadastro geométrico rústico. Trata-se como é sabido de um cadastro fiscal pelo que para além da identificação e representação topográfica dos prédios também inclui a avaliação do respectivo rendimento fundiário.

Os elementos cadastrais depois de organizados pelo Instituto Geográfico e Cadastral são entregues à Direcção Geral de Contribuições e Impostos que com eles organiza, por freguesia, as respectivas matrizes prediais rústicas.

Uma vez que a sua elaboração não se baseou nos títulos de posse e que a demarcação dos prédios é da exclusiva responsabilidade dos proprietários, apenas para efeitos tributários as inscrições matriciais constituem presunção de propriedade.

Decorrente dessa quase exclusiva componente fiscal, a conservação do cadastro geométrico identifica-se com o serviço de conservação das matrizes por parte das Repartições de Finanças e compreende fundamentalmente os seguintes aspectos:

- a) Inscrição das alterações de titularidade;
- b) Inscrição das alterações culturais ou da mudança de afectação (rústica ou urbana);
- c) Introdução das modificações processadas na configuração dos prédios;
- d) Correção de erros nos elementos cadastrais;
- e) Revisão periódica dos rendimentos fundiários;

Se destes aspectos os 4 primeiros assumem um carácter de continuidade já a revisão das bases de avaliação do rendimento fundiário, que legalmente se prevê seja feita por períodos de 5 anos, não tem sido, salvo casos pontuais recentes, objecto de grande atenção. Essa revisão corresponde fundamentalmente a uma nova avaliação dos prédios rústicos fundamentada em novas bases de avaliação (Quadros de Qualificação e Classificação e Tarifas), com respeito das extremas já existentes. Dada portanto a dimensão dessa tarefa ela acaba por se ver preterida quando os recursos são escassos; mesmo para se completar a zona que falta cadastrar.

Regressando aos aspectos correntes da conservação, a legislação (Código de Contribuição Predial e Imposto sobre Indústria Agrícola e Código de Contribuição Autárquica) prevê duas vias para a introdução de alteração nos elementos cadastrais:

- a) através de comunicações por parte dos proprietários às Repartições de Finanças das alterações havidas nos seus prédios (transmissões, divisões e alterações de cultura etc.) ou de incorrecções detectados nos elementos matriciais;



b) alterações nas características dos prédios detectados pelo I.G.C. independentemente da comunicação das Repartições de Finanças;

Em ambas as vias são instruídos processos de alteração (processos de reclamação administrativa) com a documentação que as justificam e, através de apreciação desses processos, o I.G.C. introduz nas plantas cadastrais e nas respectivas fichas de prédios as alterações observadas no terreno.

Do exposto ressalta facilmente a complexidade e morosidade dos passos a dar por quem pretende inscrever as alterações sofridas pelos prédios. Com efeito se por exemplo um proprietário pretende adquirir a um seu vizinho uma faixa de terreno para arredondamento de extremas do seu prédio, terá que, junto a um notário, celebrar a respectiva escritura, não dispondo este em princípio de quaisquer elementos que permitam confirmar o acto escriturado. Antes porém terá que pagar a respectiva sisa na Repartição de Finanças. Uma vez celebrado o acto deverá requerer à mesma Repartição para que se proceda à inscrição na matriz da nova composição e características do prédio. A partir desse requerimento é instruído um processo o qual é enviado através da Direcção de Finanças do distrito a uma Delegação do I.G.C., que procederá às operações técnicas necessárias à actualização da planta cadastral e demais elementos. Uma vez estas executadas o processo regressa à Repartição de Finanças onde o proprietário recebe a nova caderneta do seu prédio alterado. Com base na escritura e nessa caderneta poderá finalmente proceder à alteração na Conservatória do Registo Predial, da descrição do seu prédio. Como resultado de todas estas fases poderá contar com certeza com um período de meses, se não anos, até que finalmente o veja correctamente inscrito em todas as instâncias que velam pela identificação dos prédios.

A situação acima expressa representa um caso vulgar onde não surgem quaisquer obstáculos, infelizmente porém as dificuldades

avolumam-se por força da natureza descritiva dos títulos de propriedade e dos registos de conservatórias. Em grande número de situações a possibilidade de se estabelecer a correspondência entre os prédios identificados pelo cadastro com os inscritos nas conservatórias e descritos nas escrituras é extremamente difícil e aleatória.

Esse facto, se por um lado constitui um grave problema quando se pretende regularizar e actualizar os direitos de posse reais, por outro cria o terreno fértil para a proliferação de situações obscuras de que se aproveitam os especuladores e oportunistas.

Como consequência perversa deste processo burocrático resulta por vezes a impossibilidade de se actuar em tempo oportuno no sentido de impedir actos consumados que não respeitaram as disposições legais em vigor. Com efeito, dada a quantidade de pedidos existentes em diversas Repartições de Finanças e no I.G.C. e os interesses financeiros neles envolvidos, aquelas vêm-se obrigadas a admitir, por exemplo, as cobranças de sisas necessárias à celebração de escrituras sem que haja possibilidade de aferir da bondade dos actos requeridos. Por outro lado por força do nº3 do art.1379º do Código Civil, as escrituras que titulassem actos indevidos deixam de poder ser anuladas passado um prazo de 3 anos.

É sintomático o facto dos processos que chegam ao I.G.C., ou se vão acumulando nas Repartições de Finanças situarem-se, em boa parte, nas zonas periféricas dos centros urbanos ou nas zonas turísticas. Com efeito são diversos os subterfúgios utilizados para ultrapassar a legislação que restringe o fraccionamento de prédios rústicos e os loteamentos urbanos, esses subterfúgios aproveitam por um lado situações pouco claras das matrizes prediais não baseadas no cadastro geométrico e por outro da dispersão e diferentes formas de abordagem entre as várias entidades envolvidas (Conservatórias, Finanças, Notários, Cadastro).

Como casos típicos podem enumerar-se entre outros, os seguintes:

- Pedidos de divisão de prédios rústicos e mistos como resultado de escrituras celebradas sem observância das unidades mínimas de cultura;

- Pedidos de inscrição (divisão) de artigos matriciais antigos confinantes que deram origem a prédios de maiores dimensões na matriz cadastral, passando assim a constituir prédios distintos sem respeito dessas mesmas unidades de cultura;

- Pedidos de eliminação de prédios da matriz rústica por já estarem inscritos na matriz urbana quando em termos de afectação deverão ser classificados como prédios mistos ou rústicos;

- Pedidos de inscrição na matriz cadastral, como prédios autónomos, de fracções indivisas, com base em registos prediais distintos,

- Pedidos de alteração de culturas de sequeiro para culturas hortícolas com vista à posterior sub-divisão em lotes de 5000m<sup>2</sup>;

- Pedidos de rectificação de áreas por força de discrepâncias entre os valores constantes nos títulos de propriedade e os constantes no cadastro;

Os casos referidos são particularmente correntes em zonas onde o cadastro entrou em vigor mais recentemente. É notório o efeito disciplinador do Cadastro nos actos a que estão sujeitos os prédios rústicos uma vez que estes passam a estar identificados e caracterizados de uma forma bastante mais rigorosa, permitindo a todas as entidades envolvidas cumprir e fazer cumprir a legislação fundiária.

Quanto a esta legislação poder-se-á talvez dizer que algumas das situações atrás enumeradas decorrem exactamente da própria natureza daquela, designadamente e a título de exemplo

- Definição dos conceitos de prédios rústicos, urbanos e mistos (Art.5º do CCPIIA e Art.2º a 6º do Código da Contribuição Autárquica);

- Inscrição de partes rústicas e urbanas do mesmo prédio em matrizes distintas (art.155º e 162º do CCPIIA);

- Definição insuficiente das unidades mínimas de cultura (Portaria 202/70 de 21 de Abril).

- Não observância prática do disposto no nº3 do art. 1376º do Código Civil que impede o fraccionamento de terrenos mesmo quando compostos por prédios distintos.

Observa-se portanto que grande parte dos pedidos de alteração e os seus fundamentos têm como motivação ultrapassar, como se disse, as restrições legais a determinados usos da terra, decorrentes dos princípios estabelecidos superiormente sobre o que se considera ser o mais correcto ordenamento do território.

São assim os técnicos responsáveis pela apreciação dos processos confrontados com situações regulares do ponto de vista jurídico mas cujo objectivo é por demais evidente.

Do que atrás foi dito poderá concluir-se da necessidade de encurtar o ciclo da identificação predial quer na sua componente jurídica quer na fiscal.

Poder-se-ia pensar quanto a esta última, que não se justificaria a obrigatoriedade de completa fundamentação documental na instrução dos processos de reclamação quando a fase de organização do cadastro se baseou essencialmente em informações

verbais. Não concordamos com esta perspectiva pois que, se por vezes se verificam situações de bloqueio por falta de alguma documentação não é possível deixar de ter presente que a identificação matricial faz parte dos mais diversos actos sobre os bens imóveis (transacções, créditos, etc.) e que a mesma constitui um dos principais elementos identificadores do próprio registo predial (com valor jurídico), pelo que se deverá recorrer a todos os cuidados quando se pretende introduzir qualquer alteração nos elementos matriciais.

Dever-se-á sim caminhar cada vez mais para uma completa fusão entre os dois registos, podendo talvez admitir-se que as matrizes cadastrais uma vez passado um período de tempo conveniente para uma sedimentação e filtragem de eventuais incorrecções adquiram valor jurídico e que a identificação dos prédios esteja essencialmente baseada na sua representação topográfica ao invés da actual identificação por via descritiva.



SEMINARIO INTERNACIONAL  
SOBRE  
CADASTRO RUSTICO E URBANO  
MULTIFUNCIONAL  
- SICRUM -

A AVALIAÇÃO CADASTRAL SOBRE BASE GEOMETRICA

ALFREDO SERRA MENDES

PORTUGAL

LISBOA - PORTUGAL - 20 a 25 Novembro de 1989

S I C R U M

SEMINÁRIO INTERNACIONAL SOBRE CADASTRO RÚSTICO E URBANO MULTIFUNCIONAL

A AVALIAÇÃO CADASTRAL SOBRE BASE GEOMÉTRICA

/Alfredo Serra Mendes/

Auditório do LNEC

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## I N T R O D U Ç Ã O

O Instituto Geográfico e Cadastral desenvolve no seu todo actividades tão diversas como a cartografia, a Geodesia, a Fotogrametria, o Cadastro Geométrico e a avaliação cadastral sendo estas duas últimas normalmente conhecidas sob a designação comum de cadastro e repartidas pelas Direcções de Serviços Geométricos do cadastro, cujas competências radicam no fundamental na elaboração das plantas Topo-Cadastrais e a Direcção de Serviços Agronómicos do Cadastro responsável pela avaliação, revisão e conservação cadastral.

Num trabalho de "MAIA AMARAL" de 1986, relatório do concurso para Eng<sup>o</sup> Assessor, era referido que partindo-se do principio que os Técnicos profissionais das Delegações Regionais estariam ligados à avaliação esta actividade representava apenas 29% do I.G.C. no quadro do pessoal técnico. Em termos de custos para o mesmo Universo a correspondente percentagem seria de 39,47% e se se referisse exclusivamente à Direcção dos serviços agronómicos do cadastro a percentagem seria de 13,8 no total.

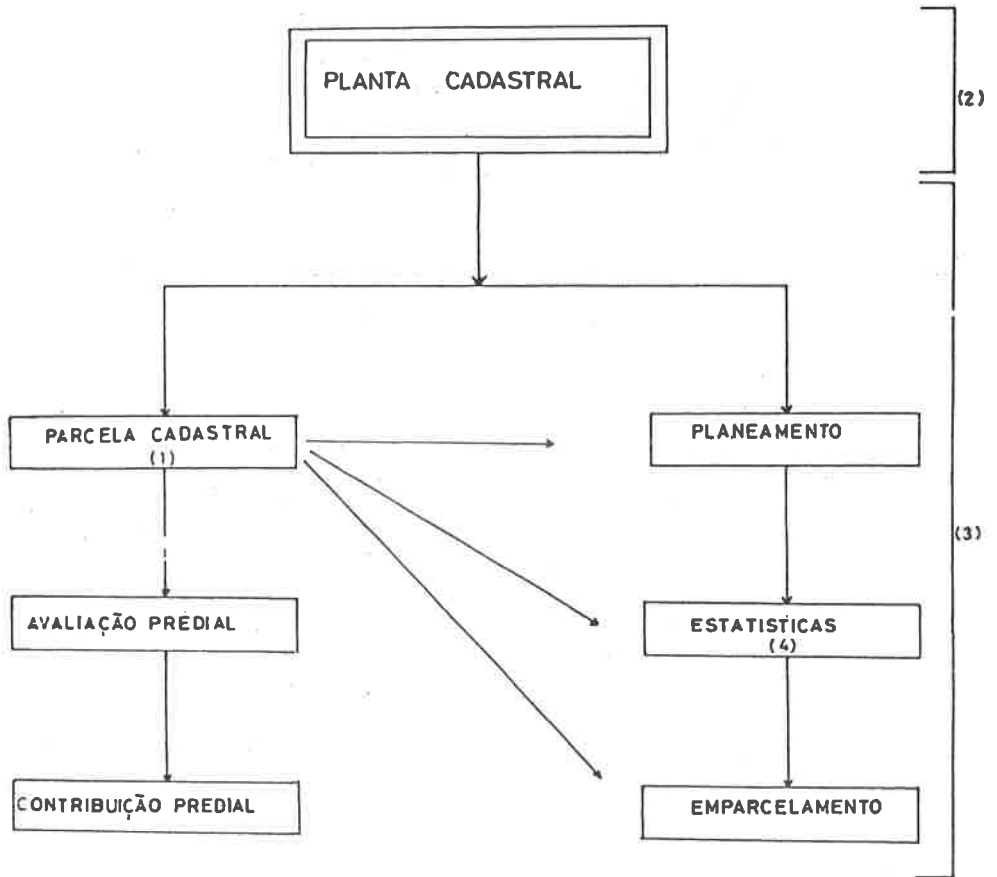
Haverá pois que proceder com muito cuidado, quando se afirma que a avaliação dos rendimentos colectáveis executada pelo I.G.C. é muito cara, porque não se pode atribuir à avaliação cadastral os custos totais do I.G.C., o que por norma infelizmente acontece.

Por outro lado sabe-se ser indiscutível a necessidade de elaborar uma planta cadastral a escala adequada para todo o país e não sendo questionável esta afirmação então é dado como adquirido que a avaliação sobre base geométrica surge como aproveitamento lógico e sequente de uma operação já paga.

Acontece porém, e de nada valerá atirar culpas a alguém em particular que o panorama Nacional a nível de cadastro e avaliação cadastral é simplesmente desolador. Maioria dos concelhos cadastrados com mais de 20 e 30 anos sem revisão, metade do território por cadastrar, normas e metodologias em uso totalmente ultrapassadas, contribuem em conjunto para se poder afirmar que a continuar-se do mesmo ritmo, com as mesmas dúvidas, com a mesma falta de coragem para formular e implementar as medidas necessárias, então será por certo segura a ideia já em mui-



Quadro nº1



- 1) Contém a informação agrícola
- 2) Direcção de serviços geométricos do cadastro
- 3) Direcção de serviços agrónómicos do cadastro
- 4) Áreas ocupadas por culturas, densidade predial etc.

tos arreigada que só daqui a 400 anos ou talvez mais se poderá fazer avaliação cadastral sobre base geométrica em todo o país.

É pois perfeitamente natural que a tomar-se qualquer tipo de decisão em tarefa tão premente é simultaneamente tão grandiosa, esta passe por exemplo no que concerne ao cadastro geométrico, pelo recurso a meios externos ao I.G.C. As Câmaras Municipais e o sector privado poderiam ser chamados a contribuir neste processo cabendo logicamente todo a coordenação ao organismo tutelar.

Já no que se refere á avaliação cadastral o caso, penso eu muda bastante de figura.

1º - Porque é uma operação muito mais rápida, apesar de muito haver para alterar no processo actualmente seguido.

2º - Porque a sua execução obedece em simultâneo a questões de ordem topográfica, agronómica, jurídica e como é bom de ver fiscal.

Todavia mesmo aqui algo poderia ser feito. Nas regiões do Sul do país já cadastradas, as desanexações, rectificações de extremas etc. poderiam ser efectuadas por particulares devidamente habilitados e sob orientação do organismo responsável. Restariam ainda assim os casos de introdução de estradas, divisões de freguesias etc. que penso não devem caber neste tipo de solução.

Do que atrás ficou exposto resulta bastante claro que em Portugal o cadastro no todo e em particular a avaliação cadastral se encontram há vários anos num letárgico impasse.

O abaixamento progressivo da posição ocupada pela contribuição predial no contexto da totalidade das receitas fiscais deve-se como talvez poucos o saibam a um factor que não terá paralelo em qualquer outro País. A desactualização das matrizes cadastrais, em conjunto com índices de inflação sem igual a nível da Europa Ocidental e ainda a estagnação na execução de novos concelhos originaram além de uma diminuição acentuada nas receitas das Autarquias (que para muitas deveria ser a principal receita), a coexistência "diga-se pacífica", ou não fossemos um país de brandos costumes, de concelhos limitrofes apresentando

para o mesmo tipo de cultura e ocupação de solo, diferenças no rendimento colectável, que chegam a atingir 20 e 30 vezes.

#### QUADRO 2

Percentagem da contribuição predial Portuguesa no total das receitas fiscais

1940.....	14,7
1950.....	15,3
1965.....	6,1
1970.....	5,2
1975.....	4,1
1977.....	3,6
1980.....	2,3
1982.....	2,0
1984.....	2,1

FONTE: INE. citado em a Tributação Predial na reforma Fiscal Portuguesa. Prof.Manuel Porto.

É natural que a situação perfeitamente invulgar de ser o próprio Estado a forçar a concorrência desleal entre proprietários e produtores agrícolas a par da inexistência de cadastro em cerca de metade do País com as inerentes injustiças nas áreas tributadas, são argumentos que não traçam do País uma imagem muito favorável no aspecto da tributação predial.

E é certo que uma correcta e justa tributação predial pode assegurar só por si uma política agrícola e urbanística eficaz.

QUADRO 3

PERCENTAGEM DOS IMPOSTOS PREDIAIS NO TOTAL DAS RECEITAS FISCAIS  
1900 - 1977 (1)

PAIS/ANO	1900	1920	1950	1965	1970	1975	1977
ESTADOS UNIDOS	51,4	44,0	14,4	16,2	15,0	15,1	15,0
REINO UNIDO	30,0	19,1(2)	8,4	13,3	11,2	13,5	15,2
JAPÃO	29,5	6,8	7,4	6,6	5,8	8,2	8,2
FRANÇA	11,6(3)	5,8(2)	2,2	3,0	2,4	2,3	2,9
ALEMANHA	8,3(3)	19,9(4)	5,6	2,0	1,7	1,7	1,8

FONTE: Jean Luis Guigou e Jean Marc Legrand, Fiscalité Foncière. Analyse  
Comparée des Pays de L'OCDE, Paris, 1983.

- 1) Não incluindo as contribuições para a segurança social
- 2) Em 1938
- 3) Em 1913
- 4) Em 1928/9

Frequentemente se verificam casos em que por inércia ou por especulação, os proprietários de bens imobiliários se permitem não utilizar racionalmente o seu património. A ausência de ajustadas contribuições prediais, permite-lhes essa veleidade.

Uma tributação actualizada obrigará no mínimo a que o possuidor do prédio o explore na exacta medida do encargo a suportar, ou então o venda ou arrende e esta afirmação é tão válida para prédios rústicos como para urbanos e ainda para terrenos para construção. Consegue-se deste modo um forte apoio para a eliminação do absentismo, para o nivelamento de preços de transacções imobiliárias e

feito fundamentalmente em terrenos para construção ou prédios devolutos.

Segundo alguns autores a tributação predial pode ainda ir mais longe sendo instrumento importante na solução de problemas de emparcelamento. A via fiscal pode revelar-se como uma via barata e eficiente conduzindo à venda, ao arrendamento, ao associativismo ou qualquer outra saída em relação à insuficiência da dimensão (1) da exploração.

Todavia mais importante neste momento é falar-se da actividade cadastral. E, neste capítulo, como atrás se frisou, o panorama Nacional não é muito animador; metodologias usadas na sua execução a par de uma grande indecisão e desconhecimento sobre a realidade cadastral, na componente externa ao organismo, e ainda má gestão e falta de visão à mistura com alguns sonhos irrealistas conduziram a que hoje se possa afirmar com propriedade que o país só pode dispor em moldes minimamente aceitáveis com o cadastro do Algarve, que não ainda todo.

Tendo muito modestamente feito parte do 7º grupo de trabalhos da comissão de reforma fiscal em representação do T.G.C.V. pode e deve o signatário tecer alguns comentários que lhe parecem pertinentes no que se refere às alterações que o Código irá provocar e nos métodos de trabalho que urge implementar.

O Código das Avaliações está praticamente pronto e penso entrará em vigor já no próximo ano.

A decisão de se seguir o que se passa na generalidade dos países fazendo incidir a tributação predial sobre o valor dos prédios, parece encaixar-se com perfeição num atributo que é comum à maioria dos proprietários, a sua maior sensibilidade ao valor patrimonial em detrimento do valor do rendimento.

Países tais como, a Austrália, Dinamarça, Alemanha, Japão, Suécia, Suíça, Turquia, Estados Unidos e ainda em parte na Holanda e Nova Zelândia tributam os prédios directamente pelo valor <sup>ou</sup> indiciariamente pela renda efectiva ou normal imputada à propriedade imobiliária.

Esta é a grande novidade, a par de muitas outras que o Código das Avaliações nos trará.

(1) A tributação predial na reforma fiscal Portuguesa, Prof. Manuel Porto.

Caberá agora ao organismo incumbido de avaliação cadastral a responsabilidade de saber ou ser capaz de acompanhar os ventos da mudança, adaptando a sua estrutura funcional e de trabalho às exigências do código e necessidades do país.

É de todos sabido, que estes trabalhos não primam actualmente nem pela celeridade nem pela economia de processos.

O empolamento dado à arvore sem cuidar de atender ao conjunto floresta tem sido de há muito o denominador comum da doutrina professada pelos responsáveis pela execução cadastral.

É pois seguro que a adaptação a novas metodologias de avaliação se afigura como uma tarefa árdua que exigirá uma nova mentalidade bem diferente da formada ao longo de anos de isolamento de outras actividades e em que era suposto serem os técnicos do I.G.C. os donos da verdade, vetando liminarmente todo e qualquer "apport" de conhecimentos que pudessem por em causa, "castelo tão sãbiamente construido".

Mas <sup>se</sup> ~~se~~ era admitido há vinte anos trabalhar-se sem olhar a custos, hoje são estes que condicionam o modo de trabalhar.

Há quem <sup>a propósito</sup> ~~afirme~~ que o mal do cadastro está em que durante <sup>mais</sup> ~~mais~~ de vinte anos não foi injectado sangue novo nos seus quadros, sem dúvida que essa pode ser uma das teses que eventualmente pôde explicar a manutenção de desfasados processos de trabalhos e de tramitação processual.

Estamos todavia ainda a tempo, para mostrar que queremos e somos capazes de fazer qualquer coisa e que essa coisa além de servir para os fins em vista se submete ainda à primeira prioridade, que terá de ser forçosamente a garantia de utilização de critérios de racionalidade e economia, o que forçosamente não acontece hoje em que se funciona de forma em tudo idêntica à definida para o Alentejo com outro tipo de propriedade, já lá vão algumas décadas.

Tentarei abordar de seguida de forma breve, porque este não é o lugar propício e nem me concederam tempo suficiente para o efeito, alguns problemas e reformas que considero imprescindível, solucionar e introduzir, e que abarcam campos tão diferentes como; a estrutura orgânica do I.G.C., metodologias de trabalhos e tramitação processual:

1 - A avaliação cadastral sobre base geométrica está cometida ao I.G.C.,

que pertence ao Ministério do Planeamento e Administração do Território. A avaliação descritiva de base não geométrica incumbe à Direcção Geral das Contribuições e Impostos do Ministério das Finanças. Quer dizer, o Ministério do Planeamento faz avaliação no Sul do País e o Ministério das Finanças no Norte, segundo critérios e custos totalmente diferentes com pressupostos base e resultados que forçosamente terao que ser também diferentes até porque não existe qualquer ligação entre os dois organismos. O produto do trabalho do I.G.C. e quando finalizado, enviado também para as Finanças a quem compete a guarda e conservação das matrizes.

- 2 - O cadastro e avaliação da propriedade urbana figuram na Lei orgânica do I.G.C., mas a responsabilidade da sua execução compete à Direcção Geral de Contribuições e Impostos, direito que lhe é conferido pelo Código da Contribuição Predial.
- 3 - Existe uma interligação indissociável entre o cadastro rustico e urbano. A actual dispersão de serviços obriga a constantes perdas de informação na passagem de um prédio rústico a urbano e vice-versa, origina confusões, dispêndio de tempo e dinheiro aos proprietários além de permitir frequentes fugas ao fisco pela indefinição na classificação dos imóveis.

Parece-me que a vantagem de juntar estes serviços seria incalculável pela desburocratização implícita, pela economia de meios humanos e materiais e naturalmente pela melhor aceitação que um serviço destes teria para o público utente.

- 4 - Nas mesmo só em termos de cadastro rústico a confusão é enorme. Um Ministério paga aos funcionários, outro impõe as regras. E, os problemas continuam depois pela transcendente questão da conservação cadastral. O longo e sinuoso percurso a que os processos de reclamação administrativa estao sujeitos desde a Repartição de Finanças até à sua resolução deveria ser simplificado e clarificada a responsabilidade dos vários intervenientes. Como se sabe contam-se como agravantes neste esquema:
  - Deficiente organização dos processos em termos de documentos e inexistência de correctas demarcações.

- Responsabilização dos Chefes de Repartição de Finanças no processo, quando as suas qualificações técnicas para ajuizar sobre tal matéria são por norma mínimas.
  - e ainda atrasos enormes na resolução dos processos provocados por toda esta dispersão e amálgama de responsabilidades, o que nos obriga a sancionar muitas desanexações ilegais, só porque o prazo de anulação foi ultrapassado.
- 5 - Outra vertente não menos importante é a que se prende com as escrituras notariais. Actualmente só são efectuadas desanexações desde que os respectivos processos venham acompanhados da inerente escritura. Sabe-se também que as áreas a desanexar têm que ser identificadas na escritura. Mas a definição correcta destas áreas é feita posteriormente por levantamento do I.G.C.. Assim sendo, é comum verificar-se falta de concordância entre as áreas escrituradas e as áreas que constam do cadastro, obrigando os proprietários à rectificação da escritura anterior se naturalmente quiserem as coisas correctas. Ora imagine-se o que esta situação implica em partilhas, tornas, processos judiciais ou mesmo projectos de investimento. Situação que a par de outras é fácil de resolver, desde que o cadastro, a Direcção Geral dos Notariados e mesmo as conservatórias do registo predial não continuem divorciados desta problemática, o que penso que será útil e possível resolver a partir da data deste seminário.
- 6 - Discordo em absoluto do modo como as Delegações Regionais foram criadas e da sua estrutura funcional.
- Existem hoje em todo o País 9 Delegações Regionais das quais 7 no Continente uma nos Açores e outra na Madeira.
- Pode-se afirmar que apenas uma ou outra poderão justificar de momento a sua existência e porquê? Porque:
- a) A indefinição de um quadro de pessoal permitiu a deslocação de pessoas, ao que parece com o unico objectivo de as encher.
  - b) É humanamente impossível executar revisões cadastrais com ajudas de



custo a menos de 100% para rendimentos mensais/operador iguais ou superiores a 5.000 hectares, sendo esta ao que parece a explicação mais frequentemente exibida para a necessidade de abrir Delegações.

c) A falta de critério na distribuição da área geográfica adstrita a cada Delegação, onde não imperou o menor senso económico, contradiz a teoria da poupança tantas vezes propalada. Por exemplo, a 30 Kms de Beja (Santa Margarida do Sado) a Delegação de Beja não pode actuar, pertencendo esta zona já a Delegação de Lisboa que dista dali "apenas 150 Kms". E estes são ainda só, alguns argumentos de peso para justificar uma revisão da orientação que tem vindo a ser imposta a este sector.

7- Mas as alterações devem também centrar-se em força nas metodologias de trabalho, tanto no que respeita aos quadros de qualificação classificação e de tarifas como na própria distribuição parcelar.

7.1- A distribuição parcelar que é feita por comparação com as parcelas tipo deve evitar um excessivo parcelamento, grande responsável de uma enorme sobrecarga de trabalho de gabinete, recorrendo à distribuição em função de percentagens, que não acarreta menor rigor ao trabalho e lhe confere indiscutivelmente maior celeridade. Penso mesmo que se deveriam estabelecer áreas mínimas variáveis com as regiões e tipos de culturas, para o parcelamento.

As árvores dispersas, logicamente terão tendência em acabar.

Mas penso que a sua anulação em cadastro estaria já correcta, estabelecendo-se uma percentagem do respectivo povoamento sempre que isso justifique. As áreas de sub-coberto deixarão de ter interesse com a introdução do novo Código, para já não falar nas "Áreas das copas" essas penso eu, a por irremediavelmente de lado.

7.2- Também o processualismo usado na elaboração nos quadros de qualificação classificação e de tarifas se encontra completamente ultrapassado pela morosidade, falta de justificação técnica e até por vezes alguma contradição com as normas estabelecidas. A sua remodelação é

imperativa.

- 7.3 - E deve começar-se pela anulação pura e simples daquilo a que se chama projecto de quadros ou então dos quadros propriamente ditos.

Sinceramente nunca consegui perceber esta duplicação de trabalho, ainda com a agravante de reportar a dezenas de folhas.

Assim se deve anular ainda uma operação que consiste na transformação dos produtos principais e secundários num único produto, cuja finalidade também não consigo atingir.

Parece-me que seria muito mais simples a exclusiva apresentação da rotação e produção dos respectivos produtos principais.

- 7.4- A elaboração dos quadros de tarifas, baseia-se em rendimentos determinados por contas de culturas que têm feito parte do processo.

As contas cadastrais são tão esmiuçadas, tão complicadas que mesmo com o recurso à informática não é raro demorar-se menos de um mês na sua execução por cada concelho.

Ora o rigor que se pretende, perfeitamente fictício e estéril (porque ninguém consegue discutir dois, ou cinco mil escudos a mais ou a menos nos encargos de uma conta de cultura trigo), se já era de difícil aceitação na tributação pelo rendimento, então tornar-se-á perfeitamente insustentável numa tributação pelo valor patrimonial. Deverão pois implementar-se contas de cultura por grupos de factores ou determinar o rendimento aplicando apenas uma percentagem de encargos à produção bruta das culturas deixando o cálculo dessa percentagem à Divisão de Estudos.

- 7.5- O processo só se poderá considerar completo, quando acompanhado de um relatório que visará primordialmente a justificação das opções tomadas.

Tendo em conta, o cunho vincadamente económico da avaliação cadastral parece-nos que não fará muito sentido dispendir tempo na recolha de dados e assuntos que não interfiram liminar e consistentemente nas atitudes, decisões e referências a desenvolver durante o estudo da região.

Não é de crer, por outro lado, que a afectação de alguns temas ao relatório, tais como: a história ou origem do concelho ou povoações tomo de lugares, adágios, aforismos, terminologias agrícolas regionais, caça, pesca, etc., pugne por algum acrescento, ainda que menos sólido, à escolha de decisões mais acertadas. Paralelamente também não se deverão viabilizar as costumadas caracterizações e definições, mais ou menos exaustivas sobre o clima, orografia, hidrografia, redes de comunicação, etc., sendo lógico que a intempestividade e natureza daqueles tópicos não colam nem às necessidades nem às prioridades do processo. Não se pretende elaborar uma monografia dos concelhos, para o que haverá inclusivé pessoas mais capazes e para o efeito devidamente habilitadas. Não é essa a vocação do cadastro. O que se pretende, ou melhor, o que se deve exigir é que o relatório reproduza <sup>apenas e</sup> fielmente todas as deliberações tomadas na concepção dos quadros e ignore ostensivamente tudo o que lhe é estranho ou transpareça como superfluo.

É por conseguinte ponto assente, desculpada a iteração inserta, que dos temas anteriormente considerados obrigatórios como: situação, limites, divisão administrativa, aglomerados populacionais, orografia, hidrografia, geologia, pedologia, climatologia, e classificação do clima, divisão de propriedade, formas de exploração, zonas agrárias demografia etc., só devem ser respeitados como tal, quando directamente relacionados com o objectivo em vista (quadros de qualificação, classificação e de tarifas) sendo notória a influência daqueles factores, na selecção, esquematização, ordenamento e estabelecimento das qualidades e classes culturais.

Consideramos assim como assuntos fundamentais a desenvolver, os seguintes:

- 1- A caracterização fisiográfica, sócio-económica e agrária do concelho ou região em causa.
- 2- Os critérios que presidem à escolha das qualidades culturais e respectivas classes.

3- Os niveis de produtividade a atribuir às parcelas-tipo, e respectiva relação de interactividade com o meio fisico e a tecnologia empregue.

4- A justificação das tarifas.

São ainda indispensáveis no relatório as referências:

- Ao periodo (quinquênio ou triênio) a que se referem os preços dos produtos, factores de produção, etc. considerado na elaboração dos quadros.
- Aos rendimentos colectáveis das dependências agricolas, quando tomadas em consideração nos quadros, nos termos do artº65º do C.C.P.
- Identificação das parcelas - tipo.

7.6- A sequência de tarefas a que é submetida a avaliação cadastral encontra-se esquematizada no quadro nº4. Parece-me que algumas dessas fases devem ser anuladas, porque nada de útil acrescentam aos trabalhos, como vamos verificar de seguida:

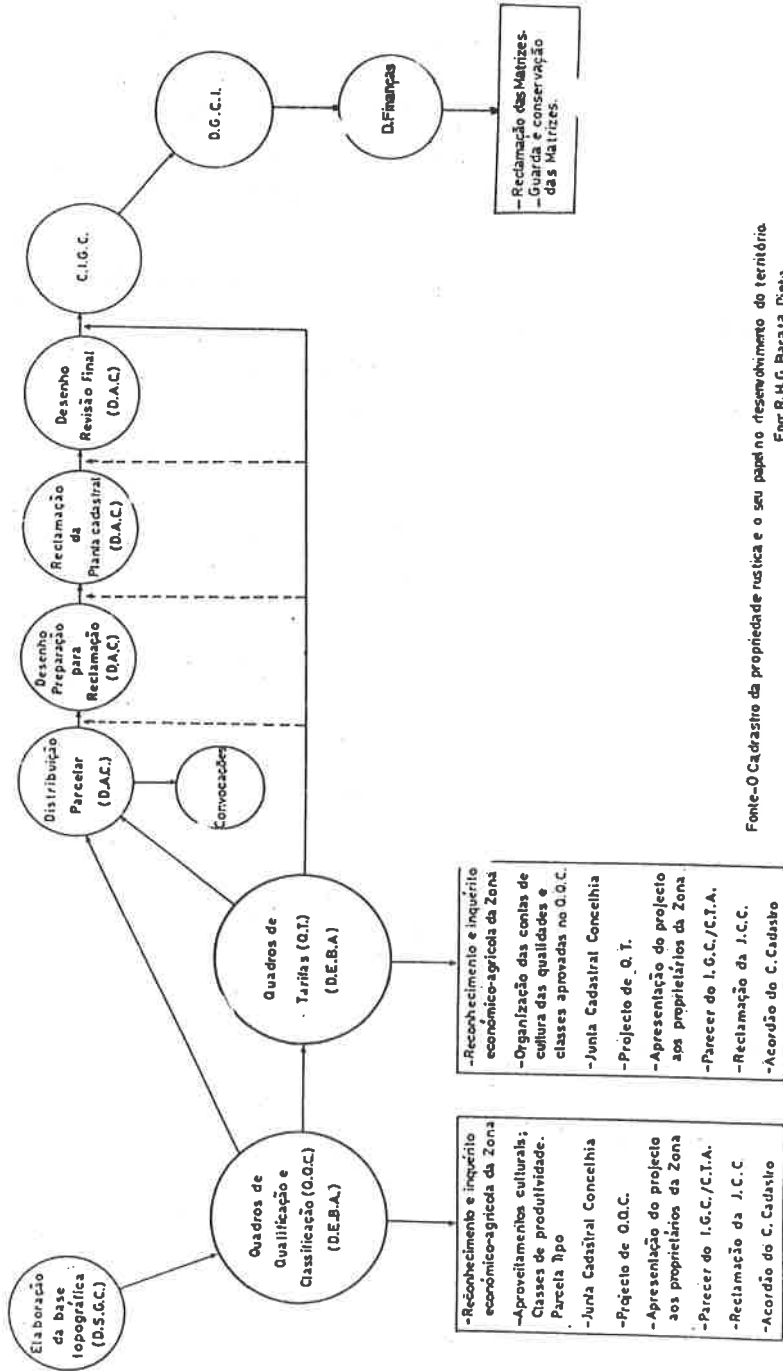
- a) - Logo que concluidos, os quadros são sujeitos à apreciação da Junta Cadastral Concelhia, depois à Divisão de Estudos e Bases de Avaliação e ainda ao Conselho Técnico de Avaliação que emite parecer vinculando o I.G.C. Este parecer é dado a conhecer à Junta Cadastral Concelhia que pode ou não reclamar para o C.Cadastro. Se eventualmente a Junta não quiser reclamar, então é o próprio Presidente da Junta que tem obrigação de reclamar para aquele concelho, que naturalmente lhe nega provimento. Está aqui representado um passo perfeitamente estéril e inútil. Penso que o conselho de cadastro como órgão supremo que é, só deve ser chamado a intervir quando haja reclamação da Junta cadastral concelhia, e não atender a Técnicos que reclamam do seu próprio trabalho, sem se saber bem porquê-
- b) - A convocação que me parece uma "variação em ré menor" da reclama-

ção está mais ou menos posta de lado, e penso que assim deve continuar.

- c) - Estão contemplados no Código duas reclamações, uma da planta cadastral pelo I.G.C. e outra das matrizes pela Direcção de Finanças, qualquer delas com duração minima de trinta dias. Muito para além do evitar-se o dispendio de verbas com funcionários, obrigação de se evitar o deslocamento dos proprietários etc. parece-me que seria uma boa medida fundir estas duas reclamações numa só, já que mais não fosse pelo simples ganho de tempo. Todavia reconheço que existem neste momento grandes dificuldades na concretização desta proposta, tendo em atenção que estas tarefas são executadas por organismos diferentes. Mas reconheço também ser esta uma situação insustentável que acarreta para os utentes e para o erário público grandes encargos, já para não acrescentar que a reclamação das finanças concorre para a imediata desactualização do trabalho do I.G.C..
- d) - Na questão da conservação cadastral penso que não será de mais recordar aqui os milhares de processos que se encontram em arquivo quer no I.G.C. quer nas Finanças cujo volume continuará a engrossar caso não se tomem algumas providências.
- É óbvio que também aqui, a resultante de serem dois organismos e dois os Ministérios envolvidos na resolução destes processos, torna qualquer tentativa de solução um espinhoso caminho a percorrer.
- Independentemente de se poder ou não vir a recorrer a entidades privadas para a solução ainda que parcial destes casos poder-se-ia desde já actuar junto das Repartições de Finanças instruindo convenientemente o responsável pela elaboração dos processos de reclamação administrativa. Penso que uma medida desta natureza poderia originar uma filtragem logo na origem, obtendo-se uma di-

Quadro nº4  
MATRIZ CADASTRAL RÚSTICA

Seqüência das tarefas da D.S.A.C.  
Tarefas e subtarefas da D.E.B.A.



Fonte-O Cadastro da propriedade rustica e seu papel no desenvolvimento do território  
Eng. R.H.G. Barata Pinto

minuição no volume de processos em circulação que calculo bastante superior a 10% entre processos irresolúveis deficientemente organizados ou por falta de demarcação.

Estes são apenas alguns dos problemas que quanto a mim afectam negativamente o cadastro e a avaliação cadastral em Portugal, e como tal não será a sua resolução pura e simples que irá operar uma transformação imediata neste panorama. Creio contudo que a implementação das medidas aqui apontadas em complemento de outras de carácter pontual, poderão sem dúvida, impulsionar firmemente toda a actividade cadastral no nosso país. Esse é pelo menos o meu desejo.



**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
**MULTIFUNCIONAL**

— SICRUM —

O CADASTRO, A TRIBUTAÇÃO FISCAL E O INSTITUTO  
GEOGRAFICO E CADASTRAL

JORGE FRAGOSO PIRES

P O R T U G A L

LISBOA, PINHAL-20 a 25 Novembro de 1989



(\*) I.G.C.—Praça da Estrela  
1200 LISBOA

O CADASTRO, A TRIBUTAÇÃO FISCAL  
E  
O INSTITUTO GEOGRÁFICO E CADASTRAL

RESUMO

A Ciência é o alfobre da Verdade e só com fundamento nesta se serve o interesse que sobreleva a todos os demais e que é o interesse geral. O futuro do Cadastro Rústico (e mesmo do Cadastro Urbano) depende da legislação de cada país. Uma coisa, porém, é certa: se os Estados aplicarem dinheiro com a intenção de daí extrair rendimentos (o que implica terem de reaver também o Capital aplicado), os Estados têm de encarar esse desembolso como uma aplicação reprodutiva do Capital e por isso a questão tem de ser analisada não de modo simplificado ou simplista, mas em termos de Investimento a ponderar à luz do Cálculo Financeiro, já que o Estado, interessado em obter rendimentos (e forçado para isso à aplicação de dinheiros), o mínimo que terá a fazer é comparar-se a uma pessoa singular e ter presente que, mediante simples depósitos a prazo, uma pessoa singular obteria garantidamente dos ditos dinheiros os pretendidos rendimentos. Segue-se daí que — a ser a contribuição predial fixada a partir do valor patrimonial dos prédios — a forma mais prática e mais barata de determinar tal valor patrimonial (afinável ao longo de alguns anos) é atender aos rendimentos revelados pelas contabilidades das actividades económicas que tenham base fundiária.

ABSTRACT

A Ciência é o alfobre da Verdade e só com base nesta se serve o interesse que sobreleva a todos os demais e que é o interesse geral.

O que há a dizer acerca do tema que abordo é, evidentemente, função da legislação que sobre o assunto dentro de cada país vá sendo produzida em cada momento.

Em Portugal a situação era em 1987 diferente da de agora, agora que já se encontra em vigor o Código da Contribuição Autárquica.

No entanto, para efeitos do que quero significar, aquilo que é essencial não se modificou.

No longo e conhecido estudo de conversão do Instituto Geográfico e Cadastral (IGC) em Empresa Pública — estudo até hoje não contrabastado por ninguém (pelo menos pela forma verdadeiramente responsável de o fazer e que é a forma escrita) — nesse estudo, que "motu proprio" em 24 de Abril de 1987 apresentei ao falecido Director-Geral, Senhor Engº Rui Galiano Barata Pinto, acompanhado das palavras "A V. Exa., ao I.G.C. e ao seu Pessoal", nesse estudo, repito, do qual apenso um extracto — precisamente um ANEXO, com o título "O Investimento em Contribuição Predial Rústica" — que VV. Exas., querendo, poderão apreciar em pormenor e que tentarei resumir nas suas passagens mais relevantes, afirmo a dado passo:

"Simplesmente (o que vem agravar e tornar ainda mais séria a questão), se o Estado gastar dinheiros com a intenção de daí extrair rendimentos — é o Investimento, por intermédio do Instituto Geográfico e Cadastral, em Contribuição Predial Rústica — (o que implica ter de reaver também o Capital aplicado), o Estado tem de encarar esse desembolso como uma aplicação reprodutiva do capital e por isso a questão tem de ser analisada não de modo simplificado ou simplista, mas em termos de Investimento a ponderar à luz do Cálculo Financeiro, já que o Estado, interessado em obter rendimentos (e forçado para isso à aplicação de dinheiros), o mínimo que terá a fazer é comparar-se a uma pessoa singular e ter presente que, mediante simples depósitos a prazo, uma pessoa singular obteria *garantidamente* dos ditos dinheiros os pretendidos rendimentos. E tudo sem esquecer que uma pessoa singular não desconhece que, num contexto de depósitos a prazo e ano após ano, o seu Capital aparece aumentando, visto ser  $C_n = C_{n-1} + C_{n-1} \cdot i_{n-1}$  .

RECEITA DOS MUNICÍPIOS EM 1985:

Fisc. 419 779 096\$ .

E, mais adiante, como conclusão:

"Logo, em 1985 ficou por remunerar quantia que — dadas as hipóteses simplificadoras adoptadas (no estudo) — há-de ser bastante superior a 3 milhões e 800 mil contos dos de 1985 ( 5 190 028 — 1 292 000 ). Por outro lado, não ficaram calculados (face aos orçamentos do IGC, os últimos dos quais têm rondado o milhão de contos por ano) os milhões de contos não remunerados ao longo dos 43 anos que se contam recuando de 1984 só até 1942. "

Por tudo isto, importa atentar no seguinte:

Em 1987, já a Lei nº 1/87, de 6 de Janeiro, estabelecia em seu artº 4º que constituem receitas do município a contribuição predial rústica e urbana.

Por outro lado, o Decreto-Lei nº 172-G/86, de 30 de Junho, também já estipulava em seu artº 5º que "têm acesso às ajudas comparticipadas pela Comunidade Europeia os agricultores que tenham ou se obriguem a ter contabilidade simplificada a partir do início do ano seguinte ao da concessão da ajuda".

Acontece também que em 30 de Novembro de 1988 apareceu aprovado pelo Decreto-Lei nº 442-C desse ano o Código da Contribuição Autárquica, que define esta contribuição como um imposto municipal que incidirá sobre o valor patrimonial dos

prédios, determinado nos termos do Código das Avaliações.

Ora — diga o Código das Avaliações o que disser — o cálculo de um aceitável VALOR PATRIMONIAL dos prédios faz-se satisfatoriamente (e um País como Portugal, dentro de uma CEE, tem de ser essencialmente "prático" !) através dos rendimentos revelados pelas escritas dos agricultores, escritas que o nosso Ministério da Agricultura lhes tornou fáceis (e úteis ao Fisco) com os cadernos ("livros de escrita") criados pela sua "Rede de Informação de Contabilidades Agrícolas" (R.I. C.A.). Tanto ... que os modelos se encontram aprovados pela Direcção-Geral das Contribuições e Impostos.

Daí, ter de se perguntar "que futuro ?", se Cadastro Rústico quiser dizer Cadastro Agronómico e se este tiver de consistir na mera inventariação de espécies vegetais arbóreas (etc.) existentes em todo o País, a dar nascimento a uma tarefa que o Ministério da Agricultura (já implantado com Direcções Regionais em todas as Regiões do País e com os respectivos quadros recheados de técnicos apropriados para a missão) pode reclamar, porventura, como sua, por a considerar imprópria de um Instituto Geográfico.

Perguntarei então: será que tudo isto (e mais o que consta do ANEXO ao estudo de conversão do Instituto Geográfico e Cadastral em Empresa Pública) demonstra que — se outras razões porventura ainda mais fortes não houvesse — não seria <sup>(não)</sup> de prolongar por mais tempo entre nós uma experiência com a propecta idade de 60 anos (e portadora, para as Finanças do Estado, dos frutos trazidos à vista nestes tempos de modernidade e de mudança) ?

Termino já:

Sob proposta do Brasil, acaba de ser criado um Instituto Internacional de Língua Portuguesa e, prevalecendo-se da ocasião, o nosso Presidente da República manifestou desejo de que o facto servisse de incentivo à cooperação nos vários domínios. Não exageraríamos, nós, do IGC, se aos Países Africanos de Língua Oficial Portuguesa e ao Brasil disséssemos: "aqui nos têm !".

A quantos não tenham nascido no meu País, e porque os Portugueses não se escusam a cooperar seja com quem for em sendas de Fraternidade e de Progresso, desejo encontrem nesta minha modesta fala algum contributo útil para eventual melhoria dos seus sistemas (se de mais perfeição forem susceptíveis !), tal como espero que quantos não falem Português nos desejem boa sorte quanto às tantas e tantas opções que há a fazer, pois os tempos de modernidade e de mudança, que não estão para vir, mas já começaram ... assim o exigem !

- Aqui têm o que tinha para vos dizer. -

Escrito terminado em 8 de Outubro de 1989.

A N E X O

O Investimento em Contribuição Predial Rústica

$$C_n = C_0 (1+i)^n$$

Admita-se então (e tudo em evidente desfavor da tese que atrás se deixou apresentada):

- a) Que nada se gastou em nenhum dos anos que vão de 1927 a 1941; (!);
- b) Que — ao contrário do que é verdade — nenhumas Amortizações referentes a Equipamento e a Edifício teria havido a considerar, nem nenhuma outra imputação de gastos gerais teria havido a fazer;
- c) Que — em cada um dos anos entre 1942 e 1981 — a despesa tenha sido, em cada um deles, apenas metade da média das realizadas nos anos de 1982 a 1985 (mas média actualizada, relativamente a cada um daqueles anos, mediante uso da tabela publicada pela Portaria nº 240/86, de 23 de Maio — desvalorização da moeda, centrados nós em 1985);
- d) Que naqueles anos os Governos teriam querido que os sucessivos totais do Investimento fossem remunerados a uma taxa de 15 % (aliás irrisória perante os 6 % a 10 % que nessas épocas seria a compensação para o mero depósito de dinheiros e irrisória perante a magnitude do problema que é a aplicação de capitais públicos que se querem destinados a render para Administração do País);
- e) Que em 1985 o Governo tivesse querido que o valor actualizado dos sucessivos Investimentos feitos neste domínio até então fosse remunerado apenas (como se um Governo pudesse limitar-se a querer uma coisa tal !) à taxa (32,5 %) naquele ano vigente no mercado de capitais para as operações activas a longo prazo, o que quer dizer que o valor correspondente à atrás citada quantia de Esc. 419 779 096\$ seria apenas 1 292 000 contos.

PORÉM, QUANTO ESTAVA JÁ APLICADO ATÉ ESSA ALTURA ?

Não obstante as tão desfavoráveis hipóteses simplificadoras que atrás ficam arroladas, vai-se apurar um número bastante para além de 1 292 000 contos e, por outro lado — devido a tais hipóteses — ainda bastante aquém do real:

A partir de uma qualquer folha de vencimentos (Fev9/87, por exemplo), e tendo em conta que de 1986 para 1987 e de 1985 para 1986 os tipos de abonos adiante destacados (e não vão todos os possíveis) variaram nas percentagens indicadas dentro do parêntesis,

I) C.E. 01.02	(11,5 ; 16,4)
II) C.E. 01.45	(11,5 ; 16,4)
III) C.E. 01.47	(14,9 ; 16,0)
IV) C.E. 04.00	(13,6 ; 15,7)

apuram-se os seguintes números (considerando também, embora fazendo intervir diuturnidades na média de apenas 2 por funcionário, como mais uma hipótese simplificada) — o Pessoal presente nas Delegações) o qual é indicado nominalmente e por categorias no Relatório das Actividades em 1985): milhares de contos:

	<u>1987</u> <u>(Fev9)</u>	<u>1987</u>	<u>1986</u>	<u>1985</u> <u>(Deleg.)</u>	<u>1 9 8 5</u> <u>(TOTAL)</u>
I - Sede ...	3 772	45 264	40 596	34 876	
I - Deleg. .				<u>18 402</u>	53 276
II—Sede ...	1 277	13 336	13 754	11 816	
II—Deleg. .				<u>5 920</u>	17 736
III—Sede ...	5 542	6 504	5 661	4 880	
III—Deleg. .				<u>1 370</u>	6 250
IV—Sede ...	400	4 800	4 225	3 652	
IV—Deleg. .				<u>1 546</u>	5 198
					<u>82 460</u>

Verificando-se que entre 1982 e 1985 os abonos variaram em sentido crescente à média de cerca de 18 % ao ano, partindo dos valores referentes ao ano de 1985 chega-se aos, dos restantes (em contos):

	1985	1984	1983	1982
I) . . . . .	53 276	45 149	38 262	32 425
II) . . . . .	17 736	15 031	12 738	10 795
III) . . . . .	6 250	5 297	4 489	3 804
IV) . . . . .	5 198	4 405	3 733	3 164
	82 460	69 882	59 222	50 188
<u>AJUDAS DE CUSTO</u> . . . . . (*)	8 820	7 245	5 985	4 725
<u>RUBRICAS</u>				
<u>C.E. 15.00 a 52.00</u> (**)	8 811	7 560	4 331	2 685
S o m a s . . . . .	100 091	84 687	69 538	57 598
Equivalências . . . . . (***)	100 091	101 624	107 089	111 740

(\*) — Admitindo (como mais uma hipótese simplificadora desfavorável à tese) que durante os anos de 1942 a 1985 (únicos em que se supõe foram feitas despesas) os funcionários participantes em campanhas anuais foram sempre num número médio de apenas 50 e que cada um só recebeu 63 dias de ajudas de custo em cada ano (como se tivesse vigorado sempre a Ordem de Serviço IGC Nº 39/DG/85).

(\*\*) — Conforme Relatórios das Actividades nos anos de 1982 a 1985.

(\*\*\*) — Valores da Despesa nos anos de 1982/85, actualizados relativamente ao ano de 1985, tendo em atenção os coeficientes de desvalorização da moeda constantes da Portaria nº 240/86, de 23 de Maio, embora fosse racional e legítimo fazer uso da taxa "1", já definida, que estava nesse ano fixada em 32,5 % (Diário da República" nº 181, II Série, de 8-8-83, só tendo havido alteração em 9-4-86, conforme "Diário da República" nº 82, I Série), procedimento que não se adoptou apenas pela razão de que os cálculos conduziram desse modo a valores mais altos (é mais uma hipótese desfavorável à tese que se quer demonstrar).

Atenda-se agora à hipótese formulada na alínea c) da folha A.1:

$$(100\ 091 + 101\ 624 + 107\ 089 + 111\ 740 = \underline{420\ 544}) : 4 = 105\ 136 .$$

$$105\ 136 : 2 = 52\ 568 .$$

Seja, para aquela hipótese, de 52 560 contos (contos de 1985) o nível — que se admitiu nunca ter sofrido aumento — dos Investimentos  $I_n$  ( $n = 1, 2, 3, \dots, 40$ ) realizados em cada um dos anos decorridos desde o ano de 1942 ao de 1981. Fazendo uso dos coeficientes de desvalorização da moeda indicados na Portaria nº 240/86, de 23 de Maio (junta), é claro que os sucessivos  $I_n$  se expressariam como segue:

1942	.....	1 661 contos	(52 560 : 31,65)
1943	.....	1 950 contos	(52 560 : 26,95)
1944/50	.....	2 295 contos	(52 560 : 22,90)
. . . .			

Admita-se que " $i_n$ " e " $j_n$ " seriam semelhantes e que representam, respectivamente, as sucessivas taxas de juro praticadas no mercado de capitais, durante os anos de 1942 a 1981, nas operações activas a longo prazo e nos depósitos a prazo.

Poderá haver quem pense que o volume total do Capital a remunerar em 1985 deva ser — pelo facto (dir-se-á, porventura) de os rendimentos ( $I_n \cdot i_n$  ou  $I_n \cdot j_n$ ) dos Investimentos serem destinados a consumo em Despesa Pública e não a capitalizar para anos subsequentes — deva ser, fizia-se, a soma do que se aplicou desde 1982 até 1985 (420 544 contos) com o que se aplicou desde 1942 até 1981, isto é:

$$420\ 544 + \sum_{n=1}^{40} I_n = 420\ 544 + 40 \times 52\ 560 = 2\ 521\ 944 .$$

Conforme alínea e) da folha A.1, o Capital "remunerado" terá sido 1 292 000 contos., Como não-remunerado em 1985 teríamos a diferença entre 2 521 944 e 1 292 000: 1 229 944 contos.

Quem assim pensasse e, em acréscimo, não tivesse em consideração nenhuma das hipóteses simplificadoras formuladas de entrada diria então que em

1985 ficou por remunerar quantia como 1 milhão e 200 mil contos dos de 1985.

Mesmo adoptando esta maneira errônea de encarar a questão, teríamos de interrogar-nos sobre quantas dezenas de milhões de contos ficaram por remunerar, ao longo de 60 anos de labuta por parte de escassas dezenas de pessoas que andaram dando fé do valor das produções de montes e vales sem conto, tendo em mente o que se terá passado, quanto à remuneração do Capital nisto vertido, nos anos que, recuando no tempo, vão de 1984 só até 1942.

Simplesmente (o que vem agravar e tornar ainda mais séria a questão), se o Estado gastar dinheiro com a intenção de daí extrair rendimentos (o que implica ter de reaver também o Capital aplicado), o Estado tem de encarar esse gasto como uma aplicação reprodutiva do Capital e por isso a questão tem de ser analisada não de modo simplificado ou simplista, mas em termos de Investimento a ponderar à luz do Cálculo Financeiro, já que o Estado, interessado em obter rendimentos (e forçado para isso à aplicação de dinheiros), o mínimo que terá a fazer é comparar-se a uma pessoa singular e ter presente que, mediante simples depósitos a prazo, uma pessoa singular obteria *garantidamente* dos ditos dinheiros os pretendidos rendimentos. E tudo sem esquecer que uma pessoa singular não desconhece que, num contexto de depósitos a prazo e anos após ano, o seu Capital aparece aumentado, visto ser  $C_n = C_{n-1} + C_{n-1} \cdot j_{n-1}$

Assim, a forma correcta de analisar a questão é esta:

Tomando a já calculada quantia de "52 560" contos e fazendo uso dos coeficientes constantes da referida Portaria nº 240/86, chegamos, como já vimos, aos valores a que teriam ascendido os Investimentos em cada um dos anos que vão de 1942 a 1981:

1942	.....	1 661 contos	(52 560 : 31,65)
1943	.....	1 950 contos	(52 560 : 26,95)
1944/50	.....	2 295 contos	(52 560 : 22,90)

Feitos os restantes cálculos (*folha apensa*) e atendendo à hipótese formulada na alínea d) constante da folha A.1, vem, lançando mão de uma tabela financeira referente à taxa de 15 % (*tabela que vai junta*):

$$1\ 661 \times 267,918 + 1\ 950 \times 232,968 + 2\ 295 \times 202,581 + \dots = 4\ 769\ 484 \ .$$



Adicionando ao valor que se acabou de apurar ( 4 769 484 contos ) a soma dos Investimentos ( 420 544 contos ) referentes aos anos de 1982 a 1985, vem:

$$4\ 769\ 484 + 420\ 544 = 5\ 190\ 028 .$$

Este número ( 5 190 028 ) representa um Investimento efectivamente muito superior àquele que (conforme alínea e) da folha A.1) a receita em Contribuição Predial Rústica em 1985 fazia supor ( 1 292 000 contos ) .

Logo, em 1985 ficou por remunerar quantia que — dadas as hipóteses simplificadoras adoptadas — há-de ser bastante superior a 3 milhões e 800 mil contos dos de 1985 ( 5 190 028 — 1 292 000 ). Por outro lado, não ficam calculados os milhões de contos não remunerados ao longo dos 43 anos que se contam recuando de 1984 são até 1942.

Tudo isto demonstra, de uma maneira mais do que absoluta, que — se outras razões porventura ainda mais fortes não houvesse — não seria de prolongar por mais tempo uma experiência com a propecta idade de 60 anos (e portadora, para as Finanças do Estado, dos frutos trazidos à vista nestes tempos de modernidade e de mudança) .

Aos      de Abril de 1987.

Desenvolvimento do cálculo

referido no 3º parágrafo da fl. A.4:

				Transporte ....	4 329 445
			63 ....	2 663 x 14,232 =	37 900
			1964 ....	2 787 x 12,375 =	34 489
1942 ....	1 661 x 267,918 =	445 012			
1943 ....	1 950 x 232,968 =	454 288			
<u>1944/50</u>					
44 ....	2 295 x 202,581 =	464 923			
45 ....	2 295 x 176,156 =	404 278			
46 ....	2 295 x 153,181 =	351 550			
47 ....	2 295 x 133,200 =	305 694			
48 ....	2 295 x 115,823 =	265 814			
49 ....	2 295 x 100,716 =	231 143			
50 ....	2 295 x 87,580 =	200 996			
<u>1951/57</u>					
51 ....	2 503 x 76,155 =	190 616			
52 ....	2 503 x 66,212 =	165 729			
53 ....	2 503 x 57,575 =	144 110			
54 ....	2 503 x 50,065 =	125 313			
55 ....	2 503 x 43,535 =	108 968			
56 ....	2 503 x 37,857 =	94 756			
57 ....	2 503 x 32,919 =	82 396			
<u>1958/63</u>					
58 ....	2 663 x 28,625 =	76 228			
59 ....	2 663 x 24,891 =	66 285			
60 ....	2 663 x 21,645 =	57 641			
61 ....	2 663 x 18,821 =	50 120			
62 ....	2 663 x 16,367 =	43 585			
transportar ....		4 329 445			
				T O T A L .....	<u>4 769 484</u>





**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
**MULTIFUNCIONAL**  
  
— SICRUM —

VEREENTE HISTORICA DO CADASTRO URBANO-UM SUPORTE METODOLOGICO PARA A INVESTIGAÇÃO EM HISTORIA DA FORMA URBANA E DA GESTÃO URBANISTICA

RUI TAVARES

PORTUGAL

LISBOA, PINHAL-20 a 25 Novembro de 1989

VERTENTE HISTÓRICA DO CADASTRO URBANO - UM SUPORTE METODOLÓGICO PARA  
A INVESTIGAÇÃO EM HISTÓRIA DA FORMA URBANA E DA GESTÃO URBANÍSTICA

Resumo

Comunicação apresentada ao Seminário Internacional sobre Cadastro Rústico e Urbano Multifuncional-- Face às novas tecnologias- Lisboa/Funchal 20 a 25 de Novembro 1989

É uma evidência que a história, sendo memória e lição, se apresenta como fundamental para a compreensão de qualquer realidade, revelando-se esclarecedora do enquadramento futuro dessa mesma realidade.

Neste caso, a reflexão sobre a instituição cadastral, que se afirma como uma realidade histórica em contínua transformação, requer uma leitura da sua evolução histórica. Mas, exactamente porque se trata de uma realidade inserida numa linha de continuidade, aquela leitura só se tornará verdadeiramente compreensível se não se restringir à história do próprio cadastro. Por outro lado, aquela leitura histórica deverá explorar a realidade cadastral como uma totalidade territorial ( espaço e forma), não se restringindo aos aspectos da fiscalidade tributária e judicial, factores primeiros da sua instituição. Entendida como uma fonte histórica, a instituição cadastral pode então apresentar-se como um suporte instrumental e metodológico na investigação sobre as estruturas territoriais do passado, numa dupla vertente morfológica e tipológica; e, assim investigada, ela pode fazer ressaltar os vectores históricos fundamentais à caracterização e avaliação da herança actual daquele passado, ao mesmo tempo que relevará factores que poderão tornar determinantes na projecção e gestão de realidades futuras.

Esta comunicação pretende introduzir, nestes pressupostos, a vertente histórica na consideração da instituição cadastral, sobretudo no cadastro urbano.

Apresentar-se-ão a debate um leque de problemas, ilustrados com exemplos concretos da cidade do Porto, que já foi possível identificar e isolar numa investiga-

ção que vimos desenvolvendo inserida no projecto pessoal de doutoramento. O leque de problemas apresentados, ainda que se refiram a uma realidade concreta de um particular grau urbanístico, referem-se a questões suficientemente amplas para poderem constituir matéria de reflexão generalizável a outras realidades territoriais e urbanas nacionais. Entre aqueles problemas poderemos destacar:

- a verificação de um vector de permanência histórica, quase estrutural, numa matriz de cadastro de solo urbanizável, não generalizado ao espaço urbano, mas com uma presença significativa e, por vezes, bastante extensa; no caso concreto da cidade do Porto verifica-se na oferta de um loteamento estreito e profundo, sendo uma situação registada em pleno século XIX, e cuja linha de continuidade podemos perseguir desde a Idade Média Final;
- o fazer cidade passa pela transformação em urbanidade das áreas de cariz rural periféricas ou intersticiais à cidade, e cujos limites matriciais são susceptíveis de introduzir variabilidades nos ritmos e nas formas da divisão do solo urbanizável, havendo então necessidade de ajustar o cadastro rústico ao cadastro urbano para alguns casos de urbanizações arruadas;
- a evolução e/ou transformação do cadastro urbano é contínua e, por vezes, rápida; mas também pode ser bastante resistente à transformação, sobretudo quando se não vislumbrem situações de oportunidade optima relativamente aos valores do solo (sejam a rentabilidade imediata da alienação, sejam a rentabilização a prazo das estruturas a construir no solo urbanizável); essas transformações podem estar relacionadas ora com atitudes particulares promotoras de urbanizações, mais ou menos planificadas, ora com atitudes fortes de gestão central ou municipal, instrumentalizando a expropriação tanto mais quanto mais planificadas; umas e outras têm diferenciadas caracterizações relativamente à alteração da situação cadastral, com diferenciados graus de resistência à transformação e diferenciados ritmos de evolução; a cidade do Porto oferece exemplos singulares que serão ilustrados para o século XVIII e XIX;

- a evolução histórica do cadastro urbano poderá estar também influenciada pelos aspectos do desenho formal da própria realidade urbana nos diversos momentos da sua constituição, possibilitando uma avaliação, em cada momento, das relações dinâmicas entre as vertentes morfológica e tipológica, pondo assim em correlação os acontecimentos ao nível da divisão do solo e ao nível da ocupação do solo; permitirá avaliar a verdadeira influência do vector da construção urbana na dinâmica de evolução do cadastro urbano.

A vertente histórica do cadastro, ultrapassando a questão previamente colocada da história do cadastro (mas não a ignorando nem a diluindo), introduzirá um vector de evolução histórica da instituição cadastral que não restringirá a sua análise a um cinzento e erudito exercício académico; ao contrário, afirmando-se como uma base de investigação sobre a herança da estruturação urbanística, apresentar-se-á como uma fonte fundamental para uma melhor avaliação da situação actual e para um eficaz apetrechamento instrumental na projecção de situações futuras ao nível da gestão urbanística e da forma urbana.

Colocar a questão da oportunidade e premência desta perspectiva no enquadramento da instituição cadastral, é o objectivo final desta comunicação.

Porto, 14 de Novembro de 1989

Rui Tavares



**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
**MULTIFUNCIONAL**  
**- SICRUM -**

INFORMATIZAÇÃO DOS VERBETES DE LANÇAMENTO DA PREDIAL  
O EMERLÃO DE UM CADASTRO FISCAL - UMA EXPERIÊNCIA

JOSÉ A. FERREIRA

PORTUGAL

LISBOA... ENCHAL-20 a 25 Novembro de 1989



**SEMINARIO INTERNACIONAL SOBRE CADASTRO  
RUSTICO E URBANO MULTIFUNCIONAL  
FACE AS NOVAS TECNOLOGIAS**

**INFORMATIZAÇÃO DOS VERBETES DE LANÇAMENTO DA PREDIAL  
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(Comunicação 2 20/SICRUM/NOV89/LNEC)

**José Alves Ferreira/Instituto de Informática**

## INFORMATIZAÇÃO DOS VERBETES DE LANÇAMENTO DA PREDIAL.

### O EMBRIÃO DE UM CADASTRO FISCAL - UMA EXPERIENCIA

Por José A. Ferreira (\*)

(Comunicação 2 20/SICRUM/NOV89/LNEC)

A Direcção-Geral das Contribuições e Impostos e o Instituto de Informática estão envolvidos, no desenvolvimento de um ambicioso projecto sobre a informatização da Contribuição Autárquica e das Matrizes Prediais, rústicas e urbanas.

O volume da informação a tratar é gigantesco, correspondendo a perto de 5 milhões de contribuintes e a mais de 20 milhões de propriedades.

As Repartições de Finanças, responsáveis pela recolha local dos dados para computadores pessoais e principais utilizadores finais do sistema, são 376.

Também as Autarquias, destinatárias do Imposto, serão concerteza, directa ou indirectamente, potenciais utilizadores.

O processamento automático da Contribuição Autárquica, já em Janeiro do próximo ano, necessita de um cadastro de contribuintes e de propriedades, residente em computador, contendo alguns dados elementares apenas existentes, actualmente, em documentos sediados nas Repartições de Finanças.

São esses documentos os Verbetes de Lançamento, onde se enumeram, por contribuinte, todas as suas propriedades existentes na área dessa Repartição, e as Matrizes Prediais, registos descritivos de cada propriedade.

A meta temporal de Janeiro de 1990, imposta por lei, para a liquidação do Imposto, obrigou à implementação faseada do Cadastro Fiscal da Propriedade. Assim definiram-se três fases:

#### Fase 1 - INFORMATIZAÇÃO DOS VERBETES DE LANÇAMENTO:

Permitirá a criação de um Cadastro contendo as informações necessárias ao processamento da Contribuição Autárquica.

Resumidamente as informações são:

- Nº Fiscal do contribuinte e nº do verbete
- Nome e morada do contribuinte
- Identificação do prédio (número matricial)
- Freguesia/Concelho/Distrito do prédio

- Tipo do prédio (Rústico/Urbano)
- Regime Fiscal (Sujeito ou Isento, com data limite da isenção)
- Data da última avaliação ou actualização
- Informação s/propriedade horizontal
- Valor patrimonial

Esta fase, a concluir em Dezembro deste ano, está em execução em todas as Repartições de Finanças do Continente e das Regiões Autónomas dos Açores e da Madeira, desde Setembro passado, e respeita à recolha magnética para computadores pessoais, especialmente adquiridos para o efeito, de alguns dos dados acima referidos, que completam ficheiros concelhios, previamente carregados nos computadores pessoais, extraídos do ficheiro principal da extinta Contribuição Predial, até agora processada pelo Instituto de Informática.

A utilização deste ficheiro, como apoio à entrada dos dados, tem a sua justificação pelo universo dos contribuintes nele contido ser o mesmo da Contribuição Autárquica.

Outra razão do seu uso prende-se com o controlo e segurança da informação manipulada, tendo em conta os vários milhões de dados a movimentar.

A grande tarefa de recolha situa-se no desdobramento dos valores globais de cada contribuinte, relativamente a cada prédio ou fracção autónoma, completando-os com outras informações elementares, nomeadamente a identificação matricial e valor parcelar.

Após a conclusão da recolha pelas Repartições de Finanças, estas enviarão para o Instituto de Informática os ficheiros registados, que por sua vez irão alimentar o Cadastro Central, fundamental para o processamento automático do Imposto.

A este ficheiro, que nesta fase, poderemos considerar um *embrião do futuro Cadastro Fiscal da Propriedade*, conterá, em Janeiro de 1990, cerca de 20 milhões de propriedades respeitantes a 4 milhões e 800 mil proprietários.

A partir deste embrião, a criação de um Cadastro Fiscal da Propriedade será tarefa de grande dimensão mas passível de concretização. Essa actividade incidirá fundamentalmente no aumento das informações por prédio, acrescentando-lhe elementos que melhor os caracterizem, nomeadamente a sua denominação e localização, área, destino e uso, e no caso de prédios urbanos, o ano e o tipo de construção, a sua composição (pisos, fogos, divisões), etc.

## Fase 2 - INFORMATIZAÇÃO DAS MATRIZES PREDIAIS URBANAS.

Concluída a fase anterior, arrancará a fase de enriquecimento da base de dados existente, incluindo-lhe todas as informações pertinentes sobre os prédios urbanos registados magneticamente.

A metodologia a seguir será idêntica à anterior, isto é, a responsabilidade da criação das bases de dados locais para alimentação do Cadastro Central pertencerá às Repartições de Finanças, locais onde nasce a informação.

A base para a criação dos ficheiros locais será a Matriz Predial Urbana, documento muito descritivo e com insuficiência de informação que permita mais tarde um tratamento automático do processo de avaliações periódicas.

Esta realidade forçará a obtenção de outros elementos caracterizantes dos prédios, mais consentâneos com os fins em vista.

A aquisição de dados não descritos nas Matrizes poderão ser obtidos por visitas "in loco" ou através de declaração dos proprietários sobre formulários pré-impessos com a identificação das propriedades e respectivos valores. Parece-nos que esta última hipótese será a mais rápida e económica, podendo contudo ser complementada, para os casos de falta de resposta ou de informações duvidosas, com visitas de técnicos aos prédios.

## Fase 3 - INFORMATIZAÇÃO DAS MATRIZES PREDIAIS RUSTICAS.

Embora a quantidade de prédios rústicos seja superior aos urbanos a sua importância em termos de receitas fiscais é bastante pequena, razão pelo que se planeou a sua informatização para depois da conclusão das matrizes urbanas.

O processo de desenvolvimento da aplicação será idêntico ao da fase 2, podendo eventualmente ser apoiado por informação sediada no Instituto Geográfico Cadastral, resultante dos prédios já cadastrados e tratados informaticamente pelo IGC.

## O CADASTRO FINAL

Concretizadas as fases atrás descritas (espera-se a finalização do projecto em 1991), a Administração Fiscal passará a dispor de um Cadastro Fiscal da Propriedade Rústica e Urbana na sua versão final.

Embora tendo como objectivo a fiscalidade, a sua universalidade (todas as propriedades do Território Continental e Insular constam nele), conjugada com o tipo de informações registadas, leva-nos a prever que, a curto prazo, se converterá num cadastro multifuncional, disponível para o fornecimento de informações à Administração Central e Local, apoiando estudos e definições de políticas relacionadas com a gestão dos solos, habitação, vias de comunicação, etc.

Para a Administração Fiscal ele permitirá uma gestão moderna e integrada, apoiada por equipamento informático, dos impostos relativos à propriedade, destacando-se a Contribuição Autárquica, a Sisa e o Imposto sobre Sucessões e Doações, reforçando a imagem de modernidade que tem vindo a adquirir.

Será também possível proceder-se à actualização periódica e automática dos valores patrimoniais, com reflexos no aumento da receita destinada às Autarquias. Para tal, é fundamental que o Cadastro Fiscal contenha as informações básicas exigidas pelo esperado Código das Avaliações. No nosso entender, não é possível a implementação de um eficaz Sistema de Avaliações sem a existência de um Cadastro Fiscal da Propriedade.

O processamento de estatísticas fiáveis e completas relativas à propriedade será também uma das potencialidades do Sistema.

Algumas dificuldades impedem que a constituição deste Cadastro se processe de modo totalmente pacífico. Por razões que se prendem com antiguidade das matrizes, em que a posse da propriedade mudou em várias gerações, sem registos legais desse acto, originam a existência no papel, de proprietários já falecidos.

Igualmente o modo de transacionar os prédios rústicos, executado muitas vezes à revelia dos procedimentos legais, originam indefinições jurídicas quanto aos reais proprietários.

Estas situações distorcem a realidade quanto à posse, impossibilitando a identificação unívoca destes proprietários através do seu número fiscal de contribuinte, prejudicando, nestes casos, a utilização dos nomes e moradas fiscais constantes do Ficheiro Nacional de Identificação Fiscal.

A identificação das propriedades pelo seu número matricial será respeitada e assegurada, pois só assim se tornará possível a interacção futura com os Cadastros Legal e Geométrico.

A inexistência de um sistema informático nacional de normalização de nomes de ruas e respectiva codificação, obrigará a uma repetição inglória de milhares de denominações idênticas para 20 milhões de propriedades, com o conseqüente dispêndio de tempo na introdução deste dado, a ocupação de espaço em disco no computador e a dificuldade de acesso a informações em que a chave seja a morada.

Para colmatar esta insuficiência, o sistema de informatização do cadastro, utilizará um modo expedito de resolver o problema, sem comprometer, em fase posterior, a sua conversão para um sistema nacional de codificação que se espera vir a ser implantado.

Como conclusão vem a propósito referir o empenhamento do Instituto de Informática no desenvolvimento de um projecto, em colaboração com a Faculdade de Ciências e Tecnologias da Universidade Nova de Lisboa, representada pelo Eng<sup>o</sup> António Morais Arnaud, tendo em vista a implementação nacional de um sistema de codificação de ruas e outra informações afins.

*Instituto de Informática, Novembro/89.*

(1) Director de Projecto do I.I.





**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
**MULTIFUNCIONAL**  
  
— SICRUM —

SISTEMA DE INFORMAÇÃO URBANA EM REFERÊNCIA ESPACIAL  
ALGUMAS CONSIDERAÇÕES SOBRE A SUA IMPLEMENTAÇÃO

MARIA DE LURDES VAZ DA SILVA

PORTUGAL

LISBOA... ANCHAL-20 a 25 Novembro de 1989



SISTEMA DE INFORMAÇÃO URBANA EM REFERÊNCIA ESPACIAL  
ALGUMAS CONSIDERAÇÕES SOBRE A SUA IMPLEMENTAÇÃO

POR

MARIA DE LURDES VAZ DA SILVA

RESUMO

Numa comunidade urbana a necessidade crescente de processar e coordenar, maior volume e diversidade de informação, proveniente de diferentes origens ou serviços, obriga a uma intervenção acrescida e a uma eficaz organização dessa mesma informação, de modo a constituir um adequado suporte às mais variadas aplicações indispensáveis à gestão urbana.

Uma resposta eficaz para estas questões é a implementação de um Sistema de Informação Urbana em Referência Espacial (SIURE).

Num Sistema deste tipo as informações estão organizadas numa base de dados, a qual deve permitir o seu interrelacionamento. O modelo a escolher para relacionar cada informação ou objecto com outro, será aquele que corresponder melhor à realidade e otimizar a exploração da base de dados. Para se poder optar, caso a caso, pelo tipo de ligação a usar, é necessário dispor de uma base de dados, como a que se apresenta, na qual "coexistem os conceitos hierárquico e relacional".

Um Sistema de Informação Urbana em Referência Espacial deve permitir a sua utilização por vários agentes ou serviços autónomos e instalados em locais distintos. Para isso é necessário dispor de um Sistema Multiutilizador que integre mecanismos de protecção e confidencialidade da informação.

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(\*) - Engenharia Civil

Directora do Departamento de Cartografia e Gestão de Sistemas, da  
HIDROPROJECTO

## 1 - SISTEMA DE INFORMAÇÃO URBANA EM REFERÊNCIA ESPACIAL

Numa comunidade urbana a necessidade crescente de processar e coordenar, maior volume e diversidade de informação, proveniente de diferentes origens ou serviços, obriga a uma intervenção acrescida e a uma eficaz organização dessa mesma informação, de modo a constituir um adequado suporte às mais variadas aplicações, da gestão urbana, nomeadamente:

- Gestão das redes (águas, esgotos, telefones, iluminação, electricidade,...);
- Ocupação do Domínio Público (equipamento urbano, espaços verdes, sinalizações,...);
- Gestão do Património Imobiliário;
- Funcionamento de serviços colectivos (Transportes, Serviço de incêndios,...);
- Licenseamento para construção, demolição ou loteamentos;
- Análise da evolução das propriedades municipais, das várias actividades e dos equipamentos;
- Análise das condições sócio-económicas;
- Estudos de urbanismo;
- Gestão da ocupação do solo;
- Cadastro

É necessário pois dispôr de um sistema que relacione, as intervenções dos diferentes agentes ou responsáveis das informações (ou dados) através de referências comuns e com meios partilhados.

O Sistema de Informação Urbana e Referência Espacial (SIURE) é uma resposta adequada para as questões enunciadas, permitindo:

- organizar a informação em torno dos principais eixos localizadores, das ruas, do emparcelamento, das plantas topograficas;
- estabelecer uma rede de troca de informação através de relações ordenadas entre:

- . uma base de dados única, evolutiva e que por isso é um factor de coerência;
- . e os utilizadores do sistema, autónomos e instalados em diversos serviços ou locais.

A constituição de um SIURE implica à colaboração entre os diferentes serviços utilizadores os quais devem definir, adquirir e actualizar os seus próprios dados e pelos quais são responsáveis.

A gestão informática, a coordenação, a geocodificação e a criação e manutenção do ficheiro único de dados de referência serão da incumbência de um Centro de Dados Urbanos, pertencentes ao SIURE, que realizará aquelas tarefas para todas as informações geográficas comuns ao conjunto dos utiliza-

dores. O Centro de Dados Urbanos funcionará assim como um prestador de serviços aos utilizadores.

Na figura seguinte apresenta-se um esquema da organização de um Projecto SIURE.

### ORGANIZAÇÃO DE UM PROJECTO SIURE

#### DADOS - INSTRUMENTOS - APLICAÇÕES

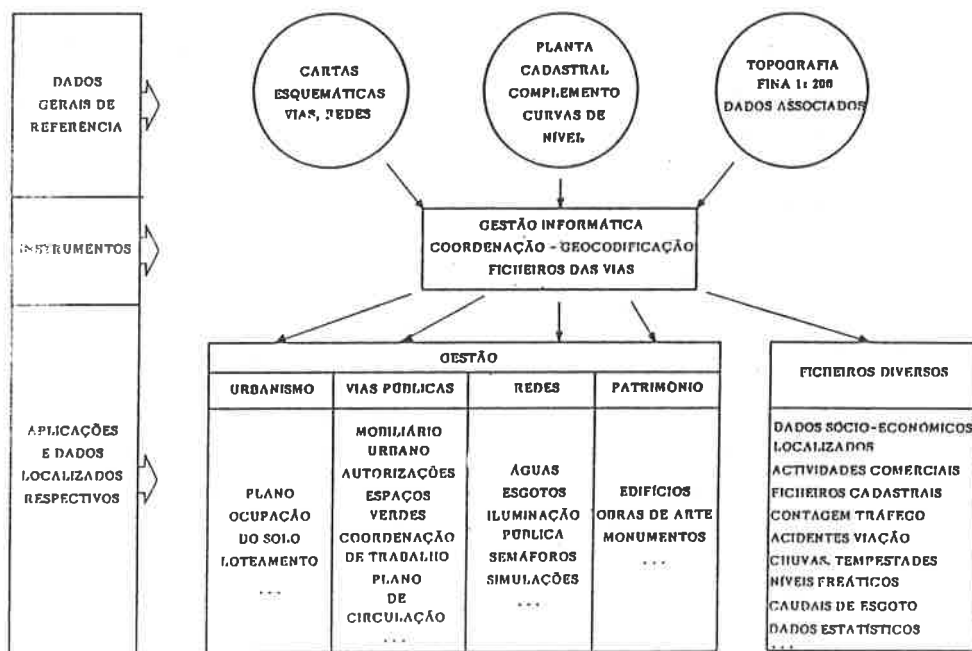


FIGURA 1

## 2 - ORGANIZAÇÃO DA INFORMAÇÃO

### 2.1 - Base de dados. Objectos

O Sistema Informático a utilizar num SIURE, deve garantir a coerência entre toda a informação e, para cada dado ou objecto memorizado, deve manter as suas características reais, isto é, não devem ser dissociadas as suas propriedades (ou dados alfanuméricos) das suas características gráficas.

Para isso toda a informação deve estar organizada numa base de dados única e evolutiva, que permita garantir a coerência da informação.

Numa base de dados deste tipo as informações que a constituem e que são geridas pelo sistema, são consideradas objectos, que podem ser muito variados e dos quais se apresentam alguns tipos e respectivos exemplos:

- objectos físicos - rua, colector, prédio, candeeiro, etc...;
- entidades superficiais - zona postal, bacia de drenagem, quarteirão;
- acontecimentos - trabalhos de reparação, acidentes, novas obras;
- objectos intencionais - regulamentos, proibições, etc.

Estes objectos podem ser do ponto de vista gráfico representados por elementos digitalizados (fechados ou abertos) e por símbolos e possuir ainda características próprias ou intrínsecas (dados associados).

Assim por exemplo um edifício pode ser caracterizado através dos seguintes dados associados:

- tipo de construção
- número de pisos
- número de fogos
- área em planta
- tipo de ocupação
- índice de ocupação
- cota de soleira
- área de estacionamento
- número de caves
- ano de construção
- data da última limpeza de fachadas
- e outros, sem limitações informáticas

### 2.2 - Relações entre objectos

Para além disso, e como já se referiu, muitos dos objectos estão relacionados com outros objectos da base de dados.

Essas relações podem ser hierárquicas, de rede ou puras, havendo sistemas informáticos que optimizam a relação vantagens/incovenientes de cada um daqueles tipos de relações e permitem a "coexistência de conceitos

hierárquicos e relacionais".

Neste caso os objectos podem simultaneamente pertencer a uma rede, estar inserido numa hierarquia e estarem em relação pura com outros objectos.

É, por exemplo, o caso de um colector que está relacionado naturalmente, com:

- as câmaras de visita de montante e de jusante (relação de grafo ou rede)

- o colector principal onde aflui (relação hierárquica)

- a rua onde está implantado (relação pura)

- e outras sem limitações informáticas

Uma base de dados desta natureza (com coexistência de conceitos hierárquico e relacional) permite a existência de objectos intencionais como os já referidos do tipo "regulamento".

Este objecto imaterial e não localizável, está em relação com as zonas às quais se aplica e essas zonas estão por sua vez relacionadas, por exemplo, com determinados edifícios, podendo assim o regulamento ser indirectamente cartografado. Inversamente o seu texto, armazenado em ficheiro, cujo endereço é um dado associado pode ser consultado através dos mesmos percursos lógicos, utilizando a identificação de um dos edifícios ao qual o regulamento se aplica.

Para que não existam limitações, a criação de um objecto não deve ser imposta pelo sistema ao utilizador; este deve poder criar os modelos informáticos dos objectos conceptuais, a que se atribui o nome de "componente". Os objectos da base de dados são ocorrências desses componentes.

### 2.3 - Ambientes

Por outro lado a informação deve estar organizada em "ambientes" que correspondam a um sector de actividade, a uma tarefa, a um serviço municipal, a uma instância de decisão, ou a um domínio de estudo ou projecto (conforme se mostra na fig. 2).

O ambiente é proprietário, para cada componente, dos dados que lhe estão associados e que lhe foram atribuídos. Isto permite ao detentor de um ambiente controlar os dados de que é reponsável. Os detentores de outros ambientes poderão unicamente consultá-los.

Os ambientes desempenham em papel triplo:

- garantem a propriedade, a integridade e a confidencialidade das informações;

- filtram ou seleccionam os acessos ou as representações gráficas;

- reagrupam as funções e os dados.

O administrador do sistema definirá assim os ambientes em função

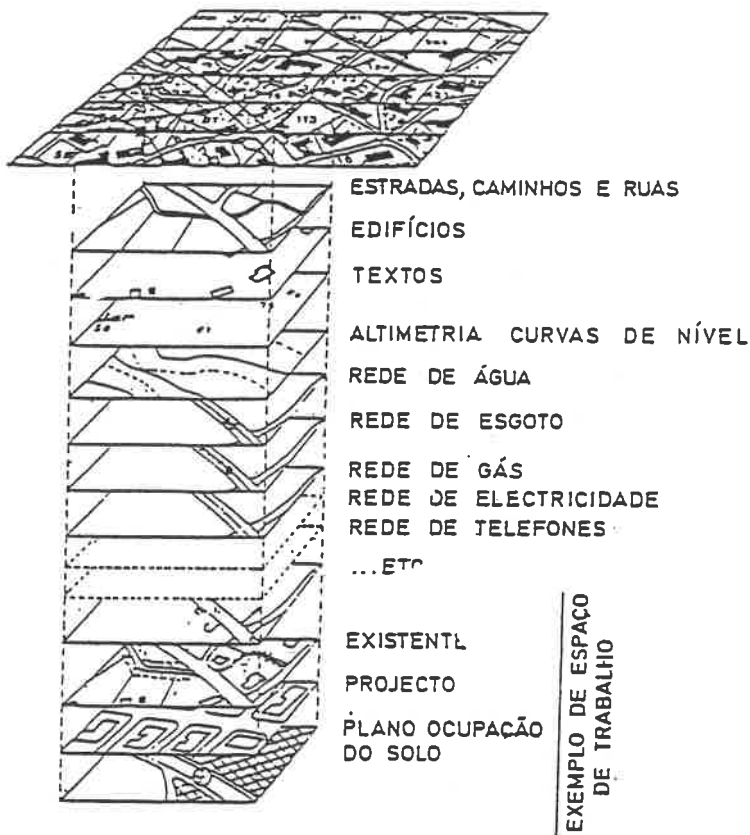


FIGURA 2

do conjunto dos serviços, instituições, interlocutores ou parceiros da base de dados: alguns dados ficarão deste modo disponíveis para consulta unicamente por parte de alguns detentores de chaves de acesso.

### 3 - SISTEMA MÚLTIUTILIZADOR INTEGRANDO AS PROTECÇÕES E A CONFIDENCIALIDADE

#### 3.1 - O Sistema de gestão

A base de dados, sendo a única estrutura de acolhimento, reflete a organização do sistema, quer relativamente ao ambiente informático da instituição, quer relativamente áqueles que gerem a informação.

Torna-se pois necessário definir os diferentes níveis de responsabilidade e de privilégios dentro do regulamento de exploração da base de dados, bem como configurar os diferentes níveis de diálogo.

### 3.2 - Os níveis de competência

Relativamente à organização da base podem distinguir-se três níveis principais de competência:

- o nível "administração lógica" ocupado pelo grupo de pessoas incumbido da definição dos componentes sob todos os seus aspectos, e da coerência da modelação dos objectos, dados e relações, referentes a áreas profissionais e às aplicações técnicas e administrativas;

- o nível "gestão técnica" é uma responsabilidade operacional directamente ligada ao serviço dos utilizadores nomeadamente ligada à integridade orgânica da base e à eficácia funcional das aplicações;

- o nível "operador" diz respeito estritamente à execução de tarefas específicas não devendo em geral o operador ser colocado em posição de poder alterar, directa ou indirectamente, a base de dados.

### 3.3 - Os registos de movimentos

O gestor técnico deve poder indicar a cada utilizador o tipo de registo de movimentos que podem ser realizados, para as várias operações:

- consulta: não há modificação na base de dados, não sendo necessário qualquer registo;

- recolha: introdução e supressão de dados

Assim que haja modificação de dados, isto é, "movimento na base", o mesmo deve ser registado com a data e a respectiva natureza, podendo ainda ser armazenado apenas o novo estado ou em alternativa tanto o estado antigo como o novo.

### 3.4 - A gestão dos utilizadores

A admissão de um utilizador deve implicar automaticamente um registo num ficheiro de utilizadores e a geração de um ficheiro de sessão.

Para definir, organizar e memorizar o resultado das diferentes sessões de trabalho, pode dispôr-se de um módulo de gestão de utilizadores, desempenhando as seguintes funções:

- criação (admissão) dum utilizador
- definição do nível de privilégios:
  - . simples consulta
  - . consulta e introdução
  - . consulta, introdução e supressão
- definição do contexto de trabalho do utilizador:
  - . nome da base

- . biblioteca de referência
- . acesso aos ambientes
- . ficheiro de parâmetros.

O utilizador tem assim acesso directo ao Programa sem se preocupar com o respectivo "sistema operativo" e ignorando os contextos que não são da sua responsabilidade.

### 3.5 - A confidencialidade

A propriedade e a confidencialidade da informação devem ser definidas a dois níveis:

- nível do ambiente;
- nível do objecto e seus dados.

Um dado ou um objecto cuja consulta e exploração ficam reservados a uma dada categoria de utilizadores, dizem-se privados. Os outros designam-se de públicos.

Os objectos e dados públicos podem ser consultados e explorados em todos os ambientes que lhes estiverem associados, ficando o seu acesso interdito a partir de qualquer outro ambiente. A declaração do componente ou do modelo do dado integra a classificação de público ou privado.

Por outro lado, os ambientes podem ser:

- acessíveis directamente a qualquer utilizador que disponha do código de chamada dos mesmos, podendo então intervir no conteúdo dos dados memorizados no ambiente e em especial, modificá-los ou suprimi-los;

- acessíveis indirectamente aos utilizadores não dispoendo do código de chamada, mas podendo ter acesso aos dados do ambiente e visualizá-los. Neste caso, os utilizadores poderão unicamente consultar os dados, sem poderem modificá-los ou suprimi-los, ou finalmente;

- inacessíveis a todos quantos não disponham, para além do código de chamada, da Palavra Chave que o responsável pelo ambiente tiver determinado e cuja difusão é da sua responsabilidade.

A acessibilidade é dada por defeito a qualquer ambiente não preservado por uma Palavra Chave.

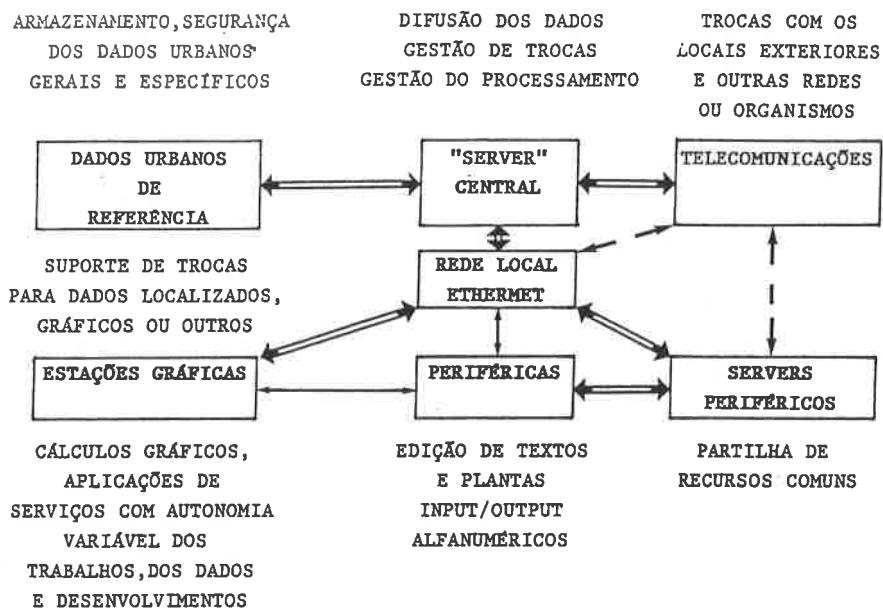
O programa deve permitir definir um ou vários códigos secretos para o acesso ao ambiente.

## 4 - CONSIDERAÇÕES FINAIS

Analisadas que foram algumas das características essenciais que um sistema informático deve ter para ser aplicado numa Gestão Urbana integrada um SIURE, apresenta-se seguidamente um exemplo dos vários elementos constituintes de um Sistema de Informação Urbana.



em Referência Espacial, indicando-se também as respectivas funções.



Na escolha do sistema a implementar deve ter-se sempre presente que um SISTEMA DE INFORMAÇÃO URBANA EM REFERÊNCIA ESPACIAL:

- é um instrumento informático comum ao conjunto da Comunidade Urbana (autarcas, serviços, empresas concessionárias, etc.);
- é uma rede de trocas de informação aberta para o exterior;
- é um sistema de gestão de uma base de dados/objectos localizados, explorando as potencialidades gráficas;
- é um sistema que realisa, para todas as informações geográficas comuns ao conjunto dos utilizadores, a gestão informática, a coordenação, a geocodificação e a constituição e manutenção do ficheiro único de dados de referência;
- e, finalmente, é também uma equipa técnica e competente, capaz de criar os produtos informáticos necessários às variadas aplicações da gestão dos

serviços da Comunidade.

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**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
**MULTIFUNCIONAL**  
  
— SICRUM —

UM PROJECTO PILOTO DE CADASTRO URBANO

ANTÓNIO J. CARDOSO e  
JOÃO BRANDÃO SOARES

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Um  
projecto  
piloto  
de  
cadastro  
urbano

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João Brandão Soares (CCRC)

Lisboa, 20-21 de Novembro de 1989  
Funchal, 22-25 de Novembro de 1989

# Um projecto piloto de cadastro urbano

António José Cardoso \*  
João Brandão Soares \*\*

## Sumário:

1. A ideia
2. Esboço do projecto
3. Objectivos
4. Interesse regional do projecto

## Resumo:

Com a presente comunicação, os autores pretendem dar a conhecer as linhas essenciais de um projecto piloto para desenvolvimento de um cadastro da propriedade de fins múltiplos num centro urbano de média dimensão, recorrendo às modernas tecnologias. É ainda referido o conjunto de vantagens que se julga poder vir a colher com tal iniciativa, sobretudo na perspectiva do desenvolvimento urbano e regional equilibrado.

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## 1. A ideia (\*)

### a) A cooperação luso-dinamarquesa na origem do projecto

Os primeiros contactos da Comissão de Coordenação da Região Centro – CCRC – com a experiência dinamarquesa em matéria de ordenamento do território, cartografia, cadastro e fiscalidade da propriedade (tributação e avaliação prediais) ocorreram com:

- a participação do especialista Anders Müller no Seminário Internacional sobre a Problemática da Tributação Local (Coimbra, CCRC/OCDE, 7 e 8 de Abril de 1988), tendo então sido realizadas reuniões preliminares sobre possíveis linhas de cooperação a prosseguir;
- a visita à Dinamarca de uma delegação portuguesa (constituída por dois técnicos da Direcção-Geral das Contribuições e Impostos – DGCI – e por um dos autores) entre 1 e 4 de Agosto de 1988, para conhecer *in loco* os sistemas de informação territorial, avaliação, tributação e registo prediais;
- a visita a Portugal dos especialistas dinamarqueses Anders Müller e Gregers Mørch-Lassen (pertencentes ao Statsskattedirektoratet – Danish Inland Revenue Directorate, correspondente à DGCI), ocorrida em 9-21 de Novembro de 1988.

Justo será salientar aqui o papel central desempenhado nestes contactos pelo então Presidente da CCRC e responsável pelo grupo da contribuição predial no quadro da Comissão da Reforma Fiscal, Prof. Doutor Manuel Porto.

Na sequência destes contactos e aproveitando a larga e bem sucedida experiência dinamarquesa neste domínio, foi decidido propor a realização de um projecto piloto de cadastro da propriedade de fins múltiplos num centro urbano de média dimensão, tendo sido preparado pelos especialistas dinamarqueses um documento preliminar sobre o assunto [1]. À data de elaboração da comunicação, a CCRC, que tem estado particularmente atenta ao desenvolvimento desta cooperação, tem pugnado para que a escolha do centro urbano alvo do projecto piloto venha a recair numa cidade da Região Centro, tudo parecendo apontar para que seja Coimbra a cidade eleita. Nesta conformidade, já foi solicitado à Câmara Municipal de Coimbra que manifeste à CCRC o interesse na sua execução e na envolvimento de representantes e técnicos municipais. Ocorreu uma deslocação a Coimbra no dia 29 de Maio de 1989 de técnicos dinamarqueses, para um contacto com a Câmara Municipal, designadamente para discussão preliminar sobre o documento 'draft', para observação da cartografia disponível e para recolha de informações sobre o sistema de digitalização que o município irá utilizar. O facto de ser o Statsskattedirektoratet a encabeçar estas acções de

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\*) As ideias expressas pelos autores não comprometem, de forma nenhuma, os organismos envolvidos e a envolver no projecto descrito. Por outro lado, é importante assinalar que, tratando-se de um projecto cuja implementação não foi ainda iniciada, é previsível que a sua forma venha a sofrer alterações significativas. Mais não pretendemos do que a divulgação da sua forma actual, solicitando-se desde já a todos os leitores a formulação de críticas e sugestões susceptíveis de enriquecer os resultados a obter.

cooperação não exclui o envolvimento, aliás já assegurado pela própria vontade manifestada pelas autoridades dinamarquesas, de outros departamentos oficiais e empresas privadas do Reino da Dinamarca. É já seguro que a Datacentralen (agência nacional de serviços de informática) e o Matrikeldirektoratet (Danish National Survey and Cadastre, organismo responsável pela produção oficial de cartografia) têm interesse em estar envolvidos no processo de cooperação.

A Câmara Municipal de Coimbra já manifestou a sua adesão de princípio ao projecto, aguardando-se uma melhor definição de alguns detalhes para que a adesão seja tornada definitiva.

É ainda importante reflectir sobre as perspectivas de financiamento que se abrem para a execução deste projecto piloto. O financiamento do FEDER (Fundo Europeu de Desenvolvimento Regional) parece ser a possibilidade mais vantajosa. Tal cooperação financeira comunitária não exclui a cooperação e o envolvimento técnico de diversos departamentos da Administração Central e de Empresas Públicas, que podem ter grandes vantagens em estar associados ao projecto.

#### **b) As questões da tributação predial na origem do projecto**

A importância determinante que deverá passar a ter a contribuição predial autárquica no quadro das receitas municipais só será alcançada se, como é oficialmente reconhecido, se proceder a uma revisão das normas de avaliação das propriedades rústicas e urbanas, visando, "(...) com encargos administrativos mais baixos, uma determinação mais rigorosa da matéria colectável e um reforço das garantias dos contribuintes (...)" [2].

Uma das aplicações, porventura não fundamental [3], dos sistemas cadastrais é o fornecimento de dados para a tributação e avaliação prediais.

A Lei de Bases da Reforma Fiscal (Lei nº 106/88, de 17 de Setembro) instituiu um novo imposto sobre o valor patrimonial dos prédios (arrendados ou não) — a contribuição predial autárquica.

Até agora, a contribuição predial incidia sobre o rendimento, assumido como real e efectivo, mas, em muitos casos, a dificuldade na sua determinação levava a que fosse tributado o rendimento normal presumido. A antiga forma de contribuição predial, abarcando os prédios urbanos e rústicos, regia-se por um Código de 1963, pontualmente alterado [4]. A contribuição predial autárquica, baseando-se no valor patrimonial, obriga a criar um sistema de avaliações completamente novo. Até à implementação desse novo sistema, os valores patrimoniais serão calculados através da multiplicação dos valores locativos existentes por um determinado factor [5].

#### **c) As referências dos especialistas dinamarqueses: adaptação a Portugal [4]**

A experiência dinamarquesa alicerça-se no desenvolvimento dos sistemas de informação territorial, incrementado nos últimos vinte anos com a criação de uma rede de sub-sistemas, que produziu uma longa série de utilizações mais específicas e precisas (designadamente, gerando facilidades no ordenamento do território, na gestão municipal de terrenos, na administração das licenças de construção, na expansão e manutenção de infraestruturas, no planeamento, projecto e gestão das redes de energia, comunicações e saneamento básico, na reabilitação urbana, no controle ambiental, nas tarefas de protecção civil e defesa nacional, etc.). Esta extensão do sistema foi conseguida em grande parte pelo uso de computadores e foi realizada na perspectiva das aplicações



múltiplas. Como parte deste sistema, a avaliação predial baseia-se nas informações do registo predial, do registo das vendas e do registo de edifícios e de fracções. O último dos três registos referidos, iniciado entre 1977 e 1979, permite estabelecer a ponte entre os vários sub-sistemas de informação territorial (o cadastro, o registo predial, o registo municipal da propriedade e o registo das vendas) e os sistemas que usam o nº de identificação pessoal ou a morada como identificação. Este registo de edifícios e de fracções contém diversas informações:

- a propriedade, que pode englobar várias edificações, o tipo de posse e os sistemas de abastecimento de água e de drenagem de esgotos;
- o edifício, que pode englobar várias fracções, com as finalidades, a acessibilidade a estradas, o nº de fracções, os anos de construção e beneficiações, o tipo de estrutura (betão armado ou não), os materiais das paredes exteriores, o nº de pisos, a área de sótão, a área total em planta, a existência de elevador, as instalações de aquecimento e o tipo de energia ;
- a fracção (habitacional, comercial, etc.), com o uso que lhe é dado, área total e útil, tipologia, existência de instalações sanitárias e cozinha, o proprietário e a renda (cfr. [4]).

Para a concretização do projecto, deveremos adaptar a experiência dinamarquesa à situação nacional, sendo fundamental auscultar a opinião da(s) autarquia(s) envolvida(s) – verdadeiro(s) "dono(s) da obra" – acerca de outros detalhes de informação sobre as propriedades que se entenda conveniente armazenar. Apesar disso, também aqui a participação dinamarquesa deve ser exigida, dado que a experiência que nesse país já existe permitirá estabelecer a conexão entre a quantidade de dados a recolher e o volume de investimento que essa recolha implica. Para termos uma ordem de grandeza das operações envolvidas, segundo o último recenseamento da habitação, o concelho de Coimbra possuía, em 1981, 29 782 edifícios com 44 475 alojamentos. Estes são os "números oficiais" que conseguimos obter, não custando admitir que os números reais actuais os excedem largamente.

## 2. Esboço do projecto

Em Portugal, como é sabido, não existe um cadastro da propriedade urbana. Tal como em muitos outros países, a sua urgente produção deverá utilizar as novas tecnologias da informação.

Uma primeira questão é a de determinar a necessidade de realização de um cadastro apoiado em cartografia (e, sendo positiva a resposta, o bom senso implicaria a adopção de cartografia digitalizada) ou se é suficiente criar uma base de dados alfanuméricos sobre a propriedade (sendo então boa regra ter a possibilidade de referenciar os dados ao lugar, através de um sistema de coordenadas geográficas) (\*). Em qualquer dos casos, o município de Coimbra apresenta boas condições de aplicação, pois, em paralelo, tem já adjudicada a digitalização da cartografia de boa parte do concelho, incluindo toda a zona urbana e de expansão. Saliente-se até o empenhamento do município em incluir como parte integrante do projecto piloto a fase do processo de obtenção de cartografia da zona mais fortemente urbanizada do concelho.

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(\*) Uma boa descrição das relações entre cadastro e cartografia pode encontrar-se em Anders Müller, [6].

Qualquer sistema de cobertura cartográfica de actualização permanente, designadamente dos perímetros urbanos (áreas em que as alterações ocorrem mais rapidamente), deverá ter uma forte participação das autarquias locais, dado que estas entidades gerem ou tendem a gerir uma parte substancial das redes e equipamentos de utilização colectiva e são licenciadoras de substancial parte das modificações da morfologia urbana do seu território. A criação de sistemas de informação geográfica de âmbito municipal é da responsabilidade dos municípios. A introdução de meios automáticos permite, com base em cartografia de grandes escalas, acelerar a elaboração do cadastro urbano. Este último é um instrumento de grande relevo em planeamento urbanístico, registo predial, avaliação para efeitos fiscais e projecto de infraestruturas e equipamentos. Uma moderna concepção de cadastro urbano incluirá a criação de registos informáticos englobando, entre outros elementos, uma caracterização de cada prédio [4].

As operações relativas a informação e avaliação prediais exigem a utilização de vários registos. Então, é conveniente que se observem algumas regras básicas na sua gestão, a saber:

- a identificação de cada propriedade deverá ser única e inequívoca em cada registo;
- a definição de cada propriedade deverá ser idêntica em todos os registos;
- a programação de cada registo deve habilitá-lo a ser compatível com todos os outros com os quais está ou poderá estar relacionado, bem como permitir a agregação de dados para níveis regionais e nacionais;
- a actualização e correcção dos registos deve constituir um processo permanente, o que é mais fácil se forem objecto de múltiplas utilizações e se estiverem integrados no conjunto das actividades da administração local [4].

O objectivo primordial do projecto-piloto consistirá na criação de uma base de dados informatizada, alfanumérica (letras e números), necessária para o cálculo automático de valores imobiliários [1]. Para a concretização deste objectivo, foi previsto o seguinte desenvolvimento para o projecto (adaptado de [1]):

- relatório preliminar de que conste a informação requerida, como pode ser obtida e actualizada, qual a estratégia a longo prazo com vista ao desenvolvimento da avaliação informatizada e indicando qual a informação complementar a incluir no cadastro multifuncional e o modo como essa informação pode ser utilizada;
- aquisição do 'hardware' informático necessário, apontando-se para uma solução tendo em vista a compatibilização de ficheiros que garanta a transferência entre a base de dados e o futuro sistema de actualização da cartografia, intimamente ligado ao processo de digitalização de cartas, já adjudicado;
- realização das actividades cartográficas;
- preparação do pessoal para recolha de dados;
- desenvolvimento de um sistema de base de dados;
- recolha de dados;
- introdução de dados;
- formação de quadros permanentes;

- relatório descritivo e avaliador do projecto-piloto, incluindo a estratégia com vista à criação de bases de dados informatizados em todas as áreas urbanas [1].

Um orçamento preliminar para o projecto piloto, a desenvolver em cerca de ano e meio e incluindo a execução da cartografia digitalizada das áreas urbana e de expansão da cidade, aponta para valores entre 100 e 150 mil contos, o que, mesmo sem financiamento externo, garantiria um "pay-back" seguramente inferior a dois anos, como veremos, pelos ganhos directos do município ao nível das suas receitas, para além de outras vantagens substanciais que do projecto resultarão.

### 3. Objectivos

Uma questão que se pode desde logo colocar é a de que, sendo tão premente promover a elaboração do cadastro das áreas urbanas em Portugal, para quê um projecto piloto e não o pronto lançamento da cobertura integral das áreas urbanas e urbanizáveis. Trata-se, na realidade, de uma tarefa grandiosa, sendo antes de mais adequado afinar uma metodologia correcta para a sua concretização. As estimativas do custo e da demora da criação de uma base de dados para a avaliação dos 3,4 milhões de propriedades urbanas, sob a forma de valores médios sujeitos a um grande desvio, apontam para 1,75 milhões de contos e 3,5 anos [1]. A experiência de outros países mostra que a criação da base de dados constitui em grande medida o "estrangulamento" do processo de informatização da avaliação. A criação dessa base é extremamente morosa e dispendiosa [1].

O elevado custo dessa operação, bem como a incerteza na quantidade e qualidade de informação a recolher (que, aliás, também depende muito do modelo de avaliação a adoptar no novo Código das Avaliações), constituem uma boa razão para que se comece com um projecto-piloto [1]. Este projecto, dado que decorrerá a uma escala municipal ou infra-municipal, permitirá uma multiplicidade de utilizações extra-fiscais. Cumpre então perguntar como se assegura:

a) que os resultados, esperados muito positivos, vão aproveitar à escala nacional? Dado que o modelo a desenvolver a nível nacional será centralizado, como garantir desde já que a DGCI irá "aprender" com esta experiência piloto a nível local? Sugere-se então o envolvimento financeiro e técnico da DGCI;

b) que os resultados extra-fiscais, quando se passa para outros municípios e para a escala nacional, poderão ser aproveitados? Sugere-se que seja criado um comité de acompanhamento do projecto, com estrutura muito leve, para o qual deverão ser convidados a Associação Nacional dos Municípios Portugueses e os Gabinetes de Estudos e Planeamento dos Ministérios;

A importância que hoje assumem as aplicações tributárias do trabalho de registo cadastral da propriedade deve-se, essencialmente, aos seguintes factores:

- desde logo, os méritos que podem ser reconhecidos à tributação de situações ligadas à propriedade, por exemplo como forma de tributação de riqueza ou de promover uma maior responsabilização da administração, na lógica do princípio do benefício [4];

- a procura da promoção de uma efectiva justiça fiscal, sendo o cadastro uma indispensável base de trabalho para a realização de uma correcta e sistemática avaliação (ou reavaliação) das propriedades prediais [4];
- a necessidade de encontrar meios de rendibilização dos organismos que se dedicam a estas tarefas, geralmente muito dispendiosas. São geradas novas receitas devido ao cálculo actualizado dos rendimentos colectáveis das propriedades. No caso português, estima-se em vários milhões de contos anuais o aumento de receitas fiscais que proviria da actualização global do nosso cadastro [4]. Só para o caso do município de Coimbra, cuja receita anual em contribuição predial ronda os 400 milhares de contos, o aumento previsível de receita, devido apenas à realização de um cadastro sistemático e actualizado – e não resultante de qualquer agravamento fiscal – é, no mínimo, da ordem dos 100 mil contos anuais.

#### 4. Interesse regional do projecto

Para além dos méritos do projecto piloto em matéria de eficiência e equidade fiscais e de relação positiva na comparação benefícios / custos, o projecto apresenta um inegável interesse na perspectiva do desenvolvimento urbano e regional equilibrado.

Como já referimos, os resultados do projecto-piloto poderão ser utilizados como base para uma estratégia visando a criação de uma base de dados em todas as áreas urbanas [1].

Em Portugal, é de esperar que pelo menos 10 milhões de contos venham a ser dispendidos no decurso dos próximos 10 anos na informatização das informações respeitantes ao território e na elaboração de mapas para estas actividades, nas áreas urbanas [1]. Por outro lado, deverá ser atribuída prioridade às áreas urbanas e as soluções que possibilitem utilizações múltiplas são preferíveis [7]. Esta constitui mais uma razão a favor da realização do projecto-piloto e da inclusão nos seus objectivos da definição do modo como a informação necessária a outras actividades poderá ser integrada num cadastro urbano polivalente e de qual a estratégia a seguir com vista à criação de mapas e cadastros nas áreas urbanas [1].

Na realidade, a forma como se estão a processar as modificações da estrutura urbana de Portugal, designadamente da sua Região Centro, exige a realização de um grande esforço de obtenção de informação integrada, sistemática e de actualização permanente. Esta será a única possibilidade de garantir um correcto e atempado ordenamento do território e uma eficaz gestão dos recursos naturais disponíveis.

A Região Centro possui, como é sabido, uma ainda reduzida taxa de urbanização, mas o ritmo de crescimento das suas áreas urbanas é extremamente acelerado. Esta situação, quantitativamente semelhante no Litoral e no Interior da Região, reflecte porém formas de organização e ocupação espacial distintas: no primeiro caso, avulta uma excessiva pressão urbano-industrial; no segundo, é característica dominante a polarização com rápidos ritmos de crescimento [8]. Em ambos os casos, trata-se de fenómenos que obrigam a redobrados esforços de ordenamento e planeamento territorial.

Por outro lado, é objectivo regional o reforço da rede urbana e da sua hierarquia, com a finalidade de conferir uma maior coerência ao sistema de povoamento [8].

Da multiplicidade de utilizações extra-fiscais que o projecto pode permitir, são de destacar as que respeitam ao ordenamento do território (política municipal de solos, administração das licenças de construção e reabilitação urbana) e ao planeamento e gestão das redes colectivas. Estas considerações levam a atribuir todo o interesse a iniciativas como a que se descreveu, visando obter informações rigorosas sobre o território urbano, sua envolvente e seus ritmos e formas de evolução.

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SEMINARIO INTERNACIONAL  
SOBRE  
CADASTRO RUSTICO E URBANO  
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— SICRUM —

NOVOS RUMOS PARA O CADASTRO  
DA PROPRIEDADE RUSTICA E URBANA

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## NOVOS RUMOS PARA O CADASTRO DA PROPRIEDADE RÚSTICA E URBANA

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### Sumário:

O objectivo desta comunicação é apresentar algumas ideias e propostas de actuação que permitam passarmos de uma fase complexa de produção cadastral essencialmente dirigida para a tributação fiscal - o actual Cadastro Geométrico da Propriedade Rústica - para uma fase verdadeiramente evoluída, baseada em soluções digitais simples integradas numa perspectiva multifuncional, preferencialmente relacionada com os aspectos de planeamento e jurídico sem esquecer a componente fiscal. Procura-se, deste modo, atingir o chamado Cadastro da Propriedade Imobiliária ou Cadastro de Imóveis, acompanhando e apoiando o desenvolvimento económico e social do País.

Neste contexto, propõem-se alterações na organização, gestão e metodologias actuais, que contribuirão para a definição conceptual e progresso do Cadastro, com ênfase para a conservação cadastral, normalização de dados e dos processos produtivos e formação técnica/profissional a todos os níveis.

### Abstract:

The objective of this technical paper is to present some ideas and proposals for the cadastral activities, which will enable to surpass the prevailing complex process of the Rural Geometric Cadastre, mainly oriented to fiscal taxation - in order to reach real an evolution, based on simple digital solutions integrated on a multipurpose perspective, taking into account the planning and legal aspects, without forgetting its fiscal component. This way, one is looking for a Real State Cadastre, following and supporting the requirements and demands of the social and economic development of the country.

Thus, some changes on the present organization, management and methodologies are put forward, trying to contribute for a definition of cadastral concepts and its progress emphasizing the cadastral maintenance/updating, standardization of land related data, working methodologies and professional education at all levels.



## 1 - CONCEITO GERAL DE CADASTRO

O desenvolvimento do tema do Cadastro da Propriedade Rústica e Urbana pressupõe que se defina, à priori, o que se entende por Cadastro dadas as diferentes interpretações que a definição suscita especialmente no nosso País.

Assim, definirei o Cadastro no seu conceito geral de registo sistemático e actualizado dos dados referentes às propriedades ou sejam os prédios nas suas componentes descritiva (índice cadastral), numérica (elementos de medição) e gráfica (cartas cadastrais).

A recolha dos dados referentes ao proprietário está estritamente ligada aos dados referentes à propriedade constituindo a componente jurídica do Cadastro (Registo Predial).

É também usual nesta definição a introdução dos dados referentes à avaliação cadastral dos prédios, essencialmente para fins fiscais, como é o caso do Cadastro Português.

É fundamentalmente sobre o primeiro parágrafo desta definição, ou seja sobre o conceito específico e restrito de Cadastro que irá incidir esta comunicação.

### 1.2 - PRINCIPAIS FINALIDADES DO CADASTRO

Este estudo será orientado tanto para os aspectos de gestão como de metodologias e processos de trabalho, evidenciando as principais vantagens de um sistema cadastral tendo em vista a correcta persecução dos objectivos fundamentais do Cadastro da Propriedade Rústica e Urbana que serão:

- a definição inequívoca da propriedade bem como do proprietário permitindo a sua correcta e objectiva identificação com grandes vantagens, especialmente nos meios das transferências imobiliárias.
- a base de um sistema de planeamento e ordenamento do território como referencição privilegiada de elementos indispensáveis ao conhecimento da situação urbanística e estrutura fundária, à conservação da natureza e preservação das condições ambientais, etc.
- fornecer estatísticas necessárias a vários sectores da administração e a entidades privadas.
- a base mais fiável à constituição de sistemas de informação geográfica ou territorial.
- e por último a sua tradicional orientação como base a uma justa e correcta fixação da tributação fiscal.

## 2 - PORQUÊ NOVOS RUMOS PARA O CADASTRO?

A tentativa de nos enquadrarmos dentro das modernas tendências do Cadastro e o atendimento de solicitações internas bastante concretas leva-nos a propor algumas medidas que irão alterar substancialmente a gestão e técnicas utilizadas no Cadastro nos últimos tempos. Uma das razões que, só por si, justificaria estas medidas reside no facto do Cadastro, tal como tem sido executado e conservado, não responder cabalmente às exigências da actualidade nos diversos campos do desenvolvimento, quer a nível central, quer regional e local.

Além disso, assiste-se, actualmente, a uma louvável consciencialização da importância do Cadastro, tanto por parte dos utentes que procuram cada vez com maior frequência esse tipo de informação como, até, por parte dos próprios técnicos e gestores dos organismos responsáveis que, durante tanto tempo, não atribuíram o justo valor às actividades cadastrais.

## 3 - ORGANIZAÇÃO E METODOLOGIAS: SUA ANÁLISE E PERSPECTIVAS DE EVOLUÇÃO

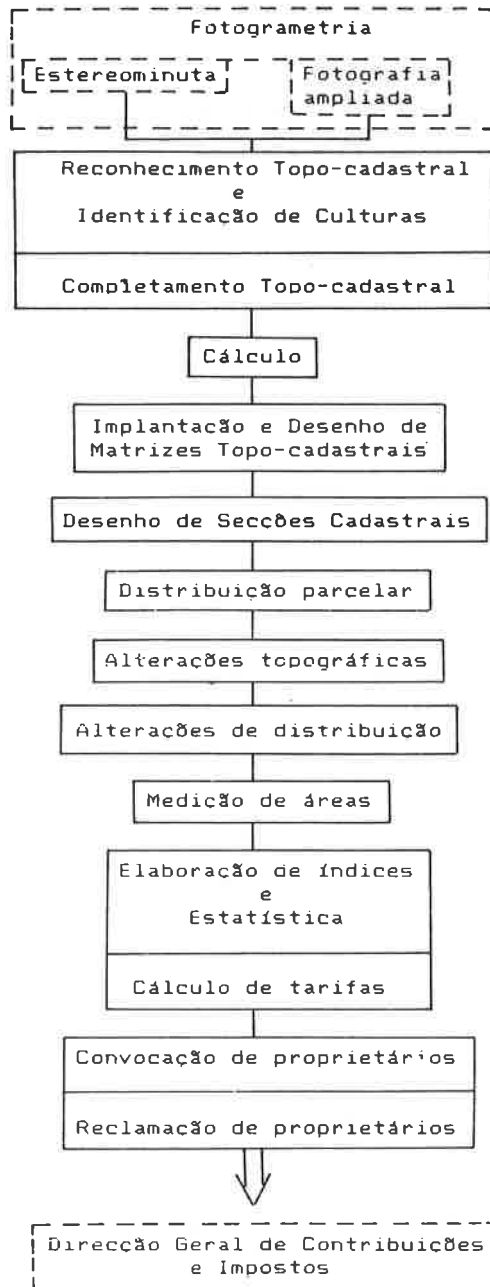
Para compreendermos as perspectivas cadastrais no futuro é necessário apresentar, ainda que sucintamente, uma panorâmica da situação actual do Cadastro Geométrico da Propriedade Rústica.

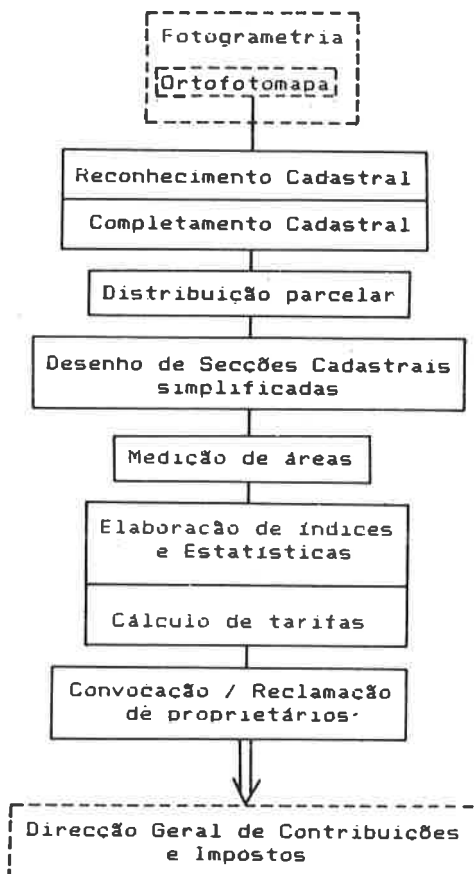
### 3.1 - PRODUÇÃO CADASTRAL: METODOLOGIAS

Existem duas linhas de produção de Cadastro:

- a primeira, seguida desde os anos 50 e tendo terminado em termos de actividades de campo em 1983, é constituída por restituição analógica, completamente topo-cadastral e distribuição parcelar. (ver esquema na página 3A).
- e a segunda, desde 1982-83, é baseada no reconhecimento e complemento cadastral sobre ortofotomapas seguido de distribuição parcelar. (ver esquema na página 3B).

Nestas duas linhas de produção não estão mencionadas operações respeitantes à verificação da qualidade do reconhecimento e complemento topo-cadastral e cadastral e revisões à implantação, desenho e medição de áreas, bem como a revisão final de todo o trabalho de uma determinada freguesia ou concelho, estabelecendo-se definitivamente a correspondência entre os elementos da parte descritiva do Cadastro (informação alfanumérica) e as cartas cadastrais ou topo-cadastrais (informação gráfica).





### 3.2 - ANÁLISE DOS DOIS PROCESSOS DE TRABALHO

O chamado Cadastro Geométrico de precisão, cujo processo de execução é baseado na restituição analógica, é bastante mais preciso e mais completo fornecendo informação cadastral e topográfica, no entanto é mais moroso obrigando, tal como está organizado, a uma repetição de actividades idênticas em várias fases do processo (ex: listas de proprietários e respectiva numeração de prédios) que introduz erros e provoca enganos cuja clarificação vai onerar o processo.

O Cadastro inventarial e fiscal, baseado no reconhecimento cadastral sobre ortofotomapas, apresenta uma melhor relação entre o tempo e a obtenção de resultados em detrimento da precisão e da aquisição de informação topográfica seleccionada, no entanto é rico em termos de informação fotográfica não seleccionada conseguindo-se em paralelo com a altimetria (junto ou em separado) um conjunto que permite responder a grande variedade de solicitações.

Um dos principais inconvenientes é a sua forma analógica devendo proceder-se a um processo de digitalização exaustivo para obter uma cartografia digital.

### 3.3 - ALTERAÇÃO DE METODOLOGIAS

Da análise das metodologias de produção cadastral na componente rústica do Cadastro da Propriedade e atendendo às necessidades actuais visando a elaboração do cadastro, tanto Rústico como Urbano, propõe-se a constituição de duas outras linhas de produção alternativas baseadas em métodos simples e eficientes, tendo em vista a rápida concretização do cadastro:

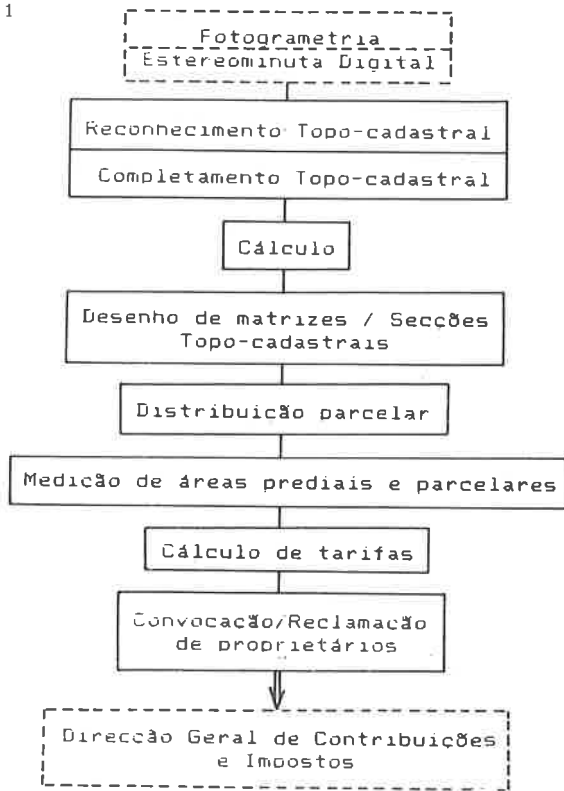
A primeira, no caso mais geral em que se proceda à avaliação cadastral em simultâneo com a elaboração do cadastro. (ver esquema 1 na pág. 4A).

A segunda visando a elaboração do cadastro atendendo apenas à sua perspectiva geométrica e inventarial sem avaliação cadastral (ver esquema 2 na pág. 4A).

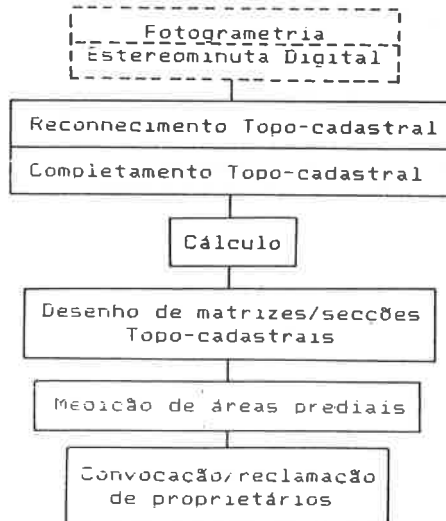
Para optimizar o processo dever-se-á proceder à simplificação de algumas tarefas em simultâneo com a criação das novas linhas de produção.

A elaboração de índices e estatísticas bem como outras tarefas inerentes ao processo de produção cadastral não foram consideradas nos esquemas anteriores, pois serão executadas rapidamente e em simultâneo, em virtude da utilização dos programas de cálculo adequados.

Esquema 1



Esquema 2



### 3.4 - ALTERAÇÕES NA GESTÃO E ORGANIZAÇÃO

Para implementar as soluções preconizadas em termos de metodologias será imprescindível alterar alguns aspectos organizativos que foram e são responsáveis por uma menor produção cadastral introduzindo custos acrescidos em todo o processo cadastral.

Assim, dever-se-á, numa primeira fase, reestruturar as Direcções de Serviços relacionadas com o Cadastro criando-se uma Direcção de Serviços que seja responsável por todo o Cadastro e outra que seja responsável por toda a Avaliação Cadastral.

A Direcção de Serviços de Cadastro teria a competência para efectuar todo o levantamento cadastral e respectivos cálculos, elaborar índices e cartas/secções cadastrais, além de efectuar o apoio topográfico e delimitação e demarcação das circunscrições administrativas.

A Direcção de Serviços de Avaliação teria por competência o estudo das bases de avaliação e a distribuição parcelar, tanto rústica como urbana, destinados à tributação fiscal e outros tipos de avaliação destinados a expropriações e outros fins.

Deverá ser alterada a filosofia de implantação das Delegações Regionais e seu relacionamento com as Direcções de Serviços de Cadastro e de Avaliação Cadastral.

Deverão ser reformuladas as competências e atribuições do Centro de Informática na área do Cadastro. Paralelamente deverá haver reestruturação do Conselho de Cadastro no que respeita à sua forma de actuação. O Conselho Técnico de Cadastro deveria ser reactivado, pois o seu papel tem sido praticamente esquecido a ponto de não dar pareceres nem reunir. Caso não haja condições para ser reactivado, então que seja extinto.

Novas medidas ao nível da Gestão Cadastral deverão ser tomadas de forma a viabilizar a nova organização e aprofundar o carácter científico da gestão cadastral tornando o Cadastro mais autónomo, tanto técnica como financeiramente.

A ligação do Cadastro ao Registo Predial será aconselhável tendo em vista a concretização da componente jurídica do Cadastro cumprindo-se assim uma importante finalidade do Cadastro.

### 4 - TRANSFORMAÇÃO DO CADASTRO ANALÓGICO GRÁFICO EM CADASTRO DIGITAL E/OU CADASTRO POR COORDENADAS

Em relação aos concelhos que dispõem de cartas topo-cadastrais ou simplesmente cadastrais, as soluções preconizadas para a transformação da informação analógica em digital englobam técnicas de digitalização manual "off line" passíveis de posterior tratamento interactivo e técnicas de digitalização automática por rasterização "Scanning".

A opção técnica a adoptar passa por um rastreio exaustivo da situação quanto ao estado de conservação e actualização cadastral das plantas e secções cadastrais, sendo a digitalização manual empregue nos casos em que as técnicas de rasterização "Scanning" exijam a recuperação prévia das cartas por métodos de beneficiação laboratorial demasiado dispendiosos.

é de prever, contudo, que no futuro próximo se assista ao encarecimento da mão-de-obra e ao aperfeiçoamento das técnicas de "Scanning" tornando viável o tratamento laboratorial das cartas antigas segundo de digitalização automática.

Em virtude das cartas antigas a digitalizar apresentarem variações de escala devido à deficiente qualidade dos suportes cartográficos, constituídos por vezes por papel vulgar ou cartão sujeito a deformações, a digitalização manual deverá ser acompanhada da aplicação de transformações matemáticas calculadas com base em pontos de coordenadas conhecidas, além das transformações afins inerentes ao próprio processo de digitalização.

Nas zonas em que pela qualidade e natureza dos levantamentos cadastrais seja possível o cálculo de coordenadas, o melhor método de conseguir uma carta digital com maior precisão será proceder ao cálculo de coordenadas analíticas através dos elementos de medição de campo disponíveis. Esta operação combinada com a cartografia básica em forma digital - ainda que morosa - e por isso dispendiosa, terá viabilidade por uma questão de diversificação de estratégias. Esta diversificação poderá contribuir para aliviar a carga sobre determinados equipamentos e aproveitar a mão-de-obra existente sem recorrer a dispendiosos programas de formação ou aperfeiçoamento profissionais.

Há, contudo, casos extremos em que a recuperação das cartas topocadastrais não deverá ser possível devido à desactualização, tanto da cartografia básica como do cadastro, proveniente de uma conservação cadastral desastrosa ou praticamente nula. Sendo nestes casos necessário uma renovação cadastral ou seja a execução de nova cartografia básica e novo levantamento cadastral aplicando-se a solução indicada para os novos concelhos a cadastrar.

Saliente-se que nos concelhos em que foi utilizado o sistema de coordenadas Bessel-Bonne devemos proceder à transformação de coordenadas de modo a uniformizar com o sistema padronizado para a maioria dos levantamentos cadastrais ou seja o sistema Hayford-Gauß. No capítulo da escolha do Datum também devemos utilizar de preferência um único Datum.

## 5 - CONSERVAÇÃO CADASTRAL

Sob Conservação Cadastral designamos, no sistema em vigor um conjunto de operações que permitem a actualização do Cadastro, tais como a resolução de processos de reclamação administrativa e a revisão cadastral.

Sendo este um capítulo em que é urgente tomar medidas que evitem a progressiva deteriorização da situação e se não caia nos casos extremos que referi anteriormente.



A desactualização cada vez maior do Cadastro leva a interrogarmos sobre o sistema de conservação cadastral.

Lembramos que um Cadastro sem conservação/actualização deixa de cumprir as funções para que foi criado levando a dizer-se que "Cadastro sem conservação não é Cadastro".

Para que se modifique a situação devemos actuar em duas frentes:

1ª alterar a metodologia de conservação revendo-se a situação dos processos de reclamação administrativa.

2ª conjugar esforços para que, através de legislação mais apropriada, as entidades intervenientes na conservação cadastral cumpram as normas estipuladas.

Quanto à 1ª: A conservação devia servir para manter ou melhorar a qualidade da informação cadastral, tanto a nível descritivo como cartográfico o que não tem acontecido, nomeadamente no que respeita à parte cartográfica, devido à utilização quase sistemática de processos de levantamentos gráficos, que a breve trecho, ainda que devidamente aplicados, conduzirão a situações insustentáveis obrigando a novos levantamentos. Esta situação atingir-se-á tanto mais depressa quanto pior for a qualidade do levantamento inicial e quanto maior for a frequência das alterações.

O desenvolvimento regional integrado introduz alterações no que respeita à implantação e transformação de estruturas a todos os níveis vindo a acelerar o processo de desactualização e impondo novas exigências em termos de volume e precisão da informação topo-cadastral.

Dai que, nos últimos anos, se assista à progressiva tomada de consciencialização da situação cadastral.

No sistema de conservação em vigor as alterações topo-cadastrais tais como, divisão de prédios, implantação de novas construções, vias de comunicação, etc., são introduzidas recorrendo a métodos gráficos tanto quanto possível sem alterar as extremas dos prédios primitivos para que não haja alteração de áreas fiscais. Isto provoca uma certa perda de qualidade das cartas quando o levantamento inicial for antigo ou não tiver sido correctamente executado.

A solução a adoptar, ainda que pareça pouco prática, deverá apontar para uma verificação exacta dos limites do prédio objecto do processo de reclamação administrativa quer este seja conduzido por iniciativa do proprietário, pelas autarquias ou pelos organismos cadastrais intervenientes (Delegações Regionais do IGC) efectuando-se o levantamento com a precisão exigida para as plantas novas.

Caso haja alteração de área que exceda as tolerâncias admitidas, isso deverá ser comunicado aos proprietários confinantes, às entidades intervenientes no processo (Finanças e Registo Predial) bem como ao proprietário ou proprietários em questão.

Este é um método que a pouco a pouco vai melhorando a precisão das plantas cadastrais antigas e que também pode ser aplicado em zonas que disponham de plantas cadastrais recentes, mas que não garantam a precisão desejada.

No campo da avaliação cadastral deveremos seguir o método da revisão periódica do cadastro, pois a conservação pontual não resolve a maioria das alterações de distribuição parcelar.

Na revisão periódica também poderiam ser detectadas alterações topo-cadastrais marginais que por qualquer razão tivessem permanecido no desconhecimento dos organismos cadastrais.

Quanto à 2ª: Para que esta metodologia tenha êxito é imprescindível que todas as entidades, que de uma maneira ou de outra contribuam para as situações de alteração na estrutura e conteúdo das propriedades (prédios), colaborem abertamente informando os organismos competentes.

Estes deverão, por sua vez, responder pronta e adequadamente resolvendo as situações de modo a não entravarem projectos e iniciativas muito caras quer a proprietários quer a órgãos da administração, estabelecendo-se o prazo padrão para a resolução do processo de reclamação administrativa.

Para viabilizar este procedimento os proprietários deverão contribuir financeiramente de modo proporcional ao valor patrimonial do prédio sujeito a actualização, independentemente da distância desse prédio ao organismo ou entidade que proceder à resolução do processo de reclamação administrativa.

A resolução dos processos deverá obedecer a normas específicas rigorosas, perfeitamente definidas, para que haja total transparência no processo evitando-se situações de aproveitamentos menos lícitos.

Ainda, com o objectivo de minimizar o tempo de resolução dos processos devem os organismos intervenientes proceder aos levantamentos, segundo os métodos uniformizados, de modo a facilitar a sua plena integração no Cadastro.

De notar que, devido ao facto de apenas se executar o Cadastro da Propriedade Rústica, qualquer prédio que for urbanizado ou urbanizável deixará de fazer parte dos registos e das cartas cadastrais, isto é, passará a não constar no Cadastro, pelo que a conservação seria mais eficaz se procedessemos à execução do Cadastro da Propriedade Urbana, explorando-se por completo as potencialidades do Cadastro, que em ligação com o Registo Predial adquiriria a sua verdadeira dimensão ou seja, em última análise, o que designamos por "Cadastro da Propriedade Imobiliária" ou "Cadastro de Imóveis".

## 6 - CADASTRO URBANO: Alguns princípios básicos

É urgente a definição pormenorizada desta componente do Cadastro que se reveste de particular importância numa eficaz política de planeamento urbanístico, em acções de carácter socio-económico, na gestão de redes de distribuição de energia, água, águas residuais, controlo da poluição, etc.

Além disso é uma importante fonte de receitas para as autarquias em virtude da recente introdução da contribuição autárquica.

O desenvolvimento conceptual do Cadastro Urbano assentará em bases análogas à do Cadastro Rústico introduzindo-se uma maior precisão nos levantamentos e procedendo-se à representação cartográfica, na forma analógica, em escalas da ordem de 1/1 000 e 1/500.

Será fundamental para proceder ao levantamento cadastral inicial e à posterior conservação cadastral a criação de redes de apoio, quer por adensamento da rede geodésica por processos de trilateração e poligonação ou por GPS (Sistema de Posicionamento Global), quer por métodos de coordenação fotogramétrica de pontos pré-sinalizados.

Essa rede deverá ser materializada no terreno em pontos estratégicos que permitam boa visibilidade e se mantenham o mais possível inalteráveis.

As técnicas a adoptar na recolha de dados da componente urbana do cadastro devem basear-se na restituição da base cartográfica na forma digital combinada com o levantamento analítico por processos de intersecção inversa e directa ou polar dupla entre outros, utilizando teodolitos informáticos permitindo o registo electrónico das observações.

A utilização exclusiva de ortofotomapas para fins cadastrais não será adequada para zonas urbanas por motivos evidentes, decorrentes da própria concepção dos ortofotomapas.

No entanto, estes poderão ser utilizados como auxiliares na representação de pontos da rede de apoio que servirão de base aos levantamentos cadastrais.

Para responder às solicitações do planeamento urbanístico e da gestão municipal é necessário proceder ao levantamento dos espaços e zonas verdes, bem como dos arruamentos e de outros pormenores topográficos independentemente do seu interesse cadastral próprio.

Devem ser inventariados os edifícios segundo a sua utilização ou destino como, por exemplo, indústria, comércio, serviços, habitação, administrativos, etc..

A identificação dos edifícios existentes num mesmo prédio deve ser feita à base do número da porta além do nome e número da rua.

Esta informação permite uma identificação inequívoca desses edifícios e é de reconhecido interesse para o sector de serviços como as comunicações (postais, telefónicas, etc.) entre outros.

A descrição pormenorizada dos diferentes edifícios pertencentes a diferentes proprietários contém um elevado número de informações que tornam a base de dados mais complexa e exige um grande esforço na recolha de dados pelo que, numa primeira fase e para que se possa avançar mais rapidamente, deveremos optar apenas pela descrição do prédio e do(s) seu(s) proprietário(s).

Para que se mantenha o cadastro das zonas urbanas permanentemente actualizado é necessário um perfeito entendimento entre os sectores técnicos das Câmaras Municipais, eventualmente das Comissões de Coordenação regionais e os organismos ou entidades responsáveis pela conservação cadastral, pelo que deverão ser tomadas medidas que obriguem a procedimentos concretos na transferência de informação, evitando-se, tanto quanto possível, a efectivação de revisões cadastrais periódicas.

É de prever contudo, a renovação do cadastro em zonas em que se pretenda executar projectos específicos que exijam uma maior precisão dos levantamentos viabilizando-se assim a realização da renovação cadastral.

Quanto à avaliação urbana, ela deverá ser baseada no valor de construção dos edifícios e/ou no valor do terreno no mercado, dado que o sistema de rendas de casa em vigor, não permite utilizar com segurança esta informação sobre o rendimento para avaliar justa e correctamente.

Em termos de avaliação também deverão ser efectuadas revisões periódicas a exemplo do que acontece ou deveria acontecer na componente Rústica do Cadastro da Propriedade.

## 7 - NORMALIZAÇÃO

Existem normas e instruções que, devido à falta de divulgação e à sua desactualização em relação às pertinentes necessidades actuais em matéria de informação topo-cadastral, não têm sido utilizadas pelas entidades privadas e mesmo pelos organismos oficiais, o que tem levado a criar sistemas que, neste momento, se mostram incompatíveis ou de difícil compatibilização.

Daí que, uma das prioridades, seja a divulgação das normas existentes no que respeita à cartografia básica analógica e ao cadastro tais como simbologia, formato e tipo de suportes cartográficos e outras indicações quanto a precisão e confiança dos levantamentos e das cartas topo-cadastrais em consequência das metodologias empregues ao longo dos tempos.

Na mesma linha de actuação para os levantamentos topográficos ou cadastrais a executar deveremos proceder à adaptação das normas e instruções existentes em virtude da introdução de novas tecnologias, tanto para garantir a uniformização da informação cadastral, como para homogenização das metodologias a empregar nos levantamentos a nível nacional por parte de outras entidades, que poderão a curto ou médio prazo ser responsabilizadas directa ou indirectamente pela execução e condução dos trabalhos topo-cadastrais tais como, autarquias, organismos de coordenação regional e empresas privadas.

Esta normalização deverá ser elaborada com a participação das várias entidades intervenientes no processo e formalizada de modo a adquirir força de lei para que sejam atingidos os objectivos anteriormente mencionados.

Ao IGC, por força da sua experiência e responsabilidade nesta matéria, julgo que deve competir a sua condução e acompanhamento técnico, tal como a sua verificação na prática, funcionando deste modo como organismo de controlo a nível nacional.

## **B - FORMAÇÃO E APERFEIÇOAMENTO PROFISSIONAL**

As exigências de momento implicam um investimento apropriado no campo da formação técnica, tanto ao nível do aperfeiçoamento profissional devido à introdução de novas tecnologias, como à formação inicial de técnicos. Pois, não é possível descentralizar os centros de produção de cadastro e responsabilizar entidades sem que estas estejam preparadas para assegurar a sua execução em condições técnicas satisfatórias.

Além disso, as entidades que possuem alguma competência técnica para o efeito estão carenciadas de quadros, não conseguindo por isso a sua mobilização para um sector que exige grande número de técnicos em actividades de campo, designadamente nos levantamentos cadastrais.

Quanto aos níveis de formação que deveriam ser criados destacaria a criação de um técnico de nível médio geógrafo (engenheiro técnico geógrafo ou engenheiro técnico topógrafo) que, com uma formação básica relativamente boa, teria funções especializadas, de ordem essencialmente prática com perfeito domínio das técnicas usuais incluindo a operação directa de equipamentos.

Um técnico profissional que se poderia designar por técnico de topografia, que teria a formação básica correspondente ao técnico profissional existente, mas formação específica de acordo com as funções gerais do nível do topógrafo e do desenhador-cartógrafo actuais.

Com estes dois níveis de formação, juntamente com o actual nível de engenheiro geógrafo, estaria criado o leque profissional apropriado à resolução dos problemas técnicos que se deparam às actividades cadastrais no futuro, atingir-se-ia uma situação análoga à existente em outros ramos da engenharia e uma certa correspondência aos técnicos de outros países europeus.

Em qualquer destes níveis a componente de formação específica relativa ao Cadastro deve ser realçada tendo em vista a urgente formação de técnicos nesta área.



**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
**MULTIFUNCIONAL**  
  
- SICRUM -

O CADASTRO COMO SUPORTE DO DESENVOLVIMENTO DA AGRICULTURA

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PORTUGAL

LISBOA, ANCHAL-20 a 25 Novembro de 1989

## 1. Introdução

A adesão de Portugal à Comunidade Económica Europeia provocou alterações profundas na política agrícola portuguesa.

A adopção da Política Agrícola Comum (PAC) e a aprovação do Programa Específico de Apoio à Agricultura Portuguesa - PEDAP, conduziram à criação de medidas que actuam ao nível das estruturas e dos produtos agrícolas com a finalidade de promoverem a modernização e o desenvolvimento deste sector.

A coerência e o impacto que essas medidas têm sobre a agricultura portuguesa depende nomeadamente da objectividade dos dados que serviram de base à sua elaboração.

Da mesma forma, o ajustamento dessas medidas e a elaboração de outras só poderão ser correctamente executadas se a "radiografia do esqueleto" do espaço rural português estiver feita.

O cadastro da propriedade é exactamente a radiografia que contém informação exaustiva sobre proprietários, prédios, localização e uso dado aos mesmos.

Essa informação consoante as necessidades e objectivos visados, pode focar aspectos pormenorizados ou parcelares.

O conhecimento de todos estes aspectos permitirá às entidades responsáveis uma gestão mais adequada e racional dos recursos disponíveis.

## 2. A existência de cadastro é indispensável para a agricultura portuguesa

Portugal é um país com numerosos e graves problemas estruturais no sector agrícola.

Apesar de todos os apoios comunitários, os recursos continuam a ser escassos face nomeadamente às necessidades nos meios rurais em caminhos, redes de rega e enxugo.

Desta forma, a utilização dos meios deve ser criteriosamente estudada.

Dispôr-se de dados de base que permitam estabelecer indicadores que conduzam a decisões quanto a prioridades de actuação, é indispensável quer a perspectiva seja de análise da relação custo-benefício, quer seja de minimizar desajustamentos sociais.

O cadastro da propriedade congrega um conjunto de dados que devidamente relacionados permite produzir alguns indicadores com influência decisiva ao nível da hierarquização de prioridades, e influenciando também a definição de políticas orientadoras.

Mas o cadastro é também de fundamental importância quando se planeiam acções de desenvolvimento regional. A este nível, o Ministério da Agricultura tem tido sérias dificuldades. O instrumento mais recente de Planeamento Agrícola -- PDAR ( Plano de Desenvolvimento , Agrícola Regional ) . pode ver significativamente reduzida a sua possibilidade de sucesso por não dispôr de informação cadastral na maior parte do País -- 52,5 % de Portugal não tem cadastro. Esta situação agrava-se bastante na metade Norte do País onde sómente 2,4 % de 4,5 milhões de ha estão cadastrados .

E precisamente nesta região que se encontram 580000 explorações agrícolas com uma média de 6 blocos por exploração e onde se detetam deficiências mais graves nas redes de caminhos, rega, e enxugo.

Este panorama complexo reforça a necessidade de meios de diagnóstico precisos que suportem o planeamento das acções e dos investimentos públicos a nível regional.

Mas se o cadastro é fundamental para identificar prioridades e planear o desenvolvimento regional e local, torna-se indispensável a sua existência quando se pretende executar projectos integrados de desenvolvimento agrícola.

Nas áreas sem cadastro o período de execução de um projecto aumenta 50 % . E o caso dos projectos de emparcelamento que reorganizam numa dada zona centenas ou mesmo milhares de explorações, criando uma nova situação cadastral.

A inexistência de cadastro e a morosidade da sua execução foi até há pouco tempo um obstáculo fundamental ao alargamento das áreas com projectos de emparcelamento em curso.

Este aspecto é de tal forma importante que tem dificultado a tomada duma decisão rápida e definitiva relativamente ao PNER -- Plano Nacional de Emparcelamento Rural .

O Cadastro Vitícola e Oivícola nacionais têm também sérias dificuldades de execução uma vez que um dos aspectos fundamentais desse cadastro é a sua inserção na propriedade, que não se consegue sem identificar extremas e proprietários.

### 3.0 cadastro necessário à agricultura e compatibilização entre bases de dados e Sistemas informáticos

Não é só a inexistência de cadastro que afecta a implementação de projectos integrados de desenvolvimento nos meios rurais. Também o tipo de cadastro até hoje executado em Portugal, voltado para a tributação fiscal acarreta problemas.



De facto a informação que o cadastro recolhe relativamente aos proprietários não tem rigor e valor jurídico.

Esta situação obriga a uma duplicação de trabalho por parte do M. A. . Quando executa projectos de emparcelamento tem que fazer inquéritos exaustivos para realizar aquilo a que chama " Investigação Jurídica da Propriedade " e apurar os reais titulares dos terrenos.

A informação que se obtém do cadastro depende naturalmente dos dados que foram recolhidos. Esses dados devem corresponder às necessidades das várias entidades utilizadoras.

Por exemplo, não basta saber-se por onde passam os caminhos. E também necessário saber se são privados ou públicos, quais as entidades a que estão afectos, quantos km têm e quais as suas larguras.

A existência deste tipo de atributos é indispensável e contribui para um levantamento e caracterização efectiva da realidade do do nosso País e muito particularmente dos meios rurais.

A forma como são disponibilizados estes dados também é de fundamental importância por forma a não ser necessário repetir trabalhos de digitalização ou quaisquer outros de introdução de dados.

A compatibilização entre os sistemas de informação e bases de dados criadas pelo IGC e os principais organismos utilizadores de informação cadastral é muito importante.

Está nessa compatibilização uma poupança substancial de recursos humanos e materiais.

A DGHEA deverá continuar a ser um interlocutor preferencial do M.A. junto do IGC para definir ligações necessárias e possíveis.

#### 4.A coordenação entre entidades

Fazer cadastro é caro, obriga a recursos financeiros avultados, necessita de meios humanos altamente qualificados e especializados, e equipamentos e materiais dispendiosos.

Portugal não tem recursos infindáveis e desta forma não pode cada entidade pública iniciar uma linha particular de recolha de dados.

A identificação das necessidades de cada entidade e a intensificação do espírito de colaboração entre todas é de primordial importância.

A experiência do Alto Minho é um exemplo importante e frutuoso da coordenação e cooperação institucional neste âmbito.

Em 1988, quando a D.G.H.E.A. iniciou o Projecto de Emparcelamento Rural do Alto Minho, foi confrontada com a inexistência de cadastro.

Executar cadastro com os seus próprios meios acarretaria uma demora significativa na elaboração de projectos de emparcelamento incompatível com as expectativas dos agricultores e a necessidade de aplicar em tempo útil os fundos do PEDAP.

As autarquias, conscientes de que o desenvolvimento das áreas rurais do Distrito de Viana do Castelo, depende decisivamente da implementação de projectos integrados de desenvolvimento através do emparcelamento nestas áreas, mobilizaram-se para ultrapassar este problema.

Elaboraram um protocolo com o IGC, tendo contado com o apoio da DGHEA e da CCRN.

O protocolo prevê a realização de ortofotomapas à escala 1/2000 e do cadastro de propriedade.

Por sua vez o IGC assumiu cabalmente o compromisso, mobilizou grande parte dos seus meios para esta região e tem-se empenhado notavelmente nesta tarefa.

Como resultado, no final do corrente ano ficarão cadastrados cerca de 10000 ha no concelho de Ponte de Lima e poderão iniciar-se acções de emparcelamento em larga escala.

A conjugação de esforços e o empenhamento de todas as entidades é e será sempre determinante para a obtenção de bons resultados.





**SEMINARIO INTERNACIONAL**  
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**CONSIDERAÇÕES SOBRE A NECESSIDADE DE INFORMAÇÃO PARA O  
PLANEAMENTO EM PORTUGAL, RELATIVAMENTE ÀS ACTUAIS ENIGÊNCIAS  
NACIONAIS E COMUNITÁRIAS NESSE DOMÍNIO.**

**RENATO HOMEM**

**PORTUGAL**

LISBOA... NCHAL-20 a 25 Novembro de 1989

SEMINÁRIO INTERNACIONAL SOBRE CADASTRO RÚSTICO E URBANO  
MULTIFUNCIONAL FACE ÀS NOVAS TECNOLOGIAS  
LISBOA 89/11/20

CONSIDERAÇÕES SOBRE A NECESSIDADE DE INFORMAÇÃO PARA O  
PLANEAMENTO EM PORTUGAL, RELATIVAMENTE ÀS ACTUAIS  
EXIGÊNCIAS NACIONAIS E COMUNITÁRIAS NESSE DOMÍNIO.

RENATO HOMEM \*

SUMÁRIO

O Mercado Único Europeu; o FEDER e o seu âmbito de intervenção; o planeamento e a necessidade de informação; A informação Estatística; A informação Cartográfica; Peri-urbanização - um exemplo das recentes dinâmicas do espaço Rural/Urbano; realização de um Estudo e Assistência Técnica no âmbito do FEDER respeitante à Cartografia e Cadastro em Portugal; perspectiva de utilizadores de informação para o planeamento.

SUMMARY

The European Economic Community; ERDF and its domain of intervention; planning activities and the needs of information; Statistic information; Cadastre information; Peri-urbanization - an example of new dynamic of rural/urban spaces; Study and Technical Assistance supported by ERDF; information users perspective in order to plan activities.

Antes de entrar propriamente no tema em debate neste seminário é necessário fazer um enquadramento prévio desta comunicação, relacionado com os grandes objectivos de construir na Europa um grande Mercado Único, num grande esforço conjunto dos Estados-membros que se espera venha a contribuir para o desenvolvimento dos países com mais problemas.

Será feita referência aos instrumentos de que dispõe a Comunidade, com especial realce para o FEDER e as suas intervenções.

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Finalmente, serão tecidas algumas considerações sobre as necessidades de informação para o conhecimento e gestão da dinâmica resultante do esforço de progresso vivido no nosso país, com repercussões espaciais visíveis, realçando-se a importância do Cadastro e a sua situação actual em Portugal.

Como é sabido, e como tem sido amplamente ventilado em todos os Estados-membros da Comunidade, vive-se uma época de profundas reformas a todos os níveis, para a realização em 1992, do Mercado Único Europeu, que permitirá a livre circulação de pessoas, capitais, bens e serviços num grande espaço comunitário.

Nesta perspectiva, enquadradas na Política Regional da Comunidade e tendo em vista o reforço da Coesão Económica e Social prevista no Acto Único Europeu, foram recentemente introduzidas alterações na estrutura e regras de funcionamento dos fundos com finalidade estrutural, (FEDER, FEOGA e FSE), para precisar, racionalizar e coordenar as suas intervenções, entre si, e com as de outros instrumentos financeiros, na prossecução de 5 objectivos prioritários que são :

nº 1 - promover o desenvolvimento e ajustamento estrutural das regiões menos desenvolvidas;

nº 2 - reconverter as regiões, regiões fronteiriças ou partes de regiões (incluindo as zonas de emprego e as aglomerações urbanas) gravemente afectadas pelo declínio industrial;

nº 3 - lutar contra o desemprego de longa duração;

nº 4 - facilitar a inserção profissional dos jovens;

nº 5 - na perspectiva da reforma da política agrícola comum:

a) - acelerar a adaptação das estruturas agrícolas;

b) - promover o desenvolvimento das zonas rurais.

Assim, e com o objectivo de reforçar o impacto da acção estrutural da Comunidade pretende-se duplicar em termos reais até 1993 as dotações dos fundos estruturais relativamente aos valores que tinham em 1987, sendo para as regiões abrangidas pelo objectivo

nº 1 (onde Portugal é considerado na totalidade), duplicadas essas mesmas contribuições até 1992.

O Governo Português, para utilizar os instrumentos comunitários que eram desta forma disponibilizados, teve de explicitar a dimensão dos seus problemas e apresentar um documento de estratégia nacional, de acordo com os figurinos comunitário.

Neste âmbito, a Direcção-Geral do Desenvolvimento Regional coordenou recentemente a elaboração do Plano de Desenvolvimento Regional (PDR) - instrumento estratégico interno da política de desenvolvimento regional para os próximos 5 anos - bem como as negociações com a Comunidade para a aprovação do Quadro Comunitário de Apoio (QCA), que é o actual instrumento contratual com a Comunidade sobre a forma e intensidade das intervenções apoiadas pelos instrumentos estruturais comunitários

Nestes documentos, o FEDER - Fundo Europeu de Desenvolvimento Regional, (que é considerado o mais importante instrumento financeiro da Comunidade destinado a corrigir os principais desequilíbrios regionais da Comunidade) assume grande importância, sendo as suas intervenções, como se sabe, especialmente vocacionadas para o financiamento de:

- investimentos produtivos;
- investimentos de criação e modernização de infra-estruturas que contribuam para o desenvolvimento ou reconversão das regiões em causa;
- acções cujo objectivo seja o desenvolvimento do potencial endógeno das regiões;
- acções de desenvolvimento regional a nível comunitário;
- medidas de preparação, acompanhamento e avaliação necessárias à aplicação dos regulamentos comunitários;
- investimentos produtivos e em infra-estruturas que tenham por objectivo a protecção do ambiente, sempre que ligados a actividades económicas.

Investimentos estes, que se têm manifestado de forma notória em Portugal, principalmente nos sectores da Indústria e do Turismo, nas Telecomunicações, nas utilizações Energéticas de Recursos Novos e Renováveis, nas infraestruturas de Transportes, no Saneamento Básico, nas infraestruturas de apoio ao Ensino, no sector da Saúde, etc, e que têm envolvido todos os agentes económicos e sociais, públicos e privados - Administração Central, Empresas Públicas, Autarquias Locais, Empresas Privadas e outros-.

Todas estas intervenções implicam preocupações com o equilíbrio e desenvolvimento das actividades e populações, preocupações essas, que embora não sejam de hoje, assumem nos nossos dias uma maior importância do que à duas décadas atrás quando começaram a ser sentidas em Portugal pela primeira vez, e que podemos considerar terem atingido um ponto culminante com a elaboração dos dois documentos já referidos , o PDR e o QCA.

Actualmente a perspectiva das intervenções no desenvolvimento regional é substancialmente diferente das anteriormente adoptadas ( incluindo as que tiveram participações financeiras comunitárias ) pretendendo-se privilegiar a situação de cada região, dos seus recursos e potencialidades, na definição das estratégias e formas de actuação, adequando-lhe de forma coerente os tipos e montantes financeiros necessários.

Algumas das modalidades de intervenção que reflectem esta abordagem de forma mais significativa são:

#### PROGRAMAS OPERACIONAIS REGIONAIS

São conjuntos articulados de acções plurianuais e coerentes visando o desenvolvimento estrutural das regiões em atraso de desenvolvimento ou a reconversão das regiões industriais em declínio.

Consideram-se intervenções com impacte bastante significativo, e devem responder a problemas específicos regionais mediante a



aplicação de medidas envolvendo acções num ou mais sectores de actividade que contribuam para a resolução de problemas de desenvolvimento numa região bem delimitada.

### SUBVENÇÕES GLOBAIS

São uma modalidade de intervenção inovadora, especialmente dirigida ao apoio ao desenvolvimento local e valorização do potencial endógeno.

Incluem, entre outros, financiamentos a pequenos projectos de infraestruturas diversas de responsabilidade autárquica, apoios a iniciativas empresariais não enquadradas noutras formas de intervenção estrutural, promoção e divulgação de oportunidades de investimento em sectores estratégicos, e criação de serviços comuns de apoio a empresas ou promotores empresariais.

Como se pode constatar, passa a haver uma maior descentralização das decisões, com uma emergência -> Local -> Regional -> Nacional, de realidades e interesses que é necessário integrar e compatibilizar, num tipo de abordagem que requer uma maior precisão de análise e programação das intervenções a realizar.

Para equacionar a prazo o tipo e forma das acções a financiar de maneira equilibrada com os recursos e a potencialidades de cada área, de forma coerente com os objectivos de desenvolvimento adequados a cada realidade, é necessário dispôr de informação em quantidade e qualidade, facilmente acessível e de actualização simples, rápida e fiável.

Sem esta base, é extremamente difícil avaliar os problemas e estrangulamentos existentes, aos diversos níveis espaciais que podemos considerar, e concomitantemente, programar e preparar as acções e instrumentos que os permitam ultrapassar.

Para a actividade de planeamento, podemos considerar fundamentais algumas fontes de informação:

A Informação Estatística -> que vem assumindo cada vez mais um papel de relevo, a que não tem sido alheia nem a Comunidade nem Portugal.

Tem sido feito um esforço de harmonização da produção e tratamento desta informação de forma a que os sistemas estatísticos dos diversos Estados-membros consigam manusear informações em níveis utilizáveis por todos.

Esta situação tomou forma entre nós como uma norma (Dec.-Lei nº 46/89 de 15 de Fevereiro), designada por Nomenclatura das Unidades Territoriais para Fins Estatísticos (NUTS), constituída por 3 níveis de agregação para unidades territoriais cuja fixação concreta em cada Estado-membro corresponde quer a características específicas nacionais, quer às condicionantes e objectivos espaciais das políticas nacionais de desenvolvimento regional.

Os níveis das NUTS são fixados do seguinte modo:

nível I - (3 unidades) território do continente e de cada uma das Regiões Autónomas;

nível II - (7 unidades) territórios correspondentes às áreas de actuação das Comissões de Coordenação Regional;

nível III - (30 unidades) com uma nova delimitação, de agregação de concelhos.

Entre os restantes Estados-membros encontramos uma estrutura similar de divisão territorial, que permite por exemplo, numa óptica de política regional comunitária acompanhar e avaliar a aplicação e impactes da utilização de fundos comunitários e outros instrumentos financeiros da Comunidade, para, como convém à actividade de planear, poder inflectir o tipo de intervenção se os objectivos propostos não estiverem a ser alcançados.

Enquadrada numa outra modalidade de intervenção de FEDER, (medidas de Preparação, Acompanhamento e Avaliação), está neste momento em negociação com a Comunidade uma acção de Assistência Técnica, que a concretizar-se permitirá reunir as

condições consideradas suficientes para que o Sistema Estatístico Nacional seja adequado às necessidades do País, e responda às solicitações do planeamento aos diversos níveis em que este actua.

Outra das componentes informativas básicas para o planeamento é a Cartografia, considerada nos seus vários tipos e estruturada de forma interligada e actualizada.

Desde as diferentes estruturas geológicas, hidrológicas, pedológicas, agrícolas, florestais, etc, e que nos permitem visualizar as funções que um território suporta, ao tipo de informação sobre a divisão administrativa, aos aglomerados populacionais, às redes viárias, tudo isto é necessário conhecer quando se querem tomar decisões sobre um território e a sua população.

Nalguns destes aspectos podemos constatar que Portugal tem grandes carências de informação.

O Cadastro Rústico e Urbano e o tipo de cartografia a que está ligado, pela escala a que se refere e a informação que disponibiliza pode-se considerar de especial relevância para o planeamento regional e mais especificamente urbano, dada a sua capacidade de se adequar às exigências dos vários tipos de projectos de infraestruturas e equipamentos, entre outros, já referidos no âmbito dos investimentos comparticipados pelo FEDER.

Também as exigências comunitárias, por exemplo em relação aos impactes de determinados tipos de projectos sobre o Ambiente, ou em relação às intervenções no âmbito da Política Agrícola Comum, não nos permitem alhear do suporte cartográfico que essas acções devem ter.

Todos os investimentos que temos vindo a referir identificam-se, como é óbvio, num espaço geográfico bem definido, que é necessário conhecer para se poderem seguir as diferentes tendências de implantação e possíveis repercussões; ao nível do emprego criado, das produções conseguidas, do escoamento dos

produtos, dos efeitos ambientais, etc, todo um sem número de variáveis que estão estreitamente ligadas ao bem estar das populações.

Este mesmo espaço tende, no vórtice da época actual, a transformar-se rapidamente, tornando-se difícil percepcioná-lo de forma correcta dadas as mutações económicas e sociais que acompanham os vultosos investimentos, principalmente se estes se realizam a um ritmo bastante acelerado como é o caso.

O estudo à escala local das novas formas de urbanização tem permitido conhecer a existência de processos relativamente recentes como é o caso da peri-urbanização, que se considera interessante abordar pela ligação estreita que se pode estabelecer entre o seu conhecimento e gestão e a realização e actualização do Cadastro Rústico e Urbano.

(GAMA, António - 1987) - Ao contrário do que é habitualmente considerado como a separação entre a cidade e o campo, de mudança mais ou menos brusca nos seus vários aspectos, a área peri-urbana apresenta-se mais como um espaço de transição bastante extenso, que combina ao mesmo tempo aspectos rurais e urbanos, apesar de continuar a ser polarizado pela cidade na organização espacial das actividades económicas.

Neste espaço de coexistência de aspectos rurais e urbanos que se traduzem na plurifuncionalidade do uso do solo, na pluriactividade das suas populações e na complexidade da estrutura social e das práticas culturais, há uma procura (principalmente por parte da indústria e algum tipo de comércio) de maiores extensões para ocupar, de rendas fundiárias mais favoráveis e de mão de obra disponível e mais barata.

Acrescente-se a isto a tendência das populações urbanas de procurar espaços naturais e locais de lazer na áreas circundantes às cidades, e tem-se um espaço de organização complexa e de difícil compreensão e gestão.

A simples descrição de um processo como a peri-urbanização, serve para exemplificar a necessidade de informação adequada, como é o caso do Cadastro Rústico e Urbano e da cartografia a ele associado

Voltando ao FEDER e à sua actividade correctora das assimetrias regionais da Comunidade, refira-se que uma das suas modalidades de intervenção, aliás já referida, diz respeito a medidas de **Preparação, Acompanhamento e Avaliação**:

- estas medidas compreendem o financiamento de estudos de carácter geral, e relativos à acção regional da Comunidade, e acções de assistência técnica ou de informação (preparação de intervenções operacionais, realização de actividades inerentes à política de desenvolvimento regional, etc).

No Plano de Desenvolvimento Regional entregue pelo Estado Português na Comissão das Comunidades, houve a preocupação de enquadrar nesta modalidade de intervenção acções relativas ao Aperfeiçoamento do Sistema Estatístico, como já foi dito, e à Cartografia e Cadastro, enquanto suportes dos processos de ordenamento e planeamento do território nacional.

Prevê-se que estas acções venham a apoiar e proporcionar eficácia às intervenções operacionais constantes no PDR e no QCA, e como tal, já está em fase de negociação com a Comunidade a operação respeitante ao Sistema Estatístico, esperando-se que as autoridades nacionais responsáveis pela Cartografia e Cadastro saibam responder ao desafio europeu aproveitando a possibilidade de estudar e preparar o lançamento de acções neste domínio.

A primeira fase, de Estudo, servirá para indicar algumas das formas de enquadramento administrativo e técnico, definir com segurança as formas de realizar este empreendimento, a sua viabilidade técnica e económica, as soluções alternativas, as prioridades, etc.

Trata-se de organizar um conjunto de elementos que se coadunem com as exigências nacionais e comunitárias para este tipo de operação e que permitam orientar futuras decisões no domínio da Cartografia e Cadastro e dos projectos de investimento a concretizar nesta área, no médio prazo.

Na perspectiva de utilizador de informação, e aproveitando a presença de tantos e tão conceituados nomes ligados a esta área científica não se pode deixar de referir, na sequência do que se vindo a dizer, o que para qualquer utilizador da área do planeamento seria o ideal em termos de disponibilidade de informação:

-> a possibilidade de aceder a um sistema que reunisse os dados dos tipos de informação básica referida, os armazenasse de forma a conseguir actualizá-los com facilidade e rapidez, que permitisse correlacionar essa informação entre si de acordo com as necessidades de cada utilizador, e que a pudesse disponibilizar na forma gráfica mais conveniente.

Não se pretendendo discutir aqui a exequibilidade técnica e humana da concretização de um sistema deste tipo, pensa-se no entanto que é importante não perder de vista a possibilidade de integrar a informação já referida, incluindo o Cadastro, num sistema a jusante da produção da informação, com esta ou outra forma, de preferência normalizada, que se adequasse às necessidades do planeamento e ordenamento do território do nosso País.





**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
**MULTIFUNCIONAL**

— SICRUM —

O DOMINIO PUBLICO MARITIMO, SUA INTERACÇÃO COM O CADASTRO  
E O PLANEAMENTO

JOSE JULIO CAMPOS

PORTUGAL

LISBOA, PINHAL-20 a 25 Novembro de 1989



- 3 - Exemplo dessa realidade é a legislação que rege os terrenos do domínio público hidrónico dentro do qual o domínio marítimo assume porventura a maior importância.

O decreto-lei nº. 468/71 de 5 de Novembro que, a par de revisão e actualização de numerosa, dispersa e antiga legislação pretendeu sobretudo unificar o tratamento jurídico desses bens dominiais, constitui, ainda hoje, diploma fundamental nesta matéria.

Ai se define a margem do domínio hídrico como uma **faixa de terreno contigua ou sobranceira à linha que limita o leito das águas** limite que, no caso das águas do mar ou dos demais sujeitos e influência das marés é definido pela **linha do máximo preamar das águas vivas equinociais.**

A sua largura com respeito às águas acima referidas é de 50 m, salvo tratando-se de praias com largura superior, caso em que a margem se estende até onde o terreno apresente essa natureza.

- 4 - A margem assim definida assume uma dupla função: constitui o limite da jurisdição das autoridades marítimas, hidráulicas e portuárias, e submete os terrenos nela compreendidos ao regime de dominialidade pública, presumindo-se com essa natureza todos aqueles que, não estiverem na propriedade ou posse privada desde 31 de Dezembro de 1864 ou 22 de Março de 1868 conforme os casos. Com efeito, foi por decreto publicado na primeira daquelas datas que pelo direito português se incluíram no domínio público as margens e praias das águas do mar, o mesmo acontecendo, no Código Civil de 1867 entrado em vigor em 22 de Março de 1868, quanto às arribas alcantiladas.

- 5 - Se bem que respeitadas naqueles diplomas legais os direitos de propriedade já constituídos, o reforço da dominialidade e uso público das margens é claramente denunciado na disciplina normativa subsequente designadamente no dec. lei nº. 468/71.

Sirvam de exemplo entre outros aspectos, as servidões administrativas e outras restrições de utilidade pública impostas para acesso e passagem ao longo das águas no interesse da fiscalização, da pesca e da navegação, o direito de preferência a favor do Estado na alienação voluntária ou forçada por actos entre

vivos, a faculdade de proceder à expropriação para submissão de determinadas zonas ao regime da dominialidade hidrica, a integração automática no domínio público, de terrenos do Estado sempre que lhe pertençam etc.

6- É, no estudo e emissão de pareceres sobre assuntos relativos à utilização de defesa e conservação desse domínio na vertente marítima que a designada **Comissão do Domínio Público Marítimo**, órgão consultivo junto da Marinha, se tem particularmente evidenciado.

Criada por portaria de 30 de Junho de 1922, embora ~~apenas~~ tenha assumido a designação actual pelo Decreto nº. 20 788 de 20 de Janeiro de 1932, tem a sua existência consagrada na actual estrutura orgânica da Marinha pelo decreto-lei nº. 300/89 de 7 de Setembro, e integra representantes de praticamente todos os departamentos do Estado com jurisdição ou interferência ainda que indirecta no domínio marítimo, constituindo pela doutrina dos seus estudos e pareceres, publicados em parte importante no **Boletim** anual da Comissão, contributo dos mais relevantes para a definição e defesa do domínio marítimo.

7 - Sendo o reconhecimento administrativo da propriedade particular nas margens do domínio público marítimo, a delimitação deste na confrontação com aquela, os aspectos que directamente se prendem com o Cadastro, e residindo aí o labor mais intenso e porventura mais profícuo da **Comissão do Domínio Público Marítimo**, convirá em traços gerais, referir os procedimentos seguidos para esse efeito.

- a) Iniciado o processo de delimitação, normalmente sob o impulso processual dos particulares interessados, mas não raro, também por iniciativa da Administração, abre-se uma fase de instrução, levada a efeito pelas entidades administrantes do domínio público, com recolha de elementos de prova, designadamente actos de registo e notariais, decisões judiciais ou administrativas, peças cartográficas ou documentação a mais diversa, susceptíveis de comprovar o exercício de posse ou propriedade privadas desde data anterior a 31 de Dezembro de 1864 ou 22 de Março de 1868, conforme os casos;
- b) O processo assim instruído é submetido a parecer da Comissão do Domínio Público Marítimo, a qual, apreciando os elementos de prova, conclui ou não pelo reconhecimento dos direitos dos particulares propondo, se for caso disso, a nomeação <sup>duma</sup> Comissão de Delimitação;

- c) Esta, integrada por representantes do Estado e dos proprietários interessados, promove a demarcação dos terrenos, coordenando os marcos com ligação à rede geodésica do país, e elabora o auto de delimitação e levantamento topográfico correspondentes;
- d) Aprovada a delimitação em novo e final parecer da Comissão do Domínio Público Marítimo, e após as homologações previstas na lei, e assegurada a publicidade do auto respectivo mediante publicação no Diário da Republica.

8 - Com o procedimento acima enunciado ficam claramente definidas a propriedade pública e privada nos tratos delimitados.

Se bem que tais operações não precludam a competência dos tribunais comuns para decidir da propriedade e posse das margens, a delimitação administrativa, desprovida embora da coerção jurídica que assiste as decisões judiciais, assegura com não menor segurança - ousamos dizê-lo - a verdade material quanto a existência dos direitos, atenta a profunda indagação probatória que precede as delimitações.

Mau grado isso, nem a constituição das parcelas dominiais, nem as novas confrontações que daí resultam para os prédios particulares, se têm reflectivo no registo predial e na organização do cadastro.

9 - Por isso na perspectiva da informação cadastral, do planeamento integrado do território e da segurança jurídica, permitimo-nos, emjeito de conclusão formular as considerações finais seguintes:

- a) Impõe-se, como instrumento util, para os fins acima referidos, a delimitação sistemática do domínio público marítimo, não a deixando á mercê de solicitações casuísticas dos proprietários interessados;
  - b) A publicidade das delimitações, pese embora a solenidade com que é feita, não confere a necessária segurança jurídica quanto ao exercício e limites da propriedade privada, pois que é no registo predial e na inscrição matricial dos prédios que assenta a publicidade e presunção desses direitos.
- Convirá que, por mecanismos de informação ou participação adequa

dos, os autos de delimitação constituam suporte documental para a definição das confrontações da propriedade privada quer na descrição registral dos imóveis quer nas correspondentes matrizes prediais;

- c) A inscrição das linhas poligonais das delimitações na cartografia cadastral, para além da acrescida notoriedade conferida a tais actos, propiciaria, com inegável vantagem, uma representação global das parcelas do domínio público marítimo em todo o território nacional.

10 - Estes são os aspectos que, numa apreciação fugidia, pareceram de relevar quanto à interferência do domínio público marítimo com a problemática do cadastro.

LISBOA, 16 DE NOVEMBRO DE 1989

JOSE JULIO CAMPOS

Membro da Comissão do Domínio Público Marítimo



#### **NOTAS FINAIS**

- 1 - Parece não restarem quaisquer dúvidas sobre a oportunidade e resultados alcançados com a realização do SICRUM.
- 2 - Esta publicação fica a dever-se à valiosa colaboração e apoio da Comissão de Coordenação da Região Centro a qual permitiu colocar à disposição da comunidade científica e técnica nacional esta fonte de informação sobre temática da maior acuidade para o País.  
Aqui expressa a Comissão Organizadora o seu mais vivo agradecimento à CCRC.

**Coimbra, Fevereiro de 1991.**



Impresso na Secção de Offset  
da Comissão de Coordenação da Região Centro  
Concluído em Maio de 1991  
Tiragem: 750 exemplares





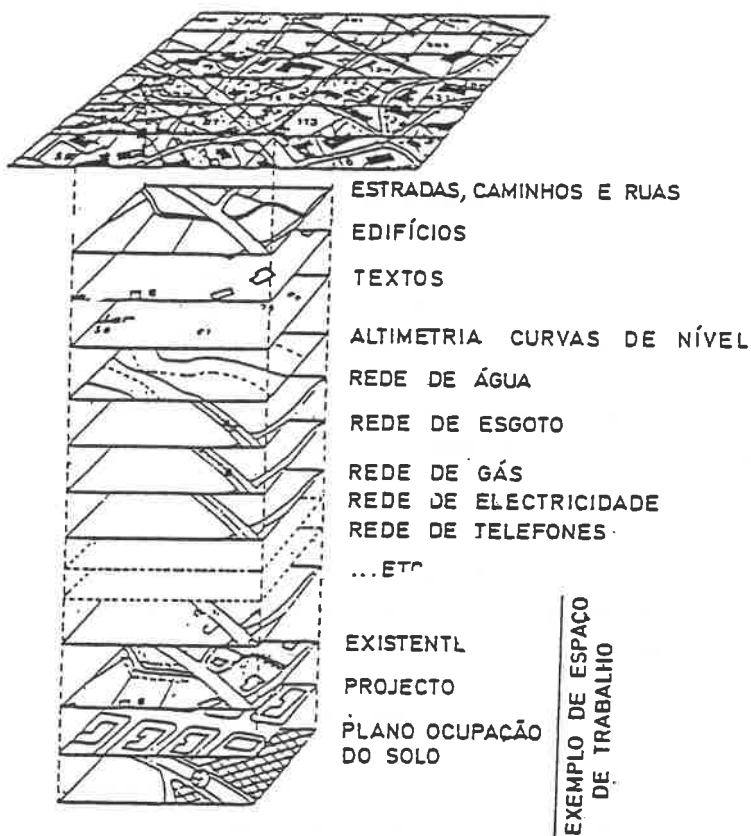


FIGURA 2

do conjunto dos serviços, instituições, interlocutores ou parceiros da base de dados: alguns dados ficarão deste modo disponíveis para consulta unicamente por parte de alguns detentores de chaves de acesso.

### 3 - SISTEMA MULTIUTILIZADOR INTEGRANDO AS PROTECÇÕES E A CONFIDENCIALIDADE

#### 3.1 - O Sistema de gestão

A base de dados, sendo a única estrutura de acolhimento, reflete a organização do sistema, quer relativamente ao ambiente informático da instituição, quer relativamente àqueles que gerem a informação.

Torna-se pois necessário definir os diferentes níveis de responsabilidade e de privilégios dentro do regulamento de exploração da base de dados, bem como configurar os diferentes níveis de diálogo.

### 3.2 - Os níveis de competência

Relativamente à organização da base podem distinguir-se três níveis principais de competência:

- o nível "administração lógica" ocupado pelo grupo de pessoas incumbido da definição dos componentes sob todos os seus aspectos, e da coerência da modelação dos objectos, dados e relações, referentes a áreas profissionais e às aplicações técnicas e administrativas;

- o nível "gestão técnica" é uma responsabilidade operacional directamente ligada ao serviço dos utilizadores nomeadamente ligada à integridade orgânica da base e à eficácia funcional das aplicações;

- o nível "operador" diz respeito estritamente à execução de tarefas específicas não devendo em geral o operador ser colocado em posição de poder alterar, directa ou indirectamente, a base de dados.

### 3.3 - Os registos de movimentos

O gestor técnico deve poder indicar a cada utilizador o tipo de registo de movimentos que podem ser realizados, para as várias operações:

- consulta: não há modificação na base de dados, não sendo necessário qualquer registo;

- recolha: introdução e supressão de dados

Assim que haja modificação de dados, isto é, "movimento na base", o mesmo deve ser registado com a data e a respectiva natureza, podendo ainda ser armazenado apenas o novo estado ou em alternativa tanto o estado antigo como o novo.

### 3.4 - A gestão dos utilizadores

A admissão de um utilizador deve implicar automaticamente um registo num ficheiro de utilizadores e a geração de um ficheiro de sessão.

Para definir, organizar e memorizar o resultado das diferentes sessões de trabalho, pode dispôr-se de um módulo de gestão de utilizadores, desempenhando as seguintes funções:

- criação (admissão) dum utilizador
- definição do nível de privilégios:
  - . simples consulta
  - . consulta e introdução
  - . consulta, introdução e supressão
- definição do contexto de trabalho do utilizador:
  - . nome da base

- . biblioteca de referência
- . acesso aos ambientes
- . ficheiro de parâmetros.

O utilizador tem assim acesso directo ao Programa sem se preocupar com o respectivo "sistema operativo" e ignorando os contextos que não são da sua responsabilidade.

### 3.5 - A confidencialidade

A propriedade e a confidencialidade da informação devem ser definidas a dois níveis:

- nível do ambiente;
- nível do objecto e seus dados.

Um dado ou um objecto cuja consulta e exploração ficam reservados a uma dada categoria de utilizadores, dizem-se privados. Os outros designam-se de públicos.

Os objectos e dados públicos podem ser consultados e explorados em todos os ambientes que lhes estiverem associados, ficando o seu acesso interdito a partir de qualquer outro ambiente. A declaração do componente ou do modelo do dado integra a classificação de público ou privado.

Por outro lado, os ambientes podem ser:

- acessíveis directamente a qualquer utilizador que disponha do código de chamada dos mesmos, podendo então intervir no conteúdo dos dados memorizados no ambiente e em especial, modificá-los ou suprimi-los;

- acessíveis indirectamente aos utilizadores não dispoendo do código de chamada, mas podendo ter acesso aos dados do ambiente e visualizá-los. Neste caso, os utilizadores poderão unicamente consultar os dados, sem poderem modificá-los ou suprimi-los, ou finalmente;

- inacessíveis a todos quantos não disponham, para além do código de chamada, da Palavra Chave que o responsável pelo ambiente tiver determinado e cuja difusão é da sua responsabilidade.

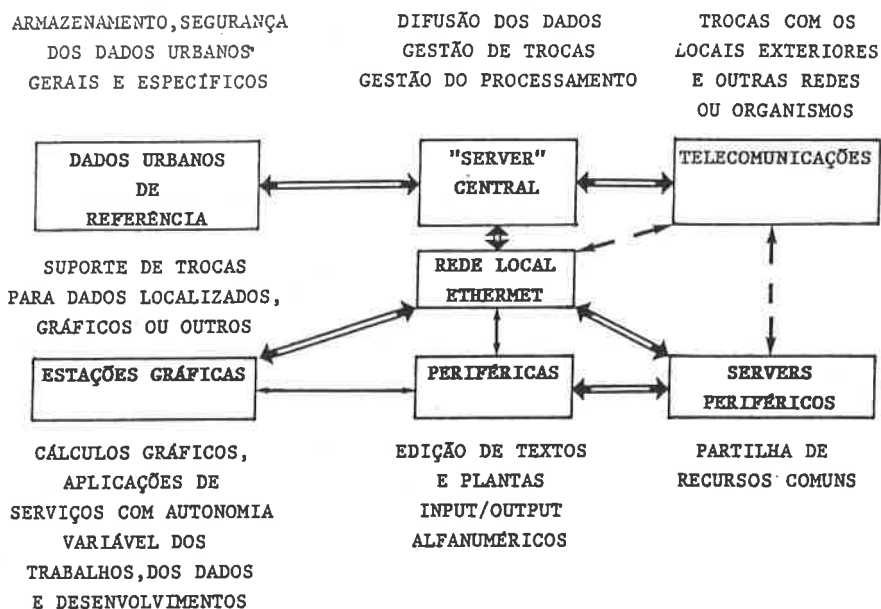
A acessibilidade é dada por defeito a qualquer ambiente não preservado por uma Palavra Chave.

O programa deve permitir definir um ou vários códigos secretos para o acesso ao ambiente.

## 4 - CONSIDERAÇÕES FINAIS

Analizadas que foram algumas das características essenciais que um sistema informático deve ter para ser aplicado numa Gestão Urbana integrada um SIURE, apresenta-se seguidamente um exemplo dos vários elementos constituintes de um Sistema de Informação Urbana.

em Referência Espacial, indicando-se também as respectivas funções.



Na escolha do sistema a implementar deve ter-se sempre presente que um SISTEMA DE INFORMAÇÃO URBANA EM REFERÊNCIA ESPACIAL:

- é um instrumento informático comum ao conjunto da Comunidade Urbana (autarcas, serviços, empresas concessionárias, etc.);
- é uma rede de trocas de informação aberta para o exterior;
- é um sistema de gestão de uma base de dados/objectos localizados, explorando as potencialidades gráficas;
- é um sistema que realisa, para todas as informações geográficas comuns ao conjunto dos utilizadores, a gestão informática, a coordenação, a geocodificação e a constituição e manutenção do ficheiro único de dados de referência;
- e, finalmente, é também uma equipa técnica e competente, capaz de criar os produtos informáticos necessários às variadas aplicações da gestão dos

serviços da Comunidade.

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**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
**MULTIFUNCIONAL**  
  
— SICRUM —

UM PROJECTO PILOTO DE CADASTRO URBANO

ANTÓNIO J. CARDOSO e  
JOÃO BRANDÃO SOARES

PORTUGAL

LISBOA... UNCHAL-20 a 25 Novembro de 1989



Um  
projecto  
piloto  
de  
cadastro  
urbano

Por: António José Cardoso (CCRC)  
João Brandão Soares (CCRC)

Lisboa, 20-21 de Novembro de 1989  
Funchal, 22-25 de Novembro de 1989

# Um projecto piloto de cadastro urbano

António José Cardoso \*  
João Brandão Soares \*\*

## Sumário:

1. A ideia
2. Esboço do projecto
3. Objectivos
4. Interesse regional do projecto

## Resumo:

Com a presente comunicação, os autores pretendem dar a conhecer as linhas essenciais de um projecto piloto para desenvolvimento de um cadastro da propriedade de fins múltiplos num centro urbano de média dimensão, recorrendo às modernas tecnologias. É ainda referido o conjunto de vantagens que se julga poder vir a colher com tal iniciativa, sobretudo na perspectiva do desenvolvimento urbano e regional equilibrado.

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## 1. A ideia (\*)

### a) A cooperação luso-dinamarquesa na origem do projecto

Os primeiros contactos da Comissão de Coordenação da Região Centro – CCRC – com a experiência dinamarquesa em matéria de ordenamento do território, cartografia, cadastro e fiscalidade da propriedade (tributação e avaliação prediais) ocorreram com:

- a participação do especialista Anders Müller no Seminário Internacional sobre a Problemática da Tributação Local (Coimbra, CCRC/OCDE, 7 e 8 de Abril de 1988), tendo então sido realizadas reuniões preliminares sobre possíveis linhas de cooperação a prosseguir;
- a visita à Dinamarca de uma delegação portuguesa (constituída por dois técnicos da Direcção-Geral das Contribuições e Impostos – DGCI – e por um dos autores) entre 1 e 4 de Agosto de 1988, para conhecer *in loco* os sistemas de informação territorial, avaliação, tributação e registo prediais;
- a visita a Portugal dos especialistas dinamarqueses Anders Müller e Gregers Mørch-Lassen (pertencentes ao Statsskattedirektoratet – Danish Inland Revenue Directorate, correspondente à DGCI), ocorrida em 9-21 de Novembro de 1988.

Justo será salientar aqui o papel central desempenhado nestes contactos pelo então Presidente da CCRC e responsável pelo grupo da contribuição predial no quadro da Comissão da Reforma Fiscal, Prof. Doutor Manuel Porto.

Na sequência destes contactos e aproveitando a larga e bem sucedida experiência dinamarquesa neste domínio, foi decidido propor a realização de um projecto piloto de cadastro da propriedade de fins múltiplos num centro urbano de média dimensão, tendo sido preparado pelos especialistas dinamarqueses um documento preliminar sobre o assunto [1]. À data de elaboração da comunicação, a CCRC, que tem estado particularmente atenta ao desenvolvimento desta cooperação, tem pugnado para que a escolha do centro urbano alvo do projecto piloto venha a recair numa cidade da Região Centro, tudo parecendo apontar para que seja Coimbra a cidade eleita. Nesta conformidade, já foi solicitado à Câmara Municipal de Coimbra que manifeste à CCRC o interesse na sua execução e na envolvimento de representantes e técnicos municipais. Ocorreu uma deslocação a Coimbra no dia 29 de Maio de 1989 de técnicos dinamarqueses, para um contacto com a Câmara Municipal, designadamente para discussão preliminar sobre o documento 'draft', para observação da cartografia disponível e para recolha de informações sobre o sistema de digitalização que o município irá utilizar. O facto de ser o Statsskattedirektoratet a encabeçar estas acções de

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\*) As ideias expressas pelos autores não comprometem, de forma nenhuma, os organismos envolvidos e a envolver no projecto descrito. Por outro lado, é importante assinalar que, tratando-se de um projecto cuja implementação não foi ainda iniciada, é previsível que a sua forma venha a sofrer alterações significativas. Mais não pretendemos do que a divulgação da sua forma actual, solicitando-se desde já a todos os leitores a formulação de críticas e sugestões susceptíveis de enriquecer os resultados a obter.

cooperação não exclui o envolvimento, aliás já assegurado pela própria vontade manifestada pelas autoridades dinamarquesas, de outros departamentos oficiais e empresas privadas do Reino da Dinamarca. É já seguro que a Datacentralen (agência nacional de serviços de informática) e o Matrikeldirektoratet (Danish National Survey and Cadastre, organismo responsável pela produção oficial de cartografia) têm interesse em estar envolvidos no processo de cooperação.

A Câmara Municipal de Coimbra já manifestou a sua adesão de princípio ao projecto, aguardando-se uma melhor definição de alguns detalhes para que a adesão seja tornada definitiva.

É ainda importante reflectir sobre as perspectivas de financiamento que se abrem para a execução deste projecto piloto. O financiamento do FEDER (Fundo Europeu de Desenvolvimento Regional) parece ser a possibilidade mais vantajosa. Tal cooperação financeira comunitária não exclui a cooperação e o envolvimento técnico de diversos departamentos da Administração Central e de Empresas Públicas, que podem ter grandes vantagens em estar associados ao projecto.

#### **b) As questões da tributação predial na origem do projecto**

A importância determinante que deverá passar a ter a contribuição predial autárquica no quadro das receitas municipais só será alcançada se, como é oficialmente reconhecido, se proceder a uma revisão das normas de avaliação das propriedades rústicas e urbanas, visando, "(...) com encargos administrativos mais baixos, uma determinação mais rigorosa da matéria colectável e um reforço das garantias dos contribuintes (...)" [2].

Uma das aplicações, porventura não fundamental [3], dos sistemas cadastrais é o fornecimento de dados para a tributação e avaliação prediais.

A Lei de Bases da Reforma Fiscal (Lei nº 106/88, de 17 de Setembro) institui um novo imposto sobre o valor patrimonial dos prédios (arrendados ou não) — a contribuição predial autárquica.

Até agora, a contribuição predial incidia sobre o rendimento, assumido como real e efectivo, mas, em muitos casos, a dificuldade na sua determinação levava a que fosse tributado o rendimento normal presumido. A antiga forma de contribuição predial, abarcando os prédios urbanos e rústicos, regia-se por um Código de 1963, pontualmente alterado [4]. A contribuição predial autárquica, baseando-se no valor patrimonial, obriga a criar um sistema de avaliações completamente novo. Até à implementação desse novo sistema, os valores patrimoniais serão calculados através da multiplicação dos valores locativos existentes por um determinado factor [5].

#### **c) As referências dos especialistas dinamarqueses: adaptação a Portugal [4]**

A experiência dinamarquesa alicerça-se no desenvolvimento dos sistemas de informação territorial, incrementado nos últimos vinte anos com a criação de uma rede de sub-sistemas, que produziu uma longa série de utilizações mais específicas e precisas (designadamente, gerando facilidades no ordenamento do território, na gestão municipal de terrenos, na administração das licenças de construção, na expansão e manutenção de infraestruturas, no planeamento, projecto e gestão das redes de energia, comunicações e saneamento básico, na reabilitação urbana, no controle ambiental, nas tarefas de protecção civil e defesa nacional, etc.). Esta extensão do sistema foi conseguida em grande parte pelo uso de computadores e foi realizada na perspectiva das aplicações

múltiplas. Como parte deste sistema, a avaliação predial baseia-se nas informações do registo predial, do registo das vendas e do registo de edifícios e de fracções. O último dos três registos referidos, iniciado entre 1977 e 1979, permite estabelecer a ponte entre os vários sub-sistemas de informação territorial (o cadastro, o registo predial, o registo municipal da propriedade e o registo das vendas) e os sistemas que usam o nº de identificação pessoal ou a morada como identificação. Este registo de edifícios e de fracções contém diversas informações:

- a propriedade, que pode englobar várias edificações, o tipo de posse e os sistemas de abastecimento de água e de drenagem de esgotos;
- o edifício, que pode englobar várias fracções, com as finalidades, a acessibilidade a estradas, o nº de fracções, os anos de construção e beneficiações, o tipo de estrutura (betão armado ou não), os materiais das paredes exteriores, o nº de pisos, a área de sótão, a área total em planta, a existência de elevador, as instalações de aquecimento e o tipo de energia ;
- a fracção (habitacional, comercial, etc.), com o uso que lhe é dado, área total e útil, tipologia, existência de instalações sanitárias e cozinha, o proprietário e a renda (cfr. [4]).

Para a concretização do projecto, deveremos adaptar a experiência dinamarquesa à situação nacional, sendo fundamental auscultar a opinião da(s) autarquia(s) envolvida(s) – verdadeiro(s) "dono(s) da obra" – acerca de outros detalhes de informação sobre as propriedades que se entenda conveniente armazenar. Apesar disso, também aqui a participação dinamarquesa deve ser exigida, dado que a experiência que nesse país já existe permitirá estabelecer a conexão entre a quantidade de dados a recolher e o volume de investimento que essa recolha implica. Para termos uma ordem de grandeza das operações envolvidas, segundo o último recenseamento da habitação, o concelho de Coimbra possuía, em 1981, 29 782 edifícios com 44 475 alojamentos. Estes são os "números oficiais" que conseguimos obter, não custando admitir que os números reais actuais os excedem largamente.

## 2. Esboço do projecto

Em Portugal, como é sabido, não existe um cadastro da propriedade urbana. Tal como em muitos outros países, a sua urgente produção deverá utilizar as novas tecnologias da informação.

Uma primeira questão é a de determinar a necessidade de realização de um cadastro apoiado em cartografia (e, sendo positiva a resposta, o bom senso implicaria a adopção de cartografia digitalizada) ou se é suficiente criar uma base de dados alfanuméricos sobre a propriedade (sendo então boa regra ter a possibilidade de referenciar os dados ao lugar, através de um sistema de coordenadas geográficas) (\*). Em qualquer dos casos, o município de Coimbra apresenta boas condições de aplicação, pois, em paralelo, tem já adjudicada a digitalização da cartografia de boa parte do concelho, incluindo toda a zona urbana e de expansão. Saliente-se até o empenhamento do município em incluir como parte integrante do projecto piloto a fase do processo de obtenção de cartografia da zona mais fortemente urbanizada do concelho.

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(\*) Uma boa descrição das relações entre cadastro e cartografia pode encontrar-se em Anders Müller, [6].

Qualquer sistema de cobertura cartográfica de actualização permanente, designadamente dos perímetros urbanos (áreas em que as alterações ocorrem mais rapidamente), deverá ter uma forte participação das autarquias locais, dado que estas entidades gerem ou tendem a gerir uma parte substancial das redes e equipamentos de utilização colectiva e são licenciadoras de substancial parte das modificações da morfologia urbana do seu território. A criação de sistemas de informação geográfica de âmbito municipal é da responsabilidade dos municípios. A introdução de meios automáticos permite, com base em cartografia de grandes escalas, acelerar a elaboração do cadastro urbano. Este último é um instrumento de grande relevo em planeamento urbanístico, registo predial, avaliação para efeitos fiscais e projecto de infraestruturas e equipamentos. Uma moderna concepção de cadastro urbano incluirá a criação de registos informáticos englobando, entre outros elementos, uma caracterização de cada prédio [4].

As operações relativas a informação e avaliação prediais exigem a utilização de vários registos. Então, é conveniente que se observem algumas regras básicas na sua gestão, a saber:

- a identificação de cada propriedade deverá ser única e inequívoca em cada registo;
- a definição de cada propriedade deverá ser idêntica em todos os registos;
- a programação de cada registo deve habilitá-lo a ser compatível com todos os outros com os quais está ou poderá estar relacionado, bem como permitir a agregação de dados para níveis regionais e nacionais;
- a actualização e correcção dos registos deve constituir um processo permanente, o que é mais fácil se forem objecto de múltiplas utilizações e se estiverem integrados no conjunto das actividades da administração local [4].

O objectivo primordial do projecto-piloto consistirá na criação de uma base de dados informatizada, alfanumérica (letras e números), necessária para o cálculo automático de valores imobiliários [1]. Para a concretização deste objectivo, foi previsto o seguinte desenvolvimento para o projecto (adaptado de [1]):

- relatório preliminar de que conste a informação requerida, como pode ser obtida e actualizada, qual a estratégia a longo prazo com vista ao desenvolvimento da avaliação informatizada e indicando qual a informação complementar a incluir no cadastro multifuncional e o modo como essa informação pode ser utilizada;
- aquisição do 'hardware' informático necessário, apontando-se para uma solução tendo em vista a compatibilização de ficheiros que garanta a transferência entre a base de dados e o futuro sistema de actualização da cartografia, intimamente ligado ao processo de digitalização de cartas, já adjudicado;
- realização das actividades cartográficas;
- preparação do pessoal para recolha de dados;
- desenvolvimento de um sistema de base de dados;
- recolha de dados;
- introdução de dados;
- formação de quadros permanentes;

- relatório descritivo e avaliador do projecto-piloto, incluindo a estratégia com vista à criação de bases de dados informatizados em todas as áreas urbanas [1].

Um orçamento preliminar para o projecto piloto, a desenvolver em cerca de ano e meio e incluindo a execução da cartografia digitalizada das áreas urbana e de expansão da cidade, aponta para valores entre 100 e 150 mil contos, o que, mesmo sem financiamento externo, garantiria um "pay-back" seguramente inferior a dois anos, como veremos, pelos ganhos directos do município ao nível das suas receitas, para além de outras vantagens substanciais que do projecto resultarão.

### 3. Objectivos

Uma questão que se pode desde logo colocar é a de que, sendo tão premente promover a elaboração do cadastro das áreas urbanas em Portugal, para quê um projecto piloto e não o pronto lançamento da cobertura integral das áreas urbanas e urbanizáveis. Trata-se, na realidade, de uma tarefa grandiosa, sendo antes de mais adequado afinar uma metodologia correcta para a sua concretização. As estimativas do custo e da demora da criação de uma base de dados para a avaliação dos 3,4 milhões de propriedades urbanas, sob a forma de valores médios sujeitos a um grande desvio, apontam para 1,75 milhões de contos e 3,5 anos [1]. A experiência de outros países mostra que a criação da base de dados constitui em grande medida o "estrangulamento" do processo de informatização da avaliação. A criação dessa base é extremamente morosa e dispendiosa [1].

O elevado custo dessa operação, bem como a incerteza na quantidade e qualidade de informação a recolher (que, aliás, também depende muito do modelo de avaliação a adoptar no novo Código das Avaliações), constituem uma boa razão para que se comece com um projecto-piloto [1]. Este projecto, dado que decorrerá a uma escala municipal ou infra-municipal, permitirá uma multiplicidade de utilizações extra-fiscais. Cumpre então perguntar como se assegura:

a) que os resultados, esperados muito positivos, vão aproveitar à escala nacional? Dado que o modelo a desenvolver a nível nacional será centralizado, como garantir desde já que a DGCI irá "aprender" com esta experiência piloto a nível local? Sugere-se então o envolvimento financeiro e técnico da DGCI;

b) que os resultados extra-fiscais, quando se passa para outros municípios e para a escala nacional, poderão ser aproveitados? Sugere-se que seja criado um comité de acompanhamento do projecto, com estrutura muito leve, para o qual deverão ser convidados a Associação Nacional dos Municípios Portugueses e os Gabinetes de Estudos e Planeamento dos Ministérios;

A importância que hoje assumem as aplicações tributárias do trabalho de registo cadastral da propriedade deve-se, essencialmente, aos seguintes factores:

- desde logo, os méritos que podem ser reconhecidos à tributação de situações ligadas à propriedade, por exemplo como forma de tributação de riqueza ou de promover uma maior responsabilização da administração, na lógica do princípio do benefício [4];

- a procura da promoção de uma efectiva justiça fiscal, sendo o cadastro uma indispensável base de trabalho para a realização de uma correcta e sistemática avaliação (ou reavaliação) das propriedades prediais [4];
- a necessidade de encontrar meios de rendibilização dos organismos que se dedicam a estas tarefas, geralmente muito dispendiosas. São geradas novas receitas devido ao cálculo actualizado dos rendimentos colectáveis das propriedades. No caso português, estima-se em vários milhões de contos anuais o aumento de receitas fiscais que proviria da actualização global do nosso cadastro [4]. Só para o caso do município de Coimbra, cuja receita anual em contribuição predial ronda os 400 milhares de contos, o aumento previsível de receita, devido apenas à realização de um cadastro sistemático e actualizado – e não resultante de qualquer agravamento fiscal – é, no mínimo, da ordem dos 100 mil contos anuais.

#### 4. Interesse regional do projecto

Para além dos méritos do projecto piloto em matéria de eficiência e equidade fiscais e de relação positiva na comparação benefícios / custos, o projecto apresenta um inegável interesse na perspectiva do desenvolvimento urbano e regional equilibrado.

Como já referimos, os resultados do projecto-piloto poderão ser utilizados como base para uma estratégia visando a criação de uma base de dados em todas as áreas urbanas [1].

Em Portugal, é de esperar que pelo menos 10 milhões de contos venham a ser dispendidos no decurso dos próximos 10 anos na informatização das informações respeitantes ao território e na elaboração de mapas para estas actividades, nas áreas urbanas [1]. Por outro lado, deverá ser atribuída prioridade às áreas urbanas e as soluções que possibilitem utilizações múltiplas são preferíveis [7]. Esta constitui mais uma razão a favor da realização do projecto-piloto e da inclusão nos seus objectivos da definição do modo como a informação necessária a outras actividades poderá ser integrada num cadastro urbano polivalente e de qual a estratégia a seguir com vista à criação de mapas e cadastros nas áreas urbanas [1].

Na realidade, a forma como se estão a processar as modificações da estrutura urbana de Portugal, designadamente da sua Região Centro, exige a realização de um grande esforço de obtenção de informação integrada, sistemática e de actualização permanente. Esta será a única possibilidade de garantir um correcto e atempado ordenamento do território e uma eficaz gestão dos recursos naturais disponíveis.

A Região Centro possui, como é sabido, uma ainda reduzida taxa de urbanização, mas o ritmo de crescimento das suas áreas urbanas é extremamente acelerado. Esta situação, quantitativamente semelhante no Litoral e no Interior da Região, reflecte porém formas de organização e ocupação espacial distintas: no primeiro caso, avulta uma excessiva pressão urbano-industrial; no segundo, é característica dominante a polarização com rápidos ritmos de crescimento [8]. Em ambos os casos, trata-se de fenómenos que obrigam a redobrados esforços de ordenamento e planeamento territorial.



Por outro lado, é objectivo regional o reforço da rede urbana e da sua hierarquia, com a finalidade de conferir uma maior coerência ao sistema de povoamento [8].

Da multiplicidade de utilizações extra-fiscais que o projecto pode permitir, são de destacar as que respeitam ao ordenamento do território (política municipal de solos, administração das licenças de construção e reabilitação urbana) e ao planeamento e gestão das redes colectivas. Estas considerações levam a atribuir todo o interesse a iniciativas como a que se descreveu, visando obter informações rigorosas sobre o território urbano, sua envolvente e seus ritmos e formas de evolução.

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**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
**MULTIFUNCIONAL**

— SICRUM —

NOVOS RUMOS PARA O CADASTRO  
DA PROPRIEDADE RUSTICA E URBANA

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## NOVOS RUMOS PARA O CADASTRO DA PROPRIEDADE RÚSTICA E URBANA

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### Sumário:

O objectivo desta comunicação é apresentar algumas ideias e propostas de actuação que permitam passarmos de uma fase complexa de produção cadastral essencialmente dirigida para a tributação fiscal - o actual Cadastro Geométrico da Propriedade Rústica - para uma fase verdadeiramente evoluída, baseada em soluções digitais simples integradas numa perspectiva multifuncional, preferencialmente relacionada com os aspectos de planeamento e jurídico sem esquecer a componente fiscal. Procura-se, deste modo, atingir o chamado Cadastro da Propriedade Imobiliária ou Cadastro de Imóveis, acompanhando e apoiando o desenvolvimento económico e social do País.

Neste contexto, propõem-se alterações na organização, gestão e metodologias actuais, que contribuirão para a definição conceptual e progresso do Cadastro, com ênfase para a conservação cadastral, normalização de dados e dos processos produtivos e formação técnica/profissional a todos os níveis.

### Abstract:

The objective of this technical paper is to present some ideas and proposals for the cadastral activities, which will enable to surpass the prevailing complex process of the Rural Geometric Cadastre, mainly oriented to fiscal taxation - in order to reach real an evolution, based on simple digital solutions integrated on a multipurpose perspective, taking into account the planning and legal aspects, without forgetting its fiscal component. This way, one is looking for a Real State Cadastre, following and supporting the requirements and demands of the social and economic development of the country.

Thus, some changes on the present organization, management and methodologies are put forward, trying to contribute for a definition of cadastral concepts and its progress emphasizing the cadastral maintenance/updating, standardization of land related data, working methodologies and professional education at all levels.

## 1 - CONCEITO GERAL DE CADASTRO

O desenvolvimento do tema do Cadastro da Propriedade Rústica e Urbana pressupõe que se defina, à priori, o que se entende por Cadastro dadas as diferentes interpretações que a definição suscita especialmente no nosso País.

Assim, definirei o Cadastro no seu conceito geral de registo sistemático e actualizado dos dados referentes às propriedades ou sejam os prédios nas suas componentes descritiva (índice cadastral), numérica (elementos de medição) e gráfica (cartas cadastrais).

A recolha dos dados referentes ao proprietário está estritamente ligada aos dados referentes à propriedade constituindo a componente jurídica do Cadastro (Registo Predial).

É também usual nesta definição a introdução dos dados referentes à avaliação cadastral dos prédios, essencialmente para fins fiscais, como é o caso do Cadastro Português.

É fundamentalmente sobre o primeiro parágrafo desta definição, ou seja sobre o conceito específico e restrito de Cadastro que irá incidir esta comunicação.

### 1.2 - PRINCIPAIS FINALIDADES DO CADASTRO

Este estudo será orientado tanto para os aspectos de gestão como de metodologias e processos de trabalho, evidenciando as principais vantagens de um sistema cadastral tendo em vista a correcta persecução dos objectivos fundamentais do Cadastro da Propriedade Rústica e Urbana que serão:

- a definição inequívoca da propriedade bem como do proprietário permitindo a sua correcta e objectiva identificação com grandes vantagens, especialmente nos meios das transferências imobiliárias.
- a base de um sistema de planeamento e ordenamento do território como referencição privilegiada de elementos indispensáveis ao conhecimento da situação urbanística e estrutura fundária, à conservação da natureza e preservação das condições ambientais, etc.
- fornecer estatísticas necessárias a vários sectores da administração e a entidades privadas.
- a base mais fiável à constituição de sistemas de informação geográfica ou territorial.
- e por último a sua tradicional orientação como base a uma justa e correcta fixação da tributação fiscal.

## 2 - PORQUE NOVOS RUMOS PARA O CADASTRO?

A tentativa de nos enquadrarmos dentro das modernas tendências do Cadastro e o atendimento de solicitações internas bastante concretas leva-nos a propor algumas medidas que irão alterar substancialmente a gestão e técnicas utilizadas no Cadastro nos últimos tempos. Uma das razões que, só por si, justificaria estas medidas reside no facto do Cadastro, tal como tem sido executado e conservado, não responder cabalmente às exigências da actualidade nos diversos campos do desenvolvimento, quer a nível central, quer regional e local.

Além disso, assiste-se, actualmente, a uma louvável consciencialização da importância do Cadastro, tanto por parte dos utentes que procuram cada vez com maior frequência esse tipo de informação como, até, por parte dos próprios técnicos e gestores dos organismos responsáveis que, durante tanto tempo, não atribuíram o justo valor às actividades cadastrais.

## 3 - ORGANIZAÇÃO E METODOLOGIAS: SUA ANÁLISE E PERSPECTIVAS DE EVOLUÇÃO

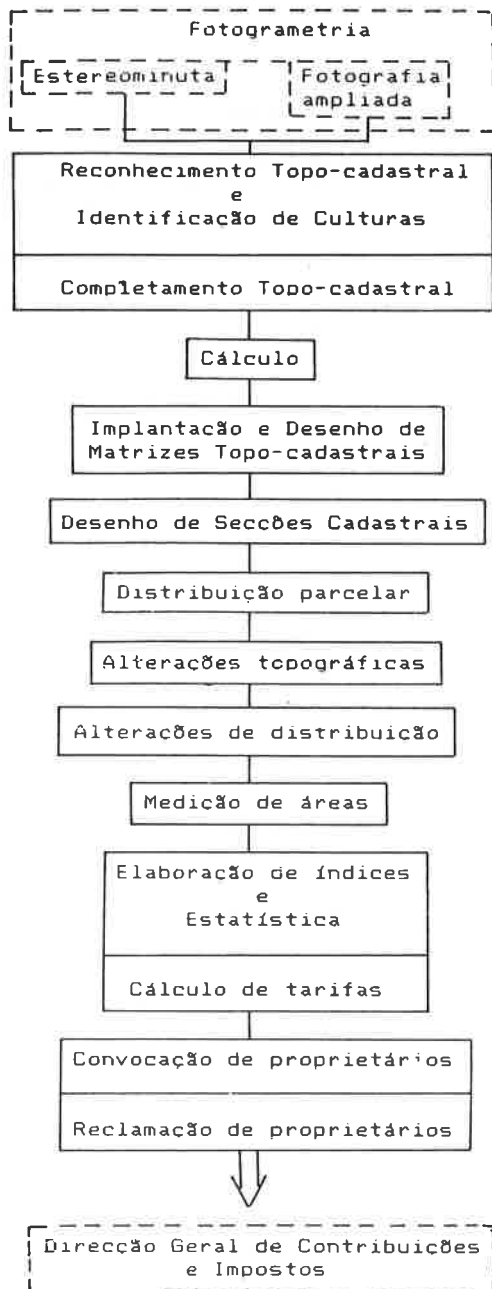
Para compreendermos as perspectivas cadastrais no futuro é necessário apresentar, ainda que sucintamente, uma panorâmica da situação actual do Cadastro Geométrico da Propriedade Rústica.

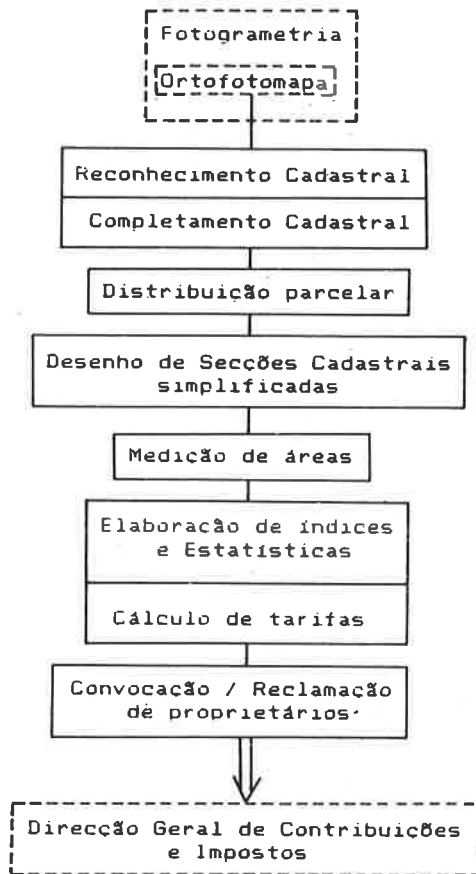
### 3.1 - PRODUÇÃO CADASTRAL: METODOLOGIAS

Existem duas linhas de produção de Cadastro:

- a primeira, seguida desde os anos 50 e tendo terminado em termos de actividades de campo em 1983, é constituída por restituição analógica, completamento topo-cadastral e distribuição parcelar. (ver esquema na página 3A).
- e a segunda, desde 1982-83, é baseada no reconhecimento e completamento cadastral sobre ortofotomapas seguido de distribuição parcelar. (ver esquema na página 3B).

Nestas duas linhas de produção não estão mencionadas operações respeitantes à verificação da qualidade do reconhecimento e completamento topo-cadastral e cadastral e revisões à implantação, desenho e medição de áreas, bem como a revisão final de todo o trabalho de uma determinada freguesia ou concelho, estabelecendo-se definitivamente a correspondência entre os elementos da parte descritiva do Cadastro (informação alfanumérica) e as cartas cadastrais ou topo-cadastrais (informação gráfica).







### 3.2 - ANÁLISE DOS DOIS PROCESSOS DE TRABALHO

O chamado Cadastro Geométrico de precisão, cujo processo de execução é baseado na restituição analógica, é bastante mais preciso e mais completo fornecendo informação cadastral e topográfica, no entanto é mais moroso obrigando, tal como está organizado, a uma repetição de actividades idênticas em várias fases do processo (ex: listas de proprietários e respectiva numeração de prédios) que introduz erros e provoca enganos cuja clarificação vai onerar o processo.

O Cadastro inventarial e fiscal, baseado no reconhecimento cadastral sobre ortofotomapas, apresenta uma melhor relação entre o tempo e a obtenção de resultados em detrimento da precisão e da aquisição de informação topográfica seleccionada, no entanto é rico em termos de informação fotográfica não seleccionada conseguindo-se em paralelo com a altimetria (junto ou em separado) um conjunto que permite responder a grande variedade de solicitações.

Um dos principais inconvenientes é a sua forma analógica devendo proceder-se a um processo de digitalização exaustivo para obter uma cartografia digital.

### 3.3 - ALTERAÇÃO DE METODOLOGIAS

Da análise das metodologias de produção cadastral na componente rústica do Cadastro da Propriedade e atendendo às necessidades actuais visando a elaboração do cadastro, tanto Rústico como Urbano, propõe-se a constituição de duas outras linhas de produção alternativas baseadas em métodos simples e eficientes, tendo em vista a rápida concretização do cadastro:

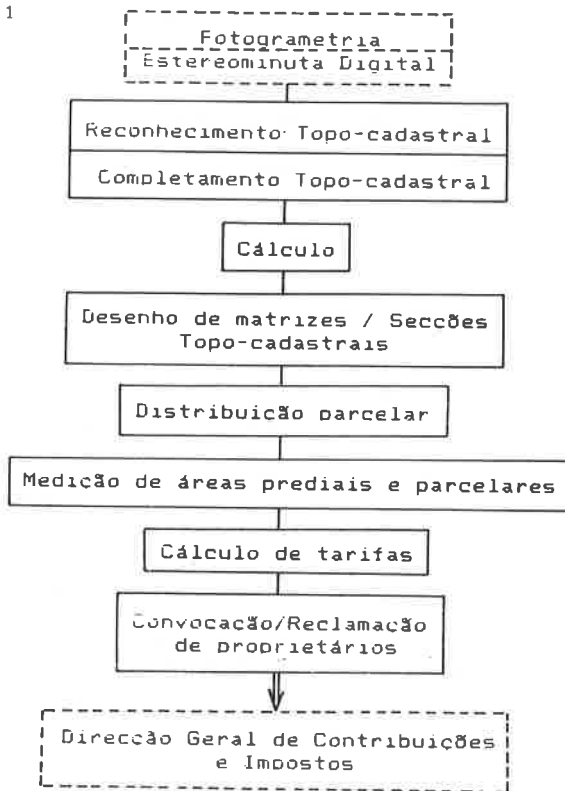
A primeira, no caso mais geral em que se proceda à avaliação cadastral em simultâneo com a elaboração do cadastro. (ver esquema 1 na pág. 4A).

A segunda visando a elaboração do cadastro atendendo apenas à sua perspectiva geométrica e inventarial sem avaliação cadastral (ver esquema 2 na pág. 4A).

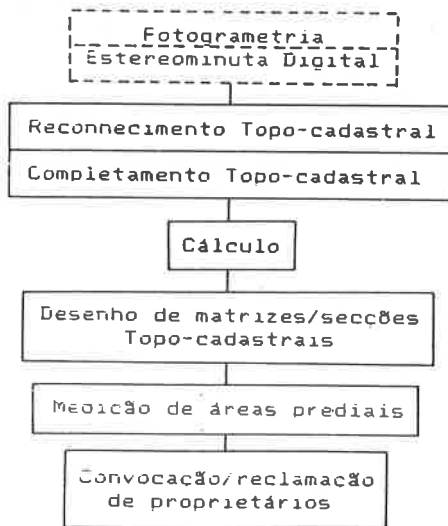
Para optimizar o processo dever-se-á proceder à simplificação de algumas tarefas em simultâneo com a criação das novas linhas de produção.

A elaboração de índices e estatísticas bem como outras tarefas inerentes ao processo de produção cadastral não foram consideradas nos esquemas anteriores, pois serão executadas rapidamente e em simultâneo, em virtude da utilização dos programas de cálculo adequados.

Esquema 1



Esquema 2



### 3.4 - ALTERAÇÕES NA GESTÃO E ORGANIZAÇÃO

Para implementar as soluções preconizadas em termos de metodologias será imprescindível alterar alguns aspectos organizativos que foram e são responsáveis por uma menor produção cadastral introduzindo custos acrescidos em todo o processo cadastral.

Assim, dever-se-á, numa primeira fase, reestruturar as Direcções de Serviços relacionadas com o Cadastro criando-se uma Direcção de Serviços que seja responsável por todo o Cadastro e outra que seja responsável por toda a Avaliação Cadastral.

A Direcção de Serviços de Cadastro teria a competência para efectuar todo o levantamento cadastral e respectivos cálculos, elaborar índices e cartas/secções cadastrais, além de efectuar o apoio topográfico e delimitação e demarcação das circunscrições administrativas.

A Direcção de Serviços de Avaliação teria por competência o estudo das bases de avaliação e a distribuição parcelar, tanto rústica como urbana, destinados à tributação fiscal e outros tipos de avaliação destinados a expropriações e outros fins.

Deverá ser alterada a filosofia de implantação das Delegações Regionais e seu relacionamento com as Direcções de Serviços de Cadastro e de Avaliação Cadastral.

Deverão ser reformuladas as competências e atribuições do Centro de Informática na área do Cadastro.

Paralelamente deverá haver reestruturação do Conselho de Cadastro no que respeita à sua forma de actuação. O Conselho Técnico de Cadastro deveria ser reactivado, pois o seu papel tem sido praticamente esquecido a ponto de não dar pareceres nem reunir. Caso não haja condições para ser reactivado, então que seja extinto.

Novas medidas ao nível da Gestão Cadastral deverão ser tomadas de forma a viabilizar a nova organização e aprofundar o carácter científico da gestão cadastral tornando o Cadastro mais autónomo, tanto técnica como financeiramente.

A ligação do Cadastro ao Registo Predial será aconselhável tendo em vista a concretização da componente jurídica do Cadastro cumprindo-se assim uma importante finalidade do Cadastro.

### 4 - TRANSFORMAÇÃO DO CADASTRO ANALÓGICO GRÁFICO EM CADASTRO DIGITAL E/OU CADASTRO POR COORDENADAS

Em relação aos concelhos que dispõem de cartas topo-cadastrais ou simplesmente cadastrais, as soluções preconizadas para a transformação da informação analógica em digital englobam técnicas de digitalização manual "off line" passíveis de posterior tratamento interactivo e técnicas de digitalização automática por rasterização "Scanning".

A opção técnica a adoptar passa por um rastreio exaustivo da situação quanto ao estado de conservação e actualização cadastral das plantas e secções cadastrais, sendo a digitalização manual empregue nos casos em que as técnicas de rasterização "Scanning" exijam a recuperação prévia das cartas por métodos de beneficiação laboratorial demasiado dispendiosos.

é de prever, contudo, que no futuro próximo se assista ao encarecimento da mão-de-obra e ao aperfeiçoamento das técnicas de "Scanning" tornando viável o tratamento laboratorial das cartas antigas seguido de digitalização automática.

Em virtude das cartas antigas a digitalizar apresentarem variações de escala devido à deficiente qualidade dos suportes cartográficos, constituídos por vezes por papel vulgar ou cartão sujeito a deformações, a digitalização manual deverá ser acompanhada da aplicação de transformações matemáticas calculadas com base em pontos de coordenadas conhecidas, além das transformações afins inerentes ao próprio processo de digitalização.

Nas zonas em que pela qualidade e natureza dos levantamentos cadastrais seja possível o cálculo de coordenadas, o melhor método de conseguir uma carta digital com maior precisão será proceder ao cálculo de coordenadas analíticas através dos elementos de medição de campo disponíveis. Esta operação combinada com a cartografia básica em forma digital - ainda que morosa - e por isso dispendiosa, terá viabilidade por uma questão de diversificação de estratégias. Esta diversificação poderá contribuir para aliviar a carga sobre determinados equipamentos e aproveitar a mão-de-obra existente sem recorrer a dispendiosos programas de formação ou aperfeiçoamento profissionais.

Há, contudo, casos extremos em que a recuperação das cartas tópo-cadastrais não deverá ser possível devido à desactualização, tanto da cartografia básica como do cadastro, proveniente de uma conservação cadastral desastrosa ou praticamente nula. Sendo nestes casos necessário uma renovação cadastral ou seja a execução de nova cartografia básica e novo levantamento cadastral aplicando-se a solução indicada para os novos concelhos a cadastrar.

Saliente-se que nos concelhos em que foi utilizado o sistema de coordenadas Bessel-Bonne devemos proceder à transformação de coordenadas de modo a uniformizar com o sistema padronizado para a maioria dos levantamentos cadastrais ou seja o sistema Hayford-Gauß. No capítulo da escolha do Datum também devemos utilizar de preferência um único Datum.

## 5 - CONSERVAÇÃO CADASTRAL

Sob Conservação Cadastral designamos, no sistema em vigor um conjunto de operações que permitem a actualização do Cadastro, tais como a resolução de processos de reclamação administrativa e a revisão cadastral.

Sendo este um capítulo em que é urgente tomar medidas que evitem a progressiva deteriorização da situação e se não caia nos casos extremos que referi anteriormente.

A desactualização cada vez maior do Cadastro leva a interrogarmos sobre o sistema de conservação cadastral.

Lembramos que um Cadastro sem conservação/actualização deixa de cumprir as funções para que foi criado levando a dizer-se que "Cadastro sem conservação não é Cadastro".

Para que se modifique a situação devemos actuar em duas frentes:

1ª alterar a metodologia de conservação revendo-se a situação dos processos de reclamação administrativa.

2ª conjugar esforços para que, através de legislação mais apropriada, as entidades intervenientes na conservação cadastral cumpram as normas estipuladas.

Quanto à 1ª: A conservação devia servir para manter ou melhorar a qualidade da informação cadastral, tanto a nível descritivo como cartográfico o que não tem acontecido, nomeadamente no que respeita à parte cartográfica, devido à utilização quase sistemática de processos de levantamentos gráficos, que a breve trecho, ainda que devidamente aplicados, conduzirão a situações insustentáveis obrigando a novos levantamentos. Esta situação atingir-se-á tanto mais depressa quanto pior for a qualidade do levantamento inicial e quanto maior for a frequência das alterações.

O desenvolvimento regional integrado introduz alterações no que respeita à implantação e transformação de estruturas a todos os níveis vindo a acelerar o processo de desactualização e impondo novas exigências em termos de volume e precisão da informação topo-cadastral.

Daí que, nos últimos anos, se assista à progressiva tomada de consciencialização da situação cadastral.

No sistema de conservação em vigor as alterações topo-cadastrais tais como, divisão de prédios, implantação de novas construções, vias de comunicação, etc., são introduzidas recorrendo a métodos gráficos tanto quanto possível sem alterar as estremas dos prédios primitivos para que não haja alteração de áreas fiscais. Isto provoca uma certa perda de qualidade das cartas quando o levantamento inicial for antigo ou não tiver sido correctamente executado.

A solução a adoptar, ainda que pareça pouco prática, deverá apontar para uma verificação exacta dos limites do prédio objecto do processo de reclamação administrativa quer este seja conduzido por iniciativa do proprietário, pelas autarquias ou pelos organismos cadastrais intervenientes (Delegações Regionais do IGC) efectuando-se o levantamento com a precisão exigida para as plantas novas.

Caso haja alteração de área que exceda as tolerâncias admitidas, isso deverá ser comunicado aos proprietários confinantes, às entidades intervenientes no processo (Finanças e Registo Predial) bem como ao proprietário ou proprietários em questão.

Este é um método que a pouco a pouco vai melhorando a precisão das plantas cadastrais antigas e que também pode ser aplicado em zonas que disponham de plantas cadastrais recentes, mas que não garantam a precisão desejada.

No campo da avaliação cadastral deveremos seguir o método da revisão periódica do cadastro, pois a conservação pontual não resolve a maioria das alterações de distribuição parcelar.

Na revisão periódica também poderiam ser detectadas alterações topo-cadastrais marginais que por qualquer razão tivessem permanecido no desconhecimento dos organismos cadastrais.

Quanto à 2ª: Para que esta metodologia tenha êxito é imprescindível que todas as entidades, que de uma maneira ou de outra contribuam para as situações de alteração na estrutura e conteúdo das propriedades (prédios), colaborem abertamente informando os organismos competentes.

Estes deverão, por sua vez, responder pronta e adequadamente resolvendo as situações de modo a não entravarem projectos e iniciativas muito caras quer a proprietários quer a órgãos da administração, estabelecendo-se o prazo padrão para a resolução do processo de reclamação administrativa.

Para viabilizar este procedimento os proprietários deverão contribuir financeiramente de modo proporcional ao valor patrimonial do prédio sujeito a actualização, independentemente da distância desse prédio ao organismo ou entidade que proceder à resolução do processo de reclamação administrativa.

A resolução dos processos deverá obedecer a normas específicas rigorosas, perfeitamente definidas, para que haja total transparência no processo evitando-se situações de aproveitamentos meros lícitos.

Ainda, com o objectivo de minimizar o tempo de resolução dos processos devem os organismos intervenientes proceder aos levantamentos, segundo os métodos uniformizados, de modo a facilitar a sua plena integração no Cadastro.

De notar que, devido ao facto de apenas se executar o Cadastro da Propriedade Rústica, qualquer prédio que for urbanizado ou urbanizável deixará de fazer parte dos registos e das cartas cadastrais, isto é, passará a não constar no Cadastro, pelo que a conservação seria mais eficaz se procedessemos à execução do Cadastro da Propriedade Urbana, explorando-se por completo as potencialidades do Cadastro, que em ligação com o Registo Predial adquiriria a sua verdadeira dimensão ou seja, em última análise, o que designamos por "Cadastro da Propriedade Imobiliária" ou "Cadastro de Imóveis".

## 6 - CADASTRO URBANO: Alguns princípios básicos

É urgente a definição pormenorizada desta componente do Cadastro que se reveste de particular importância numa eficaz política de planeamento urbanístico, em acções de carácter socio-económico, na gestão de redes de distribuição de energia, água, águas residuais, controlo da poluição, etc.

Além disso é uma importante fonte de receitas para as autarquias em virtude da recente introdução da contribuição autárquica.

O desenvolvimento conceptual do Cadastro Urbano assentará em bases análogas à do Cadastro Rústico introduzindo-se uma maior precisão nos levantamentos e procedendo-se à representação cartográfica, na forma analógica, em escalas da ordem de 1/1 000 e 1/500.

Será fundamental para proceder ao levantamento cadastral inicial e à posterior conservação cadastral a criação de redes de apoio, quer por adensamento da rede geodésica por processos de trilateração e poligonação ou por GPS (Sistema de Posicionamento Global), quer por métodos de coordenação fotogramétrica de pontos pré-sinalizados.

Essa rede deverá ser materializada no terreno em pontos estratégicos que permitam boa visibilidade e se mantenham o mais possível inalteráveis.

As técnicas a adoptar na recolha de dados da componente urbana do cadastro devem basear-se na restituição da base cartográfica na forma digital combinada com o levantamento analítico por processos de intersecção inversa e directa ou polar dupla entre outros, utilizando teodolitos informáticos permitindo o registo electrónico das observações.

A utilização exclusiva de ortofotomapas para fins cadastrais não será adequada para zonas urbanas por motivos evidentes, decorrentes da própria concepção dos ortofotomapas.

No entanto, estes poderão ser utilizados como auxiliares na representação de pontos da rede de apoio que servirão de base aos levantamentos cadastrais.

Para responder às solicitações do planeamento urbanístico e da gestão municipal é necessário proceder ao levantamento dos espaços e zonas verdes, bem como dos arruamentos e de outros pormenores topográficos independentemente do seu interesse cadastral próprio.

Devem ser inventariados os edifícios segundo a sua utilização ou destino como, por exemplo, indústria, comércio, serviços, habitação, administrativos, etc..

A identificação dos edifícios existentes num mesmo prédio deve ser feita à base do número da porta além do nome e número da rua.

Esta informação permite uma identificação inequívoca desses edifícios e é de reconhecido interesse para o sector de serviços como as comunicações (postais, telefónicas, etc.) entre outros.

A descrição pormenorizada dos diferentes edifícios pertencentes a diferentes proprietários contém um elevado número de informações que tornam a base de dados mais complexa e exige um grande esforço na recolha de dados pelo que, numa primeira fase e para que se possa avançar mais rapidamente, deveremos optar apenas pela descrição do prédio e do(s) seu(s) proprietário(s).

Para que se mantenha o cadastro das zonas urbanas permanentemente actualizado é necessário um perfeito entendimento entre os sectores técnicos das Câmaras Municipais, eventualmente das Comissões de Coordenação regionais e os organismos ou entidades responsáveis pela conservação cadastral, pelo que deverão ser tomadas medidas que obriguem a procedimentos concretos na transferência de informação, evitando-se, tanto quanto possível, a efectivação de revisões cadastrais periódicas.

É de prever contudo, a renovação do cadastro em zonas em que se pretenda executar projectos específicos que exijam uma maior precisão dos levantamentos viabilizando-se assim a realização da renovação cadastral.

Quanto à avaliação urbana, ela deverá ser baseada no valor de construção dos edifícios e/ou no valor do terreno no mercado, dado que o sistema de rendas de casa em vigor, não permite utilizar com segurança esta informação sobre o rendimento para avaliar justa e correctamente.

Em termos de avaliação também deverão ser efectuadas revisões periódicas a exemplo do que acontece ou deveria acontecer na componente Rústica do Cadastro da Propriedade.

## 7 - NORMALIZAÇÃO

Existem normas e instruções que, devido à falta de divulgação e à sua desactualização em relação às pertinentes necessidades actuais em matéria de informação topo-cadastral, não têm sido utilizadas pelas entidades privadas e mesmo pelos organismos oficiais, o que tem levado a criar sistemas que, neste momento, se mostram incompatíveis ou de difícil compatibilização.

Daí que, uma das prioridades, seja a divulgação das normas existentes no que respeita à cartografia básica analógica e ao cadastro tais como simbologia, formato e tipo de suportes cartográficos e outras indicações quanto a precisão e confiança dos levantamentos e das cartas topo-cadastrais em consequência das metodologias empregues ao longo dos tempos.

Na mesma linha de actuação para os levantamentos topográficos ou cadastrais a executar deveremos proceder à adaptação das normas e instruções existentes em virtude da introdução de novas tecnologias, tanto para garantir a uniformização da informação cadastral, como para homogenização das metodologias a empregar nos levantamentos a nível nacional por parte de outras entidades, que poderão a curto ou médio prazo ser responsabilizadas directa ou indirectamente pela execução e condução dos trabalhos topo-cadastrais tais como, autarquias, organismos de coordenação regional e empresas privadas.



Esta normalização deverá ser elaborada com a participação das várias entidades intervenientes no processo e formalizada de modo a adquirir força de lei para que sejam atingidos os objectivos anteriormente mencionados.

Ao IGC, por força da sua experiência e responsabilidade nesta matéria, julgo que deve competir a sua condução e acompanhamento técnico, tal como a sua verificação na prática, funcionando deste modo como organismo de controlo a nível nacional.

## **8 - FORMAÇÃO E APERFEIÇOAMENTO PROFISSIONAL**

As exigências de momento implicam um investimento apropriado no campo da formação técnica, tanto ao nível do aperfeiçoamento profissional devido à introdução de novas tecnologias, como à formação inicial de técnicos. Pois, não é possível descentralizar os centros de produção de cadastro e responsabilizar entidades sem que estas estejam preparadas para assegurar a sua execução em condições técnicas satisfatórias.

Além disso, as entidades que possuem alguma competência técnica para o efeito estão carenciadas de quadros, não conseguindo por isso a sua mobilização para um sector que exige grande número de técnicos em actividades de campo, designadamente nos levantamentos cadastrais.

Quanto aos níveis de formação que deveriam ser criados destacaria a criação de um técnico de nível médio geógrafo (engenheiro técnico geógrafo ou engenheiro técnico topógrafo) que, com uma formação básica relativamente boa, teria funções especializadas, de ordem essencialmente prática com perfeito domínio das técnicas usuais incluindo a operação directa de equipamentos.

Um técnico profissional que se poderia designar por técnico de topografia, que teria a formação básica correspondente ao técnico profissional existente, mas formação específica de acordo com as funções gerais do nível do topógrafo e do desenhador-cartógrafo actuais.

Com estes dois níveis de formação, juntamente com o actual nível de engenheiro geógrafo, estaria criado o leque profissional apropriado à resolução dos problemas técnicos que se deparam às actividades cadastrais no futuro, atingir-se-ia uma situação análoga à existente em outros ramos da engenharia e uma certa correspondência aos técnicos de outros países europeus.

Em qualquer destes níveis a componente de formação específica relativa ao Cadastro deve ser realçada tendo em vista a urgente formação de técnicos nesta área.



**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
**MULTIFUNCIONAL**

— SICRUM —

O CADASTRO COMO SUPORTE DO DESENVOLVIMENTO DA AGRICULTURA

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PORTUGAL

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## 1. Introdução

A adesão de Portugal à Comunidade Económica Europeia provocou alterações profundas na política agrícola portuguesa.

A adopção da Política Agrícola Comum (PAC) e a aprovação do Programa Específico de Apoio à Agricultura Portuguesa - PEDAP, conduziram à criação de medidas que actuam ao nível das estruturas e dos produtos agrícolas com a finalidade de promoverem a modernização e o desenvolvimento deste sector.

A coerência e o impacto que essas medidas têm sobre a agricultura portuguesa depende nomeadamente da objectividade dos dados que serviram de base à sua elaboração.

Da mesma forma, o ajustamento dessas medidas e a elaboração de outras só poderão ser correctamente executadas se a "radiografia do esqueleto" do espaço rural português estiver feita.

O cadastro da propriedade é exactamente a radiografia que contém informação exhaustiva sobre proprietários, prédios, localização e uso dado aos mesmos.

Essa informação consoante as necessidades e objectivos visados, pode focar aspectos pormenorizados ou parcelares.

O conhecimento de todos estes aspectos permitirá às entidades responsáveis uma gestão mais adequada e racional dos recursos disponíveis.

## 2. A existência de cadastro é indispensável para a agricultura portuguesa

Portugal é um país com numerosos e graves problemas estruturais no sector agrícola.

Apesar de todos os apoios comunitários, os recursos continuam a ser escassos face nomeadamente às necessidades nos meios rurais em caminhos, redes de rega e enxugo.

Desta forma, a utilização dos meios deve ser criteriosamente estudada.

Dispôr-se de dados de base que permitam estabelecer indicadores que conduzam a decisões quanto a prioridades de actuação, é indispensável quer a perspectiva seja de análise da relação custo-benefício, quer seja de minimizar desajustamentos sociais.

O cadastro da propriedade congrega um conjunto de dados que devidamente relacionados permite produzir alguns indicadores com influência decisiva ao nível da hierarquização de prioridades, e influenciando também a definição de políticas orientadoras.

Mas o cadastro é também de fundamental importância quando se planeiam acções de desenvolvimento regional. A este nível, o Ministério da Agricultura tem tido sérias dificuldades. O instrumento mais recente de Planeamento Agrícola -- PDAR (Plano de Desenvolvimento Agrícola Regional) -- pode ver significativamente reduzida a sua possibilidade de sucesso por não dispôr de informação cadastral na maior parte do País -- 52,5 % de Portugal não tem cadastro. Esta situação agrava-se bastante na metade Norte do País onde sómente 2,4 % de 4,5 milhões de ha estão cadastrados.

E precisamente nesta região que se encontram 580000 explorações agrícolas com uma média de 6 blocos por exploração e onde se detetam deficiências mais graves nas redes de caminhos, rega, e enxugo.

Este panorama complexo reforça a necessidade de meios de diagnóstico precisos que suportem o planeamento das acções e dos investimentos públicos a nível regional.

Mas se o cadastro é fundamental para identificar prioridades e planear o desenvolvimento regional e local, torna-se indispensável a sua existência quando se pretende executar projectos integrados de desenvolvimento agrícola.

Nas áreas sem cadastro o período de execução de um projecto aumenta 50 %. E o caso dos projectos de emparcelamento que reorganizam numa dada zona centenas ou mesmo milhares de explorações, criando uma nova situação cadastral.

A inexistência de cadastro e a morosidade da sua execução foi até há pouco tempo um obstáculo fundamental ao alargamento das áreas com projectos de emparcelamento em curso.

Este aspecto é de tal forma importante que tem dificultado a tomada duma decisão rápida e definitiva relativamente ao

PNER -- Plano Nacional de Emparcelamento Rural.

O Cadastro Vitícola e Olivícola nacionais têm também sérias dificuldades de execução uma vez que um dos aspectos fundamentais desse cadastro é a sua inserção na propriedade, que não se consegue sem identificar extremas e proprietários.

### 3.0 cadastro necessário à agricultura e compatibilização entre bases de dados e Sistemas informáticos

Não é só a inexistência de cadastro que afecta a implementação de projectos integrados de desenvolvimento nos meios rurais. Também o tipo de cadastro até hoje executado em Portugal, voltado para a tributação fiscal acarreta problemas.

De facto a informação que o cadastro recolhe relativamente aos proprietários não tem rigor e valor jurídico.

Esta situação obriga a uma duplicação de trabalho por parte do M. A. . Quando executa projectos de emparcelamento tem que fazer inquéritos exaustivos para realizar aquilo a que chama " Investigação Jurídica da Propriedade " e apurar os reais titulares dos terrenos.

A informação que se obtém do cadastro depende naturalmente dos dados que foram recolhidos. Esses dados devem corresponder às necessidades das várias entidades utilizadoras.

Por exemplo, não basta saber-se por onde passam os caminhos. E também necessário saber se são privados ou públicos, quais as entidades a que estão afectos, quantos km têm e quais as suas larguras.

A existência deste tipo de atributos é indispensável e contribui para um levantamento e caracterização efectiva da realidade do do nosso País e muito particularmente dos meios rurais.

A forma como são disponibilizados estes dados também é de fundamental importância por forma a não ser necessário repetir trabalhos de digitalização ou quaisquer outros de introdução de dados.

A compatibilização entre os sistemas de informação e bases de dados criadas pelo IGC e os principais organismos utilizadores de informação cadastral é muito importante.

Está nessa compatibilização uma poupança substancial de recursos humanos e materiais.

A DGHEA deverá continuar a ser um interlocutor preferencial do M.A. junto do IGC para definir ligações necessárias e possíveis.

#### 4.A coordenação entre entidades

Fazer cadastro é caro, obriga a recursos financeiros avultados, necessita de meios humanos altamente qualificados e especializados, e equipamentos e materiais dispendiosos.

Portugal não tem recursos infundáveis e desta forma não pode cada entidade pública iniciar uma linha particular de recolha de dados.

A identificação das necessidades de cada entidade e a intensificação do espírito de colaboração entre todas é de primordial importância.

A experiência do Alto Minho é um exemplo importante e frutuoso da coordenação e cooperação institucional neste âmbito.

Em 1988, quando a D.G.H.E.A. iniciou o Projecto de Emparcelamento Rural do Alto Minho, foi confrontada com a inexistência de cadastro.

Executar cadastro com os seus próprios meios acarretaria uma demora significativa na elaboração de projectos de emparcelamento incompatível com as expectativas dos agricultores e a necessidade de aplicar em tempo útil os fundos do PEDAP.

As autarquias, conscientes de que o desenvolvimento das áreas rurais do Distrito de Viana do Castelo, depende decisivamente da implementação de projectos integrados de desenvolvimento através do emparcelamento nestas áreas, mobilizaram-se para ultrapassar este problema.

Elaboraram um protocolo com o IGC, tendo contado com o apoio da DGHEA e da CCRN.

O protocolo prevê a realização de ortofotomapas à escala 1/2000 e do cadastro de propriedade.

Por sua vez o IGC assumiu cabalmente o compromisso, mobilizou grande parte dos seus meios para esta região e tem-se empenhado notavelmente nesta tarefa.

Como resultado, no final do corrente ano ficarão cadastrados cerca de 10000 ha no concelho de Ponte de Lima e poderão iniciar-se acções de emparcelamento em larga escala.

A conjugação de esforços e o empenhamento de todas as entidades é e será sempre determinante para a obtenção de bons resultados.





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**CONSIDERAÇÕES SOBRE A NECESSIDADE DE INFORMAÇÃO PARA O  
PLANEAMENTO EM PORTUGAL, RELATIVAMENTE ÀS ACTUAIS ENIGÊNCIAS  
NACIONAIS E COMUNITÁRIAS NESSE DOMÍNIO.**

**RENATO HOMEM**

**PORTUGAL**

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SEMINÁRIO INTERNACIONAL SOBRE CADASTRO RÚSTICO E URBANO  
MULTIFUNCIONAL FACE ÀS NOVAS TECNOLOGIAS  
LISBOA 89/11/20

CONSIDERAÇÕES SOBRE A NECESSIDADE DE INFORMAÇÃO PARA O  
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EXIGÊNCIAS NACIONAIS E COMUNITÁRIAS NESSE DOMÍNIO.

RENATO HOMEM \*

SUMÁRIO

O Mercado Único Europeu; o FEDER e o seu âmbito de intervenção; o planeamento e a necessidade de informação; A informação Estatística; A informação Cartográfica; Peri-urbanização - um exemplo das recentes dinâmicas do espaço Rural/Urbano; realização de um Estudo e Assistência Técnica no âmbito do FEDER respeitante à Cartografia e Cadastro em Portugal; perspectiva de utilizadores de informação para o planeamento.

SUMMARY

The European Economic Community; ERDF and its domain of intervention; planning activities and the needs of information; Statistic information; Cadastre information; Peri-urbanization - an example of new dynamic of rural/urban spaces; Study and Technical Assistance supported by ERDF; information users perspective in order to plan activities.

Antes de entrar propriamente no tema em debate neste seminário é necessário fazer um enquadramento prévio desta comunicação, relacionado com os grandes objectivos de construir na Europa um grande Mercado Único, num grande esforço conjunto dos Estados-membros que se espera venha a contribuir para o desenvolvimento dos países com mais problemas.

Será feita referência aos instrumentos de que dispõe a Comunidade, com especial realce para o FEDER e as suas intervenções.

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\* GEÓGRAFO - TÉCNICO SUPERIOR DA DIRECÇÃO-GERAL DO DESENVOLVIMENTO REGIONAL

Finalmente, serão tecidas algumas considerações sobre as necessidades de informação para o conhecimento e gestão da dinâmica resultante do esforço de progresso vivido no nosso país, com repercussões espaciais visíveis, realçando-se a importância do Cadastro e a sua situação actual em Portugal.

Como é sabido, e como tem sido amplamente ventilado em todos os Estados-membros da Comunidade, vive-se uma época de profundas reformas a todos os níveis, para a realização em 1992, do Mercado Único Europeu, que permitirá a livre circulação de pessoas, capitais, bens e serviços num grande espaço comunitário.

Nesta perspectiva, enquadradas na Política Regional da Comunidade e tendo em vista o reforço da Coesão Económica e Social prevista no Acto Único Europeu, foram recentemente introduzidas alterações na estrutura e regras de funcionamento dos fundos com finalidade estrutural, (FEDER, FEOGA e FSE), para precisar, racionalizar e coordenar as suas intervenções, entre si, e com as de outros instrumentos financeiros, na prossecução de 5 objectivos prioritários que são :

nº 1 - promover o desenvolvimento e ajustamento estrutural das regiões menos desenvolvidas;

nº 2 - reconverter as regiões, regiões fronteiriças ou partes de regiões (incluindo as zonas de emprego e as aglomerações urbanas) gravemente afectadas pelo declínio industrial;

nº 3 - lutar contra o desemprego de longa duração;

nº 4 - facilitar a inserção profissional dos jovens;

nº 5 - na perspectiva da reforma da política agrícola comum:

a) - acelerar a adaptação das estruturas agrícolas;

b) - promover o desenvolvimento das zonas rurais.

Assim, e com o objectivo de reforçar o impacto da acção estrutural da Comunidade pretende-se duplicar em termos reais até 1993 as dotações dos fundos estruturais relativamente aos valores que tinham em 1987, sendo para as regiões abrangidas pelo objectivo

nº 1 (onde Portugal é considerado na totalidade), duplicadas essas mesmas contribuições até 1992.

O Governo Português, para utilizar os instrumentos comunitários que eram desta forma disponibilizados, teve de explicitar a dimensão dos seus problemas e apresentar um documento de estratégia nacional, de acordo com os figurinos comunitário.

Neste âmbito, a Direcção-Geral do Desenvolvimento Regional coordenou recentemente a elaboração do Plano de Desenvolvimento Regional (PDR) - instrumento estratégico interno da política de desenvolvimento regional para os próximos 5 anos - bem como as negociações com a Comunidade para a aprovação do Quadro Comunitário de Apoio (QCA), que é o actual instrumento contratual com a Comunidade sobre a forma e intensidade das intervenções apoiadas pelos instrumentos estruturais comunitários

Nestes documentos, o FEDER - Fundo Europeu de Desenvolvimento Regional, (que é considerado o mais importante instrumento financeiro da Comunidade destinado a corrigir os principais desequilíbrios regionais da Comunidade) assume grande importância, sendo as suas intervenções, como se sabe, especialmente vocacionadas para o financiamento de:

- investimentos produtivos;
- investimentos de criação e modernização de infra-estruturas que contribuam para o desenvolvimento ou reconversão das regiões em causa;
- acções cujo objectivo seja o desenvolvimento do potencial endógeno das regiões;
- acções de desenvolvimento regional a nível comunitário;
- medidas de preparação, acompanhamento e avaliação necessárias à aplicação dos regulamentos comunitários;
- investimentos produtivos e em infra-estruturas que tenham por objectivo a protecção do ambiente, sempre que ligados a actividades económicas.

Investimentos estes, que se têm manifestado de forma notória em Portugal, principalmente nos sectores da Indústria e do Turismo, nas Telecomunicações, nas utilizações Energéticas de Recursos Novos e Renováveis, nas infraestruturas de Transportes, no Saneamento Básico, nas infraestruturas de apoio ao Ensino, no sector da Saúde, etc, e que têm envolvido todos os agentes económicos e sociais, públicos e privados - Administração Central, Empresas Públicas, Autarquias Locais, Empresas Privadas e outros-.

Todas estas intervenções implicam preocupações com o equilíbrio e desenvolvimento das actividades e populações, preocupações essas, que embora não sejam de hoje, assumem nos nossos dias uma maior importância do que à duas décadas atrás quando começaram a ser sentidas em Portugal pela primeira vez, e que podemos considerar terem atingido um ponto culminante com a elaboração dos dois documentos já referidos , o PDR e o QCA.

Actualmente a perspectiva das intervenções no desenvolvimento regional é substancialmente diferente das anteriormente adoptadas ( incluindo as que tiveram participações financeiras comunitárias ) pretendendo-se privilegiar a situação de cada região, dos seus recursos e potencialidades, na definição das estratégias e formas de actuação, adequando-lhe de forma coerente os tipos e montantes financeiros necessários.

Algumas das modalidades de intervenção que reflectem esta abordagem de forma mais significativa são:

#### PROGRAMAS OPERACIONAIS REGIONAIS

São conjuntos articulados de acções plurianuais e coerentes visando o desenvolvimento estrutural das regiões em atraso de desenvolvimento ou a reconversão das regiões industriais em declínio.

Consideram-se intervenções com impacte bastante significativo, e devem responder a problemas específicos regionais mediante a

aplicação de medidas envolvendo acções num ou mais sectores de actividade que contribuam para a resolução de problemas de desenvolvimento numa região bem delimitada.

### SUBVENÇÕES GLOBAIS

São uma modalidade de intervenção inovadora, especialmente dirigida ao apoio ao desenvolvimento local e valorização do potencial endógeno.

Incluem, entre outros, financiamentos a pequenos projectos de infraestruturas diversas de responsabilidade autárquica, apoios a iniciativas empresariais não enquadradas noutras formas de intervenção estrutural, promoção e divulgação de oportunidades de investimento em sectores estratégicos, e criação de serviços comuns de apoio a empresas ou promotores empresariais.

Como se pode constatar, passa a haver uma maior descentralização das decisões, com uma emergência -> Local -> Regional -> Nacional, de realidades e interesses que é necessário integrar e compatibilizar, num tipo de abordagem que requer uma maior precisão de análise e programação das intervenções a realizar.

Para equacionar a prazo o tipo e forma das acções a financiar de maneira equilibrada com os recursos e a potencialidades de cada área, de forma coerente com os objectivos de desenvolvimento adequados a cada realidade, é necessário dispôr de informação em quantidade e qualidade, facilmente acessível e de actualização simples, rápida e fiável.

Sem esta base, é extremamente difícil avaliar os problemas e estrangulamentos existentes, aos diversos níveis espaciais que podemos considerar, e concomitantemente, programar e preparar as acções e instrumentos que os permitam ultrapassar.

Para a actividade de planeamento, podemos considerar fundamentais algumas fontes de informação:

A Informação Estatística -> que vem assumindo cada vez mais um papel de relevo, a que não tem sido alheia nem a Comunidade nem Portugal.

Tem sido feito um esforço de harmonização da produção e tratamento desta informação de forma a que os sistemas estatísticos dos diversos Estados-membros consigam manusear informações em níveis utilizáveis por todos.

Esta situação tomou forma entre nós como uma norma (Dec.-Lei nº 46/89 de 15 de Fevereiro), designada por Nomenclatura das Unidades Territoriais para Fins Estatísticos (NUTS), constituída por 3 níveis de agregação para unidades territoriais cuja fixação concreta em cada Estado-membro corresponde quer a características específicas nacionais, quer às condicionantes e objectivos espaciais das políticas nacionais de desenvolvimento regional.

Os níveis das NUTS são fixados do seguinte modo:

nível I - (3 unidades) território do continente e de cada uma das Regiões Autónomas;

nível II - (7 unidades) territórios correspondentes às áreas de actuação das Comissões de Coordenação Regional;

nível III - (30 unidades) com uma nova delimitação, de agregação de concelhos.

Entre os restantes Estados-membros encontramos uma estrutura similar de divisão territorial, que permite por exemplo, numa óptica de política regional comunitária acompanhar e avaliar a aplicação e impactes da utilização de fundos comunitários e outros instrumentos financeiros da Comunidade, para, como convém à actividade de planear, poder inflectir o tipo de intervenção se os objectivos propostos não estiverem a ser alcançados.

Enquadrada numa outra modalidade de intervenção de FEDER, (medidas de Preparação, Acompanhamento e Avaliação), está neste momento em negociação com a Comunidade uma acção de Assistência Técnica, que a concretizar-se permitirá reunir as

condições consideradas suficientes para que o Sistema Estatístico Nacional seja adequado às necessidades do País, e responda às solicitações do planeamento aos diversos níveis em que este actua.

Outra das componentes informativas básicas para o planeamento é a Cartografia, considerada nos seus vários tipos e estruturada de forma interligada e actualizada.

Desde as diferentes estruturas geológicas, hidrológicas, pedológicas, agrícolas, florestais, etc, e que nos permitem visualizar as funções que um território suporta, ao tipo de informação sobre a divisão administrativa, aos aglomerados populacionais, às redes viárias, tudo isto é necessário conhecer quando se querem tomar decisões sobre um território e a sua população.

Nalguns destes aspectos podemos constatar que Portugal tem grandes carências de informação.

O Cadastro Rústico e Urbano e o tipo de cartografia a que está ligado, pela escala a que se refere e a informação que disponibiliza pode-se considerar de especial relevância para o planeamento regional e mais especificamente urbano, dada a sua capacidade de se adequar às exigências dos vários tipos de projectos de infraestruturas e equipamentos, entre outros, já referidos no âmbito dos investimentos comparticipados pelo FEDER.

Também as exigências comunitárias, por exemplo em relação aos impactes de determinados tipos de projectos sobre o Ambiente, ou em relação às intervenções no âmbito da Política Agrícola Comum, não nos permitem alhear do suporte cartográfico que essas acções devem ter.

Todos os investimentos que temos vindo a referir identificam-se, como é óbvio, num espaço geográfico bem definido, que é necessário conhecer para se poderem seguir as diferentes tendências de implantação e possíveis repercussões; ao nível do emprego criado, das produções conseguidas, do escoamento dos

produtos, dos efeitos ambientais, etc, todo um sem número de variáveis que estão estreitamente ligadas ao bem estar das populações.

Este mesmo espaço tende, no vórtice da época actual, a transformar-se rapidamente, tornando-se difícil percebê-lo de forma correcta dadas as mutações económicas e sociais que acompanham os vultosos investimentos, principalmente se estes se realizam a um ritmo bastante acelerado como é o caso.

O estudo à escala local das novas formas de urbanização tem permitido conhecer a existência de processos relativamente recentes como é o caso da peri-urbanização, que se considera interessante abordar pela ligação estreita que se pode estabelecer entre o seu conhecimento e gestão e a realização e actualização do Cadastro Rústico e Urbano.

(GAMA, António - 1987) - Ao contrário do que é habitualmente considerado como a separação entre a cidade e o campo, de mudança mais ou menos brusca nos seus vários aspectos, a área peri-urbana apresenta-se mais como um espaço de transição bastante extenso, que combina ao mesmo tempo aspectos rurais e urbanos, apesar de continuar a ser polarizado pela cidade na organização espacial das actividades económicas.

Neste espaço de coexistência de aspectos rurais e urbanos que se traduzem na plurifuncionalidade do uso do solo, na pluriactividade das suas populações e na complexidade da estrutura social e das práticas culturais, há uma procura (principalmente por parte da indústria e algum tipo de comércio) de maiores extensões para ocupar, de rendas fundiárias mais favoráveis e de mão de obra disponível e mais barata.

Acrescente-se a isto a tendência das populações urbanas de procurar espaços naturais e locais de lazer na áreas circundantes às cidades, e tem-se um espaço de organização complexa e de difícil compreensão e gestão.



A simples descrição de um processo como a peri-urbanização, serve para exemplificar a necessidade de informação adequada, como é o caso do Cadastro Rústico e Urbano e da cartografia a ele associado

Voltando ao FEDER e à sua actividade correctora das assimetrias regionais da Comunidade, refira-se que uma das suas modalidades de intervenção, aliás já referida, diz respeito a medidas de **Preparação, Acompanhamento e Avaliação:**

- estas medidas compreendem o financiamento de estudos de carácter geral, e relativos à acção regional da Comunidade, e acções de assistência técnica ou de informação (preparação de intervenções operacionais, realização de actividades inerentes à política de desenvolvimento regional, etc).

No Plano de Desenvolvimento Regional entregue pelo Estado Português na Comissão das Comunidades, houve a preocupação de enquadrar nesta modalidade de intervenção acções relativas ao Aperfeiçoamento do Sistema Estatístico, como já foi dito, e à Cartografia e Cadastro, enquanto suportes dos processos de ordenamento e planeamento do território nacional.

Prevê-se que estas acções venham a apoiar e proporcionar eficácia às intervenções operacionais constantes no PDR e no QCA, e como tal, já está em fase de negociação com a Comunidade a operação respeitante ao Sistema Estatístico, esperando-se que as autoridades nacionais responsáveis pela Cartografia e Cadastro saibam responder ao desafio europeu aproveitando a possibilidade de estudar e preparar o lançamento de acções neste domínio.

A primeira fase, de Estudo, servirá para indicar algumas das formas de enquadramento administrativo e técnico, definir com segurança as formas de realizar este empreendimento, a sua viabilidade técnica e económica, as soluções alternativas, as prioridades, etc.

Trata-se de organizar um conjunto de elementos que se coadunem com as exigências nacionais e comunitárias para este tipo de operação e que permitam orientar futuras decisões no domínio da Cartografia e Cadastro e dos projectos de investimento a concretizar nesta área, no médio prazo.

Na perspectiva de utilizador de informação, e aproveitando a presença de tantos e tão conceituados nomes ligados a esta área científica não se pode deixar de referir, na sequência do que se vindo a dizer, o que para qualquer utilizador da área do planeamento seria o ideal em termos de disponibilidade de informação:

-> a possibilidade de aceder a um sistema que reunisse os dados dos tipos de informação básica referida, os armazenasse de forma a conseguir actualizá-los com facilidade e rapidez, que permitisse correlacionar essa informação entre si de acordo com as necessidades de cada utilizador, e que a pudesse disponibilizar na forma gráfica mais conveniente.

Não se pretendendo discutir aqui a exequibilidade técnica e humana da concretização de um sistema deste tipo, pensa-se no entanto que é importante não perder de vista a possibilidade de integrar a informação já referida, incluindo o Cadastro, num sistema a jusante da produção da informação, com esta ou outra forma, de preferência normalizada, que se adequasse às necessidades do planeamento e ordenamento do território do nosso País.





**SEMINARIO INTERNACIONAL**  
**SOBRE**  
**CADASTRO RUSTICO E URBANO**  
**MULTIFUNCIONAL**  
  
— SICRUM —

O DOMINIO PUBLICO MARITIMO, SUA INTERACÇÃO COM O CADASTRO  
E O PLANEAMENTO

JOSE JULIO CAMPOS

PORTUGAL

LISBOA... ENCHAL-20 a 25 Novembro de 1989

- 3 - Exemplo dessa realidade é a legislação que rege os terrenos do domínio público hídrico dentro do qual o domínio marítimo assume porventura a maior importância.

O decreto-lei nº. 468/71 de 5 de Novembro que, a par de revisão e actualização de numerosa, dispersa e antiga legislação pretendeu sobretudo unificar o tratamento jurídico desses bens dominiais, constitui, ainda hoje, diploma fundamental nesta matéria.

Ai se define a margem do domínio hídrico como uma **faixa de terreno contigua ou sobranceira à linha que limita o leito das águas** limite que, no caso das águas do mar ou dos demais sujeitos e influência das marés é definido pela **linha do máximo preiamar das águas vivas equinociais**.

A sua largura com respeito às águas acima referidas é de 50 m, salvo tratando-se de praias com largura superior, caso em que a margem se estende até onde o terreno apresenta essa natureza.

- 4 - A margem assim definida assume uma dupla função: constitui o limite da jurisdição das autoridades marítimas, hidráulicas e portuárias, e submete os terrenos nela compreendidos ao regime de dominialidade pública, presumindo-se com essa natureza todos aqueles que, não estiverem na propriedade ou posse privada desde 31 de Dezembro de 1864 ou 22 de Março de 1868 conforme os casos. Com efeito, foi por decreto publicado na primeira daquelas datas que pelo direito português se incluíram no domínio público as margens e praias das águas do mar, o mesmo acontecendo, no Código Civil de 1867 entrado em vigor em 22 de Março de 1868, quanto às arribas alcantiladas.

- 5 - Se bem que respeitados naqueles diplomas legais os direitos de propriedade já constituídos, o reforço da dominialidade e uso público das margens é claramente denunciado na disciplina normativa subsequente designadamente no dec. lei nº. 468/71.

Sirvam de exemplo entre outros aspectos, as servidões administrativas e outras restrições de utilidade pública impostas para acesso e passagem ao longo das águas no interesse da fiscalização, da pesca e da navegação, o direito de preferência a favor do Estado na alienação voluntária ou forçada por actos entre

vivos, a faculdade de proceder à expropriação para submissão de determinadas zonas ao regime da dominialidade hidrica, a integração automática no domínio público, de terrenos do Estado sempre que lhe pertençam etc.

- 6- É, no estudo e emissão de pareceres sobre assuntos relativos à utilização defesa e conservação desse domínio na vertente marítima que a designada **Comissão do Domínio Público Marítimo**, órgão consultivo junto da Marinha, se tem particularmente evidenciado.

Criada por portaria de 30 de Junho de 1922, embora apenas tenha assumido a designação actual pelo Decreto nº. 20 788 de 20 de Janeiro de 1932, tem a sua existência consagrada na actual estrutura orgânica da Marinha pelo decreto-lei nº. 300/89 de 7 de Setembro e integra representantes de praticamente todos os departamentos do Estado com jurisdição ou interferência ainda que indirecta no domínio marítimo, constituindo pela doutrina dos seus estudos e pareceres, publicados em parte importante no **Boletim** anual da Comissão, contributo dos mais relevantes para a definição e defesa do domínio marítimo.

- 7 - Sendo o reconhecimento administrativo da propriedade particular nas margens do domínio público marítimo, a delimitação deste na confrontação com aquela, os aspectos que directamente se prendem com o Cadastro, residindo aí o labor mais intenso e porventura mais profícuo da **Comissão do Domínio Público Marítimo**, com virá em traços gerais, referir os procedimentos seguidos para esse efeito.

- a) Iniciado o processo de delimitação, normalmente sob o impulso processual dos particulares interessados, mas não raro, também por iniciativa da Administração, abre-se uma fase de instrução, levada a efeito pelas entidades administrantes do domínio público, com recolha de elementos de prova, designadamente actos de registo e notariais, decisões judiciais ou administrativas, peças cartográficas ou documentação a mais diversa, susceptíveis de comprovar o exercício de posse ou propriedade privadas desde data anterior a 31 de Dezembro de 1864 ou 22 de Março de 1868, conforme os casos;
- b) O processo assim instruído é submetido a parecer da Comissão do Domínio Público Marítimo, a qual, apreciando os elementos de prova, conclui ou não pelo reconhecimento dos direitos dos particulares propondo, se for caso disso, a nomeação <sup>duma</sup> Comissão de Delimitação;

- c) Esta, integrada por representantes do Estado e dos proprietários interessados, promove a demarcação dos terrenos, coordenando os marcos com ligação à rede geodésica do país, e elabora o auto de delimitação e levantamento topográfico correspondentes;
- d) Aprovada a delimitação em novo e final parecer da Comissão do Domínio Público Marítimo, e após as homologações previstas na lei, e assegurada a publicidade do auto respectivo mediante publicação no Diário da Republica.

8 - Com o procedimento acima enunciado ficam claramente definidas a propriedade pública e privada nos tratos delimitados.

Se bem que tais operações não precludam a competência dos tribunais comuns para decidir da propriedade e posse das margens, a delimitação administrativa, desprovida embora da coerção jurídica que assiste as decisões judiciais, assegura com não menor segurança - ousamos dizê-lo - a verdade material quanto a existência dos direitos, atenta a profunda indagação probatória que precede as delimitações.

Mau grado isso, nem a constituição das parcelas dominiais, nem as novas confrontações que daí resultam para os prédios particulares, se têm reflectivo no registo predial e na organização do cadastro.

9 - Por isso na perspectiva da informação cadastral, do planeamento integrado do território e da segurança jurídica, permitimo-nos, emjeito de conclusão formular as considerações finais seguintes:

- a) Impõe-se, como instrumento util, para os fins acima referidos, a delimitação sistemática do domínio público marítimo, não a deixando á mercê de solicitações casuísticas dos proprietários interessados;
- b) A publicidade das delimitações, pese embora a solenidade com que é feita, não confere a necessária segurança jurídica quanto ao exercicio e limites da propriedade privada, pois que é no registo predial e na inscrição matricial dos prédios que assenta a publicidade e presunção desses direitos.

Convirá que, por mecanismos de informação ou participação adequa

dos, os autos de delimitação constituam suporte documental para a definição das confrontações da propriedade privada quer na descrição registral dos imóveis quer nas correspondentes matrizes prediais;

- c) A inscrição das linhas poligonais das delimitações na cartografia cadastral, para além da acrescida notoriedade conferida a tais actos, propiciaria, com inegável vantagem, uma representação global das parcelas do domínio público marítimo em todo o território nacional.

10 - Estes são os aspectos que, numa apreciação fugidia, pareceram de relevar quanto à interferência do domínio público marítimo com a problemática do cadastro.

LISBOA, 16 DE NOVEMBRO DE 1989

JOSE JULIO CAMPOS

Membro da Comissão do Domínio Público Marítimo





#### **NOTAS FINAIS**

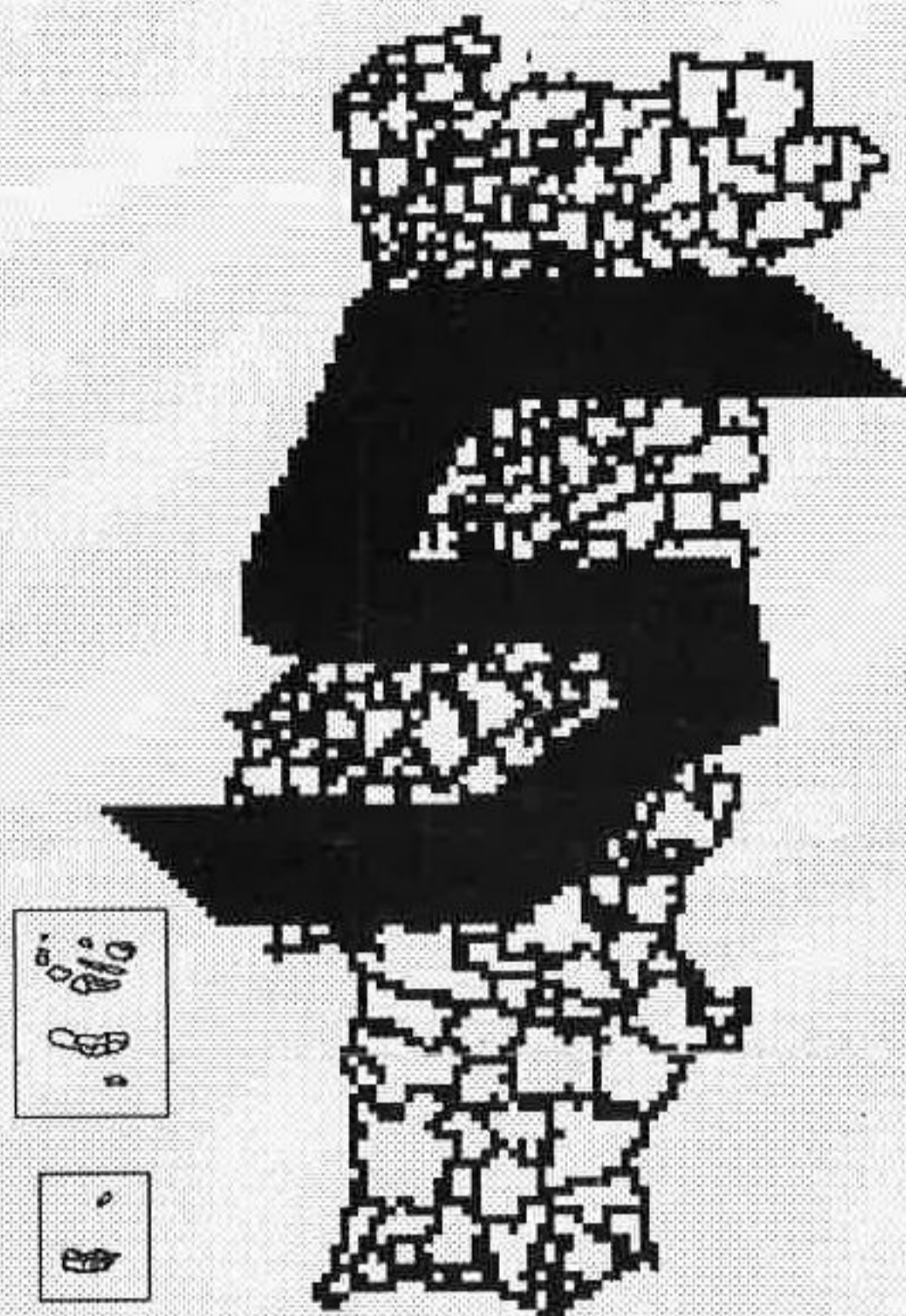
- 1 - Parece não restarem quaisquer dúvidas sobre a oportunidade e resultados alcançados com a realização do SICRUM.
- 2 - Esta publicação fica a dever-se à valiosa colaboração e apoio da Comissão de Coordenação da Região Centro a qual permitiu colocar à disposição da comunidade científica e técnica nacional esta fonte de informação sobre temática da maior acuidade para o País.  
Aqui expressa a Comissão Organizadora o seu mais vivo agradecimento à CCRC.

Coimbra, Fevereiro de 1991.



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