of Kadaster employs specialised account managers to keep in touch with the individual municipalities.

Large scale base map

In the past the Dutch government has decided that the production of large-scale topographic maps (1:500-1:2000) is not a government task. Organisations that need such a map had to find a way themselves to produce it. This has lead to the creation of joint ventures that, with some ups and downs finally have succeeded in producing a large-scale base map for the whole territory of the Netherlands. Main participants in the joint ventures are the municipalities, utility companies and Kadaster. The maps only contain the basic topographic data (buildings, roads and waterways, street names). In the future the regional joint ventures will probably grow into a (more) national structure to create one window for national customers. Also selling and viewing will be made possible through the Internet.

National clearinghouse for Geo-information

The National clearinghouse for Geo-information (NCGI) is a distributed network of organisations that produce, store or use geo-information. The goal is to make the existing geo-information transparent and accessible by metadata and to exchange the information in a digital way. The participants produce topographic, soil, land use environmental, cadastral information etc.

The first activity of the NCGI was to produce a meta-data description. This is partly ready. The meta-data standard of CEN proved to be too complicated. However in general the objectives in the business plan of NCGI were not achieved. Main problem was that there were no transactions executed through the website. Participating organisations did at the end not see the added value of such a point of distribution.

The decision was taken to privatise the NCGI, however it still has a strong link to the public administration.

Authentic registrations

The Netherlands government organisations all-together maintain many thousands sets of information. The result is that civilians often are asked the same questions, that there are inconsistencies in the datasets and therefore that decisions often are not accurate. A fragmented data administration is also more costly then necessary. This is more an organisational problem than an ICT-problem.

The Netherlands government has recognised the necessity of sustainable data management. Objective is to have a one-time collection of all data and multiple use and not to have a separate system for each government task.

It is recognised that the only way to achieve this is by legislation. A law should determine authentic registrations that are databases of high quality with explicit guarantees for quality management. These are datasets that are vital for the government service and the use by government organisations is compulsory.

The cadastral registration along with the registrations of natural persons and the company register are the first candidates to become an authentic registration.

National spatial data infrastructure

The Netherlands government has no mayor program to build up a national spatial data infrastructure but more in general there is an investment program to stimulate the creation of new flexible knowledge networks. One of the themes of this program is high quality spatial use. 50 organisations in the geo-information sector, private, public and research, have decided to make a proposal for a structural improvement of the geo-information supply, in the framework of this investment program. This means that these organisations have to find a new structure to be able to make the proposal.

Conclusion

Looking into the examples of coordination initiatives in the Netherlands it can be seen that there is a wide variety, from small (bilateral cooperation) to big (many organisations involved, ambitious objectives), from bottom up (voluntary cooperation) to top down (leading to legislation). Most of these initiatives had their own added value and proved to be necessary one or the other way.

Most initiatives are bottom up. It is the explicit vision of the government that the geo-information sector has to run its own business as much as possible. It also realises that government decisions without a high level of support of the sector do not have a big chance of success. But at the end, decisions have to be taken and legislation is a good way to do that.

Looking to the European landscape there is a big similarity with the national level. There are bottom up and small initiatives: the bilateral cooperation between cadastral organisation is in place. Kadaster went to Sweden to discuss ICT-developments, we went to Britain to see electronic conveyance and we ourselves get many visitors too. The Eulis project, discussed elsewhere during the conference, has a very modest objective with respect to the creation of a European portal for 8 national information systems. Yet a big number of issues have to be discussed and concluded to create such a portal.

Bigger coordination structures are WPLA and Eurogeographics, two organisations that unite most of the cadastral and/or mapping organisations in Europe.

The European Union has until now only produced a limited amount of regulations that are relevant for the cadastral sector. Examples are the directives on privacy issues and data base protection. Looking to the objectives of the Inspire program to create a legislative framework for a European spatial data infrastructure, it can be concluded that the involvement of the EU in cadastral issues is growing and that it is important for the cadastral organisations in Europe to coordinate closer to influence the decision making in the European Union. In this a respect the initiative of the Spanish government to create a coordination body that is closely linked to the decision structure of the European Union is worth wile considering. ■

Legal aspects of the Cadastre

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There are certain characteristics of land, which influence its ability to meet the needs of society. Location, extent,

ownership and encumbrances are four such characteristics. These characteristics are common to most land information systems in the market economies of the Western World. The accepted name for such a land-information system is a Cadastre and the legal Cadastre for Ireland is the Register of Titles maintained by the Land Registry.

To quote J van Hemert on Land Registration in Eastern Europe – 1993.

«— we have to realise what land registration in a modern society means, what it means in a market economy. In the West the Land Registry is an important instrument for the protection of the owners of land, based in all countries on their own civil code. The common factor was that ownership of land was in some way guaranteed in the civil code and registered in the Land Registry. Land Registration made it possible for land and real estate transaction and the establishment of mortgages to be executed in a reliable way. Private investments in real estate are very high, the amounts that are borrowed yearly are enormous and it is impossible at the moment to imagine how the economy in Western Europe would work without these transactions. All this private financial activity is only possible because a reliable land registration system exists based on legislation that gives private investors maximum protection—»

Different systems for recording land-based information have evolved among the countries now within the European Union. Within each jurisdiction, the systems support interdependent frameworks, although the systems themselves are not always homogenous. There are broad similarities in the systems that support the registration of real property in each country; however, there are marked differences in many countries in the manner in which the administration of the registration process is undertaken. Each country is more comfortable with building on its own registration system and each system has evolved and has been refined to meet its own national market needs. Measures aimed at increased harmonisation must ensure that the imposition of EU regulatory control does not prejudice the effectiveness of national systems. At the same time, there is an acceptance of the reality of a more federal Europe with cross-frontier land acquisition and financing together with the increasing importance of Information and Communication Technologies (ICTs) as a key resource in the restructuring of EU economies, in line with the eEurope Action Plan. This plan was launched at the Lisbon Summit in 2000 and set the goal of establishing Europe as the most competitive and dynamic knowledge-based economy in the World. Indeed, an obvious example of financial harmonisation is the fact that I did not have to change currency to attend this conference because I am within the Euro zone. These initiatives lead inevitably to increasing pressure for uniformity in the availability, accessibility and cost of information on land ownership and title. A natural consequence of any such initiatives is to consider the development of a consistent system for land information within Europe and to make progress in developing universal systems for land registration within the member states. The issue of harmonisation of information relating to land was raised during the Stockholm Summit and it is anticipated that further progress in this regard will be one of the goals of the Seville Summit.

What is the Cadastre

The concept of the Cadastre has its origins in the European states with legal systems based on the Roman Civil Code. The United Kingdom, Scotland and Ireland operate under Common Law and have developed a different approach in the establishment of systems of registration of title and mapping. This can lead to confusion in terminology regarding the nature of the Cadastre, its role and the agencies with responsibility for its creation and maintenance. Registration of title provides an essential service to the State. Actual legal ownership is readily ascertainable and parcels of land can be identified with certainty. Rouff and Roper, the leading authority on registered conveyancing, states that *«The principal object of registration of title is to confer certainty. One way in which this object is achieved is by the provision, for every registered title, of an accurate plan based on the latest revision of the Ordnance Survey map revised to date, which identifies the registered land».* The requirement for a map to support the textual information relating to registration of title mirrors the position in jurisdictions operating under the Roman Civil Code. In these states the Cadastre is required to support information relating to title, ownership and mortgages. Irrespective of the relative priorities assigned to the different components of land related information, be it the Cadastre or the textual information, the purposes for which such systems are established and maintained are similar in most regards.

While there are a number of Cadastres in Ireland, such as those retained in the Valuation Office, the Planning Offices and the Department of Agriculture, the focus of this presentation is registration of title. This area encompasses the role of the legal Cadastre for recording the location and extent of land on large-scale maps and the maintenance of title information, such as ownership and mortgages relating to land.

Land Registry and Registry of Deeds

There are two systems of registration of land in Ireland. These are the Registration of Deeds system introduced in 1707 and the Land Registry system introduced in 1891. Both systems are mutually exclusive in relation to the same title in land and the intention is to replace the Registration of Deeds system with the Land Registry system over time. It is important to recognise the distinction between the two systems because many systems in other jurisdictions referred to as Land Registry systems are in fact Registration of Deeds systems linked to a Cadastre. The Registry of Deeds system provides for the registration of documents relating to land, the effect of which confers priority on the documents registered. Synopses of the deeds together with indices for searching are maintained in the Registry. On the other hand, the Land Registry provides for registers showing the ownership to land. The registers also contain details of any encumbrances or charges affecting the land. Thus a search in the Registry of Deeds will only disclose the existence of documents relating to the land whereas a search in the Land Registry will reveal the ownership of the land and the title shown is given the backing of a State guarantee. Generally, the Land Registry registers are said to «mirror» the title but this is subject to certain limitations. One critical distinction between the two systems is that the Registry of Deeds system has no map to identify the land. The Land Registry system makes provision for the description of all registered land on Ordnance Survey maps retained in the Land Registry and these are the legal Cadastre for the country. Similar twin systems of Registration of Deeds and Land Registry registration exist in the United Kingdom and Scotland where the approach of

converting to universal Land Registration is also being pursued.

Significant progress has been made in the development of computerised registration and records systems for the Land Registry and Registry of Deeds in Ireland and these are linked to Internet based information and application service facilities. At this stage, the map is still retained in paper form. However, the Ordnance Survey has a complete digital mapping system for the country and plans are now advancing for the introduction of a digital map into the Land Registry and the conversion of its paper based records into digital format.

Users of Cadastral Information on Title and Ownership

Registration has a multi-purpose function, which serves the needs of many sectors of the economy and government. The original thrust for registration of title related to the requirements of commerce and government and these still remain major driving forces behind developments.

• *The Financial Sector*

Hernando de Soto in the Mystery of Capital states that «*Capital is the force that raises the productivity of labour and creates the wealth of nations. It is the lifeblood of the capitalist system, the foundation of progress, and the one thing that the poor countries of the world cannot seem to produce for themselves. – most of the poor already possess the assets they need to make a success of capitalism – but they hold these resources in defective forms: houses built on land whose ownership rights are not adequately recorded. – In the West, by contrast, every parcel of land, every building – is represented in a property document that is the visible sign of a vast hidden process that connects all these assets to the rest of the economy. Thanks to this representational process, assets can lead an invisible, parallel life alongside their material existence*»

An effective registration of title system is a prerequisite for the establishment of a market economy. Financial institutions cannot advance money without a registration of title system for securing loans. The financial sector has a vital central role in initiatives directed towards the creation of growth in the European economies. With the introduction of the Euro, an increased dynamic exists for the removal of barriers to cross-frontier transactions. This gives rise to challenges for national land registries to develop common approaches leading to increased harmonisation in information provision, registration requirements and registration costs. One such initiative is the EULIS project, which is directed towards establishing a common framework for registration information among a number of European states.

• *Government*

National land information systems form a vital part of the government infrastructure. Without this information, it would not be possible to control land use. A number of such systems are those that support the judicial process, planning, land use, environmental control, requirements for utility companies, land valuation, taxation, grant schemes and identification of criminal assets. This list, which is not exhaustive, relates to the service delivery elements of the public sector. In addition, the State requires systems to support decision-making and for management information

purposes in the public sector. A key element in the support of all these areas and also performing a central role in any national spatial or land information systems is information on registration of title. Where such information is retained on an integrated Cadastre developed as a geographic information system, it greatly increases the extent of its value and its significance as a contributor both to national spatial planning and general policy formulation.

• *National Resource*

The most significant feature that distinguished the first modern humans, Cro Magnon Man, from their predecessors was the ability to think representationally. All art, literature and the sciences stem from this ability. Information on land and title is retained in a representational form and, throughout the developed world, intricate systems have evolved, which enable us to extract value from representations. Hence, it is possible to raise money on the security of registered land while still retaining possession of the land. Increasingly, there is a recognition that information systems which are easily accessible, simple, cheap and open are a stimulus to the economy and that they are an aid to the generation of business opportunities. Registration of title and the Cadastre have a major role to play in this area.

• *Purchasers*

One of the fundamental reasons for the establishment of land registration is the protection of purchasers. This is achieved through the provision of reliable information on title to land. A number of features are common to most systems of land registration. However, the manner in which this information is maintained often differs from one jurisdiction to another. The main features relating to the Land Registry system in Ireland are as follows:

• A State guarantee backing the Land Registry information
• A reliable map, based on large scale Ordnance Survey maps, showing the boundaries and extent of the land
• A register which is deemed to be conclusive as to its contents
• A register giving details of the location and extent of the land, the ownership and any mortgages or encumbrances
• A system of priority for registrations
• Registers, maps and indices that are open to the public
• Independence of the Land Registry defined in legislation
• An appeals procedure to the Courts

Limitations with Land Registration

Taking the Irish Land Registry system as an example, I will set out a number of limitations with the current system. In other jurisdictions these limitations may not arise or others may exist.

• Not all rights are capable of registration and those dealing with registered land must make enquiries to ascertain if any unregisterable rights exist. Examples of such rights are rights under adverse possession in the course of statute barring registered interests, short term tenancy interests and subsisting rights predating first registration of the land.
• Ordnance Survey maps show physical features whereas Land Registry maps show registered legal

boundaries; these are not necessarily the same. Where conflict arises due to subsequent Ordnance Survey map revisions, the agreement of the registered owners may be required to amend the title maps

• Land registration deals with ownership; it does not show possession

• Land registration does not indicate all statutory prohibitions or conditions relating to the use of the land. The most significant of these matters are the subject of Planning Laws and fall within the remit of local authorities. Because each agency maintains its own Cadastre, it is necessary to make separate enquiries for a complete search.

Access to and Cost of Information

A tension exists between competing demands in the provision of access to public information. On the one hand, there is a dynamic for more openness in the availability and accessibility of all information to support transparency within the Public Sector, for commercial reasons and as a stimulus to economic growth. Freedom of Information is a policy that stems from this. On the other hand, there are issues in relation to protection of State investment, personal privacy and protection of confidential information.

A number of issues pertaining to access to information, which have a direct bearing on the Land Registry, are those relating to:

• Copyright over information being accessed by commercial customers

• The application of a public interest test in the supply of information to the public or the media

• Aggregation of information for decision making or other uses through data warehousing

• Development of information systems on non-registration information supplied to the Land Registry

• Commercial rights to Land Registry information

• Intellectual property rights

• Fees charged for information

«There is no such thing as a free lunch». Investment in ICT's and associated data capture and surveying is expensive. Land Registry organisations are almost universally within the sphere of government control. A question to be addressed in whether Land Registry systems should operate on a cost recovery basis, whether the Land Registry should receive State subvention and what fees should be charged for access to information.

Generally, Land Registry fees are fixed on a cost recovery basis. The corollary of this is that fees should relate to the cost of providing the service being delivered. However, a factor to be borne in mind is that the true cost for the provision of certain services can be prohibitively expensive and this gives rise to a need for an element of cross-subsidisation or, in the alternative, State subvention. A primary issue is how to assess the true nature of costs for service provision. Under commercial accounting principles the cost of service provision is significantly higher than under cash based government accounting.

The overheads associated with land registration fall mainly into three areas: staff costs, data capture and conversion costs, and Information Technology costs. The principal source of Land Registry revenue is through application fees for registration. Fees received from the provision of information services generally constitute a minor part of total revenue. The State benefits from many services, which the Land Registry is required to provide for no fee. Examples of such services are those provided to other government departments or those provided for no fee through statutory provisions such as transfers of family homes between spouses. In contrast, the State underwrites the Land Registry through an open-ended guarantee on title. A question in assessing the true cost to the State of social initiatives is whether they should be fully costed and charged to the State by the Land Registry to ensure true transparency. Otherwise, private sector applicants may find themselves subventing the provision of these services through cross-subsidisation.

Where business opportunities exist, private sector companies will generally seek to take advantage. Provision of information is often regarded as ancillary to the principal functions of Land Registries, whose focus is directed towards fulfilling their statutory functions relating to registration. Often, Land Registries are not adequately resourced or structured to fully exploit the commercial potential of their information. Some private companies have formed Public Private Partnerships with Land Registries to develop information systems and to exploit the commercial opportunities of the information held. The advantage for the Land Registry in such a relationship is that it benefits from the early delivery of effective and efficient information systems with complete databases. The disadvantage is that the Land Registry may be inhibited or even precluded from developing new systems for the delivery of its services. This could be a significant inhibitor to development of improved services in an environment where the opportunities afforded by information and communication technologies are rapidly evolving.

Land Registry information is a national resource and should be available equally to all sectors for commercial exploitation. Exclusive commercial arrangements, whether through Public Private Partnership arrangements or otherwise, are not appropriate for this reason. Similarly, it is important to ensure that companies who have developed value added services based on particular data sets or have linked data sets to proprietary software do not gain rights to the supply of those data sets in a particular format.

The Land Registry should ensure that it has copyright over its information. An issue to be addressed in this regard is copyright over information supplied for one purpose such as registration and subsequently made available or developed as an information service. Appropriate measures should be taken to protect the status of information on registration against claims for copyright by the authors of the information supplied. An example of this is possible claims to copyright over boundary data supplied for registration purposes. Similarly, access to Land Registry information must not prejudice the intellectual property rights of companies who have developed information systems in collaboration with the Land Registry.

Measures Towards Cross Border Information Services

The obstacles to be overcome to implement measures for cross border property information services within the EU cannot be overstated. No common principles exist for collecting and storing information; for agreed principles governing access to information; for an agreed approach to pricing; or for the development of common legal and regulatory frameworks. At a fundamental level, jurisdictions operate under different legal systems. Information technology, particularly ICT's, are both a vehicle and a driver for the development of uniform gateways to information.

The goal of fully integrated cross border property information services may be more of an aspiration than an achievable objective. However, measures can be taken in a phased approach towards introducing a common framework to certain information. Similarly, measures could be introduced, which would lead towards harmonisation of registration services. Some of the issues that may need to be addressed in this regard are:

• Establishment of an EU network on Land Registration (including associated agencies) with representation from all countries within the union

• Benchmarking Land Registry / Cadastral systems through an agreed set of Key Performance Indicators

• Agreement of common approaches towards access to information for commercial use

• Agreement on principles governing copyright over information

• Agreement on principles governing cost recovery, State subvention and the involvement of Public Private Partnerships

• Establishment of universal data sets to form the basis of EU wide registration of title information systems

• Co-ordination of approaches to electronic information systems and electronic registration

• Establishment of common protocols for file transfers and language

• Development of a heightened awareness at government and EU level of the importance of land registration / Cadastres and its role in spatial planning. ■

The UK «Cadastre»

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The word *cadastre* is generally used to describe «a methodically arranged public inventory of data concerning properties, within a certain country or district, based upon a survey of their boundaries (1)». There are numerous models however for it's use and implementation throughout Europe. Using the land parcel as it's foundation, the cadastre is used to record information about land rights, valuation, land use, etc.

There is no UK Cadastre - the word cadastre is not one commonly used in the UK, where for historical reasons the development of land administration institutions has taken place in a different way from the rest of Europe. While mapping remains the basis for those activities considered as «cadastral», in the UK there is no single organisation responsible for the cadastre.

Ordnance Survey, as a national mapping agency, maintains large scale mapping for England, Scotland, and Wales. In Northern Ireland this is the responsibility of Ordnance Survey Northern Ireland. The detailed digital

mapping maintained by these two Government Agencies provides the definitive framework upon which other organisations can «hook» and manage their data. Another difference with most mainland European countries is that the base mapping in UK is topographic – it shows features that exist on the ground but not the fixed boundary points and monuments usually associated with a cadastre.

The responsibility for the recording of land rights in the UK is divided between Her Majesty's Land Registry (HMLR – England and Wales), by Registers of Scotland (RoS) in Scotland, and Land Registers of Northern Ireland. Land and Property valuation is the responsibility of the Valuation Office Agency (for England and Wales), Assessors in Scotland, and the Valuation and Lands Agency in Northern Ireland. Land Use information is managed by a number of Government Departments e.g. Environment, Agriculture, devolved Government departments, and by Local Authorities. This paper will concentrate on the products and services of Ordnance Survey GB, but all of the other organisations mentioned above are also developing services to the citizen – the main topic of this session of the Cadastral Congress.

Ordnance Survey provides a wealth of free mapping on its web site (2) including map extracts at scales up to 1:50,000. This service, called Get-a-Map allows users to select areas by town, post-code or co-ordinate, and to pan, zoom and centre a map before printing it out. A recent research project has also looked at the possibility of extending this service to kiosks – placed in public places such as airports or railway stations. The result of the trial has not yet been announced but it is likely that any future development of the service will depend more on the business case than the technical feasibility.

Ordnance Survey has made Great Britain one of the few countries in the world to have a complete digital national topographic database, including complete large scale data for all urban areas. In the last year Ordnance Survey Northern Ireland has completed the UK picture with large scale digital data covering the entire province. Within Great Britain there is now widespread use of digital mapping across many user sectors, in one of the most developed GI markets in Europe, based on a robust data infrastructure which enables major contributions to national economic development.

Over the last twelve months Ordnance Survey has embarked on a number of projects under the umbrella of a new «e-Business strategy», the vision of which is:

«Ordnance Survey and its partners will be the content provider of choice for location based information in the new knowledge economy».

As part of its new e-Business strategy, Ordnance Survey is developing its digital mapping products and services within a coherent infrastructure known as the Digital National Framework. The DNF combines the British National Grid and GPS referencing system to create a new spatial reference standard that provides both location **and the link to topographic objects**. A unique 16 digit Topographic Identifier (TOID) is used for all points, lines, and areas, and provides a common link that will allow different data to reference the same feature, allowing users to cross-reference data in a way that should help to release the potential and value of their data.

(1) Jürg Kaufmann, Chairperson FIG Working Group 7.1, Reforming the Cadastre.

(2) http://www.ordnancesurvey.co.uk/.