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agricultural parcels with minimal value are maintained because of long tradition.

All these cases express the contradicting and changing demands over time on Cadastral Systems.

Online-user behaviour in other countries shows that the main user groups are focusing on descriptive data instead of maps.

Cooperation for GI-data and services

A regional diversity is in contradiction to a standardized demand. Similar to that GI-data products have to be developed on standardized base. And we see from the cooperation of Adv in Germany the strong development towards: «once face to the customer» (see also <http://www.adv-online.de/>).

Unified data products and services: The development of GI-data products as part of a spatial data infrastructure has to be forced on national as well as European level. A demand on unified data products comes from European wide acting users like EU, Investment banks, European infrastructure providers and the real estate market. Examples for that are:

— The INSPIRE-project: Infrastructure for Spatial Information in Europe (www.ec-gis.org/e-esdi) aims at making available relevant, harmonised and quality geographic information for the purpose of implementation, monitoring and evaluation of environmental policy-making and for the citizen.

— The EULIS-project under the eContent Programme of the European Union: An important part of such a development is the creation of international access to land and property registers. The EULIS project will create a demonstrator that will provide improved access to information on-line from eight national land registries.

Institutional Cooperation: Examples for good institutional cooperation in Europe are:

— **EuroGeographics** facilitates the cooperation of European national mapping agencies and provides guidance on geographic information incl. Cadastral Systems which they maintain.

— **UN-ECE-WPLA:** The Working Party facilitates the cooperation of European Cadastre and Land Registry agencies and aims at improving and promoting land administration among all countries of the ECE region.

— **The European Council of Geodetic Surveyors (CLGE)**, www.clge.org represents the interests of the geodetic surveying profession in Europe to the Institutions of the EU. The «Géomètres experts fonciers Européens (GE)» www.bdvi.de/BDVI/geometer/maingeo.htm have a quite similar approach with more focus on private surveyors.

The cadastre and the users demand

All the above mentioned organizations care about better cooperation among the sister institutions and about the profession of the surveyors. A good service for the main customer groups would in fact improve the position of Cadastre in Europe in a sustainable way. The real demand can only be covered in closer cooperation with the main customers as partners like the legal and financial business as well as urban and regional development.

The diversity of traditions and legislation on Land Administration in Europe has to be highly appreciated. Nevertheless this still allows a coordinated approach within

all further developments for the benefit of the customers. A satisfied customer's demand supports the interest of Cadastre Agencies and Land Registries as providers of spatial information and services. ■

The use of the Cadastre in Sweden

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Background

All land in Sweden is divided into property units. Changes to the division into property units are a continuous process-lots are amalgamated or sub-divided and other cadastral procedures are carried out. Lantmäteriet is responsible for guaranteeing legal security for individual property owners and also participates in measures to improve and formulate legislation in this field. Lantmäteriet is also responsible for register and system for land registration which shows ownership, mortgages, encumbrances etc, the custodian for that system is the National Court Administration. These two registers are the basis in the Swedish Land Data Bank System (SLDBS).

Development of the SLDBS started in beginning of the 1970s as a common system for the textual part of property and land. It started as an internal system, developed in-house and with internal demands but it has during the year grown to an open system used in the area of land administration and in the financial sector throughout Sweden with more than 25.000 users connected.

A number of additional registers have been added as time went on and today the comprehensive register is named The Real Property Register and includes:

- Address Register
- Building Register
- Co-ordinate Register
- Plan Register
- Property Assessment Register
- Sales Price Register
- Owner Associations Register
- Housing Credit Guaranties Register

Last but not least integration with:

- Geodata Bank System including digital maps of different scales and for different usage and
- Digital Archive including digitised instruments and dealings.

Lantmäteriet

The task of Lantmäteriet is to contribute to an efficient and sustainable use of Sweden's real estate, land and water. The organisation has three divisions:

1. The Division Land and Geographic Information is responsible for the generation, management, development and distribution of geographic and real property information.

Real property information comprises information from the Real Property Register, including the digital cadastral index map, the Land Register and the central registers for

buildings, apartments, addresses, mortgage certificates and real property prices. Geographic information comprises basic geographic data such as co-ordinates, terrain elevation data, aerial photographs, vegetation cover data and place names. The Division is also responsible for standardisation questions and for R&D in the fields of geodesy, cartography and geographic information systems.

The Division's main clients are credit institutions and banks, public administration, municipalities, estate agents and property management companies.

2. The Division Cadastral Services is responsible for Lantmäteriet's cadastral activities including decisions concerning the formation of new properties, changes to existing properties, joint-properties, easements, utilities and common facilities. Land ownership rights are determined and registered in the Real Property Register. Our clients include private property owners, forest companies and companies and organisations in the energy, telecommunications, road and railway sectors and the municipalities.

The main activities are carried out within 21 Cadastral Authorities, one in each county. At the headquarters there are units for development, marketing and management. The division has a total staff of approximately 850 of whom 800 are working at the Cadastral Authorities and 50 at the central level. In 38 of the municipalities there are also Cadastral Authorities within the local administration.

3. The Division Metria carries out a broad programme of repayment services in the land survey sector and also produces basic landscape information for the Division of Land and Geographic Information. Other services and products supplied by Metria include consultancy services in surveying and mapping and geographic information techniques. Through Kartcentrum Metria is responsible for the publication of the national map series and other map products, as well as a comprehensive cartographic work on a contract basis. Metria's clients are to be found in both the private sector, such as forestry and telecommunications companies, and in the public sector.

Metria has a total staff of approximately 760 and some 40 local offices.

As Lantmäteriet is one organisation all needs for co-operate functions are managed in one Department called Co-operate Functions. The biggest department within Co-operate Function is IT-Department, which comprise of 75 system developers and 60 staff responsible for Computer Services.

Major Commissions Last Year

Close co-operation with clients, an ability to listen and understand clients' needs and good planning are vital components in a well-functioning project. A good example of projects that Lantmäteriet has carried out is the National Road Database (NVDB), which has been built up by the National Road Administration and Lantmäteriet as a joint project together with local government authorities and the forestry industry. Another example is Lantmäteriet's co-operation with the National Environmental Protection Agency and the county administrative boards concerning nature protection and nature conservancy measures.

The success factor behind these examples is the idea of a common database for land administration, which is easy to access. Of course accesses to the database are only allowed for authorised user, security and data privacy is of utmost importance and is monitored carefully.

Good communication between clients and Lantmäteriet is also an absolute pre-requisite when developing customised Internet-based solutions for geographic information systems. System solutions in which the client's own specific data can be integrated with geographic data from Lantmäteriet have become of increasing interest. The advantage of distributing data via the Internet is that the user does not need to have a GIS system.

International Co-operation for Road Safety

A complete set of digital information about the Swedish road networks will result in significantly more efficient transportation and increased road safety. During 2001 the first stage of the development of the national road database was completed and data for approximately 500 000 km of road have been fed into the base. This basic information comprises the National Road Administration's road database and Lantmäteriet's database containing geographic data for Sweden. A great deal of work has been done to ensure that there is agreement between the data in the two bases.

The production centre for collecting the road data information is at Lantmäteriet in Gävle. This production centre will also be principally responsible for the continuous revision of the data in the base. The technical development work has been carried out by the National Road Administration. The working model for the development of this database has given rise to considerable international interest as an example of sound co-operation between authorities. Particular importance has been placed on the basic project planning. At the initial stages of the project deep analyses of user needs were carried out. This information was used in the formulation of technical specifications, working routines and of methods for quality assurance.

The next stage of the project will be for the local authorities and forestry companies to provide their information.

Support for Nature Protection Measures

The National Environmental Protection Agency has been given the task of increasing the protection of forest land during the next ten years an area of around 320 000 hectares may be transformed into nature reserves. The county administrative boards, together with The Environment Protection Agency, are responsible for taking decisions concerning the creation of reserves. The allocation of funds for paying compensation to affected landowners is done by the Environmental Protection Agency. During 2001 Lantmäteriet and the Agency have reached an agreement concerning support to the county administrative boards with both land ownership investigations and participation in setting out, surveying and demarcation of boundaries for reserves, and also with the development of technical solutions which would make it possible to store all relevant information in a safe and easily accessible way. During 2001 Lantmäteriet and the National Environmental Protection Agency have, together, also formulated a proposal for new legislation for cadastral procedures for nature protection. Implementation of the new legislation will mean that compensation to landowners affected by the creation of a nature reserve can be determined through a cadastral procedure.

Rational GIS Solutions

The National Environmental Protection Agency has decided to invest in an Internet-based GIS solution as the

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best way of managing information related to environmental protection. Lantmäteriet will be responsible for developing and running a geographic IT platform together with a tailored real property register for The National Environmental Protection Agency. The data in the register will include information about national parks, nature reserves, protection of biotopes and much more.

This co-operation with Lantmäteriet will result in significant rationalisation and improvement of the quality of the work that is carried out when protection measures are implemented.

Lantmäteriet has also developed a specially customised IT solution for the Swedish telecom company Telia. Via Internet, Telia has access, in open format, to a database at Lantmäteriet which means that Telia can use its own computer tools to compile specialised information, such as maps for utilities networks based on Lantmäteriet's base maps. Telia can also directly query Lantmäteriet's real property register.

Initially the system was intended to be used by about thirty users but because it functioned so well Telia has now signed an agreement for a system for 2 000 users.

Timber buyers in northern Sweden needed a geographic information system that would help increase the efficiency of their business activities. Together with Sägverken Norrland AB, Sägab and the National Board of Forestry, Lantmäteriet developed a Web service called Timmerwebb. Via Internet timber buyers now have access to maps, forestry data and satellite imagery. The information is stored in a common database and buyers can easily carry out analysis to locate interesting sources of timber and the owners of the forest properties. As there is no need for sawmills to install the database and GIS software in their computers, management, updating and installation of new program versions will be relatively inexpensive.

Conclusions

Lantmäteriet is a governmental authority responsible for a number of registers including all basic relevant information concerning land in Sweden: descriptive information, maps and archived instrument and dealings. The information in the registers is open for use and can easily be accessed if you are authorised. The use of the information is regulated in two laws, the Swedish Data Protection Act and a special law about the Swedish Real Property Register. It is up to Lantmäteriet to look after the customers and how they fulfil these laws.

The registers are structured as one common database, however there are a number of different technical solutions but that is transparent for the users. The users have one single interface for accessing the database. Comprehensive standardisation and data modelling exercises have accomplished the one database concept. The most important factor is the use of common identifiers and definitions in every register throughout the database, e.g. a building is described in the same way regardless if it is on a map or in a register for ownership.

The information in the database is updated and maintained by the organisation that is responsible for the data, which means that municipalities update e.g. property addresses, banks update mortgagors, the National Tax Board updates the assessment value etc.

The openness and accessibility of basic land information leaves the field for application open for competition, Lantmäteriet does not have a monopoly on applications for land information. However Lantmäteriet is responsible for the contents, the maintenance and the dissemination. As noticed by examples above, Lantmäteriet does have long and essential knowledge in the business so they are the natural partner for co-operation also for applications. ■