

TEXTO EN INGLÉS

THE CADASTRAL GIS: Situation in the EU with Coverage on some Candidate Countries member of EUROGI

CADASTRAL GIS - DEFINITION GIVEN BY NLS, SWEDEN

Depends on to whom you put the question. There is no strict definition, based on nationally accepted standards.

At the National Land Survey (NLS), the term "The integrated cadastral system of Sweden" is used. This means that the whole infrastructure, the registered and presented property information (land, owners, users, houses etc.), is integrated with its geographic location. These data cover the whole nation, but they are not stored in a single database. Several authorities (i.e. Municipalities, Taxation authorities, and NLS) maintain the database infrastructure. The cadastral data are linked with unique identities in order to work in a uniform system for presentation and analyses.

The word Cadastral refers to land ownership information. This information has references to location of the parcels. In Sweden, the word has a more general meaning. It includes a lot of other information connected to the land parcel, like ownership and rights to land, taxation information, buildings and real property information, mortgages, plans, regulations etc.

FACTS ON CADASTRAL GIS IN THE EUROPEAN UNION and in some EFTA/C countries

Czech Republic

During 2001 the "Enhanced Information System of the Cadastre of Real Estates" was implemented. The new Enhanced Cadastral Information System (Enhanced Cadastre) means not only quite new complex cadastral software, but first of all a higher level of cooperation among parts of state administration and full use of existing communication possibilities to improve access for clients. The Enhanced Cadastre is a key part of wider Information System of State Administration, which is being developed.

Client/server architecture has been chosen. Local databases at cadastral offices are linked with a central database by WAN. Updating the central database is based on real-time replications from the local databases. The central database serves as the only point for access to cadastral information via Internet and the point of the data exchange with the other ministries. Written and graphical data of the Cadastre are fully integrated and stored in relational database environment. Both central and local levels use uniform application software environment, based on Oracle and Bentley SW products.

The security of system is at very high level. The Enhanced Cadastre data fully comply with the National Data Standards.

Since the new system cooperates with the Central Register of Citizens and the Central Register of Economic Subjects (to identify owners and any change in postal addresses), government order No 111/2001 on this cooperation has come into effect.

Remote access to cadastral data (both descriptive and graphic) was a part of the solution of the new cadastral software and was started in 2001. It enables to "competent users" right of access to Central Database, which replicates data of local databases within minutes. The security of the Central Database is ensured by a firewall. The data are provided for reading only. Clients must be registered on base of a contract with the Central Database and deposit an initial payment before using this service. Main clients are Courts, public administration offices, municipalities, banks, lawyers, surveyors, valuers, and real-estate agents. Standardised services like searching for owners or parcels and standardised extracts from the database are available. At the end of 2001 more than one thousand clients were registered.

NUMBER OF CADASTRAL PARCELS: 21,5 mil.,
5 mil. owners.

NUMBER OF AGRICULTURAL PARCELS: 12 mil.

Finland

In Finland the national cadastre is maintained by the National Land Survey of Finland (rural) and 87 municipalities/cities (urban). These organisations has own cadastral databases for operational use and a common database for data service. Most of the operational cadastral databases includes the cadastral units as geographical objects. At the moment more than 95 % of the cadastral units area available in GI form. According to new legislation all cadastral units must be available as GI by 2005.

Until 1998 the National Land Survey of Finland (NLS) had the cadastral index map and attribute data in two separate databases. 1998 was adopted new seamless database system (JAKO-system). The existing system is object oriented and all register units are described in the national geodetic reference system as geometric objects as well as their topology.

In urban areas (ca. 2 % of total area) municipalities are responsible for the Cadastre.

In Finland one cadastral unit may include several type of land use, e.g. field, forest, build-up and even water area.

NUMBER OF CADASTRAL PARCELS: In Finland one register unit can be comprised of several parcels. The number of register units is 2.6 million but the number of parcels are ca. 4.3 million. Of these units there are ca. 0.4 million urban lots.

NUMBER OF AGRICULTURAL PARCELS The number of the agricultural parcels is about 1 million according to the Finnish IACS land parcel registry system.

France

Cadastre in France lies with the ministry of economy, finance and industry. A text assigns to that ministry the role of maintaining the cadastral map of the country, the main driver is tax collection on properties. It results that emphasis is placed on the maintenance of the alphanumeric part of the cadastral information, the graphical part being updated with several months delay.

Cadastral GIS is the main concern of local governments. In more than 60% of the major cities (more than 30,000 inhabitants), vectorisation of the cadastral map has been done in partnership between the local authorities, the utilities and the service in charge of the cadastre in the finance ministry. The agreement between the partners allows the local government and the utilities to fund the vectorisation, the cadastre service ensuring its updating. Up to now about 10% of the cadastre maps are vectorized and "GISized". In many local governments an "unofficial" cadastre exists which is created by continuous updating of the official cadastre between two deliveries of updated cadastral maps by the cadastral service.

NUMBER OF CADASTRAL PARCELS: 50,000,000 parcels and 500,000 cadastral maps.

NUMBER OF AGRICULTURAL PARCELS: 25,000,000 (figure to be confirmed).

Germany

In Germany, the introduction of geoinformation systems (GIS) started in the early seventies (last century). The cadastral information is stored in two independent systems, the Automated Real Estate Map (ALK), which handles the graphical information, and the Automated Real Estate Register (ALB), which contains the attribute data. The German states are responsible for the cadastre as it relates to the 1:1,000 scale.

The cadastral administrations of all German states are currently developing the Official Cadastral Information System "ALKIS" which will integrate cadastral data of the ALB and ALK.

NUMBER OF CADASTRAL PARCELS: Germany: ca. 100,000,000, North-Rhine Westphalia 9,000,000.

NUMBER OF AGRICULTURAL PARCELS: No differentiation between agricultural and urban area parcels. About 30 % of all parcel are located in rural areas (situation in North-Rhine Westphalia, Germany).

Greece

So far cadastral GIS in Greece is under development. Approximately 7% of the area of the country is being surveyed. Currently, gis cadastral databases are under development in certain municipalities (341 out of a total 5775). Those databases are developed, operated and updated by private sector firms that carry out the data collection.

Once the cadastral survey procedure is completed those databases will be handed over to the hellenic cadastral and mapping organization which is the governmental agency authorised of the operation and the maintenance of the cadastre.

NUMBER OF CADASTRAL PARCELS: Approximately 18 million (estimate for the entire country) Approximately 3 million parcels currently have been surveyed.

NUMBER OF GRICULTURAL PARCELS: Not known.

Hungary

In Hungary the functions and responsibilities related to land registration, cadastre, land use, land valuation, large scale topo mapping, satellite geodesy, geoadministrative boundary database, geographical names, remote sensing and LIS applications and developments are under the same roof. The Land registry is fully computerised, about the 60% of the rural areas cadastral maps are available in digital form (in vector or raster form). The ongoing National Cadastre Programme has the aim to provide full country coverage as soon as possible in order to provide multipurpose cadastral service for the user community with special emphasis on the requirements of integrated rural development (land consolidation, landscape planning, support AEM, CAP etc). 11 of the 23 districts of the capital is turned to digital cadastral system using Infocam/Leica solution based on a 3 -year development between 1995-97. The daily updated database and related service is suitable for use by the local government in planning, urban management, transportation, gardening pollution control etc.

The one-stop-shop principle is adopted and the clients can access to some parts of the Land Registry using internet via the Governmental Portal (www.meh.hu, www.ikb.hu). The Land Administration operates maintains a homepage which gives detailed information on the current organisation of the Hungarian Land Management Sector, the strategy of the sector, the role and features of the Land Registry as well as the IT strategy and its step-by-step implementation in the Land Administration.

NUMBER OF CADASTRAL PARCELS: About 7.5 million , shown on about 60,000 cadastral map sheets in scale 1:1,000, 1:2,000, R others.

NUMBER OF AGRICULTURAL PARCELS: About 2.5 million.

Iceland

The Land Registry of Iceland is the custodian of the Land Registry Database, which is the central framework for all real estate data in Iceland.

At this time there is no central Cadastre GIS in Iceland, however most local authorities (planning divisions) keep their own Cadastral GIS for urban areas, based on unique parcel identifiers in the Land Registry Database. Cadastral Register of farms and agricultural lands is kept by the Ministry of Agriculture.

NUMBER OF CADASTRAL PARCELS: 83,000.

NUMBER OF AGRICULTURAL PARCELS: 7,000.

The Netherlands

The answers in this questionnaire are restricted to the GIS systems of the dutch national Cadastre.

We maintain two main databases:

AKR: alpha-numerical information about properties and rights.

LKI: graphic information about cadastral parcels and large scale topography.

NUMBER OF CADASTRAL PARCELS: 8,000,000.

NUMBER OF AGRICULTURAL PARCELS: not registered.

Poland

The STRATEG system is designed to aid managing of a territory inhabited by a local, self-governing community: municipality, county/district, province.

The basis of the system is LIS, established upon:

- Digital map.
- Register of land and buildings (cadastre).
- Register of utilities/territorial development.
- Maintained by centres for geodetic and cartographic documentation.

That LIS has been implemented by PPU GEOBID seated in Katowice in numerous places in Poland, while the STRATEG system is being implemented i.a. in the town of Olsztyn, Piotrków Trybunalski and others.

The STRATEG system functions on PC class computers, not requiring additional software or tools besides the WINDOWS 95/98/NT operation system. The number of licensed users of that system increases constantly (over 1500) and, as research done by GUGiK (Head Office of Land Surveying and Cartography) showed, it is the most popular programme serving the purpose of graphic part of cadastre and of GIS in Poland.

The modules of STRATEG system function in four groups, connected with:

- 1) Registering individuals in a local self-governing community.
- 2) Managing of a municipality, county/district.
- 3) Updating basic information.
- 4) Collection of charges and taxes.

The heart of the system is the graphic programme EWMAPA for WINDOWS 95/98/NT, developed in Poland, the first version of which, for DOS, appeared in 1991. EWMAPA is a computer graphic programme having a unique structure of data storage: base, vector, object. Objects may be composed of elements located on different layers and sub-layers, they are of functional character. Descriptive attributes are most often associated with objects.

EWMAPA is a versatile programme which may serve the purpose of construction of digital maps, and servicing the geodetic and cartographic resources, as well as that of creating and analysing objects in space, on the basis of data contained in other modules of the STRATEG system. The system is based on a cadastral system of spatial references, that is border points, parcels, and classification contours. The layers and sub-layers in the system are of technical character as they serve the purpose of physical division of the content of spatial elements and creation of dispersed databases. EWMAPA provides various possibilities of data presentation.

The new thing is the use of colour raster and the possibility of transforming aerial photographs into **orthophotograms**, on the basis of land model constructed from height measurements (station poles) held in the geodetic and cartographic resources.

NUMBER OF CADASTRAL PARCELS: 30 millions.

NUMBER OF AGRICULTURAL PARCELS: 20 millions (They are in one system).

Slovenia

Land Cadastre evidence cover complete territory of Slovenia. Graphical part of evidence is Land Cadastre Maps will be completing available in digital form until end of year 2002. Attribute data are in digital form already available.

Data in Land Cadastre are managed and maintained from branch office of Surveying and Mapping Authority of the Republic of Slovenia. Every branch office of Surveying and Mapping Authority has at the moment its own database for their territory. All data are periodically collected into central database of Land Cadastre. Attribute data are in central database refreshed daily, graphical part of data are refresh once a week, because production of digital land cadastre maps are not finished yet for whole territory of Slovenia.

Process of production digital land cadastre maps is done with scanning analogue maps and then vectorised by hand all parcel borders. Basic unit in land cadastre is parcel; witch could be divided into parts of parcel with different land use. Every part of parcel is closed polygon with centroid and parcel number. Topology of data is built and data are without topological errors.

In attribute table are collected data about area, type of land use and production capacity of land and owner for each parcel.

Common identifier for graphical and attribute part of land cadastre data is parcel number.

NUMBER OF CADASTRAL PARCELS: Number of land parcels in Slovenia: 5,140,000.

Number of cadastral community: 2,698.

NUMBER OF AGRICULTURAL PARCELS: Number of agricultural land parcels: 4,419,000.

Spain

Cadastre gis has not a legal definition in Spain. We call it SIGCÁ (Sistema de Información Geográfica Catastral). SIGCA is used to manage the cadastral digital cartography in conjunction with SIGECA, used for the processing of alpha-numeric information.

SIGCA is used in 95% of national surface (500,000 km²) except the Basque country provinces (7,261 km²) and Navarra (10,421 km²).

The Spanish cadastral GIS is an information system composed by three different sub-systems:

- SIGCA: used to manage of digital cartography.
- SIGECA: used to manage of alpha-numerical information.

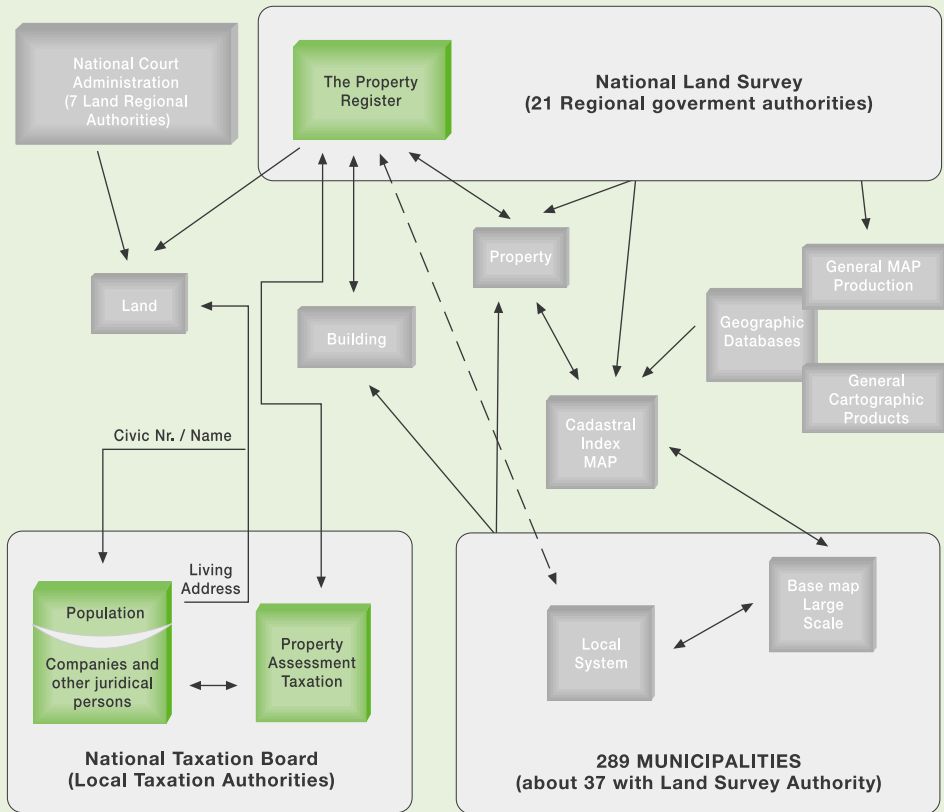
• BDN: national integrated database. This tools allows the Spanish cadastre to manage the following information:

NUMBER OF CADASTRAL PARCELS:

- 7,576 local municipalities.
- 11,000,000 urban parcels.
- 32,000,000 building elements.
- 28,000,000 urban units for taxation purposes.
- 1,200,000 hectares of urban cartography 1/1,000 or 1:500 (60% of it is digital).
- 43,200,000 rural parcels.
- 57,000,000 rural sub-parcels (different potential crops).
- 47,000,000 hectares of rural cartography (70% of it is digital).

NUMBER OF AGRICULTURAL PARCELS: ?.

Sweden



NUMBER OF CADASTRAL PARCELS About 4.7 million real properties (cancelled as well as existing).
 Number of parcels =?

Real properties in Sweden are not divided between urban and rural land.

About 3 Million registered buildings.

About 2.5 million registered addresses.

NUMBER OF AGRICULTURAL PARCELS: There are about 300,000 agricultural enterprises. Each of them normally consists of several real properties, some owned land and some leased land.

United Kingdom

There is no legal or fiscal cadastre in the European sense in the UK. There is a large scale digital map for the whole of the UK which is structured differently by the two surveys that provide the data (for Great Britain (GB), which covers England, Scotland and Wales. Northern Ireland (NI) which covers Northern Ireland.) which is used as the graphical for a land registry of which there are three in the UK. The surveys do not

include 'land use' and they only record physical features-invisible boundary lines are now being inferred in GB for residential areas and to closed polygons in rural areas.

Since the UK has no cadastre, there is no cadastral GIS in the UK.

The functions, which in many European countries are ascribed to the national cadastre, are distributed among a number of central and local government organisations in the UK. These organisations may in creating their own GIS, make use of digital mapping services supplied by the UK's national topographic mapping authority's, the Ordnance Survey-GB (OS-GB) and Ordnance Survey-NI (OS-NI).

For example, HM Land Registry in England and Wales (HMLR), Registers of Scotland (ROS), and Land Registers of Northern Ireland (LRNI) use OS-GB and OS-NI digital maps to produce the plans showing the extents of registered title parcels.

NUMBER OF CADASTRAL PARCELS: The exact figure is not publicly available but is substantial. HM Land Registry for England and Wales currently have 18 million titles on the register, which by the end of 2002 will all be available online.

NUMBER OF AGRICULTURAL PARCELS: The exact figure is not available but is substantial. In England alone the number of fields are estimated as 1.7 million and the number of farm holdings in the region of 76,000.

Denmark

The national responsibility for topographic mapping, nautical charting, the cadastre and research on geodata is by law placed in one governmental organisation KMS, the National Survey and Cadastre in Denmark. KMS enabled to launch a national digital geodata warehouse in early spring 2002. KMS sees its main role as a national geodata infrastructure provider. The Cadastre is digitised. Update in PPP with licensed surveyors. D direct links to the surveyor's CAD systems. Daily update. Many opportunities in different use in combination with other sort of geodata

1.1. Techniques applied

SW, Data Model, Data Collection, Creation and Maintenance Cadastral. GIS, Visualisation, Access and User Interaction, Geogr Query and Analysis (from data to information), advanced spatial analysis, Data & Information Protection

Czech Republic

SW-APP Group designed on demand, Oracle Database, Data collected in 90th. IS runs in local offices and central database as well. Local database enables some queries (relation between parcels and owners..) Visualisation by Bentley SW.

Basically the system does not considered geographical system. Consist of property borders, parcel numbers, kind of parcels very limited content. Cadastral system is public, everyone is authorized to get information.

Finland

N.B. Description given below describes the systems used by the municipalities for cadastral applications:

Municipal land register have been established in municipalities using one of the three commercial applications available in the market. Relational databases are used. Cadastral data is managed using commercial gis software like xcity, Mapinfo, Arcinfo and Autocad. Operational applications has been developed according the needs of municipal authorities and users based on general database management and gis applications.

France

Basically there are two main techniques used:

Vector: a data model exists which is DKM-like, Vectorisation is often subcontracted to private companies, labelisation is required to beneficiate from the free updating from the service in charge of the cadastre. Access is limited to the partners of the above mentioned partnership although access to the cadastral map through the Internet is considered to be provided by few local governments.

Raster: the programme is to turn digital the non vectorised cadastral maps by scanning technique with a seed point for each parcel by the beginning of 2004. This will be done internally by the cadastre service. Then IGN-France will geoprocessed each map and assembled them into a seamless data base which will be part of the RGE. Updating of the rasterised cadastral map will be done digitally by the cadastre service on the same basis as the updating of paper cadastral maps using digital techniques.

Usage of the cadastral information ranges from information to public on their properties, instruction of building permits and urban planning including the public utility enquiry. Some municipalities would like to use the vector cadastral map in conjunction with real estate operations to identify the areas that are turning to disadvantaged or enriching area.

Germany

As a result of Germany's federal structure, data collection is largely decentralized and carried out mostly on the regional and local level, which means that the processing and maintenance of data is mostly tailored to local and regional requirements.

Due to this decentralized (cadastral) approach the local requirements are best matched. Local data collection and up-dating, local applications are satisfied by modern decentralized information technology (decentralized data bases).

For the state of North-Rhine Westphalia, Germany, about 75% of the cadastral information is available in digital form (GIS). Within the next 5 year the data collection will be done. The updating of the data is done continuously.

Pricing: defined by fee regulations or laws (on the national level).

Copyright: defined by copyright regulations or laws (on the national level).

Restriction of use defined by regulations or laws (on the national level).

Licensing terms: dependent on the national situation.

Greece

The data model, which is still in a draft form, accommodates the management of the spatial data using GIS functions, legal data through DBMS functions, and historical record data, again through DBMS functions. So far, cadastral spatial data are being collected using primarily photogrammetric methods and techniques (orthophotomaps 1:5,000) for the rural areas and 1:1,000 photogrammetric diagrams for the urban areas. Legal and thematic data about parcels are collected through a procedure in which the owners or other beneficiaries declare their properties. Visualization of cross-section of the data is made through GIS software. Access to those data have all those who have a lawful right to access info. Of course, with the exception of 3 islands in Dodecanese and two municipalities in Athens, no regular operational cadastre exists at this moment.

Hungary

Details in English on the web: www.takarnet.hu.

Iceland

Due to late reception of the contribution the inclusion of the answer was not possible.

Please see: www.reykjavik.is/borgarverkfraedingur.nsf/pages/gagna-lukr.html on the GIS of Reykjavik (online: version: www.borgarvefsja.is/website/bvs)

The Netherlands

Analog information is registered since 1834. AKR and LKI are created by digitizing the analog information in the years 1984 until 1999. These main databases are updated daily. LKI and AKR Information about selected individual properties is delivered on line (internet techniques) from information databases with an actuality of 1 day. Information about total areas (example: a municipality) is delivered off line with a lower actuality of some weeks. The accuracy of the graphic data is 20 cm in urban areas and 40 cm. in rural areas.

LKI is stored in an internal Ingres relational database on a Unix mainframe; AKR is external stored in an IDMS database on IBM hardware. The data in the information databases are stored in the same way (copies).

Besides that an internal integrated Ingres Query database is used for special GIS applications and special products. In this database LKI and AKR information is combined. The actuality of this query database is 2 months on this moment. Investigations have started to create a combined Oracle database with an actuality of 1 week or better to replace the now used information and query databases.

For the acces and user interaction of the LKI database the (Finis) FINGIS system is used. MapInfo is the most used tool for query and analysis but besides that also special software is used.

On line information on this moment is delivered only to known clients (5000 up to 10.000 mails a day), so information protection and payments can be arranged more or less easily (fire walls, contracts, restricted products). Investigations have started for public acces via internet.

Poland

The specificity of Polish GII lies in providing parallel solutions for three aspects of GII: technical, legal, and organisational one, that may be characterised in the following way:

In the technical aspect:

- A uniform spatial reference system, the parameters of which underwent modifications, yet which always has maintained its uniformity.

- 12. A uniform system of high quality geodetic , gravimetric, and magnetic networks, being the basis for other spatial studies.

- A uniform system of horizontal and vertical networks, intensely covering the entire country, became the foundation stone of the homogeneity of GI system in Poland, providing studies based on measurement with high accuracy and unmistakable location. The accuracy that GPS provides today has been possible in Poland for over 50 years. While due to the extremely precise gravimetric measurements, the geoid identified for the territory of Poland allows a precise definition of height using GPS, to a degree securing accurate registration of deformations in earth's surface.

- A uniform set and layout of maps, with substantial coverage, often covering the entire country, as well as that of aerial photographs and orthophoto-maps.

- The entire area of the country has been consequently, over the period of a few dozen years, covered with topographic maps (1:100,000, 1:50,000, 1:10,000) and the basic map (1:5,000, 1:2,000, 1:1,000) in standardised style, at present supplemented with ortho-photomap in the same style, constituting an incomparably rich source of information. It was possible to obtain such a result thanks to efficient organisation of geodetic-cartographic services, consequent compliance with technical standards, and conducive policy of the state administration.

- A working register of geographic names, and a plethora of thematic maps, which found particular expression in the magnificent cartographic achievement of the Atlas of the Republic of Poland.

- A special government commission supervises the register of several thousand geographical names in the country and outside it, providing a uniform onomatology both on topographic and thematic maps, which in the Atlas of the Republic of Poland (Atlas Rzeczypospolitej), published 5 years ago, amounted to 1093 maps.

- A uniform, improved with time, system of technical standards that have the form of instructions and technical guidelines, the enforcement of which has been and is better than that of Polish or international norms.

- The system of geodetic and cartographic technical guidelines, used in Poland, is worth a special mention. The system of instructions, started in the interwar period, has not changed in the general outline for over 50 years, and has only been improved in details, due to technological progress. Efficient geodetic and cartographic supervision, together with precise instructions/guidelines, provided a high level of uniformity for spatial information throughout the country.

- A gradually improved inventory system of administrative boundaries.

The system of administrative borders has two faces: the legal one, from which results the obligation to publish in Official Journals of Law of the Republic of Poland (Dziennik Ustaw RP) the changes in administrative borders, and the technical one, where until 1999 the registration of borders was made according to cadastral principles, and since July 1, 1999, a special national register of borders has been functioning, where their course and changes are documented technically.

- The system of soil classification and register of land, covering the entire country.

The system of land and buildings registration is a legal and technical continuation of the cadastre of land and buildings that, depending on the region of the country, has been functioning for 170 to 140 years. It covers the entire state, both in the descriptive and map part (buildings only on maps), having the scale of 1:1,000 in urban areas, and 1:2,000 or 1:5,000 in rural areas. The entire territory of Poland, for 50 years now, has been covered with a uniform, exact soil classification (pedology). The Polish cadastre, besides borders and soil classification, comprises also land use.

- Uniform principles for creation and updating of basic maps, as well as topographic maps, together with the standardised system of symbols used on maps.

The content of cadastral maps is a part of content of the basic map, which exists for urban areas and the majority of rural areas. Where the basic map does not

exist, its functions until the time of its establishment are performed by the cadastral map. The basic map (cadastral map), updated by force of law, is used for making or supplementing topographic maps, which both (basic and topographic maps) are by law the basis for drawing other kinds of maps.

- A unique common system of making inventory of utilities.

A constituent of the basic map is the unique system of stock-taking of utilities, that by law all operators of technical infrastructure networks must submit to. Each piece of equipment and network of utilities have to be agreed for before routing and surveyed after installation, and before covering up. The system of stock-taking has been in force for 28 years now, which means that only few utilities, installed before, are not precisely catalogued geodetically. The obligation to catalogue and co-ordinate the utility systems make Poland stand out among the countries of Europe.

Slovenia

At Surveying and Mapping Authority at the moment used in-house SW solutions prepared by outside contractors (computer company).

It has just been decided to copy the central Land Cadastre to Governmental Centre for informatics (GCI), the copying will be based on the Oracle replication technique which means that the copy at GCI will be a read-only one. GCI will also take over the responsibility for other customers within the government network to the Land Cadastre Database:

- Ministries of Justice, Agriculture, Internal Affairs, Finance (for Property taxation), Education, Environment.

- Local Government.
- Statistical Office.

For the new real Property Register there is a wish to develop one common database including:

- Land Cadastre, the centralised version.
- Building Register.

- House Register part from the Spatial Unit register.

Database models have been presented for the physical structure of the databases, but no synchronisation has been made against the SC. More work has to be done in this area during the next visit and go into even more detailed discussions.

Production process of digital land cadastral maps.

Attribute data are available in digital form already 20 years. In last ten years this attribute data are uniformed and maintaining in central database.

Graphical data of land cadastre (digital land cadastral map) are in production so from year 1991 and will be finished in this year (2002).

Production of digital cadastre maps are divided into several phases:

- Scanning of analogue cadastral maps.
- Vectorisation of parcel borders and editing of parcel numbers.
- Merging map sheets of cadastral maps at the basis of measurements process.
- Compare of graphical and attribute data and correction of differences.
- Transformation cadastral maps produced at graphical methods into national coordinate system.

- Harmonisation borders between different measurement areas and between different cadastral community.

Analyse and QUERIES.

Data are in vector form and topology is build. Because of these facts queries and analysis are possible on every attribute and graphical data in land cadastre.

All digital land cadastral maps are in national coordinate system and there are possibilities for analysing and overlaying with other geographical datasets. There must be put an attention on data quality. Positional accuracy depends on sources from where digital cadastral map was produced.

Maintaining process:

- Land parcel owners order measurement at the geodetic companies.

- Geodetic company acquire from Surveying and Mapping Authority all data form archive which are necessary for field measurement.

- Geodetic company is responsible for technical part of field measurement and preparation of experts report.

- Surveying and Mapping Authority carry out all administrative part of maintaining process and build new topology in central database.

Data access and data dissemination.

On line access is allowed at the moment for public administration and land book office.

All other data users could order cadastral data in accordance with data dissemination policy and price list.

Restriction at the data dissemination is only for personal data (data about land owners) It is obligatory to respect law about personal data protection.

Spain

- Rural cadastral cartography is available on scales 1:2,000 and 1:50,000 and is developed from a photogrammetric flight at a scale of 1/8,000, from which orthophotographs are made on a scale of 1/5,000.

- Urban cadastral cartography is available on scales 1:500, 1:1,000 and is developed by means of numeric restitution from a photogrammetric flight, by digitalizing graphic document existing at the Cadastre or are based on the digital cartography held by other public administrations over which the cadastral lots are super-imposed.

- Both urban and rural cartography are available in vectorial formats: ASCii formats (FICC), shapefiles, DXF SVG.

- Orthophotograph are available on scale 1:5,000 in digital formats (GIFF)

- All the graphic data are store in ORACLE -UNIX databases with SDE (ESRI) as spatial data engine, and are in the same data base as the alphanumeric information.

- All the users in the cadastral offices can access, query and maintain the graphic database, all the applications are implemented in PC using window interface and are development in visual-basic using Map-object (ESRI).

- Citizens can access to the digital cadastral information in the cadastral offices and get a copy.

- The system can provide in real time descriptive and graphic certifications refer to an urban unit or a rural lot and contain the basic physical, legal and economic data of the property along with its graphic representation as appears in the cadastral data base.

- The main graphic features are plots, cadastral lots and buildings in urban areas, and cadastral polygons, lots

(owner) and sublots (use-crop) in rural areas linked with real assets alphanumeric data, cadastral values and owners included

Graphic information would be available in a year in Internet.

Sweden

The system covers information on all real properties in Sweden. Everything is collected and stored in databases.

The "attributes" are stored in centralized mainframes (IBM, based on AROS/ROSAM database management system).

The "geography" is stored in different local/municipal-based systems in connection with a centralised geographic database system (UNIX, based on an in-house developed database management system BANKIR/APC).

Access to the information is possible in the following ways, (depending on needs, costs and type of user):

- **On-line** (programme to programme, client-server, Internet, modules to reach updated data for own applications).

- **Data extracts** (Exports part of information from the system, adjusts the information for the customers special needs, converts or transforms the information to fit special applications and delivering through Internet or CD).

- **Standalone or intranet application together with data extract.**

Paper documents (delivers legal documents about survey diagrams, titles, mortgages etc, Cadastral Index maps on paper or other maps).

United Kingdom

As noted in the answer to question 1 the UK has no cadastre as such but in performing the function of creating and maintaining the Land Registers within England, Wales (HMLR) Scotland (ROS) and Northern Ireland (LRNI) the beginnings of a cadastre is effectively being built. This could well in time be adapted and integrated with other government functions to develop a cadastre for each of the regions. By logical extension the Land Register being created and maintained within each UK region by other authorities in the UK could be similarly integrated if the desire was present.

Within Scotland only 35% of the land parcels are held in the Land Register at the current time.

1.2. Special deatures and practices

Czech Republic

As introduced in item 1.1.

Finland

The JAKO system used at the NLS provides services for surveying. The surveyor can conduct the whole survey process with all phases of the data processing using the JAKO system only. The system is also register system that take care of the official Cadastre for which

the NLS is responsible. The third task is information service where the system provides for the users a map user interface and a wide selection of GIS tools for manipulating the data.

France

The scanning of more than 400.000 paper cadastral maps implied to develop a customised scanner able to scan a paper map in less than 1 minute including installing the map on the scanner. The principle is similar to SPOT5 technique where the earth is replaced by a flat stabilized against vibration desk and the HRV instrument being a CCD detector (similar to the barettes acquired for SPOT5) moving on a rail "flying" over the paper map.

A specific software has been developed to handle the 400.000 files and another to allow the seed points to be digitized. The seed point has the unique parcel identifier as attribute in order to link any parcel based information to the seed point.

Germany

N.a.

Greece

Since the project is still at its development, no standard software is used to manage cadastral data. Contractors have developed their own database management applications to handle the problem of database management. At the end those individual databases will be merged into one unified National Cadastral Database.

Hungary

The cadastre is the base of the National GIS. The Hungarian Land Registration System is a unified, multipurpose legal system, an integration of the Cadastre and the traditional Land Records (Grundbuch).

Iceland

N.a.

The Netherlands

The dutch Cadastre maintains the main databases LKI and AKR and distributes the data and special products, like statistical information about selling prices of properties. Measurements for updating large scale topography is mainly done by private firms, managed by the Cadastre and under our specifications.

The turn around is more than 200.000.000 euro a year. Notary is our main client (65% of our earnings). Our products mostly are standardized products (more then 95%)

ICTspendings are 60.000.000 euro a year. In total there are some 2000 employees of wich some 50 are busy in making and selling special GIS products.

Poland

Referring to the Polish Law cadastre is the basis for National GIS

An effect of the Polish infrastructure of GI is that the entire area of the country has been covered with a unified, accurate system of spatial information, presented in maps and databases; information that is based upon a uniform system of geodetic networks, collected in a uniform way and continuously updated.

The legal aspects of the Polish National GIS

- A properly arranged system of land and buildings registration which, in contrast to other cadaster systems, also stores information on land use.

The obligation to keep the register of land and buildings is a modified continuation of regulations binding in the former annexed territories of Poland belonging then to Prussia, Austro-Hungary, and Russia.

In spite of opinions encountered in the EU countries, in the last 50 years in Poland there was private ownership of land and systems of cadastre and land and mortgage registers serving to protect it.

- Legally regulated system of setting lines of demarcation between real properties and of geodetic registration of results of such procedures.

The system of delimiting real estates has been functioning incessantly, where in proceedings cadastral services replace court of justice. Only in litigious proceedings do delimiting cases find their way to courts.

- Law-induced obligation to report, by owners (and users) any changes in the property, both to the register of land and buildings and to the register of utilities.

The most symptomatic feature of the geographical information system is the legal obligation forcing the owner (of real estate) or operator (of utilities) to report changes that took place in the cadastre (of land and buildings) or catalogue of utilities. The owner is not only obliged to report changes, but also to provide, at his own expense, the surveying documentation referring to those changes. It is this obligation that makes the Polish cadastre and the GIS based on it continuously updated.

- Obligation to report changes imposed upon courts of justice, notaries public, and other organs authorised to make changes.

The obligation to report changes in the cadastre rests, then, also upon courts, notaries public, and organs of the administration authorised to make changes.

- Legally imposed requirement to disclose in land and mortgage register the data on real properties, based only on evidence data.

The law stipulates that in section I. of land and mortgage register (KW), changes may be made solely on the basis of cadastral data. Section I of KW is excluded from the KW credibility principle, which in such case applies to cadastre.

- Law-induced obligation to keep the documentation registering spatial changes in a specific and defined location.

The obligation to gather information documenting spatial changes in one place is a consequence of the, discussed above, profound legal influence upon the system of spatial information. The documentation is kept in the so-called centres of geodetic and cartographic documentation (odgik).

- Legally imposed obligation to report the intention to make supplementary measurements, as well as

reporting the results of such measurements to a specific location of data gathering and updating, where such results undergo technical supervision.

The law imposes also the duty of announcing the intention to survey a spatial change, collecting source information about the existing documentation of a location, and delivering the results of measurements to the documentation centre, in order to update the existing geodetic and cartographic data. Before accepting to documentation centre, the work is subject to technical supervision.

- Obligation, induced by technical regulations, to relate supplementary measurements to the geodetic matrix.

A very specific requirement in Poland is the obligation to add survey results to geodetic matrixes. That means that each piece of information about space is uniquely located in relation to a definite reference system, regardless the value of existing maps, which entails that even maps that are not too correct cartometrically, may be spatially corrected on the basis of supplementary surveys added to the geodetic network.

- The obligation to have necessary authorisations for performing work that serves as basis for spatial registration.

The obligation to have professional qualifications has a profound tradition in geodesy (see the materials for the norm ISO 211/TC 19122), particularly in Poland, being an example for several other professions.

- The obligation to carry out spatial co-ordination of utilities.

This obligation (cf. item 19) is a guarantee of spatial order and security in ever more confined space, especially in urbanised areas. Despite certain limitations that it imposes upon the sovereignty of operators of utilities, it is accepted because of undisputed advantages it has in preventing collisions.

Slovenia

A several of IT-projects are running in parallel at SMA. The early systems were decentralised and the reason for that is obvious, as they were developed during a time when most system should be decentralised. Another reason is that the communication facilities for IT were not that good a decade ago. Today the situation is totally different, there are good communication facilities and it is no longer important for the users to be close to the hardware. The central software has also improved a lot and today there is just in exceptional cases decentralised solutions are developed.

At 1996 SMA adopted the centralised concept and all systems developed after that are centralised:

- Spatial Unit Register including House register.
- Register of Geographical Names.
- Central Land Cadastre.
- Geodetic Points.
- Building Register.

The new Real Property Register will be centralised.

Spain

Maintenance of the information with two different procedures:

- General works, with the assistance of private firms, under our technical specifications.

— Compulsory declarations from titleholders (more than 1.646.000 last year 2001).

Distribution of cadastral information to more than 8.000 institutional customers (town halls, regional administration, and national government), 8.000.000 rural titleholders and 18.000.000 urban titleholders. (More than 900.000 cadastral certificates were sent during the last year, 2001).

This activity is developed through 65 territorial branches (Gerencias Territoriales). 2.800 persons work for the Directorate General for the Cadastre, 300 of them at the Head office.

All the properties are appraised through a specific land mass valuation system. Market prices are used as a reference to assign the cadastral value to urban real estate properties. Rural properties will be appraised with the same procedures in next years.

All the properties have a unique cadastral code, used as a reference that can not be repeated. This cadastral code is the main link between the cadastral information database and other databases, as the Land Registry one.

Sweden

Legislation makes Cadastral handling unique for each country.

In Sweden, organisations and authorities collaborate and co-operate well. Thereby, data can be used between and in different organisations. Thus, this demands standards, which are used and developed in joint projects.

In Sweden, economical agreements and contracts are handled in a concord and uniform way.

United Kingdom

Description of the ROS system for Scotland:

A digital mapping system containing definitive extents of legal titles depicted on the topographic map (from OS-GB) along with an index map and basic textual information is linked to a separate Land Register System containing details for each title in the register. A complementary Registers Direct System provides access to the Land Register and Index Map via a secure extranet over the web to subscribing property professionals.

Description of LRNI system for Northern Ireland:

A similar system to that of Scotland is in place and is being developed. The register details are available via landweb direct an online web service via a secure extranet to subscribing property professionals and the legal profession. The LRNI registers will in due course be integrated into the Northern Ireland Geographical Information System (NIGIS).

Description of HMLR system for England and Wales:

A similar system to that of Northern Ireland and Scotland exists and is at an advanced stage of development. The property professional can access the records via Land Registry Direct over the World Wide Web via a secure extranet. There is a close working relationship between HMLR and OS-GB with regard to the inter relationship of the Land Register and the topographic data to optimise resources and to improve the maintenance and currency of the two data sets.

1.3. Supportive legislation environment

Czech Republic

The Land Registration Act and the Cadastral Law, set down details of content and administration of the cadastre and specify the basic technical aspects. Extensive appendices cover nearly all the technicalities of the cadastre (e.g. methods of survey and their processing, accuracy parameters, working out of sub-division plan, system of codes used, extracts from technical standards, examples and specimens of outputs, etc.).

Finland

The data content of the Cadastre is defined by the law on Cadastre (Law on Real Estate Register). According to the effective law all cadastral units must be available as GI objects by 2005. Same legislation covers both the municipal cadastral authorities and the National Land Survey.

New legislation of cadastral data service system is in Parliament at the moment (15.4.2002). According to the proposal the status of the common cadastral data service database will be strengthened and the GI based data service will be made mandatory in the whole country by 2005.

France

Legislation relating to GIS cadastre does not exist. Only the role of the cadastre service for producing paper map (and its "dematerialized" version) as well as the role of the chartered surveyors in delineating properties limits where requested by the neighbouring parties are in force. N.B.: more details may be added by the "cadastre service".

Germany

N.a.

Greece

There are two main laws that specify the framework within which the Hellenic Cadastre is developed and will be operating:

Law 2308/1995 specifies the procedure according to which cadastral data are collected and validated.

Law 2664/1998 specifies the framework within which the Hellenic Cadastre would operate once the initial data have been collected through the procedure of Law 2308/1995.

Law 2664/1998 makes provisions for computer based management of cadastral data.

In addition to the above laws, there are contingent laws that influence the data collection and operation procedures (e.g. Law about the forest lands and coastlines).

Hungary

There have been a number of changes in the Law relating to land issues in Hungary which have provided a framework for the land privatisation, supported the

computerisation of land records and the adoption of digital technology. It was a good opportunity for examining the existing legal framework in terms of potential restrictive practices; simplifying the regulatory framework and reviewing the legal code; reviewing the credit arrangements and resolving the issues concerning copyright and ownership. In the framework of this task, the following regulations are in effect or in preparation:

New law:

Act XLVIII. (1999) amending Act IV.(1994) on Agricultural Lands. This act stipulates for the registration of users of land of over 1 ha holdings in the land offices.

New regulations:

Directive N°. 1/1998. (FVM. É. 19.) FVM. Subject: On cooperation of institutions participating in the National Cadastral Program (Ministry of Agriculture and Regional Development).

Decree N°. 50/1999. (V.26) FVM amending Decree N°. 16/1997. (III.5.) FM. Subject: On execution of the Act LXXVI on surveying and mapping. (Ministry of Agriculture and Regional Development.)

Joint Decree N°. 58/1999. (VI.18.) FVM-HM amending. Joint Decree N°. 21/1997. (III.12.) FM-HM. Subject: On execution of certain parts of the Act LXXVI on surveying and mapping. (Ministries of "Agriculture and Regional Development" and "Defence".)

Joint Decree N°. 63/1999. (VII.21.) FVM-HM-PM. Subject: surveying and cartographic national basic data management and supply. (Ministries of "Agriculture and Regional Development", "Defence" and "Finances".)

Government Decree N°. 184/1999. (XII.13.) Korm. On the detailed rules of registration of users of land of over 1 ha holdings in the land offices.

In 2001 all execution Decree of the Act LXXVI on Surveying and mapping will be modified:

- Decree N°. 16/1997. (III.5.) FM.
- Joint Decree N°. 21/1997. (III.12.) FM-HM.
- Joint Decree N°. 63/1999. (VII.21.) FVM-HM-PM.
- Codification of the new rules is under preparing.

Iceland

The Law of the National Survey nr. 95/1997.

The Planning and Building Act nr. 73/1997.

The Title and Mortgage Registration Act 39/1978.

The Law on Regulation and Valuation of Real Properties nr. 6/2001.

The Law of Rural Properties nr. 65/1976.

At the moment there is no cadastral map legislation for Iceland but an article on municipal cadastres was introduced in the Planning and Building Act 1997. Art 29 of this law provides, that municipal authorities shall have reference to the title and mortgage registry for that municipality. Despite this legal duty, no effort was made to establish a legal cadastre, many municipal authorities do however keep object based cadastral system.

The Netherlands

The activities for the registration and distribution of cadastral information are based on a Law for the Dutch Cadastre. Besides that the Cadastre is one of the shareholders of the GBKN (the large scale topographic map in the Netherlands that is integrated in LKI).

The Dutch Cadastre is a non governmental organisation but is not permitted to make profits. Tariffs must be legislated by a Ministry. They are not permitted to make (GIS) products in combination with information of other organisations. So their possibilities on the GIS market are restricted. Their costs are fully compensated by our earnings in the field of registration and distribution of data.

Poland

The Polish environment law is based directly and indirectly on the cadastral system:

For the general overview and planning.

Indirectly on the topographical maps and data which are supported and up-dated by the cadastral system.

For the monitoring and fee system:

— directly on the maps and data from the cadastral system.

Slovenia

The National Assembly of the Republic of Slovenia has adopted a new systemic organizational regulation for the field of geodetic activities. The Law on Geodetic Activities (Official Gazette of the Republic of Slovenia, 2000, No.8) was prepared by the Surveying and Mapping Authority of the Republic of Slovenia. Second important law adopted in year 2000 is Real estate property, national border and spatial units registration law. Both laws give good background for modernisation of real estate registrations. Both laws are available at our home page (<http://www.gov.si/gu/eng/gu.html>)

Spain

These are the main laws about Cadastre:

Texto parcial de la Ley 39/1988, de 28 de diciembre, Reguladora de las Haciendas Locales con las modificaciones posteriores.

Ley 53/1997, de 27 de noviembre, por la que se modifica parcialmente la Ley 39/1988, de 28 de diciembre, Reguladora de las Haciendas Locales, y se establece una reducción en la base imponible del Impuesto sobre Bienes Inmuebles.

Texto parcial de renovación del catastro rústico de la ley 24/2001, de 27 de diciembre, de medidas fiscales, administrativas y del orden social.

There are other Royal Decrees, Ministry Orders, Resolutions, etc.

All this legal regulations are available at: <http://www.catastro.minhac.es/>

Sweden

The regulation of laws generates obstacles and limits what Cadastral data can be used for. Data can not be used or the result can not be publicly presented, if it contradicts with security aspects, personal integrity etc.

Data are not accessible, if they are going to be analysed or used for non-proper activities, e.g. some market analysis. If Cadastral data are going to be used for business, there exist regulations that control how data can be sold or developed.

The government pays for the construction of Cadastral databases. Nevertheless, the customers of data have to pay for them. This is an important system because it guides the governmental production in a proper way. If customers are prepared to pay for data then the produced data are needed. The data quality can be held on a high level.

Logical interfaces are also important because the information should be interpreted in a correct way. A lot of work is carried out regarding standardisation by the Swedish standardisation organisation, STANLI.

United Kingdom

In the UK there are many statutes and statutory instruments which regulate the operations of the central and local government organisations which collectively carry out functions which in mainland Europe are characterised as 'cadastral'. The laws are too numerous to list here, but two relevant examples are the Land Registration Act 2002 and Land Registers (Scotland) Act 1979, The Land Registration Act (Northern Ireland) 1970, which determine the scope of the land registries of England and Wales, Scotland and Northern Ireland respectively.

There is no legislation in the UK that sets out how the data sets provided by OS-GB and OS-NI should be built and constructed.

There is likewise no legislation that requires the Land Registries to use OS-GB or OS-NI topographic data sets.

1.4. Education and training

Czech Republic

A. Secondary education:

Surveying Polytechnic in Prague (for students of 15-18 years).

— 4-years secondary school (surveying, mapping, cadastre, cartography, etc.).

B. University education:

Ing. is the title used for MSc. Level. Most of the universities offer also the doctoral programmes (PhD.).

Czech Technical University in Prague.

Brno University of Technology.

Military Academy of Brno.

Technical University of Ostrava.

University of West Bohemia.

Some other universities offer the programmes connected with cadastre including:

University of South Bohemia.

Mendel University Brno.

Finland

Surveyors with university degree are responsible for the design and management of the land register systems. University surveying education includes substantially gi technology.

Surveyors with intermediate educational degree are normally responsible for survey operations and they are able to establish and register parcels. Also their education includes significantly gi technology.

France

Two main schools teach the cadastre practitioners. The "Ecole nationale du cadastre" in Toulouse educate the fonctionnaires that will work in the administration in charge of the cadastre and the "Ecole supérieure des géomètres topographe" who trains the surveyors (private sector) who receives the public interest mission of delineating properties. A surveyor is chartered after a two year practical experience after the school in a cabinet of chartered surveyor and is then registered as a "géomètre expert" at the "ordre des géomètres experts" (ÔGE).

Germany

N.a.

Greece

Currently, the main training and education that takes place comes from certain courses offered by the two surveying engineering schools that operate in Greece. Also, there are efforts made recently to introduce cadastral courses at the graduate program of certain Law schools in the country. Finally, certain subjects are taught at the 3-year tertiary education schools that specialize in surveying engineering. Other universities organize seminars and lectures on the subject. All these however, are made on an ad hoc basis and there is no formal program that would educate people on cadastral issues.

Hungary

The specialists are educated on Universities or Colleges. The modernisation tasks listed above are dependent on further development of human resources. High priority should be given to this problem, as the Land Management sector has more than 4800 employees. The training for the employees parallel with the daily activity can only partly be organised within the Land Offices themselves, so other forms of education should be applied. Also a lot of different actions are in effect or planned:

GIS training for 800 land surveyors of Land Offices (1996);

Training for Land Office employees in using TAKAROS system organised in various steps (1996 and 1997);

Continuous training for county EDP managers (1995-);

Preparation and start of a distance learning programme (OLLO - Open Learning for Land Offices) giving an academic level certificate (within institutional framework) for land surveyors. The programme is supported by EU Tempus Aid Programme (1996-);

Preparation and start of training that give academic level certificate ("Land Registration Secretary") for Land Registration employees within the NMA organisational framework. The programme is supported by the NCP (1996);

Management training for District and County Land Office heads (1996-97);

Training for Land Office employees on managing state acceptance and verification procedures for digital

cadastral maps supported by the National Cadastre Programme (1997);

Creation of Human Resources Development strategy for Land Offices (1998);

Training for Land Offices 16 employees in using TAKAROS system (1998);

Management training for 21 new system administrator employees of Land Offices in using TAKAROS system (1999);

Launch of SDILA (Staff Development in Land Administration) Phare/TEMPUS project (2000);

Launch of LIME (LIME – Land Information Management for Executives), 2001.

Iceland

The National Land Survey of Iceland is the legal authority for education and certification of surveyors. A work is underway for regulation of education and certification of surveyors.

The Netherlands

A lot of effort is spent on actual handbooks for the different working processes and on quality management. Some 50% of the employees is older than 45 year. So this is a special problem in education and training. In fact there is a growing need in internal technical training of employees. New (young and well educated) employees are mainly applied in the ICT division and in marketing.

Poland

The cadastre specialists are educated at the Technical Universities in Warsaw, Cracow, Wrocław and Osztyn.

Each cadastral performers must have a special geodetic license.

Slovenia

Formal education in Slovenia is organised at secondary school for geodesy and at the University of Ljubljana on Faculty for civil engineers and Surveyors (Department for surveyors).

For all practical exercise connected with land cadastre are organised several training courses at the Surveying and Mapping Authority and at the section for surveyors inside Slovenian chamber of Engineers. At the Slovenian geodetic institute is also organised training centre for geomatics.

Spain

The Directorate General for the Cadastre is part of the Ministry of Finances.

The "Public Finance School" (Escuela de Hacienda Pública) is the institution in charge of developing the education and training programmes for civil servants, working in the Ministry. Every year the School and the Directorate General work together to design specific

programmes focusing on Cadastre. As an average, every civil servant participates in two different workshops every year.

There are different workshops for the different groups of employees. New employees have to go through different tests.

Sweden

In Sweden, GIS-educations can be described as:

— Land surveyors (technical (geodesy, photogrammetry and GIS) or real estate surveyor (GIS and Cadstral)). These are educated in Stockholm and Lund (only GIS and Cadastral). 4.5 years masters of science.

— GIS engineers (not cadastral). In Gävle, Helsingborg, Karlstad, Trollhättan, Kiruna. 2-3 years bachelors.

— City planners (GIS and planning). In Stockholm, Göteborg, Lund, Luleå. 4.5 years masters of science.

United Kingdom

Provided by the academic community, professional bodies, and on-the-job the job training. There is no registration of surveyors in the UK.

1.5. Institutional Networking, links with National GI Association

Czech Republic

An interdisciplinary and cross-sectors network directly dealing with the issues of cadastre was established in the Czech Republic in the year 1999. The association of Nemoforum is not a legal entity nevertheless it means an important national platform supporting information exchange and co-ordination of activities and development related to information on real estate and land and in some extent to GI in general. The 17 corporate members consist of public institutions (ministries, central agencies and the Union of towns and municipalities) and professional corporations and several universities.

Czech Association for Geo-Information (CAGI) is an active member of the Nemoforum. The representative of CAGI carries the role of a vice-president representing the private and academic spheres of Nemoforum. The representative of Czech Office for Surveying, Mapping and Cadastre (COSMC) is the other vice-president leading the public sphere (governmental institutions and municipalities). The experts from both of these spheres co-operate in 4 working groups: 1-NGII, 2-spatial identification, 3-cadastre, 4- support of land market. A significant role of Nemoforum is organising seminars and workshops on related topics to support the exchanging experience, views and opinion. Cadastre related issues are of prior importance within this awareness rising activity.

The members of Nemoforum participate also in other networks as EuroGeographics (COSMC), EUROGI (CAGI), FIG (COSMC and Chamber of Valuators), AGILE (Masaryk University).

Finland

The National Land Survey and the association of the municipalities are members of the National Council for Geographic Information and advisory board of public data management. National Land Survey is also member of Register Pool, which is a co-operation body between the official national registry organisations.

France

Both OGE and the service in charge of the cadastre (from the ministry of economy) are full members or the National council for geographic information (CNIG) which is in France in charge of advising the government on national policy for GI and networking the players from the public sector. They both belongs to AFIGéO which brings to the debate both the private and public operational actors. The current president of AFIGéO is the president of OGE.

Germany

The Federal Republic of Germany has a population of some 81 million people over 357,000 km². It is organized in 16 states (Länder) and some 8500 municipalities. Each state is responsible inter-alia for its own topographic service, land and property registers, and environmental and statistical data collections.

The surveying and cadastral administrations of the 16 states and the Federal Ministry of Interior with its Federal Agency for Cartography and Geodesy, the Ministry of Defense by the Agency for Military Geographical Services and the Federal Ministry for Traffic, Building and Housing with its department for railways and water streets collaborate within the Working Committee of the Surveying Authorities of the States of the Federal Republic of Germany (AdV). (<http://www.adv-online.de>). They work on technical matters of fundamental and supra-regional importance in order to find and to adopt uniform nation-wide regulations. AdV is coordinating all activities in the field of cadastre, surveying and mapping within Germany, which includes also provision of common documentation of data available and a uniform pricing policy for topographical geo data. AdV published a geo data modeling concept (<http://www.adv-online.de/neues/inhalt.htm>) in 1997.

National umbrella GI Association: DDGI

Greece

A large portion of the surveying engineering industry that is involved in the cadastre participates actively in the activities of HellasGI.

Conversely, a large portion of the HellasGI membership is comprised by professionals active in cadastral operations. Also, significant percentage of the Boards members of HellasGI have had a significant role in the Hellenic Cadastre while another significant portion of the Boards has shown an interest and involvement. In the HellasGI conferences there have always been sessions dedicated to cadastral issues.

Hungary

Production of large scale base maps including cadastral maps fall under the responsibility of the Ministry of Agriculture and Regional Development (MARD).

The Hungarian governmental organisational framework is acting under the supervision of the Department of Lands and Mapping at the Ministry of Agriculture and Regional Development (MARD/DLM). It is responsible for establishing, maintenance and supplying of the geodetic control networks, the large scale base maps including the cadastral ones, the land registry, land protection and valuation, the topographic maps of selected scales and the remote sensing. Special emphasis is given to the tasks related to the implementation of the National Programme of the Adoption of the Acquis Communautaire.

The Department of Lands and Mapping is organised into four divisions:

Division of Surveying and Informatics, which supervises the tasks relating to control point networks, national cadastral and topographic maps, technical upgrade of land offices

Division of Land Registration, which supervises tasks relating to real property registration, land area data supply, carries out legal measures pertaining the dept, and revises the appeals against land office decisions.

Division of Land Protection and Land Valuation, which supervises the tasks relating to licensing of non-agricultural use of croplands, control of utilisation obligation of croplands, support of land restoration and land use as well as supervises tasks relating to land consolidation and related activities.

Division of Control and Development.

Control, EU-accession related institutional development, Research and application oriented development using GIS and remote sensing.

The above mentioned works are carried out by the following organisations.

Institute of Geodesy, Cartography and Remote Sensing (FÖM),

19 County Land Offices and the Budapest Land Office,

115 District Land Offices and the Capital Districts Land Office,

The National Cadastral Programme Non-profit Company started its activities in August 1997, when the first credit was signed. This amount was 2.6 thousand million HUF (EURO 10.4 million). Today the company has a credit possibility of 6.6 thousand million HUF (EURO 27.4 million) Out of this amount 4.3 thousand million (EURO 17.8 million) has already been spent. Thousand million HUF was spent on digital mapping projects (EURO 2.5 million), 1.2 Thousand million HUF (EURO 4.9 million) was spent on HW and SW for land register offices. However, this amount is going to be refunded to the Non-profit Company. 44 million HUF was spent on training programmes and others expenses like operational costs of Non-profit Company and others. So far the Company carried out more than 90 public procurements for digital mapping. 67 settlements are completed. The total area involved in digital mapping is about 600,000 has including many cities and some districts of the capital.

According to the best scenario, all of the cadastral maps of the rural areas could be digitally provided for

multipurpose use by the year 2005. The approval of the proposal is subject of Governmental decision. For more information: www.fomi.hu, <http://fish.fomi.hu>, www.takarnet.hu.

Iceland

NLS and the Land Registry of Iceland have a partnership agreement for development of a multi-purpose cadastre for Iceland and a certification of surveyors.

Every institution, organisation and private company involved in GI has a representative in the National GI organisation, LISA.

The Netherlands

All employees are internal connected through intranet servers. Mails can also be sent and received on Internet (Outlook express). In some cases this is also used for the attachment of GIS information (small files).

We provide a public access to general information and metadata through our web: <http://www.kadaster.nl>

There are links with the site of the NCGI (Nationaal Clearinghouse Geo-informatie) and the site www.gbkn.nl

Poland

The National geodetic and cartographic service is constituted by the state and local governments on the district, region and country level.

National GI Association has social character and supports the governmental organisations with opinions, suggestions and information given in professional journals and GISPOL Bulletin.

The organisational aspects of the Polish GII:

- Changing as regards reporting, yet uniform in content, manner of collecting the materials in the state geodetic and cartographic data resources.

In the course of various stages of centralisation and decentralisation of the state, there were changes of names but not of the essence concerning places of gathering and processing of geodetic and cartographic documentation, hence the spatial information gathered is uniform all over the country.

- A unique fund for managing the geodetic and cartographic data, built of charges for making the data available and meant to be used for gradual improvement of the data resources.

A substantial yet constantly threatened achievement is a separate fund made up of proceedings from making spatial information available, to serve the purpose of modernisation and processing such information, and modernisation of centres storing that information. Maintaining such a separate fund allowed for swift modernisation and equipping the centres of geodetic and cartographic information.

- A civil-code-induced system of protection of geodetic signs.

According to the Civil Code (Kodeks Cywilny), geodetic signs are subject of protection by owners of real estates where they are located. This increases the respect for the basis of spatial information.

- A uniform, in the entire country, system of registering documents being input to the geodetic-cartographic data resources (the OSRODEK /centre/software system) which allows to receive, process and make available the data stored in the geodetic and cartographic resources.

Having a wide variety of software systems functioning in Poland, and facing the substantial expansion of companies grouped in OGC, the existence of practically uniform software system for gathering and maintaining the documentation (the OSRODEK system) in centres of storing spatial information deserves recognition.

- The requirement for a uniform system of digital spatial data exchange (SWING SWDE) which, taking into consideration the substantial amounts of digital maps and a proper co-ordination policy shall allow to establish a uniform GIS in the country in a short time.

The SWDE shall, in particular, allow to unify the cadastral basis of GIS.

This coherent and legally protected system of defining, gathering, processing, and making geographic information available enables to maintain constant updating of basic information sets (cadaster, basic map, inventory of utilities) and, after the principles for generalisation and data exchange are formulated, shall allow to maintain constant updating of other types of maps as well as basic data in the topographic and geographic database.

Slovenia

In Slovenia are active several institutions connected with land cadastre:

- Association of surveyors of Slovenia.
- Slovenian Chamber of Engineers – section of surveyors.
- Association of private geodetically company.

Surveying and Mapping Authority are work together with Governmental Centre for informatics at electronically land cadastre and other geodetic data access and dissemination.

Spain

All the institutional networks are connected through Intranet servers that communicate around an 80% of the employees too.

The intranet contains a wide range of information concerning legal regulations, usual questions, education and training programmes, the Quality Plan, the annual Plan of Objectives, manuals, and others.

We also provide a public access through our Web : <http://www.catastro.minhac.es>

This Website contains information in English. We highly recommend its visit.

Our website has no links.

Sweden

The Swedish Map Council, www.lantmateriet.se.

The Swedish Credit Market Council, www.lantmateriet.se.

The Swedish Land and Real Estate Council, www.lantmateriet.se.

The Swedish Location Name Council, www.lantmateriet.se.

The Swedish Development Council for Land Information, www.uli.se.

The Swedish Cartographic Society, www.karto.grafiska.com.

The Swedish Society for Photogrammetry and Remote Sensing, www.geomatics.kth.se/~ssff.

The Society for Land Surveyors, www.lantmatare.a.se.

The Swedish Standards Institute, www.sis.se.

The Society for Map Techniques, www.kifdirekt.nu.

The Society for Mapping and Surveying, www.skmf.org.

A report called REGGIT was produced 5-6 years ago by the ministry. It regulates how geographic information should be produced and used in Sweden. In 1992, Statskontoret wrote a report about price regulations in Sweden.

United Kingdom

Networking does exist among the central and local government organisations, which carry out functions of a 'cadastral' type, but not necessarily on a systematic or regular basis. Non Governmental Organisations such as the Association for Geographic Information (AGI) also provide opportunities for such organisations to network and share information, techniques, best practice, etc.

There are a range of discipline oriented organisations, professional institutions and associations other than the AGI that provide strong net working and that support Land and Property, e.g. RICS.

AGI position on the proposal to establish a permanent commission on Cadastre within the European Union.

The AGI does not support the EU Spanish Presidency proposal to establish a permanent commission on Cadastre within the European Union.

Geographic Information (GI) and the associated technologies (GIS) are all pervasive and are used across a very wide range of disciplines, many of which are not related to the cadastre either now or in the future.

GI and GIS are used extensively within the UK, which is well advanced in the use and exploitation of GI and the associated technologies. It has a buoyant market place, a strong GI Association in the AGI and all of this takes place without a national cadastre. There are a whole range of data sets within the UK that cover the whole country from an aggregated (small scale) through to a detailed level (large scale). There are a range of national initiatives that are building comprehensive reference data sets that cover street, land, property, land use, fields, topographic, aerial imagery, etc. which are supportive and becoming an integral part of the UK Government e-Government initiative.

As a point of interest – the AGI would challenge any suggestion that the lack of a cadastre within the UK has held back the development, use and exploitation of GI and the associated technologies within the UK.

The AGI view is that both at the UK level and the European level there is a need for an independent Information Commission that embraces all information including GI that will ensure Europe prospers from the information age. Fragmentation into permanent committees that deal with just one part of the total

information set as is proposed for the Cadastre, etc. does not assist in delivering the Information Age and Knowledge Economy strategies and initiatives agreed by the European Council of Ministers.

ILLUSTRATIVE EXAMPLES OF URBAN APPLICATIONS

Czech Republic

There is a high number of existing functional GIS applications implemented on different levels of public administration in the Czech Republic. The cadastral data play an important role in these systems supporting administrative agendas, planning processes or public information services in both the urban and rural spheres. The given www-addresses introduce mainly solutions described in Czech, some short description in English and illustration of maps can be seen on the pages related to the Geo-application of the Year Contest:

<http://www.cagi.cz/html/geoap2000/3.png>.

<http://www.cagi.cz/html/geoap2000/27.png>.

<http://www.cagi.cz/html/geoap2000/28.png>.

1. ECONOMIC DEVELOPMENT.

IRIS - an Integrated Regional Information System
http://irisps.crr.cz:8080/site_iris_czs/site_iris_cz.home;

GIS-MISYS Česká republika, see http://www.gepro.cz/GEOAPLIKACE/GA_01/INDEX.ASP;

<http://www.opava-city.cz>.

2. TRANSPORTATION & SERVICE ROUTING.

GIS-MISYS Česká republika, see http://www.gepro.cz/GEOAPLIKACE/GA_01/INDEX.ASP.

Ring road of the Chrudim town – GIS supported evaluation of road variants.

3. HOUSING.

Comprehensive GIS supported Statistical inventory in 2001 organised by Czech statistical office municipal solutions as in Hradec Králové, see www.mapy.hradec.kralove.org

4. INFRASTRUCTURE.

Digital technical maps of cities as Pilsen, Kladno, and others, see <http://www.gepro.cz/produkty/geoaplikace.asp>
utilities management – GeoArchive at the Municipality Office of Pardubice, <http://www.geovap.cz/html/geoarch.htm>

5. HEALTH AND SOCIAL WELFARE.

PAN – spatial analysis of unemployment – GI support for labour offices in the Czech republic, see <http://gis.vsh.cz/pan/>

6. TAX.

GIS supported detection and localisation of not-payers, see http://www.gepro.cz/GEOAPLIKACE/GA_01/INDEX.ASP

7. HUMAN SERVICES.

Address points and GIS supported public services as in Nymburk, see http://www.oku-nbk.cz/district_or_city_and_region_of_Pilsen, see <http://info.plzen-city.cz/gis/>; district of Kutna Hora, see <http://oku-kh.cz/gis>

8. LAW ENFORCEMENT.

PUKni - Browser of cadastral data (real estate register) including digital maps in various format – GI support to agendas and control related to subsidies in forestry and agriculture

9. CIVIL PROTECTION. ARGIS

10. EMERGENCY MANAGEMENT & SERVICES.

GIS support for the Centre of Emergency Calls of the Integrated Rescue System in Ostrava; see <http://ctvmo.cz>.

Navigating emergency cars in the Pilsen region, see http://www.kr-plzensky.cz/Plzensky_kraj/gis/navigace.asp.

11. ELECTIONS.

GIS application for the elections to the Parliament (by Czech statistical office) and to the local government of Kladno, see www.gepro.cz/produkty/geoaplikace.asp.

12. LAND USE PLANNING.

Many existing applications for physical and urban planning on the level of regions, districts, large or small towns, as see: <http://www.wmap.cz/region/>;

<http://dokumenty.prague-city.cz/uplan/start.htm>;

<http://www.hradeckralove.org/>;

<http://info.plzen-city.cz/gis/>; <http://mu-novyjicin.tmapserver.cz/>.

13. PARKS AND RECREATION.

Environmental Atlas of Prague based on GIS analysis, modelling and presentation of environmental data, see: <http://www.premis.cz/atlaszp>

WEB of the City Hradec Kralove (publication system and map server), see <http://www.hradeckralove.org/>.

Nature and landscape protection, including monitoring systems, see <http://www.schko.cz>.

14. CITIZEN INFORMATION (e-GOVERNMENT, GOVERNMENTAL PORTAL, Internet ACCESS, TELEHOUSING, 1 STOP SHOP).

ISKN - e-access to information on real-estate ownership; meta-information system called MIDAS - Clearinghouse for Geo-information, see <http://www.cagi.cz/midas>.

Finland

Cadastral internet service exists to support municipal landregistration <http://kuntaliitto.fi/kik2000> user: kik2000 psw:kml2000.

France

Booklet is available illustrating the use of GI in urban governance. Please contact AFIGEO www.afegeo.org

Germany

Imagine an architect who wants to realise a small trade building in a residential area. Therefore he must analyse cadastral, planning and other data of the responsible municipality. Currently these data are available in different municipal offices where they are only partially in digital form, and often in different data formats. A general approach is the cadastre in its multi purpose function within Germany.

Imagine a consultant who has a contract to build the "Magnetic Levitation Train Transrapid" (http://www.transrapid.de/pdf/tri_engl.pdf) between Dortmund, Düsseldorf and the airport of Cologne, Germany. Since the study area crosses several municipalities, the project manager contacts these municipalities for the relevant cadastral reference data. In addition - for the most recent aerial photographs, the specialist has to individually contact the surveying and mapping agency of NRW and / or private companies that obtain aerial photography for the area in order to determine who has the most recent data. Cadastral and national mapping data has to be combined.

Greece

N.a.

Hungary

Digital product service for utilities and facility management, including water, electricity, road and transport, railway, canals, telecom, gas. AM/FM is the largest stakeholder as application field in the GIS market. Major players are the SMEs.

Building cadastre, real estate valuation, land use, construction works, impact analysis, investments related applications.

Services are regulated by Law and Directives. The character of the service is multipurpose use of land registry and cadastre information.

One of the most useable framework data infrastructure is MATERIA of the Central Statistical Office. The Institute of Territorial Planning provides information service called TEIR. Metadata services are FISH, METATER and KIKERES maintained by FÖMI, Geological Institute and the Office of the Prime Minister respectively.

Iceland

The online version of the Reykjavik GIS can be accessed also using <http://eldey2.bv.rvk.is/website/bvs/bvs.html>.

The Netherlands

— Trends in selling prices of properties (different kind of houses in the different regions), every 3 months statistical overviews. Highly awarded by national journalistics and taxation applications.

— Selling prices of houses in connection with living-adresses (for potential sellers and buyers).

— Parts of the cadastral map in connection with adresses or owners.

— Selection of cadastral parcels in connection with certain rights or dates of selling.

Poland

A special STRATEG system (See Section 1) has been introduced in many towns, for example: Olsztyn, Piotków Trybunalski, Pabianice.

Slovenia

Examples of urban applications of land cadastre datasets are:

- Preparation of urban plans.
- Preparation of documents for building permits.
- Underground infrastructure cadastre, utility companies.
- Establishing cadastre of buildings.
- Real estate tax.

Spain

- Taxation applications:

There are seven different taxes (three nationals, two regional and two locals) set upon cadastral information. We highlight the importance of the Real Estate Property Tax, a local tax collecting every year more than 4.216.000.000 e income. The gross base is determined applying to real estate values, assigned by the Directorate General for the Cadastre, the tax rate that the Town Hall approves.

- Land Registry applications:

The Cadastre provides to the Land Registry before the title inscription, information about the real estate properties. The Cadastre also supplies cartography and other needed information. The Land Registry and the Cadastre are linked on daily basis through the cadastral code. The notaries and Land Property Registrars are obliged to submit to the Cadastre all the information concerning the documents that they have authorised or registered.

- Urban Planning applications:

Cadastral information is also used to create and to manage Urban Plans (e.g., the cadastral digital cartography).

- Public Assistance applications:

Whenever a citizen requires certain kind of economic public help (home aids, scholar grants, and others).

Sweden

In Sweden, there exist no specific differences between urban and rural applications.

To name some of the application areas of Cadastral-GIS (rural):

- Forest taxation.
- Forest evaluation and management.
- Transport planning (road database).
- Fertilising of agriculture areas (GPS and GIS).
- EU-support (investigations and distribution of agriculture support from EU).
- Environmental protection.

United Kingdom

Land Registration activities in Scotland make no distinction between Urban and rural areas and both benefit from the same underpinning legislation. Remember though there is only approximately 35% coverage of Scotland in the Land Register as noted in the answer to question 1.1. It is unknown what the relative % coverage is across different urban/rural areas but it is known that it varies dependent on the Land Register operational date of particular geographic areas of Scotland.

There are property-related database(s) available within the UK that do not use the topographic data available from OS-GB due to the cost of the data and the licence restrictions. e.g. GOAD data.

ILLUSTRATIVE EXAMPLES OF RURAL APPLICATIONS

Czech Republic

1. SUPPORT LAND REGISTRY.

POZEM – GIS support for land registration and consolidation used in 60% of districts in the Czech Rep.

ZRUIN – pilot project and law preparation concerning the authentic/basic register on spatial identification and real estate.

2. PROVIDING CADASTRAL MAPPING AND SERVICE.

3. IMPLEMENTING POLICIES CAP (LPIS, CwRS), AEMS, GUIDELINES RURAL21 ETC.

4. AGROSTATISTICS, LAND USE/LAND COVER.

IACS implementation, BPEJ (digital maps on soil and ecological rating and the country wide spatial units related to the cadastre)

5. LAND PROTECTION, VALUATION.

Digitalisation of the vineyard sections in the district of Znojmo and dissemination to the end users (CD-ROM); information on land valuation, and or land value maps accessible via Internet –

<http://muris.mepnet.cz/public/menu/cpm2002/htm> or http://www.cscom.cz/start_flash.htm

6. LAND PRIVATIZATION, LAND CONSOLIDATION.

A land consolidation pilot project in Kardasova Recice (COSMC and district authority of Jindrichuv Hradec together with the Dutch cadastre).

Finland

Internet map service is publicly available with links to the cadastral system and real estate purchase register. See http://www.nls.fi/jako/norm/index_eng.html.

France

N.a.

Germany

The EU wants to control the area based arable and forage subsidies using remote sensing and other reference data (done in the project INVECOS). In North-Rhine Westphalia, the digital cadastral information will be used to build up an rural land use cadastre.

Greece

N.a.

Hungary

A methodology for the computer i.e. GIS-aided land consolidation has been elaborated during the past 6-8 years in a Hungarian-German technical co-operation. The project delivered methodology for the organisational and institutional procedures in a multiagency environment, helped to set up the basics for the legislation needed and also achieved results providing know-how in education and training as well as awareness raising. The project conducted two workshops (in December 1999 and December 2000) with international participation in order to verify the results and sharing the experiences.

Anticipating the Parliament will vote the Laws on Land Consolidation and National Land Fund prepared in draft, additional new pilot projects having methodology

development character are envisaged in Dutch co-operation. A FAO Technical Co-operation Project has been prepared to assist the optimal land use change using land consolidation in areas endangered by erosion, logwaters and flood.

In the LPIS and CwRS components of the CAP IACS Hungarian institutional development the parcel numbers of the Land registry are playing the role of the connection key between the Land Registry/Cadastre and the application-oriented databases. N.B. In Hungary FÖMI RSC provides operational monitoring and reporting on yearly basis in two field:

- area-based subsidy control using remote sensing since 1999,
- crop monitoring/yield estimation since 1997.

Iceland

The Agricultural Research Institute is building a GIS with boundaries of every farm in Iceland for the Ministry of Agriculture.

The Netherlands

- All kind of ongoing activities in projects of land consolidation.
- Same applications as mentioned under item 2.

Poland

The STRATEG system was also adapted for rural needs and has been introduced in districts: Mielec, Pabianice, Brzesko.

Slovenia

Examples of rural applications of land cadastre datasets are:

- Subventions in agricultural.
- Agricultural land taxation.
- Nature protection activities.
- Protection of water sources.

Spain

The rural applications are same than the urban ones, but also:

- C.A.P. control application:

Every year more than 4.820.000.000 € are distributed among Spanish farmers. The CAP subsidies control is managed through the information provided by the Cadastre.

- Information applied to public infrastructures: cadastral information is used to expropriate lands bound to become infrastructures as well as future planning

Sweden

The reason to make differences between urban and rural land is more based on historical than practical

motives. In Sweden, the integration between urban and rural cadastral data is completed.

The infrastructure is built on national level, in combination with local updating on municipality level.

The nordic countries have cadastral systems, based on different legal and technical solutions. That means that nordic exchange of property information is not so common (or not even possible without complications). According to Swedish laws about personal integrity, it is also stated that most real property information can not be exported.

In the EU-based project "EULIS", some efforts are made to compare and give entrances to property information for some of the member countries. However, these efforts are only concentrated to some business activities in the "Cadastral field" like real estate market, brokers, and real property financing.

To name some of the application areas of Cadastral-GIS (urban):

- Physical planning.
- Real estate brokers.
- Insurance.
- Bank and financial markets.
- Real estate taxation.
- Water supply, electricity, services, etc.
- Addresses.
- Election to parliament.
- Large infrastructure projects.

United Kingdom

Please refer to the answer given to question 2.0.

Approximately 65% (mainly agricultural and moorland) is not registered and ownership information is difficult or impossible to obtain. This situation however does not stop owners or farmers obtaining agricultural subsidies. The systems managing agricultural subsidies use the OS-GB and OS-NI topographic data as well as aerial photography from UK private sector data providers.

4. TRENDS AND FEATURES OF ONGOING DEVELOPMENTS

Czech Republic

Trends and features include:

- increasing accessibility of spatial data and information via Internet,
- wider use of MIDAS - the Czech clearing house (metainformation system) for spatial data and information,
- from GIS supporting single agendas to integrated multidisciplinary solutions supported by integrated information and communication technologies,
- increasing role of regions due to the reconstruction of public administration and governance in the Czech Republic;
- from local island GISs to integrated territorial/regional and national based on distributed local/regional databases enclosing a spatial display and analysis of data;
- from parallel incompatible systems and registers to core/authentic registers and built-up services,
- from barriers between data owned by individual institutions to sharing data and building networks,

organisational frameworks and barriers against misuse of shared data.

- increasing communication and co-operation cross institutions and sectors.

Finland

There is a national Land Information System that is comprised of the Cadastre and the Land Register. The existing system does not include map/GI data so far. There is in the Parliament a proposal for law on the LIS. This new law together with existing legislation means that the new LIS will contain a nationwide cadastral index map in June 1 2005. The existing LIS will be renewed in order to include map data and provide the needed new data services which will *ineter alia* be based on a map interface.

France

On going developments relate to the RGE in France where cadastral GIS is one of the components of the reference data, all components of the RGE being made complementary and consistent (reference to Mr.Salgé's presentation at the 7th EC-GI/GIS conference held in Potsdam).

Germany

Today, the Automated Real Estate Map (ALK), the Automated Real Estate Register (ALB) and the Authoritative Topographic and Cartographic Information System (ATKIS), which were developed before powerful geoinformation systems were introduced on the market, have become increasingly insufficient.

For that reason, the cadastral administrations of all German states are currently developing the Official Cadastral Information System "ALKIS", which will integrate cadastral data of the ALB and ALK. This so-called "horizontal integration" will guarantee a redundant-free data set for the cadastre. ALKIS will consequently employ the corresponding national and international ISO-standards. In addition, the data model of ALKIS will be identical to the updated Authoritative Topographic and Cartographic Information System (ATKIS).

Because of the unique data model for ALKIS and ATKIS and a systematic semantic harmonization of the object catalogues, it will be possible to use collected data on both the cadastral level and the surveying and mapping level. This "vertical integration" is the first step to the general approach that data should only be collected once and should be used for different scales.

Greece

There is a clear trend towards digitisation and computerisation of cadastral data. GIS play a central role in the data collection procedure of the Hellenic Cadastre. In fact, prospective contractors of cadastral survey studies are required to prove their skills and competence in the use of GIS technology before they are awarded cadastral survey projects. The Hellenic

Cadastre is being designed to operate using GIS and DBMS technologies.

Hungary

The modernisation programme of the Land Office Network started with the TAKAROS (Countrywide Computerisation of Map Based Cadastre) project 10 years ago. It was gradually developed. After completing the data and document transmission intranet/extranet called TAKARNET, now META is the final step in the programme. The project is focused on ITT development. META aims to develop a well-functioning GIS solution for the county land offices, to create the conditions of marketing LIS (Land Information System) data managed by the land office network and backstopping the TAKAROS District Land Office system. Besides, META will introduce a Management Information System (MIS) for the sector, and provide a widely distributed GIS data processing ability also to support tasks also related to the EU CAP. Furthermore, it promotes the land office network to become self-financing. To achieve these aims, a strong ITT system is under procurement to the county land offices. The system will be developed in accordance with the following main requirements:

- Multipurpose electronic archive sub-system.
- Back-end data processing to support the external data processing at lower level land offices.
- Data model independent data processing facility.
- Handling maps and land-related data via TAKARNET.
- Providing management information to support land office managers.
- Enforcement of EU promoted GI standards in Hungary.

Iceland

Digital Base Maps from the NLS of Iceland and unique identifiers for all land parcels in the Land Registry Database will provide the basis of the Icelandic Cadaster iceCAD, which is practically an information layer within the Land Registry Database.

The Land Registry Database is created by the merger of existing property databases, along with the real property valuation registry and the local paper-based title and mortgage registries.

The cadastre is based on a forthcoming legal framework of certified surveyors and cadastral legislation for the determination of property boundaries. Further developments of the Database include the creation of a multipurpose cadastre, a joint action of NLS and the Land Registry of Iceland. These institutions have a partnership agreement regarding the LR Database and the registration of boundaries.

The Netherlands

Complete business redesign of mapping, registration and distribution activities.

An important aspect is the development of object oriented databases and the improvement of the

accessibility and interoperability of data for both, existing clients and new clients.

Poland

One aggregated system in which data are entered only once and the generalisation and use goes from down to top and from top to down.

Polish existing GIS works in such a way in great part.

Slovenia

About issue:

Improvement of land cadastre maps is possible with additional field measurements and transformation in specific areas.

Technology:

After finalising central database architecture for all land cadastral datasets, there will be possibilities for internet access.

Spain

The Cadastre is the main public G.I.S territorial database within Spain. Its main advantages are:

The information is treated homogeneously in all the Spanish territory

Due to its taxation applications the information is checked up yearly.

All features of the cadastral lots are represented as a vectorial surface with a reference linked with all the data in the database.

The Cadastral G.I.S is the support to identify urban and rural lots, place and measure them, and allocate a cadastral code

Sweden

The trends in Sweden mostly rely on new technology. Thus, some of the trends:

- Navigation and positioning.
- Road data.
- Transports.
- Location-based services.
- Telecom.
- E-Business.
- 3D-visualisation for city planning.
- Organising the data infrastructure.

United Kingdom

There is no specific development of a cadastre at the moment within the UK. The answer to question 5 however provides a flavour of some of the initiatives that would serve to support a cadastre in time if it was required.

There is a continuing trend to 'commercial' operation of 'cadastre'. There has been little support in recent years to the merging of OS-GB and the HMLR. These aspects can be seen within the published respective quinquennial reviews of the OS-GB and the HMLR.

There is also growing competition between the public and private sectors data suppliers with a number of national data sets that are available that support the 'cadastral' functions. e.g. aerial photography which by enlarge is supplied by the private sector here in the UK.

5. THE ROLE OF CADASTRAL GIS IN THE NSDI

Czech Republic

Cadastral GIS is backbone for

LocalSDI.— digital cadastral maps and related information on real estate ownership play the key role in the LSDI, especially in the large cities as Prague, Ostrava, Pilsen or Hradec Kralove etc and also in many medium size cities as Kladno, Znojmo etc.

TerritorialSDI.— more than 50% of the district offices in the C.R. use some kind of cadastral maps as background information in their GIS applications. (The overview of existing spatial data and information and other GIS&T related resources was done in co/operation of Czech Association for geoinformation, Ministry of interior and the Office for public information systems and published on [the web](#) and CD-ROM at the end of 2001, see pages 31-33 on www.cagi.cz/midas.)

NationalSDI.— the ISKN project in the competence of Czech Office for Surveying and Mapping will enable a web-based approach to the information on cadastre in the Czech Republic. The first stage supporting a www-access to the descriptive information was successfully finished in 2001. There are also several national wide GIS applications using geo-referenced cadastral maps for the purpose of statistics, law implementation control (concerning subsidies in agriculture/forestry or social affairs) and others.

The Programme of Czech National Geo-Information Infrastructure (NGII) was formulated in the year 2001. The programme was approved not only by the national platform called Nemoforum (which was established in 1999 to enable debate on issues related to the information on real estates) but also by the governmental Committee for State Information Policy in September 2001. The programme now represents the most important conceptual background for developing GIS and use of geodata in the Czech Republic. This document does not highlight the issue of cadastre explicitly, but this issue meets many of ten listed goals seen as important for further development of a NSDI in the conditions of the Czech Republic (incl. data policy, core geographic data, standards, education and awareness raising). The goals for the future are designed incl. the basic characteristics of about 20 projects needed for reaching the defined goals.

RegionalSDI.— there are several cross-border GIS applications as in the national parks of Krkonose (CZ, PL) or Sumava (CZ, D, A) using in some extent the cadastral maps or other information related to land/forest ownership for the purposes of NP management.

Finland

Cadastral GIS is a basic component of nsdi for both municipal and state authorities service processes.

There are in Finland over 300 GISs that are available. There integration of these with cadastral data

has been restricted because no national data service has been available. Also the lack of spatial data in some municipalities have complicated the use.

The renewed LIS will overcome these obstacles. Simultaneously the availability of spatial dimension of real estate units gives the opportunity to describe and update land use rights and restrictions as spatial objects and relation of these with real estate units can be solved by the position. The picture below gives an impression of integration possibilities between different registers.

France

On going developments relate to the RGE in France where cadastral GIS is one of the components of the reference data, all components of the RGE being made complementary and consistent.

Germany

The German state of North-Rhine Westphalia (NRW) is implementing GEOBASIS.NRW at the local community level and the Spatial Data (Geo data) Infrastructure (GDI NRW) at the state level to increase the access to existing spatial data across the state. Similar SDI are currently under development all over Germany.

With GEOBASIS.NRW, the new German cadastral standard ALKIS will be introduced in a local environment. It will extend the cadastre's formal task of property security to provide a complete georeference service for the whole community. In this function, GEOBASIS.NRW will be the basis enabling solution to georeference-related topics in e-Government. Together with GDI NRW it will also supply reference data, thereby establishing the first link of the value added chain in the field of GI, an important step for location based services.

Greece

Cadastral GIS would form perhaps the core of the NSDI in Greece. A large number of other activities would rely on a GIS based Cadastre.

Hungary

The major actions/elements of the National Spatial Data Infrastructure approved by an Interministerial Committee in October 15, 1997 include also the cadastral information:

- National Spatial Data Strategy.
- National Cadastral Program.
- National Topographic Program.
- Geo-coded Address Register.
- Administrative Boundary Database.
- Extended data content of the Digital Base Map (multipurpose cadastre).
- National Geospatial information metadata service and clearinghouse.
- Aerial Survey of Hungary and related products.
- Multipurpose parcel based information system.

Iceland

The Land Registry Database is already a part of the NSDI in Iceland but its role can be enhanced with the addition of a forthcoming multipurpose cadastre for Iceland. Use of the unique identifiers for land and buildings in the Land Registry Database is already widespread in most governmental, district and local government applications.

The Netherlands

The databases LKI and AKR are very important in all processes where properties are involved and without that the security of rights and the financial facilities based on mortgages couldn't exist as it is now.

In the Netherlands a lot of activities are going on in the field of standardisation and interoperability of GI. The Cadaster is intensif and on a high level involved in these activities.

Poland

Cadastral is the basis for the Polish GIL. Please refer to the Contributor's paper submitted to the 8th EC GI/GIS Workshop, Dublin, 2002 (The technical, legal and organisational aspects are given here without modification).

Slovenia

In future /when digitalisation will be finished) cadastral datasets will play an important role in national spatial infrastructure. Cadastral data are core dataset in many of information's systems in Slovenia. Together with register of spatial units are cadastral data common identifiers and key for geolocations and geocoding all other administrative data.

Spain

The Cadastre is the main public G.I.S territorial database within Spain. Its mains advantages are:

The information is treated homogeneously in all the Spanish territory

Due to its taxation applications the information is checked up yearly.

All features of the cadastral lots are represented as a vectorial surface with a reference linked with all the data in the database.

The Cadastral G.I.S is the support to identify urban and rural lots, place and measure them, and allocate a cadastral code

Sweden

Cadastral-GIS has legal status where data are regulated by legislation. Thereby, the databases and services are very centralised (government or municipality level). Therefore, the databases and services are built on rigorous security because the authorities are directly liable to pay damages.

Cadastral-GIS is a support for real property formation services. The technical support in the process has increased. The working process is also rationalised. The surveyor carries out all steps in the process, from planning, measurement, map production and GIS to legislation. A direct result of these enhancements is that the fee has decreased.

Some numbers of the system described in section 1

“Geography”

— The number of persons that have updating grants is 300.

— The number of users is 1,000 (including updating users).

— The number of transaction to check out data is 1,500 per day.

— The number of transaction to update data is 250 per day.

— Each transaction to update for “the general build up” is 1,500.

— Each transaction to update for “real estate formation” is 50.

— A transaction of 1,000 objects takes less than 10 seconds (including formatting, transformation, checks).

— The total number of objects in the database is 100 million (including history data).

— The total number of changed objects is 10 million per year.

“Cadastral”

— The number of persons that have updating grants is 500.

— The number of users is 30,000 (commercial bank, financial market, authorities, real estate brokers).

— The number of transaction to check out data is 300,000 per day.

— The number of transaction to update data is 750 per day.

— The total number of register units in the database is 4,68 million.

— The total number of plans and zoning information in the database is 350,000.

— The total number of servitudes/easements in the database is 1.1 million.

United Kingdom

Not applicable as the UK has no GIS Cadastre.

There are however a number of initiatives being carried out by a variety of organisations that are part of the NSDI which will serve to support a cadastre in the UK should one be sought, these include:

- BS7666 addressing standards;
- National Land Property Gazetteer (NLPG) (of address complying with BS7666);
- Master Address Database (for Scotland in support of NLPG);
- Common Address File Project in Northern Ireland;

• Project Acacia considering the merits of collaboration among OS-GB, HMLR, ROS, Royal Mail and the Local Authorities, looking at the potential for building a National Address Database and portal.

• National Land Use database – a joint venture between the DTLR and Local government.

6. CONCLUSIONS

6.1. Verification of the advantages of Eurogi's interdisciplinarity and competence in this field

Czech Republic

EUROGI represents a wide range of national GI associations over a major part of the EU and also the CEECs. This network enables to describe and compare the existing situation in a very comprehensive way and also means an important source of inspiration for the individual participants. Last but not least, the general trends and needs are defined in an objective manner. They mean a Useful background for preparation and implementation of actions in european scale.

Finland

Significant advatages can be seen especially in the future when the systems are interoperable and seamless.

France

EUROGI being the umbrella of national coordinating bodies such as CNIG in France will ensure that cadastre is included into the GI topics and concerns.

Germany

N.a.

Greece

Eurogi assembles a large portion of the knowhow at the scientific and professional level to promote agendas

Hungary

Very important. EUROGI support the participation in different EU projects.

Iceland

EUROGI plays important role in promoting common understanding of principles and ideas for future development of GSDI and NSDI.

The Netherland

N.a.

Poland

Not enough until now. For the last years EUROGI has promoted mainly the American industry in GI domain For which the cadastral specificity is not well known. First from the Preaccession Countries conference in 2000 the cadastre was perceived but in a

selective way. For example my paper for Cadastral Conference in Budapest was not accepted.

Also the last EUROGI invention – GINIE project is not friendly targeted to the cadastre.

I think that EUROGI as European organisation will be forced to be more oriented on the cadastre features.

This will be extorted by the environment protection needs and the first symptoms are now visible in the INSPIRE project.

Slovenia

N.a.

Spain

N.a.

Sweden

Yes.

United Kingdom

EUROGI has an important role to play as a facilitator.

The AGI has been a member of EUROGI since its inception. The AGI sponsors the EUROGI President (for the past 3 years and at the current time). The AGI has an elected member on the EUROGI Executive committee. The AGI values EUROGI as it extends the GI network to the benefit of all and enables the AGI to cost effectively partake part in raising GI awareness at the European level and help set the European GI strategy.

6.2. The value of the National GI Associations for the society in the Cadastral GIS field

Czech Republic

The GI Associations enable a reflection of users' needs and experience on the national level. They open discussion on issues crossing the borders of existing institutions or disciplines and initiate systematic solutions or even participate in their preparation. They transmit and disseminate the international and national knowledge (in the field of GI) in both directions.

Finland

GI Association keep up the discussion of the necessary development actions and interoperable technical solutions.

France

National GI umbrellas are an instrument to ensure consistency between policies related to or affecting GI in a given country. Duality of CNIG (government) and AFIGéO (private and public operational actors) will ensure all

vested interests have the possibility to provide inputs to the policy, definition, adoption and implementation

Germany

N.a.

Greece

National associations can form the locus that would bring professionals together and form proposals for policy making at the national and European levels.

Hungary

The growth of the National umbrella GI Association HUNAGI is promising. The number of its members were doubled during the past 12 months and it has today 55 governmental and academic institutions, the private sector and NGOs as members on governmental, regional and local level (www.fomi.hu/hunagi). HUNAGI has interdisciplinary character. By organised actions, it makes public awareness by knowledge transfer and information dissemination, which support directly both the key and potential NMA/Land Administration clients' readiness to be informed on the GIS-related developments (INSPIRE, GINIE, LUCAS etc) in the European Union and the implementation of the National Programme of the adoption of the Acquis Communautaire. HUNAGI organised the 1st EC Workshop on Cadastre (in conjunction with EUROGI and DG JRC) and will host the 6th Global Spatial Data Infrastructure conference in September, where the importance of the cadastral information as one of the fundamental elements on NSDI level will be also emphasized (www.gsdi.org, www.eurogi.org).

Iceland

The National GI Association LISA has succeeded in bringing together various players in the field of GI.

The Netherlands

N.a.

Poland

GISPOL is the main creators of GI awareness.

Slovenia

National GI Association is still on the process of formalisation, until all activities are coordinated by associations of surveyors and surveying and mapping authority of Slovenia.

Spain

N.a.

Sweden

Valuable.

United Kingdom

The AGI has an important role to play as a facilitator.

The AGI plays an increasingly significant role with regard to GI within the UK as it represents all interests related to GI and is constantly working to deliver its mission *to maximise the use of geographic information for the benefit of the citizen, good government and commerce.*

6.3. EUROGI's role in the field through its relevant project – from the NGIA perspective**Czech Republic**

The positives described in the previous items were supported by several projects organised by EUROGI.

Finland

GINIE project has vital possibility to develop the cadastral giss as european reference data.

France

GINIE is the main project which will provide context information and general policy guidelines for European cadastral GIS discussions.

Germany

N.a.

Greece

It would be beneficial to give momentum at the national level where resistance, hesitation and unwillingness to push for changes and institutional reforms exist.

Hungary

The joint GSDI6 organisation as well as the project GINIE are the actions, where the involvement of the Hungarian GI community can be beneficiary also for the developer and user of cadastral GIS.

Iceland

EUROGI has an important role in raising awareness and promoting coordinating work on data policy and strategic issues.

The Netherlands

N.a.

Poland

Not sufficient but visible when Mr A.Wolkamp was the Secretary General.

Slovenia

A lot of experiences and knowledge for our concrete projects was found at eurogi address.

Spain

N.a.

Sweden

- Policy makers.
- Reflection partner.
- GI associations are information suppliers through magazines and conferences.

United Kingdom

EUROGI has an important role to play as a facilitator.

Running workshops and shaping GI strategy and policy. Projects valued include:

- The workshop on Cadastral data as a component of SDI in support of agri-environmental programmes held in Budapest in June 2001 at which several AGI members were present and or assisted in producing the report which is of value.
- EUROGI's participation in the GINIE project.
- EUROGI's participation in the INSPIRE initiative.
- EUROGI's participation in the ETEMII project related to reference data.

The AGI expects EUROGI to represent the full spectrum of GI users and not just one sector whether it is on the supply side, services, user or academic. It is important for EUROGI to maintain the broad view and to encourage the widest participation in the use and exploitation of GI across Europe for the benefit of all in Europe whether they are government, business and or the citizen.

6.4. Links between the NGIA and the cadastral GIS operators/agencies**Czech Republic**

Czech Association for Geo-Information co-operates with the Czech office for Surveying, Mapping and Cadastre mainly on the national platform called memoforum. The COSMC represents the sphere of governmental institutions and municipalities, CAGI parallelly represents the private and Academic spheres. The experts from both of these spheres co-operate in 4

working groups: 1-NGII, 2-spatial identification, 3-cadastre, 4- support of land market.

Finland

Links are tight, the cadastral GIS operators are clearly fundamental partners in the NAT GIS associations.

France

GI Association keep up the discussion of the necessary development actions and interoperable technical solutions. Cadastre service and chartered surveyors as members of both CNIG and AFIGÉO

Germany

N.a.

Greece

Membership connections (weak in greece so far though).

Hungary

About 10% of the member organisations and institutions of HUNAGI comes from the Land Administration sector. Cadastral experts are actively involved also in the international events organised by FOMI. E.g. in the GIS Day 2002 devoted to the role and potentials of GIS in the implementation of governmental policies, which was supported also by Commissioner Erkki Liikanen by sending a dedicated welcome address. The First Congress on Cadastre in the European Union is participated by top managers of the FOMI and Capital Land Office, both member institutions of HUNAGI. The secretariat's infrastructure of HUNAGI, the National GI Association is ensured by the Land Administration since 1994.

Iceland

LISA and the National Land Survey of Iceland have supported the coordination of a National GI Classification System in Iceland.

The Netherlands

N.a.

Poland

In Poland very strong. GISPOL gives the main creative and critical opinions to the cadastre and GIS development.

Slovenia

There are good cooperation between associations of surveyors and surveying and mapping authority of Slovenia.

Spain

N.a.

Sweden

Policy.

United Kingdom

The majority of the organisations within the UK that are involved in property registers, land registration, land use, planning, financial organisations and risk assessors as well and land management are members of the Association for Geographic Information. This is one of the great strengths of the AGI that its members are from a very broad church. The following organisations are either sponsor or corporate members of the AGI:

The HMLR, ROS, OS-GB, OS-NI, NILR, Local Authorities, Department of Transport, Local government and the Regions (DTLR), Department of the Environment Rural Affairs (DEFRA). A number of senior representatives from these organisations will be present at the First Congress on Cadastre in the EU in Granada on the 15th to 17th May 2002.

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BEST REFERENCE:
ALEXANDER RICHTER, REEJUR.:
CADASTRE FOR ICELAND: SURVEY ON THE LEGAL
SITUATION ON CADASTRE AND LAND REGISTRATION IN
SELECTED COUNTRIES IN EUROPE AND NORTH AMERICA.
NLS OF ICELAND, AUGUST 2001, 175 PAGES

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8. SUGGESTED REFERENCES

1. THE COMPLETED EUROGI QUESTIONNAIRE.
2. CADASTRE IN 2014 (FIG C 7.1).
3. THE BATHURST DECLARATION FIG.
4. UDMS DOCUMENTS DELFT 2001.
5. THE PROPOSED EU DECLARATION ON CADASTRE GRANADA 2002.
6. UNECE WPLA DOCUMENTS BAD GODESBERG 1999, GAVLE 2001.
7. 1st EU CADASTRAL WORKSHOP BUDAPEST 2001.
8. WORLD BANK REGIONAL WORKSHOPS ON LAND POLICY ISSUES BUDAPEST 2002.
9. THE MUNICH DECLARATION MUNICH 2002.
10. GUIDELINES ON LAND CONSOLIDATION FAO ROME 2002.
11. Geoinformatics April/May 2002.
12. www.eurogi.org,
www.fig.net,
www.eurogeographics.org,
www.unece.hs/wpla,
www.gsdi.org.

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