

# **Information Management at the Hungarian Land Administration by Using Internet**

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**Key words:** information, on-line map-based services, GIS databases.

## **SUMMARY**

Management of information related to land administration is carried out in Hungary by the Institute of Geodesy, Cartography and Remote Sensing (FÖMI). The enlarging demands for a nation-wide land and mapping information services needed to join different types of services in one hand. By using the most advanced technologies the Institute continuously develops the quality of data supply, product marketing, different types of services. The aim of the Institute's web site is to support wide spectrum of customers with land-related data and information.

## **ZUSAMMENFASSUNG**

Die Verbindung der Informationsverwaltung zu der Landmessungs administration ist in Ungarn vom Institut für Geodesie, Kartographie und Fernerkundung (FÖMI) verwickelt. Wegen des Verlangen der Verweiterung von einem nationalen Informationsdienst für Land und Kartographie hat sich die Zentralisierung in eine Hand als notwendig erwiesen. Das Institut entwickelt die Qualität von dem Datenbestand, Produkt-Marketing und von den verschiedenen Dienstleistungstypen. Mit dem Web site hat das Institut die Absicht, die Zugänglichkeit zu den Daten und Informationen in einem ausgebreiteten Abnehmerkreis zur Verfügung zu stellen.

# Information Management at the Hungarian Land Administration by Using Internet

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## 1. INTRODUCTION

The civil surveying and mapping activities and the land affairs are administered in Hungary by a governmental institutional network. It consists of one institute with nation-wide competence and 136 land offices with territorial competence and a public benefit company. This governmental organisational framework is acting under the supervision of the Department of Lands and Mapping at the Ministry of Agriculture and Rural Development. The civil surveying and mapping administration 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 (NPAA).

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

- Institute of Geodesy, Cartography and Remote Sensing (FÖMI) as governmental organisation with nation-wide competence,
- 19 County Land Offices (CLO) and the Budapest Land Office as governmental organisations with territorial competence,
- 116 District Land Offices (DLO) and the Capital Districts Land Office as governmental organisations with territorial competence,
- Office for National Cadastral Programme, as non-profit organisation.

The Institute of Geodesy, Cartography and Remote Sensing as an institution with national-wide competence has taken upon itself the task to carry out the information management by using Internet. The aim of the task is to support wide spectrum of customers (the information society) with land-related base data, products, services and information on the web alongside with other initiatives of the civil lands and mapping administration. The main target group of users are the specialists working on the territory of surveying, mapping and land administration (state and private companies). The Internet-services help their everyday work in surveying, mapping. The next group are the land data users, map users and the decision-makers, they are also supported by the services. The next step is to target a wide range of users, among them local governments, banks, public notaries, institutes for regional planning and development, environmental protection, public utility companies, scientific and educational institutions, culture and hobbies etc.

Realisation of these aims was initialised by a project. The project, called “FISH” (Földügyi Információ Szolgáltatás Hálózaton = Web-based Land Information Services) began in 1998,

is continuously developed and for today it is a well organised, frequently used information service of the National Mapping Agency in Hungary.

## **2. BUILDING WEB-BASED LAND INFORMATION SERVICES IN HUNGARY**

### **2.1 Background**

In 1998 FÖMI issued a web site in the frame of a pilot project to fulfil the above mentioned needs. The high quality data of the land office network and FÖMI are the basic data sources for the geodatabase-inventory and services, which serve the new information society as integral part of the information infrastructure and as a part of the Hungarian National Spatial Data Infrastructure. The FISH project managed to provide an easy access to the following FÖMI and land office databases through their metadata descriptions:

- geodetic control points,
- land-ownership data,
- analogue and digital maps,
- aerial photographs
- satellite images.

As technological background the FISH project is based on the WEB geoinformation technology by ESRI through its Hungarian representative. ArcView Internet Map Server is used for the publication of maps. On the client site Java applets and JavaScript provide the selection and collection of data. The orders are stored in an Access database. The scripts on server side are written in ASP (Active Server Pages) language.

Standards being adopted: METADATA descriptions in the Hungarian Standard MSZ 7772-1 on DAT Digital Base Map and Instructions (DAT 1. and DAT 2.) produced by Institute of Geodesy, Cartography and Remote Sensing. The FISH project according to the National Information Strategy developed a core metadata-base of products and services of FÖMI based on the above mentioned Hungarian Base Map Standard. . The FISH metadata descriptions are very simplified forms of this standard. Meantime the Prime Minister's Office started a national clearinghouse project (METATÉR), which described a new EU compatible metadata standard (HunCore).

The web site contains metadata descriptions on databases of the NMA and institutional data for the institutional network of the state lands and mapping agency of Hungary.

Already at the beginning the project considered to be joined to other projects which are part of the information management. The most important databases which had to take into account were

- METATÉR : the comprising metadata , which were co-ordinated by the Prime Minister's Office and collected metadata of several institutions of geo-sciences (e.g. framework basic data, territorial information system data, geological thematic basic data etc.).
- TAKARNET: Hungarian nation-wide land and mapping information services, an intranet network. TAKARNET provides the Land Offices with Telecommunications and Network Infrastructure. It connects the Land Offices with each other and with other institutions of the Hungarian land administration as well as with external users (banks, public notaries, local governments etc.). It operates through an interface similar to that of the World Wide Web and some WWW based software applications.

## 2.2 The realisation

In the frame of the lands and mapping state sector in Hungary a series of base data on geodetic control networks, topographic maps, cadastral maps and their derived products are offered to the information society. These data are supplied in analogue and/or digital form by the Institute of Geodesy, Cartography and Remote Sensing. As to serve the information society at the level much higher than earlier and to intensify his marketing activity the FÖMI decided to give standardised metadata information on those data and to supply the digital data itself on world-wide computer network. The National Committee of Technological Developments (OMFB) supported financially the execution of the above mentioned purposes.

The web server, web site is hosted and co-ordinated by FÖMI. Its operation is structured, carried out, supervised by the webmaster.

All the basic components (databases) have a data-owner. These persons are responsible for the actuality and consistency of his/her database/information.

The bank-connection for the e-commerce has not realised till now, but there is a possibility for on-line ordering of some products, such as geodetic control points, aerial photographs, map-sheets.

## 2.3 The results

In frame of the project the next data and information services are already available on the web:

- Information about the Hungarian NMA (Department of Lands and Mapping at the Ministry of Agriculture and Rural Development, FÖMI, Land Offices)
- Information service for HUNAGI ( Hungarian partner of EUROGI)
- Metadata descriptions of analogue and digital base data of the NMA,
- Data supply from NMA's databases

### 2.3.1 Information about the Hungarian NMA

The <http://www.fomi.hu> is the address of the FÖMI's home page which was prepared in frame of this project and which contains the most information of the Hungarian NMA. Its main menu is:

- All about FOMI (Mission and tasks of FÖMI, organisational structure, departments, address, telephone, fax numbers, etc.)
- Products and services of FÖMI.
- Surveying and Mapping, the special journal of the Hungarian NMA
- Who is who? (Staff)
- Projects of FÖMI
- Events, calendar.

Information about the Department of Lands and Mapping at the Ministry of Agriculture and Rural Development are available also at FÖMI's home page. It contains the most important information about the Department, such as organisational structure, main tasks, who is who, address, telephone and fax numbers, etc.

Information about land offices is available on TAKARNET. TAKARNET is an intranet-type communication network, which connects the institutions of the Hungarian land administration (DLM/MARD, Land Offices, and FÖMI) and it provides data supply for external users on Internet.

The network has hierarchical contexture. The central access point set up the data service, and the servers of the district land offices contact to it – across more hierarchical level –, as well as the external users can reach the data through this network.

Services of the TAKARNET for the land management sector are as follows:

- Electronic mail
- Supporting of the work in land offices
- Acceleration of the communication

Services of TAKARNET for external users:

- Information about the property sheets (All of the Property Sheets (the Land Register) of the country have been loaded into PC based computer systems = TAKAROS in the Land Offices)
- Copy of maps

Members of the planned external users are as follows:

- Notaries
- Local authorities
- Banks
- Lawyers
- Property agencies

- Public administration

The physical network was set up in 1998, but the latest software was installed in middle of 2002. The network is able to provide data service since 1st June 2002 in test operation with internal users. The service is available in the whole country. External users can use the network after the ministerial degree on data supply and fees entered into force in May 2002.

### 2.3.2 Information service for HUNAGI ( Hungarian partner of EUROGI)

This site contains the description of the Association and its members: their activities, results, up-to-date information about their life, events, conferences.

### 2.3.3 Metadata descriptions of analogue and digital base data of the NMA

The high quality data of the land office network and FÖMI are collected in a geodatabase-inventory by their metadata descriptions. The public land-related base data, other data and mapping services could be widely known and easy to operate. The services help the everyday work of professionals in surveying, mapping and also support land data users, map users. The scope of the users continuously increase with the easy and flexible access to the land registry, surveying, mapping and geographic data, information or services.

The web sites of the NMA give an easy access to the database of geodetic control points, unified real estate registration, analogue and digital topographic maps, aerial photos and satellite images, digital elevation model, administrative boundaries, geographical names, CORINE Land Cover.

Users can get metadata descriptions of the databases as follows:

#### 2.3.3.1 *Horizontal, vertical and GPS control points from the geodetic control networks:*

- The Uniform National Horizontal Network (EOVA) contains the positional and descriptive data of horizontal control sites (1<sup>st</sup>, 3<sup>rd</sup> and 4<sup>th</sup> order) as well as their sketching. It contains the number of the sites, the vertical and horizontal co-ordinates in the EOVA (Uniform National Projection System) and old projection systems, the location of the sites (county, settlement, sheet number), the data of determination and checking actions, sketch of approach.
- The Uniform National Height System (EOMA) contains data of height control sites (1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> order). These data are: number of the sites, vertical co-ordinates, location of the sites (county, settlement, sheet number), date of determination, measurement and control of the sites, textual and scanned description of the surroundings.
- The GPS Database (OGPSH ) was created by FÖMI. The database contains the most important data of GPS control sites. These data are: number of the sites, the EUREF and the EOVA vertical and horizontal co-ordinates as well as the location of the sites (county, settlement, sheet number), textual and scanned sketch approach.

### 2.3.3.2 Administrative Boundary Database of Hungary

The source of the database is the national cadastre, the directly measured co-ordinates of those boundary points, which represent in the same time administrative boundaries too. The output products are databases of different resolution gained by generalisation.

The list of standards products, their characteristics and prices are shown in the following table:

Resolution	Approximate scale	Precision of co-ordinates	Price for the whole country (in HUF without VAT)
1 m	1 : 5 000	1 m	2 109 000
2 m	1 : 10 000	1 m	1 641 000
5 m	1 : 25 000	1 m	938 000
10 m	1 : 50 000	1 m	469 000
20 m	1 : 100 000	10 m	234 000
50 m	1 : 250 000	10 m	117 000
70 m	1 : 350 000	10 m	94 000
100 m	1 : 500 000	10 m	70 000
200 m	1 : 1 000 000	100 m	47 000
500 m	1 : 2 500 000	100 m	23 000

To satisfy users' requirements some attributes, like statistical codes, area of units, elements of hydrography etc. were attached. The pricing is polygon based. The data can be purchased separately for every administrative unit, in case of purchasing more units the buyer can achieve discounts.

### 2.3.3.3 Database of Civil Topographic Analogue Maps

The recent status of the analogue topographic map sheets of the civil Hungarian Lands and Mapping Administration is as follows:

- in scale 1:200 000: 23 EOTR sheets (100%),
- in scale 1:100 000: 84 EOTR sheets (100%),
- in scale 1: 25 000: 267 EOTR sheets (25%) (Terminated production),
- in scale 1: 10 000: 4017 EOTR sheets (98%).

### 2.3.3.4 Database of Civil Topographic Digital Maps

Recently, the following products of the 1:10 000, 1:100 000 and 1:200 000 Digital Topographic Map series of the NMA are available:

#### DTA-10

- raster data of
  - contour lines 4092 sheets (100%),
  - planimetry 4092 sheets (100%),
  - hydrography 4092 sheets (100%),
  - colour prints 4092 sheets (100%),

- vector data of contour lines : 2940 sheets ( 72%)
- preliminary high-resolution digital elevation model :1056 sheets ( 26%) (DEM with 5m grid interval)

#### DTA-100

- raster data of
  - contour lines 84 sheets (100%),
  - planimetry 84 sheets (100%),
  - hydrography 84 sheets (100%),
  - colour prints 84 sheets (100%),
- vector data of
  - contour lines 84 sheets (100%),
  - planimetry 84 sheets (100%),
  - hydrography 84 sheets (100%),
  - digital elevation model for Hungary (DEM with 100m x 100m regular grid interval) 100%

#### DTA-200

raster data of

- colour prints 23 sheets (100%),

#### 2.3.3.5 Gazetteer of Hungary (Database of Geographical Names, FNT)

The gazetteer-database contains 39 types of geographical names including the names of settlements, parts of the settlement, the landscape, large units of the land, woods, nature conservation areas, relief and hydrography, names of remarked points (ruin, look out tower etc.) as well as the names of the most important objects of traffic.

The database has two versions. The first one (FNT1) corresponds in quantity of names approximately to a topographic map in scale 1:40,000. This database was produced by the use of 300 sources (maps, geographical literature, economical, statistical sources), and each municipality had the chance to complete, modify the database reflecting the local use of name. FNT1 covers the whole territory of Hungary, and changes are continuously updated. The second version (FNT2) corresponds in quantity and in the types of names used roughly to the topographic map scale 1:10,000, with a readiness of 35%. It covers the names of the database FNT1 with additions taken from large-scale topographic maps, cadastral maps, and other sources. The two parts of the database comprise 105,000 records.

#### 2.3.3.6 Database of Aerial Photos and Films

Hungary is well covered with aerial photos. The photos are made by aerial topographic cameras, in different heights, different times on panchromatic film, colour film and colour infrared film. The aerial photos are stored in the Department of Data and Maps Archive. Numbers of photos are over more hundred thousands. They are ordered in a territorial and technical catalogue. They can be searched for buy, lending, copying. Derived products (enlargement, geocoding, stereo interpretations) are available, too.



In 2000 a new series of 'aerial photography of Hungary' took place, the scale of photography was 1:30 000. As a result of this project more, than 7000 pieces of colour diapositive aerial photos were taken, all of them were scanned and archived. This enormous amount of data will serve as a "back-bone" of the nation-wide digital orthophoto program at scale of 1:10 000.

#### *2.3.3.7 Database of Satellite Images*

FÖMI distributes all European, American, Indian and Russian satellite images and has contracts with EURIMAGE, SPOTIMAGE, EUROMAP and the Russian Space Agency. The national archive of satellite images is maintained by FÖMI.

#### *2.3.3.8 CORINE Land Cover 1:50.000*

The CORINE Land Cover 1:50.000 project has direct links to the standard European CORINE Land Cover project, however most elements of the methodology were upgraded according to the present level of technology in geo-data processing. The CLC50 nomenclature used has been developed from the standard (level-3) nomenclature and includes nearly 80 level-4 and level-5 classes, which have been adapted for Hungarian conditions.

#### 2.3.4 On-line ordering

Some of the data are available on-line. The background of the on-line map-base application is a map in scale 1:200 000. Users can search, brows, collect and order from the databases as follows:

##### *2.3.4.1 Horizontal, vertical and GPS control points from the geodetic control networks:*

The following control points can be ordered on-line:

- Horizontal Control Points (58 188 points with their sketch)
- Vertical Control Points (23 130 points with their sketch)
- GPS Control Points (1151 points with their sketch)

##### *2.3.4.2 Unified real estate registration*

The unified Land Registration consists of:

- Real estate registration map which is identical to the cadastral map and serves also for land surveying purposes.
- The parcels each have a unique parcel number and certain details are recorded on the 'Property Sheets'. Property sheet consists of three parts: page #1, #2 and #3.
  - Page 1. with the descriptive data (parcel number, address, site area, features of cultivation, soil quality, etc.),
  - Page 2. with the titles i.e. data relating to the ownership (name, birth, address, etc.),
  - Page 3. with all the other titles and deeds (mortgages, restrictions, easements, etc.).
- The land book contains the descriptive data of every real estate inside the community arranged according to parcel number order showing the extent of the total area as well.

Recently the 'Property sheets' are available through Internet (TAKARNET), but the system is under developing for providing the cadastral map sheets to the land registry data.

#### *2.3.4.3 Database of Civil Topographic Maps*

The map-based application provides the ordering of the selected sheets.

#### *2.3.4.4 Database of Aerial Photos and Films*

On-line searching, collecting and ordering of aerial photos from the 2000 photos for the whole territory of the country as well as visualisation of a low resolution (1000 x 1000 pixel) version of them.

#### 2.3.5 Other services

- Map Status Description: The database contains the map inventory for the whole country by settlements according to the 2000 state (include mapscale, projection: old, new, etc.).
- Some zoomable examples from the original Aerial photo database in origin resolution
- Several kinds of zoomable examples from the original Satellite images database in origin resolution
- On-line searching of Spot images for the whole territory of the country, as well as visualisation of images with a very low resolution (1000 x 1000 pixel).
- On-line application for conversion between co-ordinate systems. The program gives co-ordinates of a point given by EOV (Uniform National Co-ordinate System) co-ordinates, or WGS'84 ellipsoidal surface co-ordinates or EUREF'89 spatial rectangular co-ordinates in the other two co-ordinate systems. Maximal error of the co-ordinates of the transformed points is within 0.5 m, or 0.02 angle-second.
- GIS explanatory dictionary, contains about 800 notional word
- Download of several database-examples, presentation applications, regulations etc.
- Forum: questions and answers
- On-line catalogue of the Technical Library.

### **3. FUTURE PLANS**

Intensive efforts to create a common national information environment for the surveying and mapping society through Internet are being undertaken in Hungary. The benefits to be gained from frequently use of this information have been recognised by the leaders of the NMA. These led to the decision to further develop the existing web site. In order to ensure the enlarging demands FÖMI plans to undertaken the next developments:

#### **3.1 To create a common information environment for the surveying and mapping society**

This task means to enlarge the already existing information with information relating to other members of the Hungarian Surveying and Mapping Association, for instance

- Hungarian Society of Surveying and Mapping and Remote Sensing, the only professional-social organisation of the Hungarian land surveyors. The Society supports its members, helps them to solving the tasks, and organises its work for benefit its members. The society has professional sections on land surveying and land consolidation, photogrammetry and remote sensing, land management, land surveying expertise, geodesy, cartography, engineering geodesy, topography and has a senior's club. The information management on the Internet try to help the members to get more and up-to-date information about the life of the society.
- Hungarian National Committee of FIG, ICA, ISPRS, EuroGeographics, IUGG, IAG etc. Hungary has been represented in all commissions of the above mentioned associations, organisations and the delegates have been always playing an active role in their life. To inform the Hungarian surveying and mapping society about this activity is also a further aim of the development.

### 3.2 Development of appearance, design

Good content wish good appearance. The development means the use of modern technologies, effects, to make the side more interactive for the much simpler use.

### 3.3 New environment of browsing

Within the frame of the European Harmonisation Programme of the Ministry of Agriculture and Regional Development in the year 2000 - for the first time of its history - aerial photography was completed for the whole territory of Hungary during a short period of time at scale of 1:30000. As a result of this project more, than 7000 pieces of colour diapositive aerial photos were taken, all of them were scanned and archived. This enormous amount of data will serve as a "back-bone" of the nation-wide digital orthophoto program at scale of 1:10 000.

The browsing of the whole country on a low resolution orthophoto environment is the next step of the developing.

We can conclude that the information management at the Hungarian land administration by using internet as a first step on this territory goes on its way. The requirements are already drawn up. The implementation of this technology is an important and interesting challenge.

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## **BIOGRAPHICAL NOTES**

### **Enikő Kovács**

*Academic experience:* Msc. in Civil Engineering, Msc. In Automatisation of Geodesy  
(Technical University of Budapest, 1970, 1976)

*Present position:* head of department at the Institute of Geodesy, Cartography and Remote  
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*Practical experience:* land surveying, participation in numerous national and international  
R+D projects,

### **Tibor Király**

*Academic experience:* High school on computer programming, Budapest

*Present position:* Webmaster at the Institute of Geodesy, Cartography and Remote Sensing

*Duties and experiences:* Developing and managing web based GIS systems, LAN and in-  
house administration system, developing programs in Java, HTML, C/C++, Avenue, Visual  
Basic, ASP, Pascal, SQL.

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