INSTITUTE OF GEODESY, CARTOGRAPHY AND REMOTE SENSING

The Institute of Geodesy, Cartography and Remote Sensing (FÖMI) was established in 1967.

FÖMI, as a governmental institute, has a national mandate in land management, surveying and mapping, and also plays the role of an authority in these areas. FÖMI belongs to the Ministry of Agriculture and Regional Development (MoARD). It operates under the direct professional supervision of the Department of Lands and Mapping.

The institutional network of the Hungarian Land Management comprises the following institutions**:** Department of Lands and Mapping of MoARD, FÖMI, network of Land Offices (19 County Land Offices, the Budapest Land Office, the Budapest District Land Offices and 115 District Land Offices).

At the beginning, the Institute was responsible for the tasks in organisation, management, supervision, state border survey, R+D activity, and also central data and map archiving of the entire surveying sector in Hungary.

The field of FÖMI activities has gradually been extended to programmes relating to:

- satellite geodesy, from the mid-70s,
- remote sensing for the utilisation of space imagery and aerial photography, from 1981,
- computer based central land registration, from 1988,
- development of geoinformation in the sector of lands and mapping, and also
- central quality management, from 1997.

Further FÖMI competencies are:

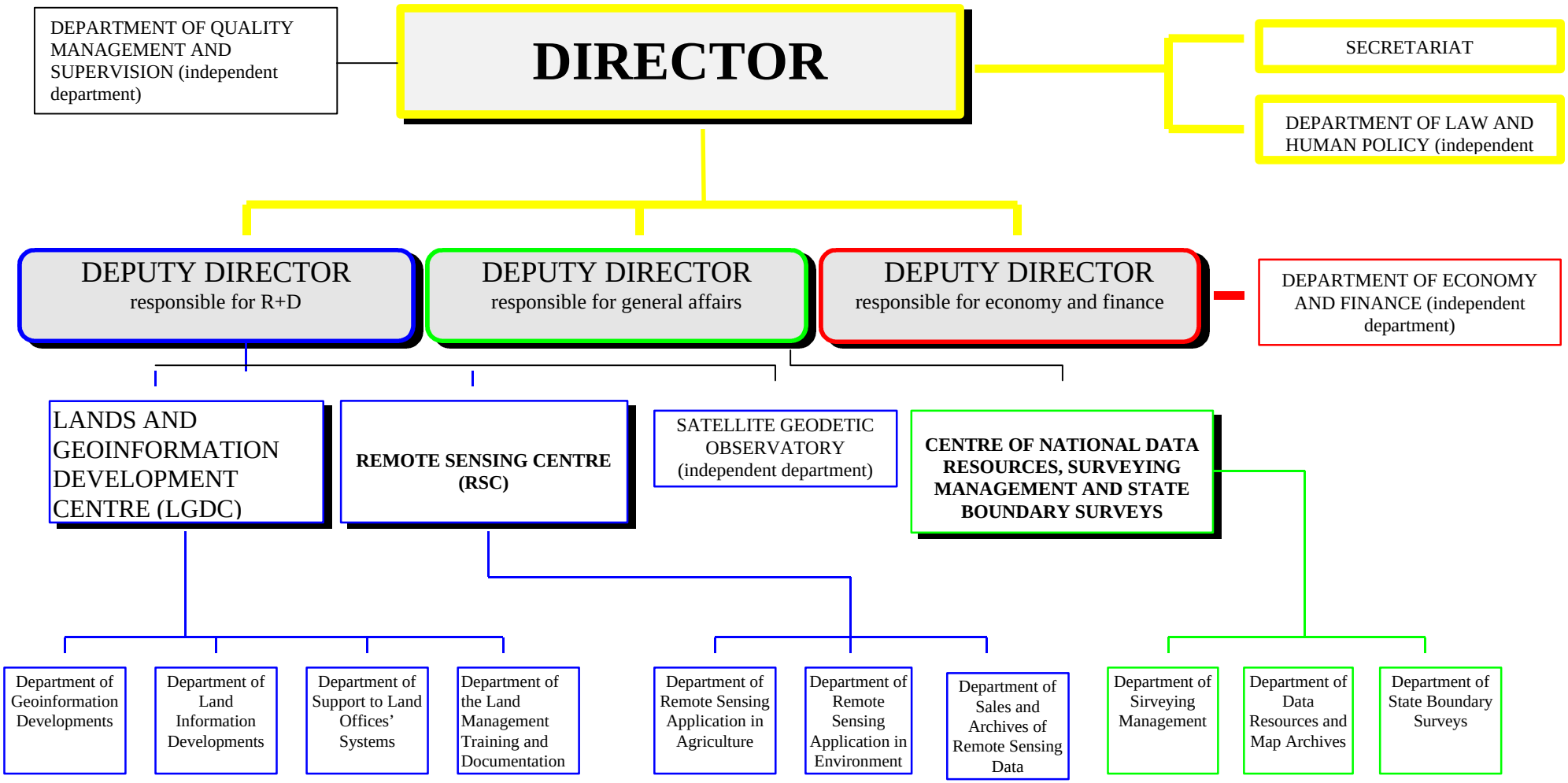
- collection and distribution of documents on surveying and mapping activities,
- running the technical library, editing and publishing scientific journals and proceedings.

Executing its official, operative and R+D activities, FÖMI became a respected participant and organiser of various national and international co-operations. The R+D achievements of FÖMI have been recognised internationally. Also, the Institute plays a significant role in higher professional education - FÖMI hosts a university department and a space geodetic laboratory.

FÖMI’s successful professional activity is honoured by several memberships in scientific commissions, various national and international associations of geodesy, cartography, remote sensing, geoinformatics and space research.

Organisational structure of the Institute

Supreme authority is the Department of Lands and Mapping
within the Ministry of Agriculture and Regional Development



1. LANDS AND GEOINFORMATION DEVELOPMENT CENTRE (LGDC)

The Centre was established in 1997 to serve as an R&D background unit for organizations of the Hungarian land management sector. The Centre has its focal point to make developments, to support utilization of developments needed in changing word of the entire system of land management and mapping. It also co-ordinates the extension training and continuing education for the land offices' staff, and provides technical documentation for the land management sector.

Major tasks of the Centre are:

- to support the land offices in operating and developing the newly introduced information systems,

- to elaborate the system specifications and improvements arising from the continuous development of the TAKAROS system (national computerisation of the map-based cadastral system) and the extension of TAKARNET services (networking of the TAKAROS information systems),

- to elaborate plans for ensuring the countrywide unification of data and services in surveying, mapping, geoinformation, digital land registration, and land management in the frame of the Hungarian Land management and mapping sector, as well as to execute and co-ordinate the relevant R&D tasks,

- to elaborate and maintain standards, instructions and technologies for the professional sector,

- to produce, maintain and supply mapping, cadastral, land information and geoinformation databases as well as value-added products, with special attention to the potential applications provided by the TAKAROS and TAKARNET systems,

- to collect documentation of the systems, products and services produced during development activities, as well as maintain and run the central technical library of the sector,

- to organise the necessary training and continuing education within the framework of the sector's institutional systems,

- to represent Hungary in common activities of the surveying and mapping agencies and bodies of the EU member states as well as in the European standardisation of geoinformation.

The Centre, co-operating with other units of the Institute, takes part in the professional education provided by the College of Surveying and Land Management, at the University of Sopron. The Centre is divided into four departments.

1.1. Department of Geoinformation Developments

Priorities of the department are to develop methods of acquisition, processing and analysing of surveying and mapping data, producing value-added products, supplying digital data.

The Department's field of activity includes developing relationships between land- and geoinformation data systems, and executing related developments.

Major tasks of the department are:
- to elaborate standard and instructions for producing the digital base maps of Hungary, and executing tasks related to their introductions,
- to elaborate standard and instructions of the digital topographic maps of Hungary,
- to develop digital topographic databases,
- to develop Hungarian administrative boundaries database, including the co-ordination and performance of nation wide data collection, database maintenance and data supply in co-operation with the land offices, as well as to derive value added products from it and to harmonize with similar databases in Europe,
- to elaborate and maintain the database of horizontal and vertical geodetic control points and the database gazetteer of Hungary, and also supply data from them,
- to provide high resolution and accurate scanning, film recording and printing services,

- to produce and supply thematic output from the existing digital databases,
- to provide system management, maintenance and development services to the digital mapping modules of the land office information systems (TAKAROS, TAKARNET).

The department is equipped with up-to-date professional hardware and software systems in digital mapping and geoinformatics, and is capable of processing, analysing and supplying data of almost all types of well-known platforms and formats.

1.2. Department of Land Information Developments

Tasks of the department are:
- to maintain the central land registry database,
- to develop land information data products as derived from decentralised TAKAROS system data of land offices and based on TAKARNET network,
- to perform data analysis of the above mentioned data as well as to produce and supply value-added products,
- to make system specifications related to the improvement of the TAKAROS system and to the extension of TAKARNET services,
- countrywide supervision, unification and updating of the code files and auxiliary data files to be used in land registration and digital mapping and cadastre,
- to compile nation wide and selective databases from the land information data produced and maintained at the land offices, to elaborate and develop their data supply system as well as to supply them as value- added products in co-operation with the land offices.

1.3. Department of Support to Land Offices' Systems

Tasks of the department are:
- to test the application of land registry modules of the TAKAROS system,
- to organise the installation of the TAKAROS system and training for the staff,
- to provide continuous support in operating and running the installed system,
- to collect and specify the needs for modification and further development of the TAKAROS and TAKARNET systems,
- to take part in loading the data files from the decentralised systems into the TAKAROS system,
- to keep the land registration auxiliary data files up-to-date countrywide, in co-ordination with the ongoing tasks of the Department of Land Information Developments,
- to supervise and support the decentralised, computer-based land registration system developed earlier for the land offices, and upgrade the system in line with the changes of the relevant legal regulations.

1.4. Department of the Land Management Training and Documentation

Tasks of the section can be categorised into six major groups:
- to map the human resources of the land management sector to register the qualification of the staff, explore the needs for training, and organise extension courses,
- to manage, co-ordinate and perform the tasks arising from international obligations,
- to collect, classify and register data products, software, hardware and their documentation available at the Lands and Geoinformation Development Centre,
- to edit metadata on the existing data products, to present and disseminate data products and software at conferences, expositions and on the INTERNET,
- to run the technical library of the Institute, which is the largest one in Hungary in the field of geodesy, cartography and remote sensing - more than 30,000 books, periodicals, reports, and conference proceedings and other documents are available here for researchers and other users,
- to edit the well-known Hungarian professional monthly journal "Geodézia és Kartográfia".

2. REMOTE SENSING CENTRE (RSC)

The Remote Sensing Centre has the following major tasks:
- as national centre, it is responsible for acquiring, archiving, pre-processing and distributing satellite data, imagery, and aerial photographs, and it supports the users through training, consultancy and distribution of information leaflets and brochures,
- it implements application oriented R+D projects, as well as develops technologies, both at national and international level, mainly for use in agriculture, environmental protection management, water management and cartography,
- the RSC is active in the work of national and international scientific bodies,
- as a basic unite of the institutional network of the Hungarian Space Office, the RSC is active in running national and international research programmes.

The Remote Sensing Centre is the national distributor of Landsat, SPOT, ERS, IRS-1C and Cosmos satellite data.

The Remote Sensing Centre maintains the satellite data archives, which contains several hundred satellite images, as well as the computer system and colour photo laboratory to process satellite data and aerial photographs.

The RSC, in co-operation with other units of the Institute, takes part in the higher education activities of the College of Surveying and Land Management, at the University of Sopron.

The Remote Sensing Centre has three departments to perform the above listed tasks.

2.1. Department of Remote Sensing Applications in Agriculture

Since 1980, the priority task of the Department has been to develop remote sensing methods and technologies for crop monitoring, both at national and county levels.

Crop monitoring includes accurate mapping and area estimation, numerical characterisation, monitoring the plant development as well as accurate and reliable yield prediction and production forecasting.

Further areas where satellite images can provide useful information, even at parcel level, include the delineation of drought affected areas or areas damaged by water, and the assessment of such damages. The Department’s job is to develop new remote sensing methods and technologies upon user request.

The Department also develops application-oriented EU-harmonic methods and technologies, independently in national and international projects, or as the national focal point and co-ordinator of various international projects.

The Department provides support for the introduction of countrywide services based on the applications of new technologies.

2.2. Department of Remote Sensing Applications in Environment

This Department was created as a response to the demand for remote sensing in solving problems of environmental protection and management. Primary customers are the Ministry of Agriculture and Regional Development, and the Ministry of Environmental Protection. They have already begun to use environment modelling to define the principles of environmental policy and regional planning. These techniques are expected to play a growing role during the period of Hungary’s associated membership to the EU.

Major tasks of the Department are:
- applied research, methodological and technological development for environmental applications of remote sensing,
- creation of the CORINE Land Cover Database for Hungary, in compliance with EU standards, and keeping it updated,
- participation in the national and international R+D programmes of the sector,

- consultancy in the field of environmental applications of remote sensing and participation in educational activities,
- co-operation with the national and international organisations of this area.

High-resolution satellite images, aerial photographs and ground survey data as well as modern image processing and geoinformation facilities are used to implement these tasks.

2.3. Department of Sales and Archives of Remote Sensing Data

The activity of the Department includes acquisition and archiving remotely sensed data (satellite images, aerial photographs), production of value-added products, informing national and international users, supplying data as well as developing methods used in data supply and in transmission of the requested information.

Major tasks are:

- the technical and commercial management of purchasing satellite images, archiving the acquired satellite data and continuous development, maintenance and running of the National Archives of Satellite Images,
- to conclude international commercial agreements with satellite data distribution centres,
- to provide Hungarian users with information, publish periodical newsletters,
- to organise meetings for users and provide consultancy,
- to operate the colour and black&white photo laboratory and the computer unit equipped with modern hardware, to meet the user demands at a higher level,
- to produce value-added products upon customer request, process aerial photographs and satellite images and accomplishing thematic data analysis,
- to organise exhibitions.

3. SATELLITE GEODETIC OBSERVATORY (SGO)

Major tasks of the Observatory are to learn the international results of space technology applications developed for use in geodesy and perform the related R+D works in Hungary. The Observatory introduces the results obtained into practice, continuously maintains and develops the national higher order geodetic network. The Observatory, as a basic unite of institutional network of the Hungarian Space Office, implements national and international research programmes. As an external department of the Eötvös Loránd University (ELTE), it operates a space geodetic laboratory

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Major tasks and themes of research and development are:

- development and maintenance of the national GPS (Global Positioning System) network,
- co-ordination of operations in the Hungarian higher order (horizontal and vertical) geodetic and GPS networks and performing tasks coming from international obligations,
- determination of the geoid surface for Hungary,
- running a permanent GPS station information service,
- geodynamic investigations in international, regional and local relations using GPS techniques,
- space-VLBI research and software system development,
- providing highly accurate time service.

4. CENTRE OF NATIONAL DATA RESOURCES, SURVEYING MANAGEMENT AND STATE BOUNDARY SURVEYS

In line with Act LXXVI of 1996 on surveying and mapping activities and its enacting clause, the Centre is responsible for the production of the unified horizontal and vertical control point network covering the whole area of Hungary and that of the national base maps to be prepared in the framework of EOTR (Unified National Map System).

In addition to the organisation and management of the surveying and mapping tasks, the activities of the Centre include the maintenance of the existing products as well as the registration and widespread supply of data.

In close co-operation with the competent partner authorities, an independent organisational unit of the Centre is responsible for surveying, mapping, maintaining and recording the state boundary.The Centre fulfils the tasks through three organisational units:

4.1. Department of Surveying Management

The Department's main duties are organisation, management and control of surveying and mapping, and in certain cases, also official acceptance of the result of these activities. The Department is responsible for the proper use of the budget allocations through tendering and contracting, under the supervision of the Department of Lands and Mapping of the Ministry of Agriculture and Regional Development.

They make contracts for and supervise the following major activities:
- establishing and maintaining horizontal and vertical control networks as well as replacing the destroyed or damaged control points,
- producing new base maps, updating, revision and digitisation of the existing ones,
- updating, revision and printing of topographic maps at scale 1:10 000 and also developing digital database from them,
- preparation of surveying studies for the production of large scale base maps within the framework of the National Cadastre Programme.

In order to perform the above mentioned tasks, the Department:

- checks the specifications and breakdown of prices for the various jobs,
- controls the stage of implementation of the given jobs,
- follows up the schedule and deadlines of the implementation,
- examines the completed jobs and effects the official acceptance,
- keeps contact with the non-profit Co. for the National Cadastre Programme, and the locally competent land offices,
- keeps continuous records of the jobs completed and the use of the financial allocations, transfers the contracted amounts and reports these facts to the supervisory authority Department of Lands and Mapping, MoARD,
- provides consultancy concerning the surveying problems
- performs the tasks related to the operation of the Committee of Licensed Surveyors for Land Management.

4.2. Department of Data Resources and Map Archives

The Department runs the Central Archives of Surveying Data and Maps.

The scope of its duties include:
- countrywide storage and supply of numerical and graphical data of the horizontal and vertical control networks,
- conversion of horizontal control point co-ordinates determined in various projection systems,
- management of tasks connected to local inspection, maintenance and replacement of control points,
- storage and supply of cadastral and topographic base maps and derived maps as well as aerial photographs,
- maintenance and distribution of information on map coverage countrywide, in both analogue and digital

form.

The Department is the distributor of the national geodetic base maps at a scale of 1:1 000 for urban areas, 1:2 000 for villages, and 1:4 000 for rural areas as well as for the topographic maps at a scale of 1:10 000 made in EOTR (Unified National Map System).

The Department also distributes derived topographic maps at the scales of 1:25 000, 1:100 000 and 1:200000 made before 1997 by civil mapping institutions. Agrotopographic maps at the scale 1:100 000 are also sold in the FÖMI Archives. It is worth mentioning that old maps are also available.

4.3. Department of State Boundary Surveys

The Department performs:
- tasks of surveying, updating and maintaining the state borders co-ordinated by the Ministry of the Interior,
- production of detailed technical summaries in boundary documents for jobs accomplished with the experts of the neighbouring countries and approved by competent authorities,
- tasks concerning the obligations of the owners of the border markers.

The total length of Hungary’s boundary lines with seven neighbouring countries is over 2200 km. On these lines more than 50 000 corner points can be found, which are recorded in different co-ordinate and map systems (4 types) that were valid at the time of the peace treaties.

The accurate technical border documentation edited by the Department, verified by international agreements and kept at FÖMI, contains the co-ordinates of the corner points and their descriptions. Thus, these serve as a technical (surveying) basis of any international contract related to the state boundaries. Besides the daily routine tasks, the Department is responsible for a unified co-ordinate and map system covering the whole Hungarian state border and for regulations which will meet both the current demands and be compatible with future surveying jobs in Hungary.

5. DEPARTMENT OF QUALITY MANAGEMENT AND SUPERVISION (independent department)

This Department performs central duties concerning the quality management of public basic data.

Major tasks of the Department are:

- to make sure that the standards of quality concerning the sectoral activities are applied and observed at the national level,
- to perform tasks related to the central quality management of producing national base maps,
- to execute on-site controls in offices or in the field, on notification or randomly, in any phases of the national basic surveying jobs - from the preparation of the surveying study up to the qualification ending with the official acceptance of the job completed - of the contractors, subcontractors and the concerned land offices,
- to perform any task concerning the professional supervision on land surveying and mapping assigned to its competence by the leading authority,
- to summarise and analyse the annual reports prepared by the land offices on professional supervision,
- to perform first order professional supervision and control on the invitation of the Department of Lands and Mapping, MoARD.

The Department provides for the development of the FÖMI's own quality control and management system, covering all its activities as well as is preparing the Institute to obtain the relevant standard quality management certificates. The Department is monitoring all activities concerning quality management at FÖMI level.