1. Short overview of land affairs in Hungary

Hungary has an area of 93,029 km² and 10.2 million inhabitants. In the middle of the 90’s there were over 7 million property records and 60,000 cadastral maps. During the political and economical changes in the 90’s, a land compensation programme has been enacted whereby land areas are redistributed to former owners or other compensation claimants. So, and effective 2.1 million new land parcels has been created on more than five million hectares. All these have been managed, auctioned, divided, set out, and the results assimilated into the Cadastre System. This situation required prompt activities, modernisation and computerisation of Land Offices network in the last decade. Now new land tenure trends and voluntary land consolidation procedure started – the legislative introduction of theirs are expected.

2. Real Estate Registration and Cadastral Maps as the Cadastre System in Hungary

There have been land book, land registration and cadastral maps operating in Hungary for over 150 years. This system was totally based on paper records consisting of cadastral maps (boundary information) and property sheet records, which record the property description, ownership information, and any financial or other burdens on the property (i.e. the legal and administrative records). These records have continuously been maintained and were unified in 1972 by the Act on Real Estate Registration. Later on modernised legislation became in force by the Act LXXVI (1996) on Surveying and Mapping and the Act CXLI (1997) on Real Estate Registration.

The modernised, already complex cadastre system (often called unified real estate registration) consists of:

- Real estate registration sheets. The parcels each having a unique parcel number in a given settlement and certain details are recorded on the „Property Sheets“. Property sheet consists of three parts: Page #1, #2 and #3
  - Page 1. Descriptive data (parcel number, address, area, cultivation, soil quality, etc.)
  - Page 2. Titles i.e. data relating to the ownership (name, birth, address, etc.)
  - Page 3. All the other titles and deeds (mortgages, restrictions, easements, etc.)
- Real estate registration map, which is identical to the cadastral map and serves also for land surveying purposes.

3. Lands and Mapping Sector in Hungary

Recently, for registration of land parcels and other real estates (e.g. buildings), a full cadastre system (unified land registry) is in force in Hungary, identical with the concept introduced by FIG. It is a unified, multipurpose legal system, integration of the cadastral maps and the registration records including the traditional Land Records. The Hungarian Cadastre System is operated by the District Land Offices of the counties and the Capital Districts Land Office of Lands and Mapping Administration (See Fig.1.)
4. National Cadastre Programme

Approximately 60,000 cadastral map sheets cover the area of Hungary at scales from 1:1,000 to 1:4,000. A large part of the sheets are in different projections, mapping systems and datums (steriographic, cylindrical etc.).

After the political and economic changes the land privatisation affected more than half part of the country (5.6 out of 9.3 million hectares). All efforts have been made to keep the old cadastral maps up-to-date during the land privatisation process. From the other side, a nation-wide map renewal (data capture) programme was worked out to realise the unification and updating the existing systems within framework of the National Cadastral Programme (NCP). New, EU-realise the unification and updating the existing systems within framework of the National Cadastral Programme (NCP). New, EU-

5. The Modernised Lands and Mapping Administration

Over the past decade, the DLM with the aid of EU PHARE Programme and, to a lesser extent, of the Swiss Government, as well as based on Hungarian government budget considerable investments has been made the modernisation of the infrastructure for Lands and Mapping Administration.
11. STANDARD ON DIGITAL BASE MAP

MSZ 7772-1:1997 Digital Maps: Part one: Digital Base Map Conceptual Model

This standard is referred to in Hungarian as “DAT-Standard” by its nickname.

The DAT Standard gives prescription of the following main groups of information:
- Cadastral and Real estate data
- Natural and Man-made features

Prescriptions are formulated as adequate to resolution available in scale band 1:1000–1:4000. The data handling unit is the settlement.

11.1. DESCRIPTION OF THE CONCEPTUAL MODEL OF THE DAT STANDARD

The following chapters of the DAT Standard are describing the conceptual model:
- Terminology,
- Data model of the digital base map,
- Position (spatial referencing): Map projection system (Hungarian EOV), Reference system (Hungarian Datum, HD-72), Height system (Baltic sea level, ortometric),
- Classification of objects and thematical structure,
- Spatial schema: Geometrical primitives, Topological primitives, Spatial view, Explanatory texts,
- Attributes,
- Relations: between nodes, between edges, faces and rings,
- Data quality: Source, Extent of application of data, Quality of geometric data, Quality of attribute data, Accuracy, Completeness, Consistency of data, Technology for data collection, Data protection, Verification.

11.2. STRUCTURE AND OBJECT CLASSIFICATION OF DIGITAL BASE MAP STANDARD

The digital maps are represented in object-oriented relational database. The specific objects are described by their attributes, relations and data quality parameters.

At conceptual model level the specific objects are represented by their generic objects. Those objects for which the attributes are common are grouped into one object group. The object groups having common attributes at higher level are grouped into one object classes.

Three object types are distinguished by its geometry: point, line, surface objects. The objects are managed by their topology such that fulfilling the full-topology requirement. The topology elements distinguished are: node, edge and face. The nodes are divided into more specific types.

By geometry, the digital base map databases are 2-dimensional with planimetric coordinates. The heights are or can be given as attributes. The attributes, relations and quality parameters are defined in the standard as generic. Their values are given in supplementary tables.

11.3. PHYSICAL MODEL OF THE DIGITAL BASE MAP – TECHNICAL REGULATION


DAT2-M1. Supplement Instruction on “Transformation between different projection systems used in Hungary, with special emphasis on transformation to the regular projection system EOV”. Budapest, 1996.
OBJECT CLASSIFICATION
DIGITAL BASE MAP STANDARD (MSZ 7772-1:1997)

A GEODETIC CONTROL POINTS
AA Horizontal and 3D geodetic control points
AB Vertical geodetic control points
AC Survey points

B DEMARCATION
BA Administrative unit boundaries
BB Administrative sub-unit limits
BC Parcel I. (public domain)
BD Parcel II. (non-public domain)
BE Subparcels and branches of cultivation
BF Quality classes of arable land

C BUILDINGS
CA Buildings
CB Accession of buildings
CC Fences, sustaining walls
CD Special objects, special buildings
CE Structures, monuments, memorial places

D TRANSPORTATION AND FACILITIES
DA Identification points of transportation facilities
DB Roads and facilities of built-in areas
DC Roads and facilities of rural areas
DD Railways and fixed track ways
DE Facilities of air traffic
DF Construction works (I.)
DG Construction works (II.)

E TRANSMISSION LINES, CABLEWAYS
EA Axis of conduits, cableways
EB Construction works of conduits, cableways

F HYDROGRAPHY AND HYDROLOGICAL FACILITIES
FA Flowing and still waters
FB Water public utilities
FC Hydrological engineering structures

G HYPOGRAPHY
GA Contour lines
GB Relief configurations
GC Digital terrain model

H AREA CATEGORIES
HA Areas of data capture actions
HB Base map handling units
HC Special areas

EXAMPLE ATTRIBUTE TABLE
DIGITAL BASE MAP STANDARD MSZ 7772-1:1997

<table>
<thead>
<tr>
<th>Identifier</th>
<th>Name of the attribute type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Object identifier number</td>
</tr>
<tr>
<td>2.</td>
<td>Code of object type</td>
</tr>
<tr>
<td>3.</td>
<td>Geometry description number</td>
</tr>
<tr>
<td>4.</td>
<td>Parcel number</td>
</tr>
<tr>
<td>5.</td>
<td>Postal address</td>
</tr>
<tr>
<td>6.</td>
<td>Name of enframing settlement</td>
</tr>
<tr>
<td>7.</td>
<td>Code of enframing administrative subunits</td>
</tr>
<tr>
<td>8.</td>
<td>Code of area type</td>
</tr>
<tr>
<td>9.</td>
<td>Volume of registered land (m²)</td>
</tr>
<tr>
<td>10.</td>
<td>Land valuation value</td>
</tr>
<tr>
<td>11.</td>
<td>Market value of the parcel when acquiring</td>
</tr>
<tr>
<td>12.</td>
<td>Economic-sector code</td>
</tr>
<tr>
<td>13.</td>
<td>Legal type code</td>
</tr>
<tr>
<td>14.</td>
<td>Easement descriptor</td>
</tr>
<tr>
<td>15.</td>
<td>Legal status descriptor</td>
</tr>
<tr>
<td>16.</td>
<td>Data relating to the legal title of acquiring</td>
</tr>
<tr>
<td>17.</td>
<td>Data relating to charges, mortgage</td>
</tr>
<tr>
<td>18.</td>
<td>Line of cultivation (also area out of cultivation)</td>
</tr>
<tr>
<td>19.</td>
<td>Name and address of the owner organization</td>
</tr>
<tr>
<td>20.</td>
<td>Property share of the owner organization</td>
</tr>
<tr>
<td>21.</td>
<td>Name and address of trustee or land user</td>
</tr>
<tr>
<td>22.</td>
<td>Legal status of demarcation procedure (preliminary, final)</td>
</tr>
</tbody>
</table>

Data relating to changes producing the parcel:

<table>
<thead>
<tr>
<th>Identifier</th>
<th>Name of the attribute type</th>
</tr>
</thead>
<tbody>
<tr>
<td>23.</td>
<td>Date</td>
</tr>
<tr>
<td>24.</td>
<td>Registry number of the decision</td>
</tr>
<tr>
<td>25.</td>
<td>Form of change (e.g. union, sharing, easement)</td>
</tr>
<tr>
<td>26.</td>
<td>Storage address of sketch of updating</td>
</tr>
<tr>
<td>27.</td>
<td>Date of abolition</td>
</tr>
<tr>
<td>28.</td>
<td>Code of visualization legend</td>
</tr>
<tr>
<td>29.</td>
<td>Identifier of the related unit of data capture action</td>
</tr>
<tr>
<td>30.</td>
<td>Centroid of the parcel (x, y[H])</td>
</tr>
</tbody>
</table>

Description of object in DAT