

Hungarian Base Map Data Standard, Technical Rules and Regulations

Szabolcs Mihály

Institute of Geodesy, Cartography and Remote Sensing, Hungary
H-1149 Budapest, Bosnyák tér 5.
judit.szabo@fomigate.fomi.hu

Abstract. Based on structural standardization results of CEN TC-287 and on the Hungarian cadastral map presedents and recent needs, of contant the Institute of Geodesy, Cartography and Remote Sensing with leadership of the author developed Conceptual Model of Digital Base Map standard (MSZ 7772-1:1997, DAT-standard) and the respective physical model standard and the physical model formulated in 6 so called DAT-Instructions (DAT1., DAT1-M1., DAT1-M2., DAT1-M3., DAT2. and DAT2-M1.). The conceptual model instructions have been introduced into the practice of National Cadastre Program during the Hungary, with successes.

The paper describes the legal environment, structure, content and experiences of the DAT-standard.

1. History

- Cadastral map (from middle of XIX's)
- Surveying (Multipurpose cadastral) map (from 1970's) /cadastre + technical features)
- Practice late of 1980's:
 - Digital data capture with different analog approaches
 - Non-unique concept for database content and format, and software
 - "Layer" approach of wide-spread Hungarian ITR data capture software
- Digital Base Map (from 1997)
 - Unique approach
 - Harmonized with CEN
 - Conceptual model
 - + physical model
 - + physically existing databases
 - Object-oriented and relational data base
 - Full-topology

2. Legal environment of digital base map

- 1996: Law on Surveying and Mapping (LSM) – firstly in surveying history of Hungary
- 1997: Executive Orders on LSM
- 1997: Issue of MSZ 7772-1:1997 Standard on Digital Base Map
- 1997: Issue of Series of Digital Base Map Instructions

3. Structure of Digital Base Map standard

Harmonization of digital base map standard with GI standards of CEN.

Earlier versions of CEN TC-287 GI Standards have been used, as it follows below:

- ENV 12009:1997 – Geographical Information, reference model
- ENV 12160:1997 – Geographical Information, spatial schema
- ENV 12656:1998 – Geographical Information, quality
- ENV 12657:1998 – Geographical Information, metadata
- ENV 12661:1998 – Geographical Information, geographic identifiers
- ENV 12762:1998 – Geographical Information, position

4. Content of the digital base map standard

The MSZ 7772-1:1997 Standard on Digital Base Map 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.

5. Elements of the Digital Base Map standardization

In process of standardization from 1995-96 the Institute of Geodesy, Cartography and Remote Sensing (FÖMI) developed the DAT-standard and a series of DAT-Instructions, with the last on background of the standard.

5.1. DAT-Standard

By its content it is built such that providing a well-harmonized continuity with respect to the earlier large scale map prescription. During development of the DAT-standard all the user-types, data capture organizations and the institutions of data owner Land and Mapping Agency organization network represented themselves in 10 nation-wide meetings, altogether 450 persons. These meetings have been managed by FÖMI with help of the National Committee on Technological Developments (OMFB) and the GI-standardization committee TC-818 of the Hungarian Standard Organization (MSzT) as well as supported by Lands and Mapping Department (LMD) of the Ministry of Agriculture (MoA). The MoA/LMD (as headquarters for Hungarian Lands and Mapping activity) accepted the standard preparation results and the Hungarian Standard Organization beginning of 1997 issued the first CEN-based structure standard, as first volume of such series:

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

This standard is referred to as "DAT-Standard" by its Nick-name.

5.2. DAT-Instructions – Physical Model

Based on the DAT-Standard a series of instructions have been elaborated for physical model of Digital Base Map which are detailed prescription of how to develop the map itself. During the elaboration by FÖMI, the instructions have been critically discussed by representatives of land offices, MoA/LMD and data capture organizations.

Finally, end of 1996 the following DAT-Instructions have been issued by MoA/LMD:

DAT1. Instruction on "Planning, producing, renewing, documenting, checking, quality-checking, certifying and state acceptance of Digital Base Maps". Budapest, 1996.

DAT1-M2. Supplement Instruction on "Structure, datatables, exchange format and handling rules of Digital Base Maps". Budapest, 1996.

DAT1-M2. Supplement Instruction on "Legends for printing the Digital Base Maps". Budapest, 1996.

DAT1-M3. Supplement Instruction on "Checking and certifying the inner consistency of data of Digital Base Maps". Budapest, 1996.

DAT2. Instruction on "Digitizing the multipurpose analog cadastral maps and its quality checking." Budapest, 1996.

DAT2-M1. Supplement Instruction on "Transformation between different projection systems used in Hungary, with special emphasis on transformation to the regular projection system EO.V." Budapest, 1996.

In this paper no further discussion will be given to the DAT-Instructions.

6. Structure and object classification of Digital Base Map

The Digital Base Map is 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**. The digital base map database consists of 8 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 in agreement with CEN standard.

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 the DAT-M1. Supplement Instruction.

The "Digital Base Map Thematic Structure", the "Digital Base Map Object Classification" and an "Example Attribute Table" are annexed.

7. Content of the Digital Base Map Standard

Terminology

Data model of the digital base map

Position (spatial referencing)

Map projection system

Reference system

Height system

Classification of objects and thematical structure

Spatial schema

Geometrical primitives

Topological primitives
Spatial view
Explanatory texts

Attributes

Relations

Relations between nodes
Relations between edges
Relations of face and ring

Data quality

Source
Extent of application of data
Quality of geometric data
Quality of attribute data
Actuality
Completeness
Consistency of data
Technology for data collection
Data protection
Verification

Tables of objects of the digital base map
Tables of attributes of the digital base map
Metadata describing the digital base map

8. Digital Base Map experiences

During 1997-1999 the standard and instructions have been experienced in the National Cadastre Program of Hungary.

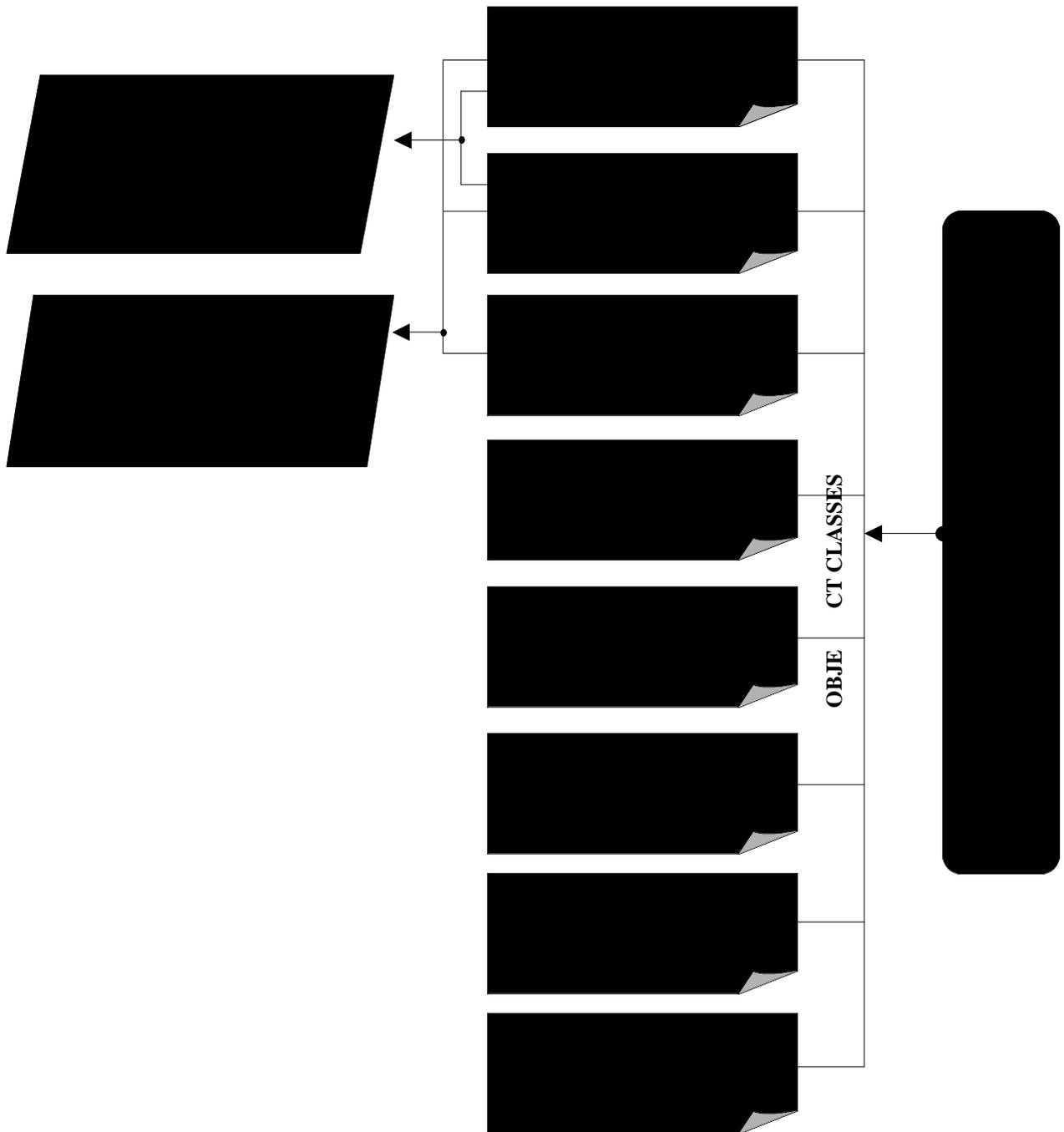
- DAT-based data collection software used
 - Microstation-based (TAKAROS system of land Offices)
 - Autocad-based and others
 - Stand-alone?
- DAT-harmonised land office data handling software (nationWide unique TAKAROS)
- Survey of 27 settlements in the frame of National Cadastre Program
 - basicly cadastral data
 - new survey and digital conversion
 - included are villages, towns, cities
- Excellent performance, with some modifications
- No needs to modify the MSZ 7772-1:1997 standard
- The DAT-Instructions however are under modification at some detailed level (no general and structural changes are needed).

9. Digital Base Map future

Extensions are expected to

- Digital Topographic Data Base
 - surveying model (ongoing program)
 - cartographic model
- ABDS for the CEED (administrative boundaries, distributed data base).

DIGITAL BASE MAP THEMATIC STRUCTURE (MSZ 7772-1:1997)



DIGITAL BASE MAP OBJECT CLASSIFICATION (MSZ 7772-1:1997)

- A GEODETIC POINTS
 - AA HORIZONTAL AND 3D GEODETIC CONTROL SITES
 - AB VERTICAL GEODETIC CONTROL SITES
 - AC SURVEY POINTS

- B BOUNDARIES
 - BA ADMINISTRATIVE UNITS
 - BB ADMINISTRATIVE SUB-UNITS
 - BC PARCELS I. (PUBLIC DOMAIN)
 - BD PARCELS II. (NON-PUBLIC DOMAIN)
 - BE SUBPARCELS AND BRANCHES OF CULTIVATION
 - BF QUALITY CLASSES OF ARABLE LAND

- C BUILDINGS, FENCES AND GROUND OBJECTS
 - CA BUILDINGS
 - CB ACCESSORIES OF BUILDINGS
 - CC FENCES, SUSTAINING WALLS
 - CD GROUND OBJECTS, SPECIAL BUILDINGS
 - CE STATUES, MONUMENTS, MEMORIAL PLACES

- D TRANSPORTATION FACILITIES
 - DA IDENTIFICATION POINTS OF TRANSPORTATION FACILITIES
 - DB TRANSPORTATION FACILITIES OF INHABITED AREAS
 - DC TRANSPORTATION FACILITIES OF PERIPHERAL AREAS
 - DD RAILWAYS AND FIXED TRACK WAYS
 - DE FACILITIES OF AIR TRAFFIC
 - DF CONSTRUCTION WORKS (I.)
 - DG CONSTRUCTION WORKS (II.)

- E CONDUITS, CABLEWAYS
 - EA AXIS OF CONDUITS, CABLEWAYS
 - EB CONSTRUCTION WORKS OF CONDUITS, CABLEWAYS

- F WATERS AND HYDROLOGICAL FACILITIES
 - FA FLOWING AND STILL WATERS
 - FB WATER PUBLIC UTILITIES
 - FC HYDROLOGICAL ENGINEERING STRUCTURES

- G TERRAIN
 - GA CONTOUR LINES
 - GB RELIEF CONFIGURATIONS
 - GC DIGITAL TERRAIN MODEL

- H AREAL CATEGORIES
 - HA LAND OFFICE RAYONS
 - HB REGISTER AREAS
 - HC SPACE-LIKE AREAS

EXAMPLE ATTRIBUTE TABLE, DIGITAL BASE MAP (MSZ 7772-1:1997)

**Code of attribute table: ATTRBC
ATTRIBUTES TYPES OF PARCELS (PUBLIC AREAS)**

Identifier	Name of the attribute type
1	Feature identifier number
2	Code of object type
3	Geometry description identifier
4	Parcel number
5	Postal address
6	Feature code of public area code of enframing settlement
7	Code of public area type
8	Land value
9	Market value of the parcel when acquiring
10	Economical sector code
11	Legal type code
12	Easement descriptor
13	Legal status descriptor
14	Data relating to the legal title of acquiring
15	Data relating to charges, mortgage
16	Line of cultivation (also area out of cultivation)
17	National registry identifier of the owner organization
18	Name and address of the owner organization
19	Property share of the address organization
20	Name and address of trustee
21	Demarkation status (preliminary, final) Data relating to changes producing the parcel:
22	Date
23	Registry number of the decision
24	Form of change (e.g. union, sharing, easement)
25	Storage address of sketch of updating
26	Date of abolition
27	For visualization: code of legend
28	Identifier of the related land office rayon
29	Centroid of parcel (x, y [H])