Overview of Estonian National Topographic Database

Tallinn 2006

Objectives

The Estonian National Topographic Database (ENTD) was established to achieve the following objectives:

1) to manage and organise the production of topographic spatial data and topographic products and maps (hereinafter products and maps) covering the whole territory of Estonia
2) to provide the society with up-to-date and high-quality data, data services and maps produced on the basis of these data
3) to provide state and local government databases with topographic spatial data for objects managed in respective databases
4) to implement the directives of the European Parliament and of the Council establishing an infrastructure for spatial information in the Community.

What is ENTD?

According to the Regulation on Establishment and Maintenance of Estonian National Topographic Database, ENTD is a database maintained by the state agency Estonian Land Board, which serves as:

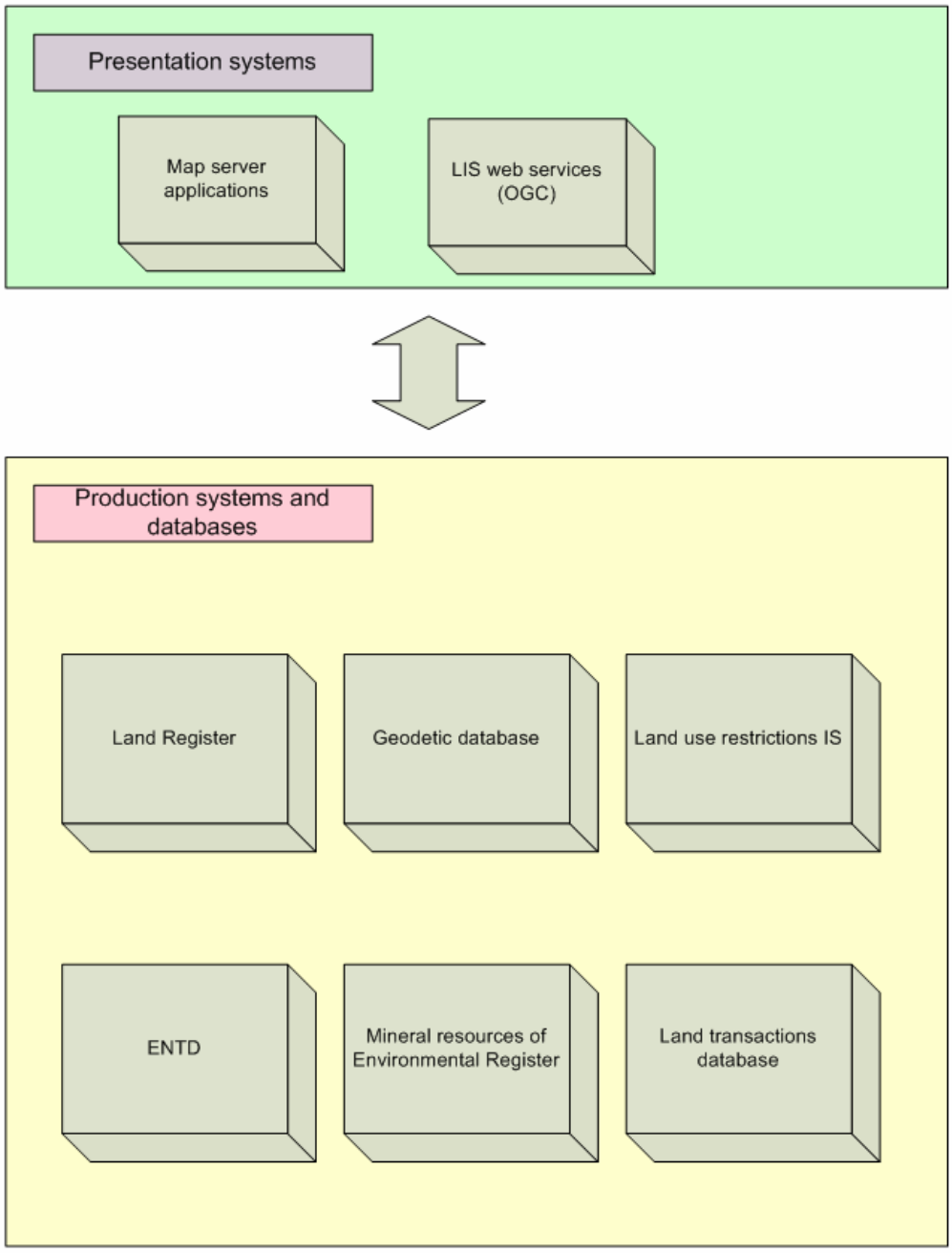
1. a source for updating and producing of backdrop maps for the cadastre
2. a source of topographic data for cadastral maps.

ENTD is a geographic information system. A geographic information system is a set of hardware, software and data, which enables to collect, manage, analyse and display spatial information.

ENTD and Land Information System

ENTD is a part of the Land Information System being one of the Land Information System's production systems.

Land Information System (LIS)



Content and Structure of ENTD

ENTD consists of the core database, product-oriented databases and the data maintained in them.

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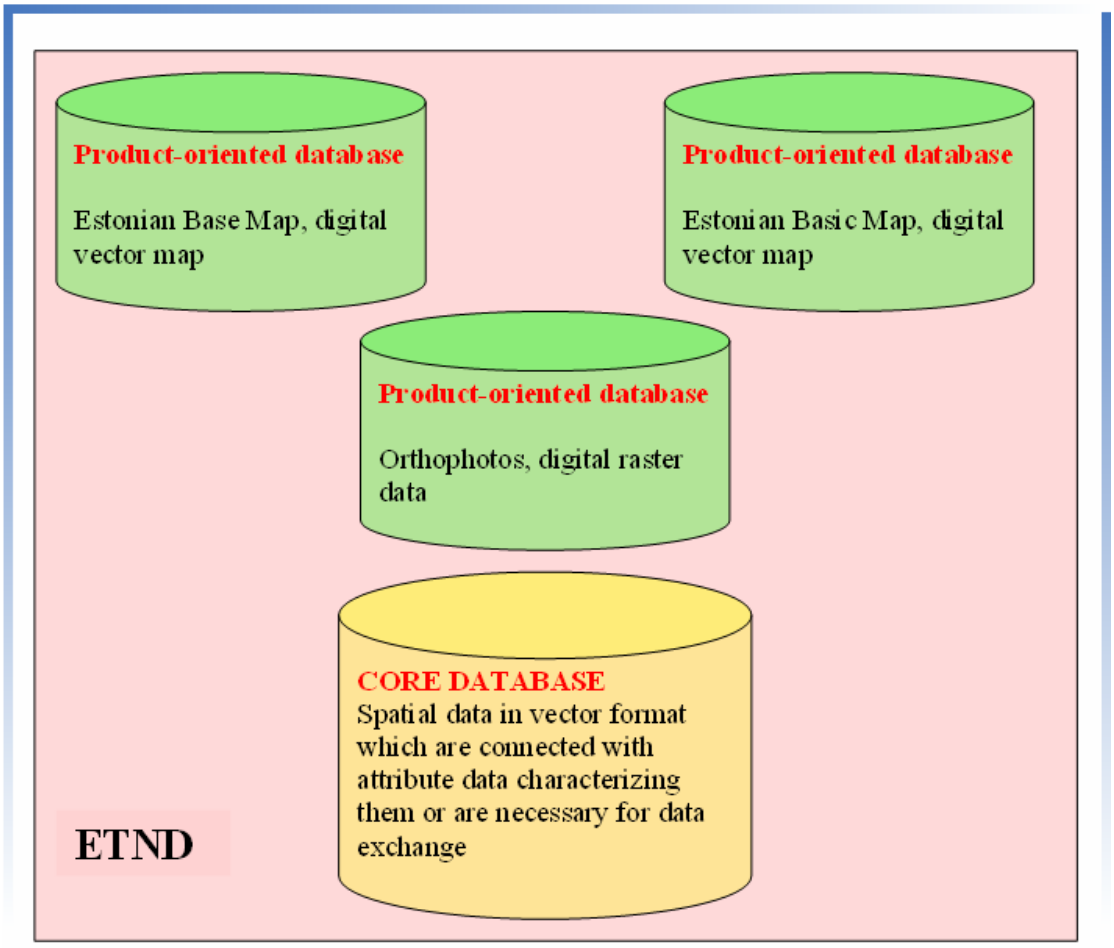


Core Database

Data that are managed in the core database of ENTD are the most important data. These are spatial data in vector format, which are connected with attribute data characterizing them or necessary for data exchange. These are data that are produced during topographic mapping or obtained during data exchange, and which form basis for digital maps to be produced and services to be rendered. The initial core data is formed of the digital data of the Estonian Basic Map at the scale 1:10 000.

Product-oriented Databases a.k.a. Product Databases

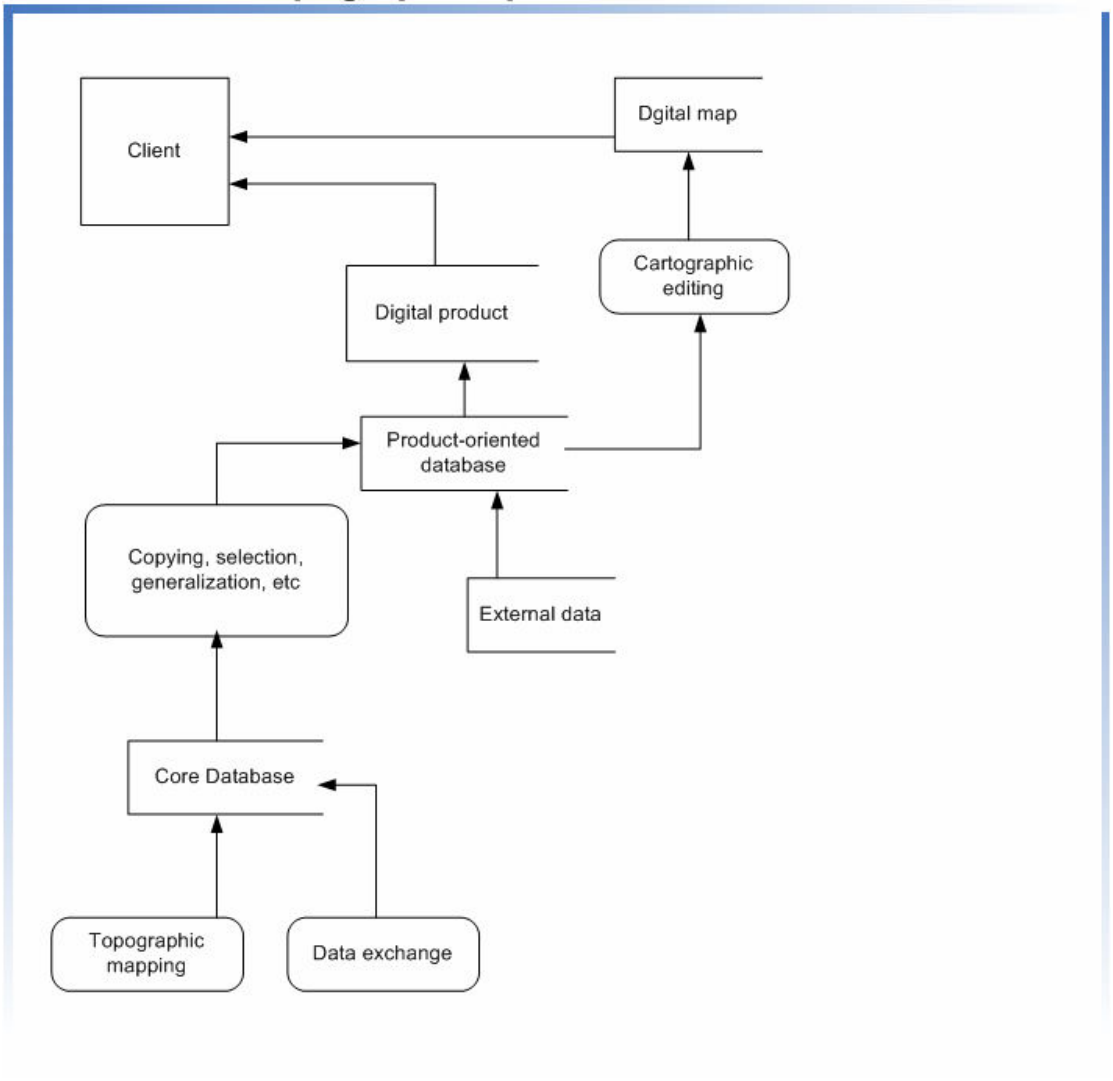
The most important products are digital maps. Every proper map has a specification with defined requirements for the content and layout of the map. Based on the content requirements necessary data are extracted from the core database and a product database is created. In this database, data are processed and designed according to the requirements. In the product database also other information, which is needed for map making or which is generated during production (symbols, colour charts, etc.) is kept. The number of product databases is not limited. The creation of them depends on what kind of digital maps and products are required and expected from the Land

Board. Sometimes it is not expedient to create a separate product database for every map product. From one product database several slightly different maps or digital products can be generated and all these are considered to be part of ENTD.

External Data

In addition, ENTD can contain different data, the management and updating of which does not take place in the course of topographic mapping, but which are needed either for data exchange or map production. Such data are for example administrative boundaries, which are kept updated in the Land Register (Cadastre). To generate maps, administrative boundaries are transferred into a respective product database and used together with other data.

Production of topographic spatial data



How data will be updated in ENTD?

Continuous Extensive Mapping

The main source of spatial data is the traditional extensive topographic mapping in which stereophotogrammetry has an increasing role; the latter is supplemented with field mapping. The aim of both stereo- and field mapping is to use modern software solutions and technologies, so that updates could reach the core database as soon as possible, i.e. the period between photographing and updating would be as short as possible. In stereophotogrammetric mapping the data updating starts directly in the core database, in field works PDA-s and laptops are used and updates are entered into the core database at the first opportunity.
When there is a need to update data between two mapping rounds, it is possible to do so by on-demand mapping of changes using the above-mentioned field mapping methods.

Data Exchange

Through data exchange both the attribute and spatial data of ENTD are updated on the basis of other information systems (Land Use Restrictions IS) and state registers (e.g. Road Register, Register of Construction Works).
It is characteristic to the majority of ENTD attribute data that the changes in them are not caused by changes in real world (nature), but by changes of data in registers (e.g. numbers of roads, addresses of buildings, etc.). Therefore, it is more expedient to update the core data of ENTD rather through data exchange than mapping.
Updating spatial data through data exchange improves the quality of data regarding both the positional accuracy and temporal accuracy. New objects have usually been measured and changes are entered into ENTD database also in-between regular mapping rounds.
The data exchange between ENTD and other databases is of great benefit also to maintainers of these databases, as it provides automatic updating possibilities of spatial data in these databases.
Thus, the data exchange is important not only from the point of view of updating the core data of ENTD. It helps to reduce the costs of data production and improve the quality of data for both parties.

Life Cycles

There are several ways of updating data in the core database and therefore the data are renewed at different speed. Through data exchange data can change rapidly – e.g. once a week (buildings in the Building in the Constructions Works Register). Other

data are updated in five years as the result of regular topographic mapping (e.g. forest shapes).
Updating of the core database is not automatically accompanied by renewal of map products; maps are updated according to the specification, e.g. once a year, the updated core data is however directly available trough ENTD data services.

Models

For geographic information systems and map products models are of great importance. There are three mutually connected models:

1. reality model – a simplified description of the real world
2. data model – a way of structuring the data in the database (implementation of reality model using capabilities of the particular database)
3. presentation model – a set of cartographic means and guidelines (described in reality model and structured on the basis of data model) for visualisation of spatial data. The implementation of reality model results in a designed map.

The core database of ENTD has its own reality and data models.
The reality model makes ENTD interoperable with other databases at the logical level – at the level of perception and defining of features in nature. The more similar the criteria of feature perception and definition in reality models of different databases, the easier it is to make them interoperable.
While designing the data model, data were structured in the core database taking into account the updating, exchange and user requirements.
The representation model of the core database is implemented for data visualisation only in the course of data updating, checking and improving.
Maps and products have their own reality and data models that can differ from the core database models. Every map and product has its own presentation model.