DESIGNING NEW MAPS ADAPTED TO USERS NEEDS

Mrs Lise Just
National Survey and Cadastre
Rentemestervej 8
DK 2400 Copenhagen NV
Denmark

Fax +45 3587 5053
E-mail: lij@kms.dk

Introduction

On 1 January 2001 the Danish National Mapping Agency completed the establishment of a new nationwide topographic database. This marked the beginning of a new era in designing topographic maps in Denmark.

The intelligent and logical structure of the new database gives almost unlimited opportunities for new products. Some of these products could be paper-maps especially designed for leisure use. Others include the professional use of the geographic data in a Geographic Information System - GIS.

In a digital mapping system like the new database, it is possible to turn on and off the different layers and themes available in the system. However, it is far from trivial to determine which combinations of features are best suited for each specific purpose.

Never before in our history of mapping have the ordinary, civil users been asked about their needs and preferences for map products. This is due to the fact that, in the past, the production of maps was related exclusively to the needs of the national defence. The civic market has just used the same maps that were created for military use. Many of the objects in the traditional maps are related to tasks for the defence. For instance, the dikes are defined in height so that a soldier can hide himself including his pack, and the width of a stream is specified in such a way that it indicates whether it is possible to jump across it or not.

In view of the new possibilities to produce a variety of different maps products for diverse use, we carried out a survey to assess which needs the costumers and users really have. The goal was to give a solid foundation for defining the new topographic maps to be derived from the new database.

The TOP10DK database

The new topographic database has been named *TOP10DK*: *TOP* for topographic, *10* for scale 1:10,000 and *DK* for Denmark.

From the outset, we had three purposes for establishing the TOP10DK –database. It was intended to be:
1. The topographic basis of our own map production
2. The topographic basis of GIS in Denmark

3. The frame of reference for the geo-related registrations of data carried out by other agents, whether they are public authorities or private organisations

As early as in 1992 when the first thoughts of TOP10DK began to be formulated, the costumers were involved in the process. A project for specifying the characteristics of the database was carried out, involving the important users of topographic data, especially the professional users within the public sector, the administration, the defence, the universities and some private data providers and users.

The result was the specification of the now existing version of the TOP10DK database containing:
- 46 geometric object types grouped in 8 object classes:
  - Traffic
  - Built-up areas
  - Buildings
  - Nature
  - Culture
  - Technology
  - Hydrography
  - Miscellaneous
- Topologic structure
- Names of localities and objects, connected with geometry
- Administrative borders
  - County, municipality and parish borders
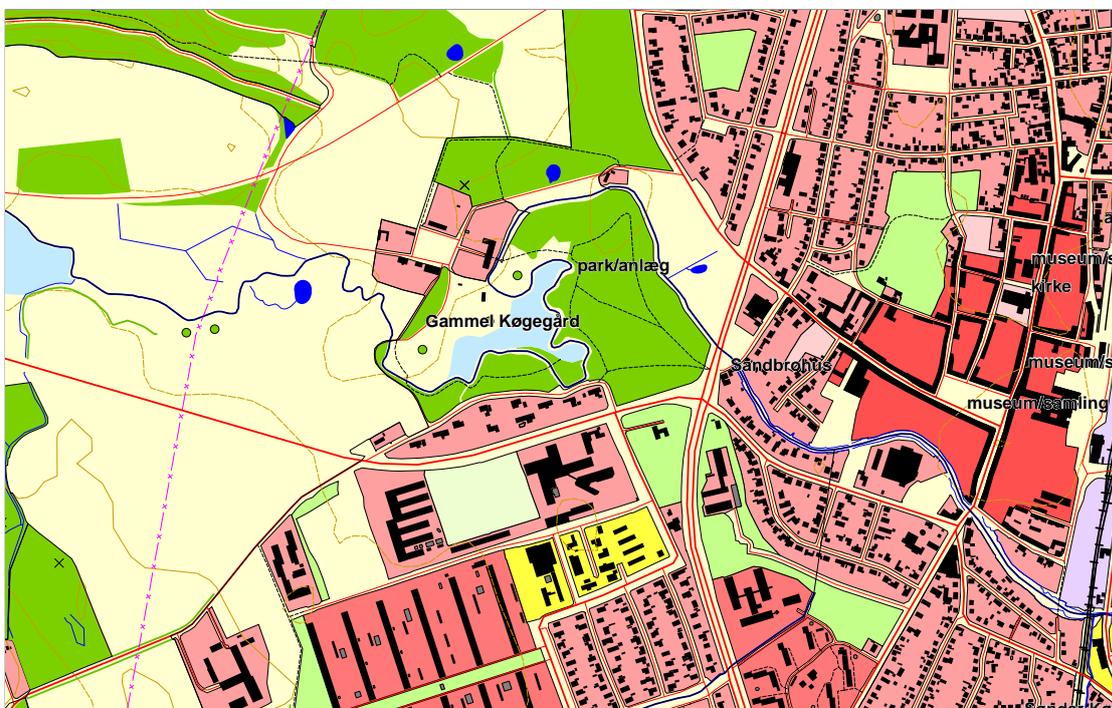- Indication of altitudes (grid and curves).

Fig: An example of TOP10DK

The TOP10DK database is established by photogrammetric registration. Every year an updating will be carried out for one fifth of the country, so that the dataset for every county will have a total updating every 5 years.

The costumers today
To-day the Mapping Agency sells TOP10DK as a GIS-dataset to professional users, especially within the public sector – the government administration, the counties, the municipalities.

Their primary use of the maps is for planning, administration, presentation and supervision. Their use is not very sophisticated. They use it as a basic map or presentation-map, and the possibilities for analyses are not utilised very much.

Other topographic maps
Until to-day we have been producing topographic maps the traditional way. The most used scales are 1.25,000 for administration and 1:100,000 for an overview. The updating of maps in the scale 1:25,000 has been stopped 2-3 years ago. The Danish Defence mostly uses the scale 1:50,000. These 3 maps are today published as raster-maps on a cd-rom and as map sheets.

The idea with the new TOP10DK database is to derive other topographic maps in other scales from the database, so the database will be the mother of all the topographic maps.

To a large extent it is possible to make the new maps with exactly the same characteristics as the old ones, but there are lots of possibilities to change the content and design. And the users are the best ones to define the needs in relation to their assignments.

The costumer survey
Before starting an external customer survey we made an internal investigation of our own knowledge about the market. We asked all employees with market-knowledge and with contact to customers to participate in different focus groups. From that exercise we got a very good impression of what is going on. In the light of these discussions we made the model for the external survey.

We asked 4 different groups of users of their needs for geographical data to-day and for the future, which kind of tasks they were using the data for, and if they could see new possibilities for better services. The survey was accomplished partly as focus groups, partly as single interviews.

The 4 groups were:
1. The partners of collaboration or business partners. These partners work out solutions alone or together with us. They are helping us in the future selling our products, solutions and services.
2. The customers. Most of them come from the public service sector and the universities.
3. The potential or up-coming customers, especially from the private sector using geographical data for visualising, geomarketing, presentation etc.
4. The last group was the non-professional users and people using maps for leisure, and the organisations of these people.

We got two kinds of response. One kind of the response was about general opinions about data, dissemination of data and the costumer's future needs, the other kind was about the future products.

Customers needs
It is very important that datasets are flexible, and flexibility should be obtained through a modular structure. The products should include the possibility of choosing groups of objects, themes or items of information. The user should be able to switch such items off and on.

The coherence between the datasets is very important too. The structure of TOP10DK is logical and the idea is to use TOP10DK as the standardised basic map, to which you can connect register information from other sources. It should be possible to add new objects from these other sources, and to insert your own information, too.

To-day we have several on-going projects, aiming to adjust information from other registers to fit TOP10DK. These include adjustment of statistical definitions of urban areas used by the National Statistical Office, data linkage with the nation-wide Buildings & Dwellings Register in order to secure that buildings are represented identically in the two databases, or agreements of similar spelling of road-names. All of this adds up to the fact, that TOP10DK is a dynamic database, developing towards more interoperability with other datasets.

At present the use of geo-data is spreading to new user groups. This means that people without a professional knowledge of how to handle geo-data will be an increasing group of users. These new users will not want to get data from a lot of different sources. They prefer a final solution directed to their specific task at hand. For this reason we have to think solutions into our way of disseminating data in the future.

For dissemination of geographical data it is important that data is accessible in an easy and cheap way. Public data will be more and more in demand, and it seems reasonable to regard basic geo-data as a common national infrastructure. Users should be able to get them without big contracts with private data providers. The Internet will be of crucial importance as the delivery and distribution system of the future.

If you can get data delivered directly from a web-side, you expect the data to be up-to-date. If you can get data in a minute, you don't expect the data to be 10 years old. So the actuality will be another important parameter in the future too. In Denmark our traditional topographic maps have an up-dating cycle of 6-10 years. For TOP10DK it is 5 years, but for some themes this will not be satisfactory for many users. For some of the themes, especially roads and buildings, we look for methods to secure a more frequent updating mechanism. One method is cooperation with the municipalities to re-use the information they have already collected for their own purposes, thus reducing the cycle to 1 year.

So, the 5 parameters, which our participants in the costumer survey pointed out as the most important in the use of geodata in the future, were:

- Flexibility
- Coherence and interoperability
- Accessibility
- Final solutions

- Actuality.

The new products

The participants in the survey were also asked to give their opinion on the products they wanted to see in the future. However, the users of maps are generally conservative in their opinion of design and scale. So the result of our costumer survey was a wish of using the maps with a cartography or design as similar as possible to the existing maps and to be used in the existing scales. As users grow more accustomed to the potentiality of using GIS, we expect that they will eventually get some new ideas. Nevertheless, it is to be expected that many users will still like a map to look as it used to be, so the recognition in the presentation of the result will still be prevalent.

In our survey the users want to continue the use of maps in the scales of 1:25,000 and 1:100,000.

We set up a matrix of the possibilities of datasets derived from TOP10DK, broken down into what we call product-families and product-lines.

Product-line Family	GIS-dataset	Vector-dataset	Raster-dataset	Paper-maps
MAP 25 Scale 1:25,000 (1:10,000 – 25,000)	**GM25**	**VM25**	**RM25**	**PM25**
MAP 50 Scale 1:50,000 (1:25,000 - 75,000)	**GM50**	**VM50**	**RM50**	**PM50**
MAP 100 Scale 1:100,000 (1:75,000 - 150,000)	**GM100**	**VM100**	**RM100**	**PM100**

Fig: Matrix of the future product-families and product-lines.

The 3 families are called Map25, Map50 and Map100 (until now these are only working titles, as we have not yet decided their real names). The numbers 25, 50 and 100 indicate the approximate scales.

From each of the families you can derive different kinds of datasets as a product line.
The high-end ones are the GIS-Maps or the GM-line. These datasets have the full GIS-functionalities and can be used for every GIS-task. They are suitable for planning, administration and not least analyses.

The Vector-Maps or the VM-line contains reduced datasets from the GIS-dataset. It is not possible to use it for analyses, but it is sufficient for making your own maps. It is not as complex and heavy as the GIS-dataset and, consequently, it is faster to work with.

The RM-line or Raster-Maps are the traditional maps used as background maps. Finally, PM-line is the Paper-Maps.

All of the datasets in the matrix will be of interest in the future, but the different users will be interested in different datasets.

The professional users especially in the public sector will be interested in the GM-line and the RM-line with focus on the scales 1:25,000 and 1.100,000. They are less interested in the VM-line and the Paper-maps. When they need such products, they will find it natural to make the plot by themselves.

For many of the users on the private market, it is not necessary to have the full functionality, but they can use the Vector-dataset for geomarketing, planning, and administration and in the graphic business you can use it for advertising and presenting a nice cartography.

The Danish Defence has traditionally been using the maps in scale 1.50,000 and will continue to do so.

The private citizens will still need paper maps, but dissemination of maps on the Internet will change the use, as it becomes easy to download your own maps. In the National Mapping Agency, we are now considering what to do with the paper maps in the future. Are we still going to have a number of nationwide printed maps, or will all paper maps in the future be print-on-demand or plot-on-demand.

The situation to-day
At the moment – April 2001 - The National Mapping Agency has decided to use the above matrix for developing the coming production of topographic maps from now on.

First of all, a specification of the Map25 has been set up. To the GM25 dataset we have designed two set-ups, one just like the traditional map and one with a more soft cartography to use as a background for overlaying other information. We have sent these datasets to the counties to test the set-ups, the design and the content until October. The result will be used in a new edition of the Map25 starting next summer.

Meanwhile the first edition of the Raster Maps in 1:25,000 (RM25) has started in January 2001 and we expect to publish it next summer. It is very similar to the content of the TOP10DK database, but a special quality check has been carried out in order to eliminate errors and mistakes.

The Map50 will be established for the Danish Defence starting at the end of 2001.

For Maps in the scale 1:100,000 it is necessary to make a reduction of data and a high degree of generalization. A project with this goal has been going on for the last two years and will be presented on another session on this conference by one of my colleagues. We are continuing with the specification of the GM100 this year and next year. Subsequently, the production of the Raster Maps (RM100) will start in 2003.

Conclusion

It has been extremely useful for us in the Mapping Agency to hear the users' opinion of our products. Our initiative has been very positively received and we look forward to continuing the good relations to our customers.

It has also been a test of our own knowledge of the market, and it was confirmed that we had a rather good idea of what is going on. Now we can set up plans for the future development of mapping products with a high degree of certainty that we will accommodate users needs. Unfortunately it is not always possible to offer the best solution immediately when the needs are expressed.