LOCAL INTERNET PORTAL OF CARTOGRAPHIC KNOWLEDGE

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1. Introduction

Map-making with assistance of GI technologies becomes widespread reputable scientific technology such as statistics, mathematics, philosophy, etc. This is good but not surprising message for true cartographic community. Contemporary it means strong and urgent signal for re-arranging and enhanced role of cartographic education.

In former times (and as well as several years ago), mapmakers will be only that who has been cartographically educated. Some estimations given in previous international cartographical congresses have been calculating with the numbers that 80-90 % maps is prepared by laymen or laywomen nowadays and only small part of mapmakers are cartographers in fact. Main consequence of this fact is weak quality of majority published and used maps (we are not talking about maps from specialized cartographic enterprises or national mapping organizations), because of weak cartographic skills of their authors.

GI technologies in general make fake feeling that map creation is something very simple. just click on the button and create something what will be colored. The rules of the cartographic generalization, both classical and digital ones, statistical analysis of the portrayed events, basic cartographical skills about legend design with color and logical aspects are unpleasantly very often missing. In the environment of the digital or computer cartography is almost missing support for correct cartographic visualization. GIS tools usually contain only basic supportive tools for map creation and real maps are usually results of combination of computer handling data and accompanied by a lot of manual work. Of course, in future will increase amount of cartography support functions in GIS, but because their implementation will be rather difficult than easy it will take some time.

2. Trends in cartographic education on the background of portals possibilities

In our near future of data-rich society it will be possible for everyone with access to the information highway to get at the relevant spatial data. So what will be the role of the cartographer in that future era? There is a contemporary ICA vision that: "the cartographer will be an information broker, able to indicate what datasets are relevant for a specific spatial decision support task, as well as a graphic designer able to visualise the relevant spatial data in such a way that her clients are able to grasp the information" (Ormeling F., 2001). The idea of the roles of spatial information broker

and visualiser is important also for organizing of the cartographic education on local or regional levels.

There are also more general trends influencing the environment in which cartographic education is going on. The most important are processes, which are part of the main global trend, i.e. development of the global information society. Every state or group of states is reacting for this trend by some steps in knowledge and technology fields. The steps are visible from the so-called GI-policies or state information policies. In Czech Republic are between many other parts of the State Information Policy also topics such as "Portal - Public Administration Interface" and "Information System Projects for the State and Regional Administration (Public Administration)".

The important part of second mentioned initiative is creation of the National Geo-Information Infrastructure. We will give short description of both streams of the state information policy as important aspects of the environment at which our cartographic knowledge database intentions will develop in the close future.

The Portal - Public Administration Interface Objective is:
Implementation and operation of a uniform presentation interface for the public administration information systems. The targets are:

1. All information processed in ISVS (i.e. Information System of Public Administration) is accessible from a single location;
2. Uniform access to ISVS-processed information even for foreign users; unified search; the system collaborates with reference interface and provides for authorized communication;
3. Unified publication processes in ISVS; unified search nationwide; active communication of citizens with ISVS; electronic presentation of the state is unified.

The second interesting project for our cartographic efforts is the National Spatial Data Infrastructure effort, which is called in Czech Republic National Geo-Information Infrastructure.

The objective of National Geo-Information Infrastructure is creation of legal standardised, organisational, and technological prerequisites for co-ordinated acquisition, processing, and provision of geographical information from the entire country, both to the public administration and the private sector. For this reason legislative and standardised medium, harmonised with the EU, elimination of target duplicity in data collection, updating and processing of geographical information have to be done. It is planned to develop cartographic models on inter-ministerial level; multi-purpose bird's eye surveys and ortho-photographical maps; detailed reference model of regional topography; and active reference network of GPS stations in the territory of the CR.

The accessibility and sharing of geographical information via electronic communication, especially through Internet, is organic part of these scenarios.

The cartographic outputs and their implementation in various activities starting from decision support systems till electronic atlases of the diseases occurrence will be used and applied. The request for high quality and true cartographic interpretation will be

part of the process. The maps will be created in new variants and will have new concepts and faces.

We mentioned above the importance of the distribution of GI through **Internet,** which leads us to a whole new range of users in cartography. Young people that never would have looked in an atlas are most interested when the spatial information is presented on this new medium. And of course it will not end with the Internet. We have the new WAP technology coming up that will allow people to access information on their hand held mobile telephones, included spatial information (Ormeling 2000, Konecny 2001). For instance in our country, the Czech Republic, the applications of mobile information in forestry management or precision farming are under the process.

The fact that spatial information is now available in digital form allows us to turn it into so-called **smart maps**, that is maps that seem to think: depending on the scale at which they are queried, they will display more or less data, be more or less generalized. They will have a larger or smaller number of names added. And when the scale passes below a specified threshold, certain land use categories will not be displayed any more, and the appropriate legend boxes will disappear as well.

Another important aspect of the digital revolution is that finally we are able to produce **animated maps and model dynamic reality** with our maps more accurately than ever. But this also provides requirements. We cannot present our children with atlases full of static maps, when, in the evening, they will see the weather forecast on the television with moving cloud patterns and tropical cyclones. Our atlases will have to compete with the computer games children are playing with, so the cartographic animation has to play several functions.

Finally it is **virtual maps** that we are now producing, when planning for the future we can create three-dimensional scenes in a realistic way that show what the proposed changes would look like in reality, on the basis of our databases.

In the Internet as well as in other electronic means of data presentation**, the role of maps is changing.** Before the electronic age, maps served two functions: both storage and display. And our traditional topographic maps are so crowded because they had to play both functions. Nowadays, these two functions can be separated. The *storage function* rests in the data files or database; the *display function* is determined by the users on the basis of what they need for a specific spatial data – based task. Only those data layers are activated that we need for the task at hand, and even can be selected per layer data. But the development goes even further. The map on the computer monitor or on the mobile phone is changing into an **interface** to access the spatial data behind it. If you click on a map symbol, its name will be shown, or it's number of inhabitants, or a photograph or whatever. If you click on an area the area characteristics will be shown, such as the average population density or height above sea level. But the map interface will also refer to other data files (Ormeling 2000, Konecny 2001).

Increasingly, maps are used as interfaces to the clearinghouses for geo-information that are emerging all over the world.

We are certain that spectrum of the possible cartographic activities connected with SDI will grow.

But contemporary situation is not so bright as our visions. To improve it we have to start to improve education process.

3. Cartography in Portal Age (Czech Republic - Masaryk University Example)

One of the possibilities how to help to solve existing problem of weak cartographic outputs from GIS is to increase awareness about cartographic procedures between GIS community. Almost of this community has one characteristic; all have computer background and use internet such a main information source in profession area. It means, that propagate cartographic processing of spatial data through this medium is probably easiest way how to impact GIS community nowadays. Another trend especially in developed countries (but not only) is process of the creation public portals which are established by both public administration and private sector (see part 2. of this paper). This facts are leading us to create the local internet portal of cartographic knowledge which could be single one but better part of the portals of the higher levels of portals, e.g. part of the state information systems or information systems of public administration (the title of the activity is not so important for our intentions).

In internet terminology the term **portal** is used in two meanings. First one is gate to internet world, but second one, and it is our case, *is an internet gate to some field of human activity.* Portal in both cases means some comfort way which helps to its user with orientation in internet information ocean. This services for easy search of appropriate information are usually main task of portal creators. In our case is main problem content self, because of lack of information which helps to the map creation. From this reason main attention was focused on creation of base cartographic information infrastructure. Our portal project is connected to transition of our regular education into internet supported form. In this case internet serve as an extending complement for classic courses. We decided to use part of this system such a skeleton for the portal definition. Before the description of the portal components it is needed to notice what does it mean to be local in its name. Despite Internet is fundamentally global medium; we named our portal as local from two reasons. First is that we suppose users from our region (i.e. Czech Republic and maybe Slovakia), the portal is mainly in Czech language and external sources are also mainly from this region. Next reason is cultural background of cartographic knowledge, and we are focused on cartographic philosophy (e.g. Kolacny's, Lauerman s, Srnka s and Veverka s books and papers), techniques, rules and manners, which were used, in our region (of course a lot of cartographic rules are universal, but not all).

The description of our portal we start by technology overview (which is less important part of our paper from the point of view of the main goals). We decide to use standardized and open source solutions. Despite of lack capabilities of contemporary html definition we use it, according to presumable www browsers i.e. MSIE above version 4, Netscape above version 4 and latest builds of Mozilla. All of above-mentioned browsers have support of Javascript, which is used for user interaction; CSS for enhanced page definition and also exist possibility to rendering SVG format. SVG format is used such key multimedia format. On the server side is used Apache web server with Ruby module for CGI scripting and MySQL for data repository. Ruby was used instead of PHP, because of this object oriented language is main developing tool in

our lab, and easy implementation of spatial oriented routines compensate native support of html code in PHP.

Nowadays the portal consists from four fundamental parts. It deals with *directory of cartographic resources, cartographic knowledge base, on-line cartographic courses and on-line cartometric services*. Side part of portal is also *discussion group for communication with users* and identification of their topical issues (in education process could sometimes play very important role). For the future we plan to create also cartographic e-zine such part of portal, and of course we will extend it based on users demands.

Fig.1: Front page of the Local Internet Cartographic Portal

Directory of resources is necessary part of each Internet portal. In our case we focused on cartographic resources in the Czech Republic (the items not only available via internet are also included). We try to map all resources in our country. Resources are classified according to their purpose, briefly commented and with attached www page, email, post address or at least with recommendation how to reach it. In directory we have following classes:

- Institutions (links to research, education, and publishing cartographic institutions)
- Data (links to geodata resources, which can be used for map design in our region; Links lead neither directly to downloadable data or data producer web page or to on-line metadata catalogues).
- Maps (links to on-line internet maps, actual analogue map works in our region with information about publishers and main dealers) .
- Courses (links to internet courses and to the description of courses at cartographic educational institutions in the Czech Republic) .
- Education materials (links to on-line available papers about cartography, cartographic books with connection to publisher, dealer and library).
- Cartographic software (links to providers of software, which is usable for cartographic purposes).

All links are accompanied by above-mentioned brief comments. These comments consist from our evaluation of the resources, which help to the users with orientation in the sources

Cartographic knowledge base means the transformation of study materials into list of rules, procedures and term explanations. Our Laboratory on Geoinformatics and Cartography is focusing on thematic mapping in digital environment and this is main scope of the knowledge base. Knowledge base is searchable through *the key words*, which can be connected to the topics of record or to recorded text. Records of cartographic knowledge base are thematically sorted according to record of usage for certain type of map visualizations (i.e. different types discrete or continuous cartograms, cartodiagrams), according to value theme (i.e. often used themes such climate, hypsography, demographic, …) and finally according to cartographic technique issues (i.e. text placement, generalization, projections, color usage, …). Beside general rules and procedures we try to add some comments related to most often used GIS packages (in case of the Czech republic it means ArcView, GeoMedia and MapInfo). Initial database is created base on our Lab provided courses. We do not include some FAQ as a part of the portal, but we decide continually extend knowledge base by records related to questions, which will appear in discussion group. We also decide to continually build base in remarkably wider scope then to focus on complete solving of a particular cartographic issue.

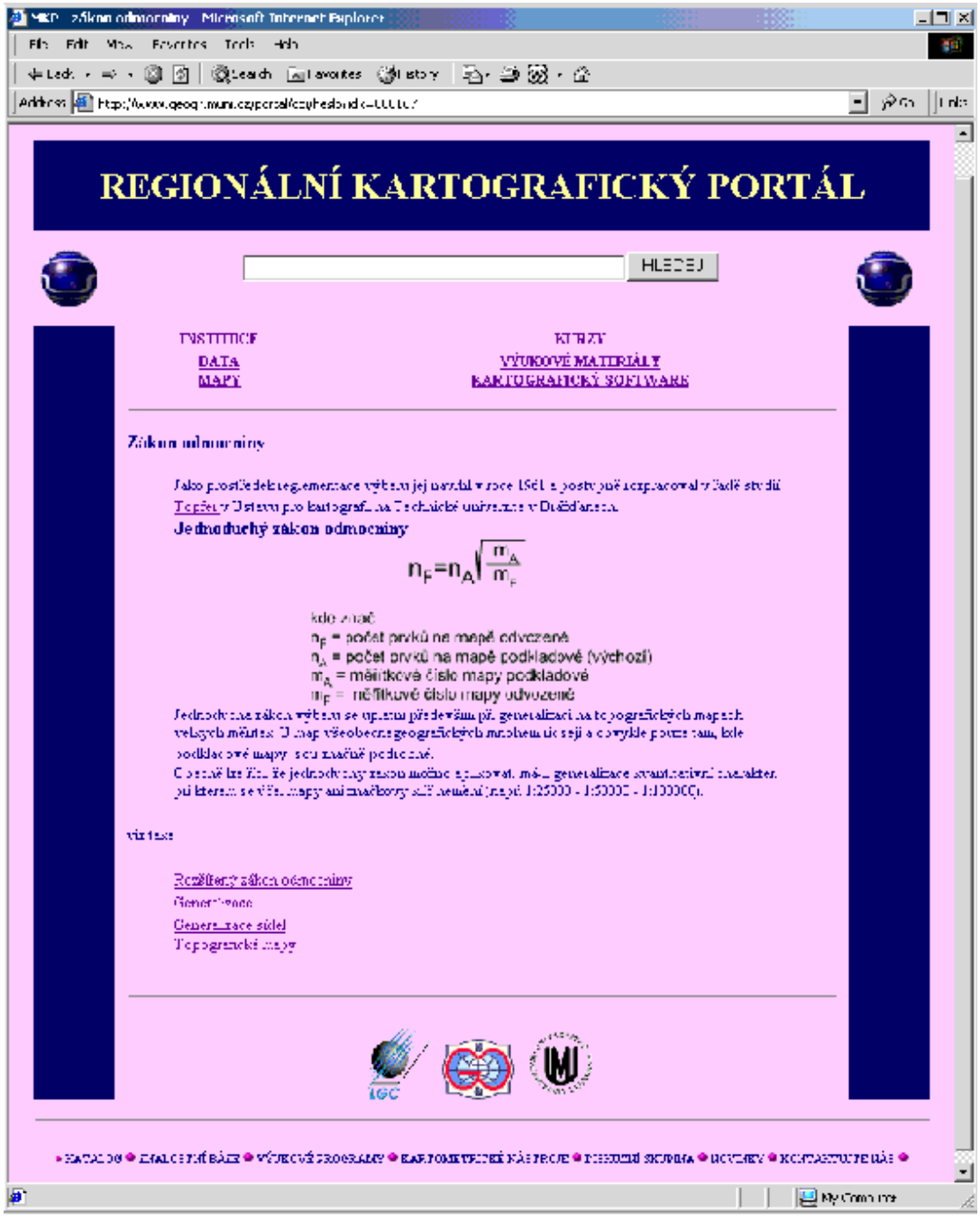

Fig.2: Example of cartographic rule description

The process of the creation of the courses is one of most difficult part of the portal. As was mentioned before it is related to Internet courses, which are complementary to regular education in our department. We try to simplify courses and also ad on-line exercises (in our regular courses this part nowadays missing, because of assumption of exercises at place in contact education). At time of paper origin we have prepared two public courses. First is focused on statistical mapping in digital environment and second is focused on usage www technologies for cartographic publishing.

Last part of portal consists of cartometric services. According to analytical background of majority of rules, we include on-line processing for make it easy application of it. This services consist from calculators, data and map processors. Calculators suppose

processing of manual data input, nowadays we have included color manipulation tools and generalization selection tools. Data and map processors are used for automated processing of data sources. This mean geometry statistics and enhancement for generalization purposes and map visualization checking. For this processing we use ftp protocol (user put source data via www on our anonymous ftp server and obtain ftp link to result). Data must be in GML form (nowadays we serve avenue script for ArcView, but we suppose soon implementation of this OpenGIS standard in all GIS environments) and maps are processed in SVG form. Map checking is limited to map face, legend processing is in work (in our practice we use an XML description of map layout based on SVG, but in the portal we suppose usage of pure SVG, where is difficult to identify map parts). Result of data processing are reports and outputs in origin format. Data processing nowadays consist from attribute value classification, spatial refinement of point and line features (raw and with selected attribute weigh), simplification of line features geometry geostatistical description of point and line features (i.e. density, proximity, line shape and network classification) and identification of spatial conflicts in chosen scale. In case of map checking we nowadays focuse on fulfillment and color correctness. Cartometric tools are derived from CASTOR project of our Lab, which solve issue of creation of carto-analytical support system for geodatabases.

Conclusions

The above mentioned realization and support of newly constituted cartographic education will play important role in the process of the improvement of the true cartographic knowledge usage in the conditions of the information society. It will give new chance to use new digital technologies for creation of the maps not only to our students but as well as to wide cartographic and also non-cartographic communities. It is very important that all this process is based on the technological tools by which changes in the information society are visible and contemporary breaking down barriers between sometimes strictly deliminated scientific societies and wide public and private sector. We believe that all these processes - to create portal based tools to deal with cartographic knowledge base- will highlighted the important and unique role of the cartography as a science in the process of the handling and interpretation of the cartographic information and knowledge through the new information and important tools - the portals.

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