Abstract: IT maps are made for Internet users which need some global information about objects, features and conditions in our environment or thematic maps. Interactive IT maps evolve into a cartographic form that has never been seen before. They have a large potential in comparison with analog paper maps. On the Internet you can find various types of IT maps and the better ones sweep more info to the user with their quick browsing. The aim of this research is to show that raster IT maps is not yet for discard. Raster maps are still in use today and they have more advantages than disadvantages. In the paper are specialy pointed interactive IT map of Dubrovnik in a way that the whole map and all information regarding objects is presented in only one html–page. There are also IT maps of Makarska, Sibenik, Virovitica, etc. This map were made by OCAD–program for cartography.

1 INTRODUCTION

We can say that the maps are "Graphic representation of selected aspects of the Earth's surface", for the purpose of communication and analysis. The Internet has redefined how maps are used. Maps are no longer restricted to paper. Maps on the Internet are more interactive. They are accessed through a hyperlinking structure that makes it possible to engage the map user on a higher–level than is possible with a map on paper. Internet is making it possible to more easily distribute different kinds of cartographic displays such as animations. The Internet presents the map user with both a faster method of map distribution and different forms of mapping.

Internet can be observed as a set of basic communication protocols, as a physical collection of various types of hardware, e.g. a router and another network hardware, or even as a special idea about connecting people and communication (Francula, Tutic 2002). Spatial visualisations are representations. They aim to represent, in a manner that is consistent, some particular phenomenon (Dodge, Kitchin 2001). In the last few years cartographic trends have been changing. Presentation of spatial, cartographic information become very popular on IT. Static raster images are mostly used for the visualization of maps (URL 1). Concept of interactive IT maps is a part of multimedia cartography, which does begin to grow with the growth of computer technology. No longer restricted to paper, maps are now transmitted from place to place over computer networks. IT as a medium has got a major impact on the methods in digital mapping, especialy methods of interactivity in the display of maps. The demand for more sophisticated maps is dramatically increasing by applications like electronic yellow pages, phone pages, traffic information services and tourist applications.

Maps are an important source of information from which people form their impressions about places and distributions. The Internet has already improved the distribution of maps. If done properly, the Internet also has the potential to improve the quality of maps as a form of communication, thereby changing both the mental representations that people have of the world and how people mentally process ideas about spatial relationships.

The Internet has had a profound effect on the process of mapping and map use. The new medium has already led to more interactive forms of mapping and the increased availability of map animations. But, much work lies ahead in order to make the Internet an effective means of transmitting spatial information in the form of maps (URL 2). True interactive web map software is a world apart from hot–spotted GIFs or linked PDF–format maps: more powerful, more customizable, more interactive and cheaper to maintain.
Figure 1 shows the difference between static and dynamic web maps. Each of these categories is further subdivided into view only and interactive maps. The most common map found on WWW is the static view only map. Often the sources for these web maps are original cartographic products which are scanned and put as bitmaps on the WWW.

2 INTERACTION WITH THE USER

Apart form these demands, a user should be able to interact with the map. All operations on the map (like zooming, panning) must be supported as well by their simple and intuitive usage, as well as by additional information about each cartographic object as requested by the user. A user should be able to control the appearance and other properties of the map objects and to see their properties. Application must be adapted to the presentation of the map according to the profile of the user and his special interests (e.g. separated presentation for visualizing the location of shops for pedestrians and shops for invalids). The major challenge in the future will be the further development of collaborative GIS, where remote users share common data and common system resources, like analysis or visualization tools (Gartner 1999).

2.1 Interactive web map servers

Web–based maps do not substitute entirely for desktop map analysis software. In the following situations we recommend detailed comparison of alternatives before opting for a web map approach:

- Complex map editing: Because of the latency inherent in the internet, complex editing of polygons and lines is tough and often awkward.
- Large–format plotting: It is a very rare web map system that offers good support for large format plots. It is possible however.
- Complex menu systems and interface or map controls: These are possible via downloaded Java or Windows applets, but require custom development. With a server–based system, all maps and other data are maintained centrally. When the server is updated, everyone immediately uses the same up–to date information.

3 EXAMPLE OF DIFFERENT IT APPLICATIONS

At the Institute for cartography we have made an interactive IT map of Dubrovnik by OCAD–program for cartography. Map contains mostly tourist information or information that can possibly be of interest to tourists when they plan their trip to Dubrovnik or already stay in the city. The expansion of this information and their maintenance can also be a very good information source for local people. The map contains information about street index and then some information about emergency services, hotels, health institution, food, assiduously services and car services, cultural objects and entertainment contents as well as other institutions (Figure 2).
Figure 2. Example of interactive IT map of Dubrovnik and the search possibility (URL 3). Blue dots present hotel locations.

There is a possibility of zooming and panning of map content on the screen, while searching for a specific information you are given the automatic zoom and pan for the object location or object information. When a user finds the required information (ascending) inside of drop-down menu, he/she can later press down a button next to the same menu and then all locations of the object category he is browsing for are shown. The location which is then shown on the map is labelled with small circle. The user can click with the mouse on the circle which gives him basic information about that specific object (URL 3). These are usually pieces of information about address, telephone, fax, working hours, payment methods, URL’s and e-mail (Figure 2).

Interactive photomap of Switzerland is very impressive (URL 4). The largest scale is close to 1:2200 for entire country. Photographic template can be removed and then we have a city map with a lots of tourist information. Inside a road map we have aerial photo–images which can be turn off (Figure 3). Map is being updated every few months, but aerial images every five to ten years.
Figure 3. Part of Switzerland photomap in scale of 1:1,800,000. Blue dots are locations of railway stations (URL 4).

Interactive city map of Makarska (Figure 4), Sibenik (Figure 5), Virovitica (Figure 6) and much more was made at the Faculty of Geodesy by students. This was made as practical work within the subject Digital Cartography.

Figure 4. Interactive city map of Makarska before and after searching for specific street (URL 5)
4 ADVANTAGES AND DISADVANTAGES

The simplest technique to present spatial data on an Internet web site is to embed a raster image into the html–page. The advantages of html–pages with raster images are their simplicity and low cost. Their advantages are also the ability of every web browser to visualize such web pages (URL 3). The disadvantage is a very restricted interaction with the user. In order to overcome the shortcomings of simple raster images, costlier solutions are required. These solutions are typically based on IT client, a map server and a spatial database system. Before the use of IT maps, the client program must be downloaded (plug–in or java applet control) and it cannot be assumed that an occasional user has already installed the software. This procedure takes time. Today’s web user is very careful because of the viruses when he needs to download or install a program from Internet. He or she shall evaluate the risk and except or reject such offer for browsing interactive IT maps. These are some pre–works but the user still does not know whether the content of the map fulfils his/her expectations or not. Then the download of the spatial data and map begins, which also takes some time. That time depends on internet connection speed, server speed and user computer speed. The user is still waiting. After that the visualization starts and the user is able to decide, whether he or she is interested in this information at all. Working with the map means also to be patient because for each operation a data is requested from the server and an operation will not be finished until all data have been transmitted to the user’s browser. The response time will decrease in future by the introduction of Internet connections with a high bandwidth. For a large portion of occasional Internet users the browsing for interactive IT maps is not pleasant, but it can be frustrating when visiting such web sites without profit from the benefits of map–oriented IT applications.

On the other hand, we can use the advantages of vector data (response time and the power of the client application) with information about cartographic objects. Most CADD programs have a reputation for being difficult to use, but you’ll find OCAD to be a notable exception. It's designed specifically for cartography and works with simple graphical tools.
rather than complex commands. OCAD 8’s advantage over drawing programs like Zoner Draw is that it can be set to work in a geospatial mode, allowing measurement of lines and areas and export of maps to GIS programs. OCAD also has snap-alignment features that you won’t find in simple drawing programs, making it possible to draw polygons and roads without overlap or voids. Unlike GIS programs, however, the basic version of OCAD is not designed for analysis of geospatial data.

4.1 Benefits of interactive maps

Because it lets users manipulate and interact with the data on the map, interactive maps surpass the functionality of any other mapping system on the web. It really comes into its own when dealing sets of points, and in particular where location is one of the criteria that influences selection. Users will want to see the locations of many objects where there are too many items to show them all. Users will want to sift and filter the data when seeking patterns or clusters in spatial data.

5 CONCLUSION

Interactive maps are made for internet users which need some global information about objects, features and conditions in our environment or thematic maps. IT raster maps are still in majority on the web. Program OCAD is suitable for making internet map with relatively small databases. Increasing internet connection speed, popularity of IT cartography also increases. Browsing inside a large database can be faster if the database is divided into few smaller databases. Development is still needed to expand the network and improve methods of map distribution and map interaction. The availability and up-to-date characteristic are two major advantages of web maps.

References:


URL's:
URL 1: Sweden.pdf
http://maps.unomaha.edu/MP/Articles/Sweden.pdf

URL 2: Maps and the Internet
http://maps.unomaha.edu/ica/Default.html

URL 3: Dubrovnik
http://www.geof.hr/~rzupan/dubrovnik/dubrovnik.htm

URL 4: Switzerland
[map.search.ch] Karte: Schweiz, Endoxon AG,

URL 5: Makarska
http://www.geof.hr/~dudiljak/Udiljak-Digitalna-Makarska.html

URL 6: Sibenik
http://www.geof.hr/~cmarin/sibenik.html

URL 7: Virovitica
http://www.geof.hr/~hklepac/Karte/grad/grad.html

Curriculum Vitae (presenting author)

Robert Zupan was born in Zagreb in 1973. He attended primary and high school in Sibenik. In 1998, he graduated from the Faculty of Geodesy, University of Zagreb. In 1996 he received Dean’s reward and in 1998 Rektor’s reward for student work. At the postgraduate studies he inscribed the course in Photogrametry and Cartography in 1999. In the
year 2000. He was elected an assistant junior. From 1999 he has worked at the Institute for Cartography at the Faculty of Geodesy. His main interests include military cartography and military topographic maps. Assistant work in the following subjects: Thematic Cartography, Digital Cartography, Cartographic Generalization, Cartographic Transformations, Thematic Cartography and seminars Cartography and GIS, and Practical Cartography. He participated at a few international conferences. Got his master degree in December 2003.

He has a lot of experience with vectorization (hand, semiautomatic), but mostly with automatic vectorization and scanning. His special attention is oriented toward making maps (internet maps, topographic, thematic, town plans, tourist maps,...). He is also working with MicroStation (IRAS/B, IRAS/C, Provec, ParcelVec,... almost all Intergraph software), OCAD, AutoCad, CorelDraw...

He works with undergraduate students eligible for their degree finals every day, and helps them with their graduate project.

He is a member of MicroStation user community, member of Croatian Cartographic Society and Croatian Geodetic Society.

Curriculum Vitae

Stanislav Franges was born in Zagreb in 1959. In 1984 he graduated at the Faculty of Geodesy, University of Zagreb. In 1993 he obtained M.Sc. and in 1998 Ph.D. in geodesy at the Faculty of Geodesy, University of Zagreb. He holds courses on General, Topographic, Thematic and Practical Cartography, Map Reproduction and Cartographic Visualisation. He was the mentor in elaboration of more than 60 diploma theses and two M.Sc. thesis.

He is the assistant professor and head of the Institute for Cartography at the Faculty of Geodesy. He has participated at the scientific projects: Cartographic Space Researching (1987–1990), Cartography and Geoinformation Systems (1991–1995), Croatian Cartography – Scientific Bases (1996–2002). He is a collaborator on scientific project Cartography and New Technologies, and on scientific and professional projects Croatian Geodetic Dictionary and Croatian Cartographers. He is the leader of scientific and professional projects New Map Graphics of Official Maps in Preparation for Printing by the State Geodetic Administration, Designation and Names of Individual State Topographic Map Sheets and their Division into Sheets, TOPONIMIS – Names, 1st Phase and Printing of State Maps. He published more than 70 papers and 90 maps. He has participated at about fifteen scientific and professional gatherings in the country and abroad. He was awarded for the design of photomap Velika Gorica at the International Cartographic Exhibition in Ottawa in 1999. From 2001 he is the editor–in–chief of the journal Geodetski list. He is a member of the Croatian Geodetic Society and a vice president of the Croatian Cartographic Society.