Map-based Internet Information Services
Examples of GIS Utilization in Off-line Mode

Pawel Madej

Abstract
This paper presents two examples of Internet information services based on a map. The first design is a meta-database concerning the nation-wide measurement network in the area of hydrology and meteorology. The second example is oriented toward assistance of local specialists responsible for operational activities in flood protection. The web sites content were generated in large measure automatically on the basis of data from the information layers of the GIS database.

1. Introduction

The strength of communication inherent in a picture, on the one hand, and the georeferences of the majority of available information, on the other hand, makes a map the fundamental way of presenting information in environmental issues. If it is a digital map, then it can also become the basis for a user interface, permitting intuitive access to all kinds of information concerning the structures to be found on the map. The user interface tools standard is an Internet browser; thus, map-based Internet information services are presently an often used solution. Some web sites use tools solutions offered by GIS producers as engines for map presentation. There are also examples of Internet GIS working together with the databases of classic GIS systems offered by independent producers. Finally, there are solutions based on vector and/or raster graphics not possessing an operational link with GIS databases, though they can also be, in a greater or lesser degree, automatically generated on the basis of the GIS database content.

In this article, two examples of such internet information services will be presented.

1  Institute of Meteorology and Water Management, ul. P. Borowego 14, 30-215 Kraków, Poland, tel.: +48.12.6398145, fax.: +48.12.4251929, email: pawel.madej@imgw.pl
3 e.g. Java-based solutions (openmap.bbn.com, www.jshape.com).
2. **Case 1: Presentation of metadata about IMWM measurement stations**

As far as measurements in the area of hydrology and meteorology are concerned, Institute of Meteorology and Water Management (IMWM) has a practical monopoly in Poland. Many institutions use these data in design work, scientific research, etc.; thus, they are interested in information regarding available archival resources. Below is described a solution showing the possibilities for utilization of a map as a source of information about the IMWM nationwide measurement network. This is essentially a meta-database about measurement stations, permitting users to obtain information about the location of measurement points, scope of measurements, observation periods available in databases, etc.

User interface idea is showed on the fig. 1, by the example presents basic information about the measurement network in the San River basin (an area of ca. 17,000 km² located in southeastern Poland and the Ukraine). It is an interactive vector map providing the possibility of selection of active layers, continuous scaling, and panning of a map. The objects on the map respond to the movement of the cursor as well as to a click of the mouse, and in this manner, the user can obtain information about the measurement stations of interest to him/her (attribute data). From a tools viewpoint, the solution is based on a linking of HTML, Javascript and SVG. The web site content was generated in large measure automatically, on the basis of data from the information layers of GIS databases collected in the form of the ArcView project.

This design is presently at the demo stage, and its implementation as an element of the IMWM’s information service is being considered.

3. **Case 2: Flood risk an response database**

The second example is oriented toward assistance of local specialists responsible for operational activities in flood protection. The idea behind it is to prepare an information resource in the form of a database, shared by county and municipalities crisis

---

5 This work is prepared partially in the framework of the EU COST Action 719 “The use of Geographical Information Systems in Meteorology and Climatology”.
6 SVG (Scalable Vector Graphics) is a recommended by W3C Consortium language for describing two-dimensional graphics in XML (www.w3.org/Graphics/SVG).
7 Utilizing, among other things, the ‘shp2svg’ script authored by Nedjo Rogers, cf. www.carto.net/projects/shp2svg
Fig. 1 The Institute of Meteorology and Water Management (Poland) measurement network in the San River basin
intervention teams, describing the consequences of exceeding locally-identified threshold values (precipitation and/or water level) from the viewpoint of risk to inhabitants and of crisis response. The solution has the task of integrating graphics (maps, raster images) and text information, among other things, and permit presentation of such information.

A key portion of the database are descriptions of risk situations and responses to them. This portion of the database will be filled in and updated by specialists from municipal crisis intervention centers. Risk situations and responses are associated, on the one hand, with service clients (crisis intervention forces); on the other, with objects on the map, e.g. measurement points. In this manner, the text portion of the database is linked with a digital map representing another portion of the database, maintained by county forces.

Access to the information content has been realized in the form of an Internet service permitting edition and presentation of information. The solution takes the form of an interactive map (vector + raster) in SVG format, providing access to text information. The web site content is saved in a database, while web pages are generated dynamically at the server side. From the information presentation end, the solution offers similar functional capabilities to those in the previous example.

This solution is presently entering the pilot phase of execution in the Klodzko Valley, an area at risk for flash floods located in southwestern Poland.

4. Conclusion

The aforementioned internet information services are based on an interactive vector and raster maps which, were generated in large measure via export from a GIS database. This permits the capabilities of GIS systems to be utilized in preparing the web site content.

A information content prepared in this manner can be disseminated via web server or (case 1) via distribution of the files forming it; e.g. on CD. On the part of the user, all that is necessary is a browser, presently the best is Internet Explorer, supplemented with Adobe SVG Viewer.

This type of solutions are of interest to institutions which do not possess enterprise GIS or are interested in distribution of information based on interactive maps directly to the user.

---

8 Utilizing MySQL database and PHP (among other things the ‘opensvgmapserver’ authored by Nedjo Rogers have been used, cf. www.carto.net/projects/open_svg_mapserver).
9 This example is an element of IMWM work in the OSIRIS Project (IST-1999-11598), financed partially in the 5th Framework Program of the European Union.