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online mapping

World Wide Web Mapping and GIS: An Application for Public Participation
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The World Wide Web (WWW) has garnered far ranging interest from those of us interested in the representation and analysis of geographic information. The WWW is seen as an exciting medium for numerous reasons: it can be accessed by a global audience, on almost every computer platform, and does not require expensive software nor specialist training to use. The multimedia capabilities of the WWW have made it a medium in which visual representations - images, maps, diagrams, graphs - are as easy to implement as text. Five or so years back, cartographers and others began using the WWW to display static maps, and some low levels of interactivity could be added to the maps by using 'image maps' - click-sensitive areas of the map which could hyper-link you to other maps or materials. Alas, this relatively low level of interactivity did not match the complex, interactive maps available in Geographic Information Systems (GIS) and geographic visualization software packages. This situation has, of course, changed. In the last few years a series of technologies has matured to the point where interactive, WWW-based mapping and GIS are now commonly found on the WWW.
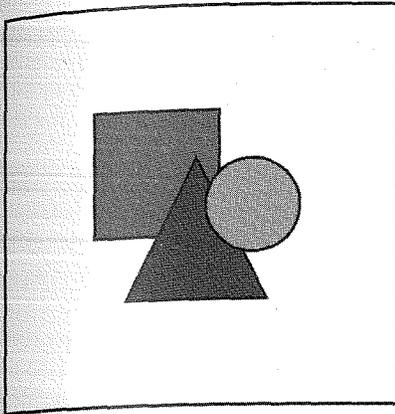
Numerous different methods exist for providing more sophisticated mapping and GIS capabilities via the WWW. It is relatively simple to make spatial data and analytical software available over the WWW; users can download the software and data and perform their own analysis on their own computer. A more sophisticated method is to use a map generator, where WWW users set the parameters of a map or GIS analysis on a WWW-based form. This form is passed to a map or GIS server, which generates a map or series of maps, then posts the results on the WWW page. The U.S. Census Bureau's Tiger Mapping Service is a good example of this type of technology. Real-time map browsers, such as ESRI's Map Objects and Internet Map Server provide similar functionality in a package explicitly aimed at component- and WWW-based GIS developers. Map Objects (and other similar packages) are aimed at software developers who want to cobble together customized GIS packages for specialized uses. For example, a developer, using component GIS software, can create a GIS that includes the limited GIS and mapping functions necessary for realtors searching for particular houses for clients. This customized, component GIS can function on the WWW with the addition of Internet Map Server software.

My own experiment with Map Objects and the Internet Map Server was funded by a small grant which allowed me to pay a graduate student to develop an interactive mapping and GIS site aimed at enhancing public participation in issues concerning housing in an inner-city Buffalo neighborhood. The set of WWW-based maps generated in this project are prototypes with limited functions, intended to assess the capabilities of the software. The process behind this project has been described in the master's thesis of K. Chang and is available at the WWW site where the Public Participation mapping and GIS application is running. Other background information on the application and some of the conceptual and theoretical ideas are available at the site. From this page, a link takes you to a series of three Map Objects maps.

These options consist of three different map scales: a local, neighborhood scale map, a city of Buffalo map, and a US and World map. The focus of the project was the neighborhood scale map.

This map has a series of basic GIS functions, including zoom in and zoom out from map, re-center the map, and 'hot-links' to additional information. A park on the map may be linked to the appropri-

ate information about that park on the City of Buffalo WWW site, for example. More sophisticated functions include identify and add information to the map and database.

Identify is a simple function which allows a user to get the name of a building owner or the address by clicking on the lot of interest on the map. A related function allows the site user to find a lot or building owner. Future development of the site will include additional categories of information, such as building violations, and tax status.

A comment function allows users to comment on a lot or building. These comments are then posted to the WWW page. This feature was incorporated as neighborhood residents wanted a way of compiling information on problem houses and lots - including simple violations (such as junk in the yard) or bigger problems such as abandonment and drug activity. There are, obviously, some problematic issues raised by such anonymous, public postings of alleged housing problems. However, these are the types of issues that will have to be confronted as such publicly accessible WWW-based GIS and mapping sites become available. An elaboration on the comment function is even more problematic: users of the WWW site can actually change the database, which is linked, to the neighborhood map.

The ability to change the database behind the map could be restricted to 'master users' such as a community planner, who could sift through information from the comments page and select appropriate changes to the database. The planner could also add any new or changed information from the city. However, the prospects of an 'open database' are being discussed. Such an open database would serve to collect 'local knowledge' and information about the neighborhood. Obviously, there are some benefits to this type of data collection, and some big disbenefits.

In sum, the interactive mapping and GIS site designed as a prototype reveals that WWW-based mapping is certainly possible given adequate resources. The software for creating such maps is mostly reasonable, except for the Internet Map Server component (although many educational institutions have access to the IMS software). The student who programmed the site did not know Map Objects but had a moderate knowledge of Visual Basic and object oriented programming, and it took him approximately 250 hours to create the site (including digitizing the neighborhood maps). Creating such a site also requires a NT server, and it is extremely useful to have the server devoted to development of Map Objects applications. My general assessment is that many of the technological problems of providing interactive mapping and GIS via the WWW have been solved, although a reasonable investment in money and time is required to get such applications working. The real issues concern the impact of such applications: the general public having access to more sophisticated mapping and GIS tools, and the problems and possibilities of 'open databases.' It is these more academic questions which will occupy our attention in the near future.

MAPublisher Version 3.5 for Windows/Mac Freehand 8.0 and Version 3.5 for Windows/Mac Illustrator 8 from Avenza

MAPublisher is a suite of GIS and cartographic plug-in tools that allows the import of top GIS and CAD file formats into high-end graphics and illustration environments with all the attribute databases intact and ready to use.

- Improved file import that more effectively imports common GIS file formats (ARC / INFO Generate, ArcView Shapefile, MapInfo MID / MIF, AutoCAD DXF, and USGS DLG and SDTS formats) into the vector graphics environment with all database attributes intact.
- Table management tools that allow the import of external database tables for merging and linking to existing map layers as well as creation, editing and deletion of separate data tables.
- Automated raster image registration.
- Automated labeling based upon attribute data.
- Export to MapInfo MID / MIF and ArcView Shapefile formats.
- Map projection and scale transformations (over 100 projections and 40 ellipsoids available).
- Automated grid and scale bar generation.
- Export to intelligent, data-rich pdfPLUS containing searchable and queriable data tables.
- Search, query and select by data attribute.
- Joining of vectors based on simple or attribute values.
- Automated legend creation based upon attribute data that enables automated legend value assignment for multiple legend