Building The Virtual Map Library; Some Considerations*

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This past winter and spring I have brought up a local area network on campus. The MAGIC LAN, the Map and Geographic Information Center's network, is a ten-user Novell 3.1.1 LAN supplying information across campus. MAGIC is supplying spatial information to a variety of user communities.

Usually, this means that I have to go to academic departments and determine how, given their particular computer configuration, they can best get at the data stored on HOMER–the Library's on-line public access catalog. A frequently asked question, or statement posing as a question, is, "It almost looks as if we won't have to go to the Map Library anymore."

There was a bit of tongue-in-cheek or gentle ribbing in this, but also some anxiety and, I think, a harbinger of the future. Although we are a long way off from the user not visiting the map library, we should begin to think about the virtual map library or digital geo-spatial library now, at the time when we are developing foundations. This paper explores the notion of the virtual map library as space, or in the current thought, the map library in cyberspace.

DIGITAL SPATIAL INFORMATION

Before I define cyberspace, I would like to compare digital geo-spatial information and maps with other types of analog spatial information and point out some differences and similarities.

The map is a carrier of spatial information in a graphic analog format. It is cartographic symbology, highly refined and very enriched; it has been a primary carrier of densely encoded spatial information for centuries (Other examples of analogical carriers of spatial information include air photos, well logs, guide books, telephone books, and censuses.).

Digital information as a carrier of spatial information is extremely mutable. Typically, we do not think of telephone books as carriers of spatial information but, of course, they are if the names are sorted by the address rather than by name. The telephone book as digital information is minimally three variables: NAME, ADDRESS, NUMBER. However, it can be expanded. The NAME is SURNAME, FIRST NAME, INITIAL. The ADDRESS is STREET NUMBER, STREET NAME, PLACE. The NUMBER is AREA CODE, LOCAL CALLING AREA, 4-DIGIT NUMBER. In a database, any of these variables can be used as a primary sort. In the case of the ADDRESS, the database can be mapped to a relational location on a street or in a region. The *Atlas of British Surnames* (Lasker & Mascie-Taylor) is an example of mapping surnames as point-distributed data using telephone books as a primary data source. Some 152 names, samplings for the study, are mapped in the atlas, and thousands more await mapping. The TIGER data, with their wealth of streets and address ranges, awaits the CD-ROM telephone book (and a very large machine) to map all McGlamerys, McClamerys, McClamorys, McLemores and so on

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who issued from that first mumbling John McGlamery settling on the pre-Revolutionary Calf Pasture River, Virginia.

We tend to think of maps when we think of spatial information, but that is a definition based on form rather than function. The primary function of the telephone book is to supply someone's number, whereas the secondary is to give an address. In our library the telephone books are filed at the general reference desk, not in the map library. Libraries tend to be categorized by form, hence: map library, microtext collection, music library (scores, sound recordings, etc.), serial collections. Maps are format specific not subject specific, so maps in libraries are organized into map libraries. In fact, there is much overlap–maps and atlases at the reference desk, microtext in the map library–as the budget allows.

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Digital spatial information can be used from many places at once. The data are not necessarily localized, and perhaps are not and never will be in a library. Perhaps the data are pulled from several places and blended at the synergistic whim of the researcher. Perhaps the output is a map, or a table, or a report. Perhaps there is no output other than a dynamic data stream as a cartographic display on the monitor screen; the ebb and flow of traffic density in an urban area; the shooting deaths in the nation; a Doppler radar feed of passing weather patterns . . . or all of the above. Is it a map? Pull the plug and it is only a dead screen.

MANAGING, ACQUIRING, STORING, AND PROCESSING

How then do we manage this information? How do we acquire, store, preserve it? And how do we provide reference services to it? In map libraries, we are beginning to grapple with these issues in the shape of geo-spatial information's voracious appetites. In the past three years, we have seen the minimal hardware requirements to service federally supplied spatial data go from 4 to 16 megabytes of RAM, from 100 to 300 Megabyte harddrives. We are anticipating 3,400 CD-ROMs of Digital Orthophoto Quads. Storing these disks will seem simple compared to providing reference and retrieval services to them.

In his book, *Redesigning Library Services: a Manifesto*, Michael Buckland provides a good description of electronic documents and the issues of the future of library services. His manifesto effectively examines the similarities and dissimilarities between the paper and electronic formats. The challenges to the future of library services, he notes, however, have to do with the locality, or the "where" of the library. In order for digital data to work at its highest and most efficient level, it must exist on a network. At the risk of taking advantage of a captive audience, I would like to read Buckland's challenges "into the record."

1. Since library materials in electronic form lend themselves to remote access and shared use, the assembling of local collections becomes less important. Coordinated collection development and cooperative shared access to collections become more important.

2. With materials on paper, having copies stored locally is a necessary (though not a sufficient) condition for convenient access. With electronic materials, local storage may be desirable but it is no longer necessary. Therefore, a catalog defined as a guide to what is locally stored becomes progressively less complete as a guide to what is conveniently accessible. The answer is to shift from catalogs to union catalogs or linked catalogs and to holdings data linked to bibliographies, thus reversing our usual perspective on catalogs as bibliographic descriptions attached to holdings records.

3. In the meanwhile, those to be served are changing their information handling habits. Paper and pen are being supplemented by desktop workstations capable of using a multiplicity of remote sources. This leads to an entirely different perspective: from library-centered world view to one that is user-centered.

4. These technological changes also invite reconsideration of the professional orthodoxy of consolidating academic library services. The view that a multiplicity of branch and departmental libraries is inefficient might well change. Under different conditions the decentralization of library service might well be regarded as an effective strategy by administrators as well as users.

5. The trend is to digitize everything for storage and manipulation: sound, image, moving images, text, and numeric data. Documents of all kinds are becoming more homogeneous in their physical medium. Limiting libraries to printed documents, or, indeed, written documents, makes less and less sense. If that demarcation dissolves, there is a blurring of boundaries. The function of the library, the computer center, and the telecommunications office are converging, overlapping, or, at least, more closely related. New patterns are evolving in the relationships between libraries, publishers, and the information industry. The roles of archives, libraries, museums, and other information stores seem likely to become less clearly differentiated.

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6. There is much greater opportunity to bring service to wherever potential users of library service happen to be. (Buckland 1992)

Taking up the challenges Buckland outlined assumes that the information resides on a network and that the user-centered digital library is a series of workstations linked to information stores. It is the information superhighway going to a space yet to be described, a space briefly sketched as cyberspace in the popular literature.

Cyberspace is a place of pure information, populated with software daemons and built of fiber optics, twisted pairs, mainframes, UNIX workstations; an infinite and diverse variety of evolving hardware platforms and operating systems. Our role as librarians must be to consider this possibility as we plan to create, in this virtual geography, a virtual map library. I think we will achieve this by adhering to and interpreting the verities of librarianship that is, acquiring information, describing information and interpreting information.

MAGIC

The decision to build a fileserver on the University of Connecticut's campus LAN was based on the challenges of Buckland's manifesto, a push from the Association of Research Libraries' GIS Project, and my belief in the ability of library science to solve information problems. MAGIC's hardware and software are basic, costing less than $10,000. The concept, however, strongly tests our solutions . . . and resolution.

MAGIC is a user-centered virtual library, designed to be used at the user's workstation. With 1.2 gigabytes of harddrive, MAGIC has a fair amount of space, but (true in any library) only if used judiciously.

Acquiring the data has been substantially more difficult than unpacking the TIGER disks from Government Printing Office (GPO) shipments. MAGIC provides various coverages of TIGER derived data from roads to 1980 census tracts, but only for Connecticut. Each coverage is processed

into MapInfo for Windows, MapInfo for DOS, and PC ArcInfo and ArcInfo export formats. The data is stored in ZIPPED format at the end of a series of subdirectories structured as a Library of Congress call number. For example the coverage of hydrographic data for Windham County, CT is: K:\G\3783\W5\C3\1993\U5\MAP_WIN\HYDRO.ZIP. Zipping the data requires that the user download (circulate) the data, creating, one hopes, a sense of space. The idea is that the library stores information, and the user comes to the library to get data. In fact, it cuts down on the I/O (input/output) on the MAGIC server, a significant factor with a five megabyte hydrographic data file.

Describing information in a catalog has always been a major component of library science. The user expects to use the catalog for standard library materials. Rarely does the user expect to use the catalog for non-standard material . . . such as maps . . . data. Once the user realizes the importance of an on-line catalog, it becomes a major part of his or her library research. The on-line catalog becomes a vital tool of the researcher's workstation, allowing remote access to the library's resources. At the University of Connecticut's Homer Babbidge Library, the spatial data files are being cataloged in the Library's HOMER catalog. The call number on the record refers the user to MAGIC Fileserver, G\3783\T6\P2\1993\U5, reinforcing the notion of the library. This virtual map library is open 24 hours a day, however, and available wherever a machine is connected to the campus LAN. In fact, the information is available via FTP to the world community. Describing the data in the MARC format in a conventional on-line catalog might not be the best (or most elegant) solution, but it affords me the opportunity to test and play with the concepts we will need to explore as the technology grows.

The on-line catalog becomes a vital tool of the researcher's workstation, allowing remote access to the library's resources.

Providing access to spatial data means much more than simply putting the data on the net. We will continue to work with all level of users, from the expert to the novice. From us, the spatial information expert needs data and data documentation and little else. The novice might need, in varying degrees, hardware, software, and education. The library should probably think not only of supplying simply data, but also the ability to manipulate data. I would like to think I am priming the pump by providing software to users until they can acquire their own.

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The MAGIC LAN as a fileserver is based on user access categories. There are currently four logins: MAP_WIN, MAP_DOS, MAP_USER, and REF_USER and ANONYMOUS FTP via the Internet. MAP_DOS allows low-level manipulation of spatial information on a 286 DOS machine. Not demanding of RAM or processing speed, it provides entry into the field for the general word processing user who has a first or second generation machine and is making the transition to a higher level of computational analysis. MAGIC supports five simultaneous seats of MAP_DOS. Manuals circulate from the map library. MAP_WIN, providing a higher level of spatial analysis, works best on a standard Windows 3.1 type machine. MAGIC supports two simultaneous seats of MAP_WIN. MAP_USER utilizes ArcView 1.0 in a very controlled Windows desktop. Also available are *Autoroute USA* and *Europe* and *DeLorme's Map Expert.* MAGIC allows ten simultaneous users of these products. Finally, read-only access to the data is available through REF_USER on the LAN and ANONYMOUS FTP on the Internet. Users simply need to take the data off the shelf and plug it into their own workstations, Unix or otherwise. To these expert users, the library is a storage place for large files which are better available on demand over the LAN than occupying valuable disk space.

SUMMARY

In summary, we must begin to think of the attributes of the virtual map library in cyberspace. It must be constructed to serve the information needs of the digital spatial information user based on the function of the information rather than the form. These needs are similar in type to the needs of the map user; the library continues to collect information, describe it, and provide access to it. The University of Connecticut's Map and Geographic Information Center, MAGIC, is using these three functional solutions to meet the challenges outlined by Buckland in his book, *Redesigning Library Services: A Manifesto.*

REFERENCE

Buckland, Michael. 1992. *Redesigning Library Services: A Manifesto.* Chicago: American Library Association.

AUTHOR'S POSTSCRIPT

Some further observations in light of developments since the *Map Library in Transition* conference: It has been eighteen months since *Mosaic* transformed the Internet and the World Wide Web by opening up a Pandora's Box of information resources. Last year NASA, NSF, and ARPA began the Digital Library Initiative. The cost of computers has reached a point where a basic machine has the computational power which a workstation had when this paper was presented. It is difficult today to buy a computer that is not capable of computer mapping or even analysis. Operating systems are on the verge of true muli-tasking. Desktop mapping and analysis software now come bundled with spreadsheets (for example, Lotus 1-2-3 bundled with AtlasGIS, Notes and Microsoft bundling MapInfo with Office). ❑

Transition in the World of Map Libarianship

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It is a pleasure to address you this morning. Over the past 15 years, I have gained a deep respect for the map librarian profession and for the cartographic materials and spatial data information that you provide. The topic of transition is near and dear to my heart, and as a historian, I was interested to see what happened on this day, in years gone by, that we could relate to today.

In 1873, in New York City, delegates from Columbia, Princeton, Rutgers, and Yale met to formulate the rules for American football. We, of course, meet today to discuss transition rules for spatial data collection management.

In 1907, the first plans for an International Court of Justice were announced. The Court was to be set up in The Hague, Netherlands. Today, The Hague is the home of the International Federation of Library Associations (IFLA), and I currently represent us as Chairman of the Geography and Map Section. My first IFLA meeting was in Montreal, Canada, and I am pleased to see several of our Canadian colleagues here today.

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