Community information covers a wide range of sources. It also serves many users, encompassing government, health and public safety organizations, businesses of all types, service organizations, tourist attractions, historical societies, and members of the public. In fact, communities are repositories of large amounts of heterogeneous information that need to be searched, read, explored, acted upon, updated, and that offer opportunities for collaboration and other forms of two-way communication. In the absence of digital library technology, most of this information is not easily accessible to members of the community or to those making inquiries from outside. Thus, the ability to browse, search, and acquire data is essential for the establishment of community networks.

Within Canada’s Technology Triangle (CTT) we are creating a community-based digital library called the CTT Community Network. The region of Waterloo (including the cities of Kitchener, Waterloo, and Cambridge), and the city of Guelph comprise the CTT; so named because of its con-
In the absence of digital library technology, information is not easily accessible to members of the community. The ability to browse, search, and acquire data is essential for the establishment of community networks.

Concentration of technology industries, universities, colleges, and businesses. The CTT has about 500,000 inhabitants living in both urban and rural settings.

Although a broadly based community network does not yet exist in the CTT, we are conducting many experiments to determine the feasibility of providing the level of service required. We have demonstrated through prototype applications that most of the software can be assembled easily from commercial components, an approach also advocated by Hecker [4]. Web browsers form the basic user interface for the system. A Web server provides the basic multiplexing function to assemble data from HTML, SQL, and multimedia databases for presentation through the browser. Our experiments show that our architecture is flexible enough to support growth in information services as requirements dictate. Here we highlight two aspects of digital libraries that require solutions specific to community networks: browsing for information and acquiring data.

Central to a community network is the capability to find information. Generally available searching and browsing tools developed for digital libraries must be provided, and the system must be structured so that information about the community can be searched separately from global information. SQL and multimedia databases storing community information can be linked to Web pages using commercially available software such as Cold Fusion [2] or LivePAGE [5]. Both types of databases can be searched on a community basis and the results presented through a Web browser.

Maps present an excellent tool to search in specific neighborhoods for community information or services. For example, a home-care application allows a local agency to assist a recently released hospital patient in finding suitable neighborhood volunteers to provide health care.

Through a map-based interface, geographic information is related to object-property pairs, where the properties can be many different types such as history, occupants, or real estate descriptions. Any of several commercial software systems, such as those supporting multimedia databases, spreadsheets, or image viewers, may be used to process and display the property values for one or more objects.

Whereas delivery of text-based information and forms for two-way communication is now well supported, delivery of maps for map-based information services creates a problem. Compressed image maps, such as those provided through GIF files with accompanying text, are not flexible enough for all the services we expect to offer. To solve this problem, we provide access to vector-based maps through a map engine, where the user has more flexibility in manipulating the image. Because vector-based maps are large, we download the map once, when the client first comes online. Further downloads occur as the map database changes. An interface to the map engine must be incorporated into the Web browser to provide a consistent look-and-feel for the client, and the engine must maintain a database structure that supports simple connection of map objects to applicable properties and their associated processors. Such a map engine is available in prototype form as a Web browser component and has been tested in commercial and tourist applications [1].

Although we believe we can provide the technology to support the community network, the system is only as good as the available information. The community must create an infrastructure to support the continued creation and maintenance of data. Local entrepreneurs have already established enterprises to connect businesses and individuals to the Internet, and to provide various Web services. These initiatives are strong indicators that many of the information gathering and presentation activities will also be viewed as business opportunities. The secondary school system has provided the initial leadership to start the process, and it can play an ongoing role to support the gathering of information from volunteer organizations and the general community.

The provision of information for a broadly based digital library provides students with real-world
experiences in subject areas such as English, business, graphic arts, mathematics, and the sciences. Over the last year, students at some Waterloo Region high schools have been gathering data about Blair, a historically significant local community, in preparation for presentation on the community network. The students have collected and presented information about the history and geography of the community from many different perspectives, even measuring the location of gravesites for presentation using the map engine. Their teachers have used this project to illustrate the integrative nature of this learning method. More recently these same students and teachers have approached local businesses with offers to develop local Web sites. Local businesses as disparate as banks and manufacturing companies have observed this integrative approach to education, and are encouraging its further development by providing financial support.

The prototypes for some services in the CTT Community Network involving maps and wireless communication, are complete and are now being deployed in the rural areas. The network will be expanded into the urban areas in the next year. The primary issues to be addressed are scalability, deployment, and client and supplier education.

Further information about the project can be obtained through the Web site (CTTnet.uwaterloo.ca/). This site contains references to over 600 community networks including the Blacksburg Electronic Village [3]. It also contains analyses of the functionality of many of the cited networks.

**References**


©ACM 0002-0782/98/0400 $3.50