

Engaging Citizens in Environmental Decision Making: Burlington, Vermont's EMPACT Project

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IN 1998 a Burlington, Vermont partnership of a branch of city government and several educational and environmental organizations received a “metro-grant” to develop a project for the U.S. Environmental Protection Agency (EPA) under its EMPACT Program. The partners included Burlington’s Community and Economic Development Office (CEDO), the University of Vermont (School of Natural Resources, Office of Computing and Information Technology, and College of Engineering and Mathematics), the Lake Champlain Basin Science Center (LCBSC), the Green Mountain Institute for Environmental Democracy (GMI), and the Vermont Monitoring Cooperative (VMC). This group had as its goals developing additional working relationships with other environmental organizations and creating a technological infrastructure for making time-relevant environmental data available to the public. One of the distinctive features of the Burlington EMPACT Program was to involve the public in determining the environmental monitoring programs that the partners should pursue. This level of public participation is part of a growing trend by government organizations to provide opportunities for deliberative public processes in many aspects of public policy and program development.

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The presumption of the national EMPACT Program was that providing time-relevant information about environmental quality was a key feature for engaging the public in discourse about environmental issues. Given the rapidly growing use of Web resources by the public, the Burlington EMPACT project chose to employ this technology to reach the public with data in a timely fashion so that it would be relevant to their daily routine. Our challenge was to provide accurate, time-relevant, easily understood, and publicly selected environmental information to the people of Burlington—and to get them to look at it.

This project objective lies within the broader need of engaging citizens in their environment and their community. The project coordinated its activities with a related project, the Legacy Project, which sought to determine what future the citizens of Burlington desired. Legacy, part of the broader Sustainable Communities movement, has four interrelated themes that formed the foundation for sustainability: environment, society, economics, and education. Thus, the Burlington EMPACT project contributed to at least one leg of the city's sustainability goal.

Since the early recognition of the social downsides of modern urban living, even in a prosperous society, social organizations and institutions have been struggling with the degradation of social identity within the family and community. The “lonely crowd” (5) or “familiar strangers” (95) referred to by sociologists is certainly fostered by the disconnected attitudes of many people within their social environment. Technologies (e.g., TV, Internet) have clearly played a role in diverting people from participating in activities in their local communities. This, in turn, may contribute to a lack of engagement in the life of the community, including its environmental quality. While some feel that modern urban life threatens the vitality of the community, others argue that urban social networks are of a different type. These networks/communities are formed not by spatial proximity but through work, recreation, and urban meeting places (clubs, theater, etc.) The question of whether the Web can help to build local community networks by providing feedback on local environmental conditions in an understandable way is currently being evaluated. This project provides one small indicator of that possibility. The approach taken in this project does not provide a rigorous test of the utility of the Web to build an engaged community; it provides only an anecdotal case informing the question. While we can evaluate the use of the Burlington EcoInfo site, we are unable to determine its role in changing people's attitudes and behaviors relative to environmental issues in the scope of this project.

Reisman et al.

Reisman et al.

Monti, Jr.

Baldassare

<<http://BurlingtonEcoInfo.net>>

A Program for Urban Communities

The EMPACT Program

The national EMPACT Program is described in detail in other sections of this issue. It described itself as “A New Approach to Providing Timely Environmental Information to Communities Across the Nation.” Our project took this description to heart. Through the project, we sought to provide answers to such questions as:

- What is the ozone level in Burlington this morning?
- Is it safe to swim at the beach today?
- How high is the ultraviolet radiation in Burlington’s metropolitan area today?
- Is it safe to drink water from the tap?
- What is the level of contamination in the groundwater at the hazardous waste site in Burlington?

The Burlington EMPACT Project

The project plan for the environment in and around Burlington where its residents live, work, and play was developed by a partnership of public and private institutions with a stake in both the environment and the quality of life in the communities that make up the greater Burlington area. The city, through the Community Economic Development Organization (CEDO), represented the public governmental organizations directly responsible for the city’s management. The University of Vermont (UVM), through its various units (School of Natural Resources, College of Engineering and Mathematics, and Office of Computing and Information Technology), provided technical assistance with monitoring and electronic communications. The Lake Champlain Basin Science Center (LCBSC) focused on its mission to engage youth in this initiative so that engagement with environmental quality would extend to future generations. The Green Mountain Institute for Environmental Democracy (GMI) provided consultancy relative to the public participation models used to access public opinion about what monitoring was most meaningful to the various “publics” in the Burlington area. The Vermont Monitoring Cooperative (VMC), an extensive partnership organization that conducts research and provides environmental data to the research, public policy, and management community, provided technical assistance with data management and historical data availability.

The direct project objective of these partners was to institutionalize a process for engaging citizens in developing environmental information accessible to a broad cross-section of residents and to use

that information to inform collaborative actions that address priority problems in the urban ecosystem. Recognizing the breadth of public and private organizations and institutions engaged in all aspects of this objective, the initial project partners sought to develop relationships with as many appropriate organizations as possible. These relationships were seen to be critical to the long-term sustainability of the product of the partners' work, the Burlington EcoInfo infrastructure. These relationships included: the Burlington Department of Public Works, the Air Division of the Department of Environmental Conservation, the Agency of Natural Resources of the State of Vermont, the CAMNET monitoring program of the Northeast States for Coordinated Air Use Management (NESCAUM), the Burlington Electric Department, the Sea Grant Program at the University of Vermont, the U.S. Geological Survey's water quality program at Englesby Ravine, and the Metropolitan Transportation Organization.

The approach taken for the Burlington project involved several components:

- developing a central environmental information resource
- increasing access to this information through the distribution of electronic kiosks and networking at existing information technology sites (e.g., libraries, tech centers)
- conducting environmental outreach and public surveys to determine levels of community interest in various environmental issues
- engaging a community advisory board (CAB) to assist the technical team with interpreting the public survey data and translating that data into additional monitoring programs
- engaging youth in environmental monitoring both as an outreach goal and as a way to develop additional linkages to the community.

Finally, the Burlington EMPACT partners committed to developing a project foundation that could be sustained beyond the project's funding period. This turned out to be a commitment that would need to extend beyond the life of the EMPACT Program, as the national program was discontinued with the change in administration after the 2000 presidential election. Finding an institutional home for the project required the identification of structures in the urban government and social complex that embraced more integrative functions. Quality of life and environmental issues transcend individual departments, such as transportation or water, and require broader connections with diverse agencies and public entities that have responsibilities for the many aspects of environmental quality (e.g., water, air, health, transportation, energy, land, social infrastructure, etc.).

Technology for the Community

Recent advances in communication technology (e.g., Internet, Web, wireless, cellular phone) promise to transform how society communicates, distributes information, and conducts many of its social transactions. How these will alter education, commerce, business, conditions of employment, standards of living, class equity, and almost all aspects of modern life is a subject of considerable speculation and debate. In the context of this project, this technology could be a part, however small, in the development of subcommunities in the “information city” that could help urban residents “reaffirm their cultural identity” (14) and counter the long-term trends in loss of community associated with urban life.

Low

In the Burlington EMPACT project, technology offered the ability to extend human/community senses so that knowledge of conditions and contaminants beyond the reach of the five senses could be ascertained—and thus be integrated into the daily lives of the citizens of Burlington. Knowing environmental conditions in a time-relevant manner allows individuals and the community to consider appropriate personal and political responses to those conditions. Successful grassroots organizations have mobilized around environmental conditions whose consequences included increased mortality, serious morbidity, and foul-tasting and foul-smelling water and air. However, when environmental contaminants that increase illness or reduce physiological efficiency (e.g., bacteria or ozone) are tasteless and odorless and when technical reports summarizing conditions are published many months to years after the fact, communities will be slow to mobilize. Building an accessible and interpretable environmental information infrastructure can provide communities with the necessary “sensing” to promote appropriate political responses and foster a new “environmental democracy.” The emergence of the technological urban industrial society coincides with “an environmental crisis on a scale not encountered in America before” (23). It seems fitting to use technology, which is largely responsible for initiating the problem, to make the urban dweller intimately aware of the consequences of urban culture.

Melosi

For the Burlington EcoInfo project, environmental “sensing” includes environmental monitoring, data telemetry, database development, and information distribution. The monitoring technology for many environmental contaminants has been available for many years. However, continued development of monitoring technologies has been motivated by the technical community, which has been appropriately more concerned with accuracy/resolution, quality control/qual-

ity assurance, regulatory compliance, and database infrastructure and compatibility issues than with public accessibility and data interpretation. To attempt to make existing technologies work more directly to inform the public, the project team combined technical expertise, civic infrastructure, and educational outreach to build an Internet-enabled environmental information system. However, before building the specific environmental monitoring components, the project team sought input from the public on what environmental parameters, or conditions, were of most interest to the community. This reversed the normal relationship between the technical community and the public, where experts on air, water, etc., usually determine the emphases and allocation of funds for particular environmental contaminants.

<<http://BurlingtonEcolnf o.net>>

Public Outreach

To build awareness of the project Web site and demonstrate the capacity of such a system, the Burlington EMPACT project conducted a major outreach campaign in fall 2000. Brochures were mailed to over 700 residents in the city, table tents were distributed to existing computer-access sites, project posters were displayed in key locations, and e-mail distribution lists were used to inform the public of the existence of this environmental information Web site. Public access television was also used in this effort. (See Figure 1.) The Phase I site was not comprehensive in its coverage of environmental data, but rather illustrative of the way that environmental information could be made available to the public. In spring 2001, additional press coverage on television and radio advertised the summer data, including ozone levels and beach closings.

Phase I of the project also sought to gather public input on environmental concerns and new monitoring. A written survey of youth and residents (520 surveys returned) was compiled and the project staff made presentations at 60 different organizations and public events, from the Chamber of Commerce, to Earth Day festivals, to neighborhood planning groups. The results indicated that air quality issues relating to traffic and water quality issues affecting the lake were the highest priorities. Sprawl and solid waste issues were also noted as high priorities.

The last step in Phase I was to form a citizens' advisory board to review the results of the public process and existing monitoring and to recommend to the project partners an expanded monitoring program. This advisory board consisted of 15 representatives of business, government, youth groups, nonprofit organizations, and representatives from each of the city's neighborhoods. After five meetings, the group reached consensus on two new monitoring programs

(storm water and CO/fine particulates) and agreed to serve in an advisory capacity during implementation. The group was expressly interested in monitoring programs that provided a feedback loop to affect local behavior related to the environment. For instance, a program monitoring storm water could show how residents' behaviors (e.g., disposing of animal wastes, having improperly designed roof and driveway runoff systems, and poorly maintaining drainage systems) could adversely affect water quality. Similarly, a carbon monoxide and particulate monitoring program could be related to traffic density and routing.

FIGURE 1
Sample Press Release

Now, there is a Web site where you can get accurate, timely information about beach closings, UV index, pollen counts, weather, and air and water quality in the Queen City.

Starting May 31, 2001, the Burlington EcoInfo Project <www.burlingtonecoinfo.net> will post up-to-date water quality reports for Leddy, North, and Oakledge beaches on the Web site. Any beach closings will also be noted. Beach bacteria counts are done each Monday and Thursday through the summer by the Department of Public Works.

Heading out for some summer fishing on Lake Champlain? Read the Vermont Department of Health's fish advisories before eating your catch. Beach goers and others will want to check on the daily UV (ultraviolet) index. Daily ratings are posted so people can take the necessary actions to prevent overexposure to the sun's rays that increase the risk of skin cancer and eye injury.

A Web Approach to the Dissemination of Time-Relevant Information

The partners chose to develop a Web site after a relatively quick consideration of the other time-relevant media alternatives (newspaper, radio, TV). The amount of information needing to be displayed,

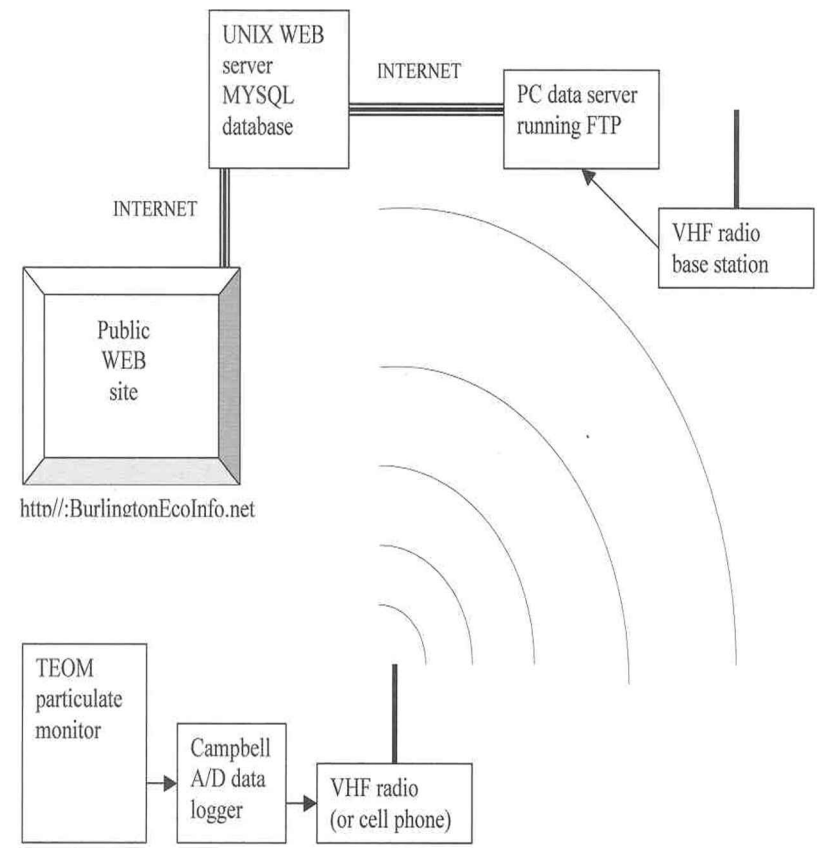
along with the desire to provide interpretation and education, logically led to a Web project. The large number of Internet users in the community and the option to provide additional access to community sectors with lower access made this choice seem appropriate.

The organizers chose a name and purchased a URL to represent the project, BurlingtonEcoInfo.net, in order to create an independent identity. However, the host server for all of the content was the University of Vermont Unix cluster, which guaranteed both server capacity and reliability through an independent staff. This arrangement freed the project staff from technical Web server concerns while allowing a non-university identity and project-relevant URL.

Time-relevant environmental data were sent by remote, automated telemetry from the monitoring instrumentation to the university's Web server. A Campbell Scientific data logger was attached to each monitoring device. This data logger has the capacity to respond to either a proprietary radio link or cell phone link initiated by a data server computer. This computer was located in a university laboratory that was centrally located to provide radio contact with data loggers at several remote sites. An FTP server running on the data computer allowed access by the Web server via automated scripts running on the UNIX Web server. These scripts periodically queried the appropriate data files on the data computer and moved the data to a MySQL database on the Web server. Interactive PHP3 scripts on the EcoInfo Web site then queried the MySQL database at the time of a request by a Web site visitor. This data telemetry model was used for all locally arranged monitoring data to provide a consistent and more easily maintained infrastructure. The data logger was able to collect both analog and digital information, thus allowing the greatest flexibility in interfacing with the wide variety of monitoring equipment encountered. (See Figure 2.)

Given both the partners' insights on what constituted useful time-relevant information, and the two new monitoring programs decided upon by the project's Community Advisory Board, the project team needed to implement a comprehensive approach to public data presentation of multiple environmental data streams. This presented the typical Web "portal" challenge of selecting the most important topics to make most visible. The Burlington EcoInfo Web site was designed and then redesigned to provide a simple interface. After a "Home Page" orientation, information access starts with either an environmental media orientation (air, water, land, energy) or a topic orientation (project information, speak out, youth, community, a Web cam, and a site map). Within each media group (e.g., air), a familiar "file tab" interface allows users to select "issues, indicators,

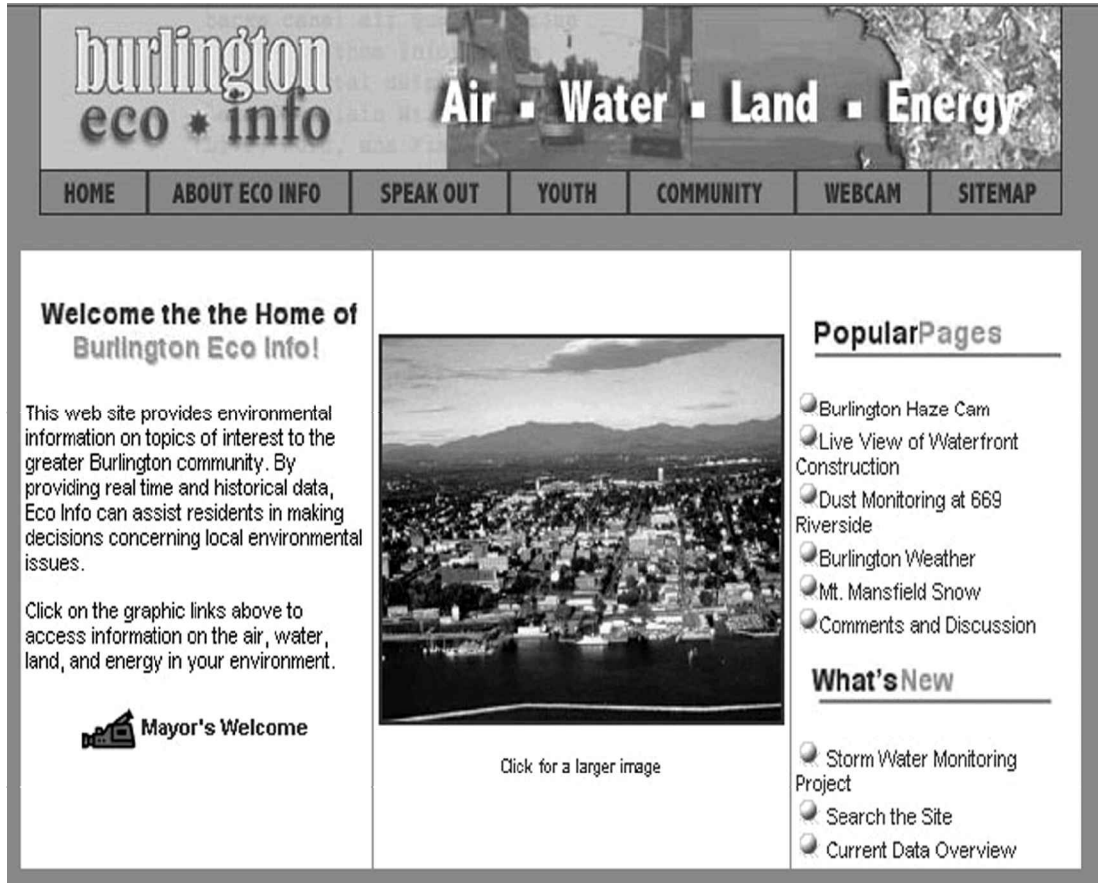
FIGURE 2
Schematic of Real-Time Data Flow from Air Monitor to Web Site



data, maps, take action.” The Home Page offers options to (a) learn about the project, including a welcome video from the mayor, (b) access some quick links, including a page with all the time-relevant data, (c) connect with a current issue, e.g., access news clippings, op-ed pieces, Water Resource Board reports, etc., on a current, local storm water issue, and (d) view live images, including a local Web cam viewing the waterfront and an overview vista of Burlington shared with the CAMNET haze/visibility project of a regional air pollution consortium (NESCAUM). (See Figure 3.)

The receiving end of the data dissemination goal requires convenient Web access by the public. A large number of people in the greater Burlington area are currently connected. However, not everybody has Web access. To increase access, the project team proposed developing and placing several Web kiosks in the Burlington area.

FIGURE 3
The Burlington EcoInfo.net Web Portal



This proved to be more difficult than was at first anticipated. While the technology of providing power and fast Internet access to Web kiosks at any possible location provided some technical obstacles, the growing availability of digital subscriber lines (DSL), cable modems, and 802.11 wireless options made this task more manageable. The greatest difficulty was in getting institutional agreement from organizations like the Department of Motor Vehicles, the local health center, the waiting room at the hospital, etc. At the time of this writing, only the University and Burlington's City Hall have agreed to allow the placement of a project Web kiosk.

In order to allow citizens to have an additional perspective on the meaning of their environmental quality, beyond standards and health risks, the project team felt that historical data would provide a perspective on environmental conditions. To implement this objec-

tive, the Burlington EcoInfo site was partnered with a data accessibility initiative through the Vermont Monitoring Cooperative (VMC), a regional environmental data consortium led by the Vermont Agency of Natural Resources, the University of Vermont, and the federal government represented by the U.S.D.A. Forest Service's Green Mountain National Forest. A data library housed on the VMC Web server at the university was made accessible through the EcoInfo site, employing a user-friendly interface. Visitors to the site could view data on a weekly, monthly, or annual basis, or from a period of their choice. Currently, the data is automatically loaded into the long-term data library at prescribed intervals.

Youth Education

To help create a more knowledgeable and environmentally literate public, educating young people about the Burlington environment was also a high priority of the Burlington EMPACT project. Supporting and enhancing school and public programs of the Lake Champlain Basin Science Center was a key part of this strategy. An environmental monitoring curriculum for grades 7-12 was created to include testing for phosphorus and *E. coli* bacteria. The curriculum included a two-hour, site-based environmental monitoring school program that uses the University of Vermont's research lab, water quality monitoring teacher workshops, a field sampling component, and a water quality classroom kit. A storm water monitoring program for high school teens that is part of a larger job training program was also supported. The teens collected data every two weeks for the city's Department of Public Works and posted the data to the Web site. At the end of the year, the teens presented their results to the public (on local public access television). While these programs involved the latest technical developments in water quality analysis, the interface with the public used traditional field and laboratory approaches.

State-of-the-art media technology was employed to promote the environmental quality educational message. Through a collaboration with the University of Vermont and the Lake Champlain Basin Science Center, the project developed an interactive public exhibit about research and the monitoring of key local environmental conditions. Using DVD technology, the "EcoDetectives" exhibit gives the user options to follow nine researchers through their investigations, to learn more about the issues, and to conduct their own experiments. Four exhibit stations were built and installed at the Science Center in the University of Vermont's Rubenstein Ecosystem Science Laboratory on the Burlington waterfront. (See Figure 4.)

FIGURE 4**An EcoDetective Station to Explore Environmental Issues**

The hope of the youth education component of the project was to build environmental literacy in the local public. Students would help engage parents and friends in their work and in the environmental data available through the EcoInfo Web site. In addition, students who stayed involved and grew interested in environmental work might become the next generation of leaders.

Engaging the Community

The degree to which the Burlington EMPACT project met its goal of engaging the public in their environmental future is difficult to determine. The project was not established with an experimental design, and thus rigorous evaluation was not possible. Given the uniqueness of the Burlington area and its community, extrapolation of

any outcomes is also probably not legitimate. Thus, the effectiveness of this program in achieving its goal remains a descriptive and anecdotal process.

Many individuals and civic groups were contacted as a result of this work. As noted above, many students and youth groups were also targeted to receive environmental training or were informed of the EcoInfo project. In addition, to implement the project, many local, state, and federal government organizations were contacted and some partnerships were established. Finally, the public was engaged through the use of the EcoInfo Web site. The number of unique accesses by visitors gradually grew to several thousand per week. No attempt to connect with the visitors to the site was initiated, so the reasons for, frequency of, and use of the site were not evaluated.

The interest in and acceptance of the EcoInfo Web site appears to be growing. Over the long term, the site could become a regularly visited place, like the Weather Channel, as was our intent. In order to assess the ability of the Web to both inform and engage the public, a formal survey methodology will probably be necessary. We can only say that the site is being used on a regular and consistent basis.

Conclusion

Technology's impact on society is largely unregulated and often unanticipated. The impact of the car on the American landscape or the role of TV in changing social relations and popular culture are prime examples. Using technology to address social needs may also not yield calculated end results. As Martin Melosi notes, "The use of various technologies to remedy urban problems, therefore, is often immersed in profound contradictions" (146). The Burlington EMPACT project sought to use monitoring telemetry and Web technology to build public environmental awareness, and through this heightened awareness, develop a more environmentally engaged community that would promote management and policies beneficial to the quality of life of Burlington's residents. Achieving this goal is a long-term process, well beyond the two- to-three-year duration of the EMPACT funding. With the discontinuation of the national EMPACT Program, projects such as those initiated in Burlington, Vermont cannot be easily sustained. Without a local home or sponsoring organization, the technical infrastructure cannot be supported. Thus the long-term impact of this technological approach will require many more years before a conclusion can be drawn. However, some questions and observations resulting from this work might prove useful to future endeavors.

The broad topical reach of the project including air and water quality, land-use issues, and energy put the project into a no-man's land in the bureaucracy of local and state government. Who is responsible for more integrative and cross-disciplinary issues in the urban community? In a country like France, there is a Ministry of Culture, which, by its stated goal, must reach across many aspects of community life. A recent model for urban planning, Curitiba in Brazil, has a single, lead planning agency through which all projects must pass for development and planning. Economics, social services, health, transportation, environmental affairs, etc., must all coordinate their efforts through this planning process. However, in many American cities, integration of municipal activities is difficult. Where in Burlington could such an organization be found? In which department should the EcoInfo project be housed? City government is typically distributed over many separate departments. Only in the Mayor's Office and, to some extent, the Community and Economic Development Office (CEDO) could integrative functions be considered. Not a management agency like Public Works, Housing, or Health, CEDO was not a long-term home for such an endeavor. Even among the NGO community, a logical home for such a project was not apparent. Many of the advocacy and educational organizations are issue-oriented, e.g., Lake Champlain Committee, Vermont Institute of Natural Science, Vermont Audubon, Watershed Associations. The most integrative organization, the Lake Champlain Basin Program, had a larger spatial interest extending over many municipalities. It is a primarily EPA-funded pollution-focused organization and, as such, much less involved in local civic issues.

While the technological objectives of the project were relatively easy to implement, the longer-term community objectives are much more difficult, especially given the absence of the appropriate structures in local government and NGOs. However, technological advances like the Web may provide the hooks and links to create a greater sense of integration within a strongly departmentalized structure like City Hall. Web-enhanced awareness of other departments' activities can provide the "common goal" linkages so essential to integrative planning. In implementing the EcoInfo site, many cross-departmental meetings at the local and state level were needed. As a result, the site contains information from many organizations. Thus, the EMPACT project continued to push organizational integration, possibly an important prerequisite of designing and building sustainable cities.

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