

Major Lessons

This project resulted in an understanding of the characteristics that distinguish Web-based projects from more traditional forms of application development. Following are the basic lessons we learned about using the WWW as a channel for service delivery.

This is new kind of service, not just a new technology. It is very easy to think of the WWW exclusively as a new technology. It is far more useful to think of it as a new kind of service for government organizations to offer to the public. WWW services combine several traditional functions (such as publishing, information gathering, business transactions, data search and retrieval, and others) into a single form of presentation. This ability to integrate services and information from many organizational units and programs means that WWW services need to be guided by enterprise-level strategies and managed by teams with a broad range of expertise. Web services have some unique characteristics that require special policy, management, and technical attention. The most obvious of these is the speed of technological change and the rapidly expanding variety of tools and technologies that come into play. A less obvious, but perhaps more important, characteristic is the completely public nature of the interaction between an agency and WWW user. There is no selection process that brings a user to the service. In theory, anyone, any time, any where can have access. The service can be linked to others without permission or knowledge. Material can be copied, distributed, and used in ways that have neither been planned for nor expected. This characteristic gives the Web its excitement and vitality, but it means a new way of thinking for most government organizations.

A Web site is a dynamic public representation of an agency and its programs. It needs to be developed and managed as a major organization-wide initiative. Clearly defining the business needs that the Web service will support and its relationship to the overall agency mission is key to this effort. The World Wide Web offers an organization the opportunity to present a wide array of information and services from a single entry point. To be most effective, this presentation needs to reflect the customer's point of view rather than the agency's underlying structure. Such an integrated approach to information and service delivery will require the participation and dedication of a broad cross-section of functional units within the organization. This is most likely to occur when the Web service supports well-defined program objectives linked to the agency's larger mission. Top management needs to understand and give ongoing attention to the unique nature of this service in order to deploy the necessary organizational resources, define key roles and responsibilities, and manage both internal and external expectations.

It is easy to underestimate the managerial and technical complexity of Web-based services. Web-based services generally come with a high degree of public visibility (unless access to the site is purposely limited to a select group). Presentation, ease-of-use, accuracy of content, good graphic design, and overall attention to detail become far more important than in an application designed for in-house use only. Moreover, since Web-based technologies change so rapidly, it is impossible to lay out a comprehensive detailed application design ahead of time, accompanied by a highly structured implementation plan. Instead, the Web site is most often incremental—developed in pieces, with one part building on another. The process is also often iterative, where staff members learn things at one stage that cause them to return to earlier work and revise or refine it. Team members need to be comfortable with a non-structured project approach and at the same time have a very clear understanding of their roles and the project's purpose, thus ensuring that activities are continually moving in the direction of project goals. Finally, it is critically important that policy, technology, and management considerations all receive serious attention. Avoid concentrating attention in only one area.

The technologies and standards employed in Web-based service delivery change continually and new products and tools are introduced almost every day. It is important that the team remain flexible and open to new ideas. They also need time for basic learning and development in a number of new technical specialities. Identifying and selecting technology appropriate for the agency's environment and for the service objective can be a significant ongoing learning and development process.

Web-based services can be expensive. Even the smallest projects demand substantial human, technical, and financial resources. Because it is easy to use, people often tend to underestimate the cost of developing an effective WWW service. Many agencies are surprised when they add up the amounts that they have spent in developing their service. Personnel and technical infrastructure costs tend to comprise the bulk of expenses. The cost of such items as WWW development tools and WWW servers is usually small compared with the human effort to define and develop the content of the service and the base level of computing and networking that needs to be available in the agency. In addition, advanced features, such as direct access to agency databases, require customer and technical support that may dramatically increase the cost of hosting the WWW site and operating

the service. These advanced services may also require hosting the WWW server in-house, raising the cost substantially over those applications that can be outsourced.

Managing information content is the most fundamental, and often the most difficult, aspect of developing and managing a WWW site. Information content is the heart of a Web service. In choosing information content, agencies need to look for (or create) material that satisfies both a clear service objective and is accessible to a well-defined intended audience. This means identifying the source(s) of information to be presented, deciding the best format for that content, and taking account of the ability of customers to access the Web. Often agencies have a great deal of information that could be made available on a Web service, but it needs to be reformatted or "reengineered" to take advantage of the linkages, search features, and navigation aids that the Web provides. In this process, existing constraints on the use of information (e.g., security, confidentiality, copyright, Freedom of Information requirements) also need to be reviewed and managed. Links, the feature that gives the Web its unique power, need to be carefully considered, implemented, and monitored. Devising and adhering to a consistent style of presentation and navigation are also necessary to help users take advantage of the content. Additionally, the ongoing management and updating of content must be considered. Those who create, provide, and maintain the needed information need to be active participants in the information management process.

Information management in a Web environment can be especially difficult for two reasons. First, the rendering of agency information on the Web often means re-working information that was most likely created in another format, for another purpose. Second, it is unlikely that the Web-based version of that information is the only version needed. It is usually necessary to maintain the same information in two or more formats for different audiences. Keeping the content up to date and consistent is a detail-oriented, labor-intensive undertaking.

Effective Web-based services demand appropriate computing and communications infrastructure. The condition of an agency's existing infrastructure can present a significant threshold barrier. Infrastructure for Web-based services includes both desktop and server hardware and software, and local and wide area networking. Even agencies with well-developed networks and network-based applications encountered infrastructure problems since most of their experience was limited to internal customers, using a common set of computing tools, for well-defined internal purposes. They needed to understand more about the open architecture and protocols of the Internet, the unpredictability of use and users, and the need to respond to a wider variety of customer-initiated demands for information services. The most common infrastructure limitation in the project agencies was the technology available on the desktop. Staff responsible for Web service development and operation, for information content development, and for customer services all faced similar gaps in the technology available for their use. They often did not have powerful enough PCs, Internet browsers or authoring tools, or access to the Internet. These gaps severely limited their ability to take advantage of the Web for either internal use or for service delivery.

The use of the Web presents new public policy issues and casts existing information policies (especially those related to access and intellectual property) in a new light. A clearly stated Internet service policy can help focus agency-wide efforts to create and manage this service. It helps ensure that appropriate organizational resources are provided and cross-organizational efforts are encouraged and supported. New York State has adopted an Internet Use Policy to guide agencies in using the Internet to deliver services to citizens. Agencies also need to create specific policies and practices of their own to take best advantage of this powerful new tool for their particular needs. The New York State policy includes a model that agencies can follow in developing their internal policy guidelines. In addition, some traditional information policy areas take on new meaning when the Web is involved: Freedom of Information, copyright, records management, and security need to be re-evaluated in light of the WWW and its capacity to distribute and present information to both known and unknown audiences. Ironically, most participants believed that the lack of a strong information policy framework was a positive factor in their projects. It gave them significant, necessary latitude regarding the focus and content of their services, especially since there was so much new territory to explore. However, most agreed that such a framework, based on both principles and experience, is needed to guide the future of networked services.

Security considerations are important, but manageable. The most common WWW applications (information and referral, downloading documents, e-mail forms, internal searches of a site) have few security risks. At the beginning of the project, security risk was perceived to be the most significant barrier to Internet use by public agencies. As experience was gained and research conducted, security was placed in a larger context and in more realistic perspective. While some Web-based applications entail major security risks (such as giving the public access to internal databases), the typical agency starts out with low-risk applications such as information dissemination and e-mail. In either case, there are many management, policy, and technology tools that public managers can employ to mitigate and manage the risk of unwanted intrusion into their data, networks, and computing resources. Rather than shy away from the Web as a security risk, agencies should actively educate themselves about both the risks and tools for managing them.

Much basic information and many technical tools needed to create and manage a Web site are available at low or no cost on the Internet itself. Practically anything an agency needs to know about using the WWW or developing Web services is readily available on the Web itself. White papers, tutorials, style guides, discussion groups, software, indexes, search tools, and many other resources are easy to find and investigate. Perhaps most valuable is the ability to find and explore applications that other organizations have developed to meet similar objectives. It is easy to find best (and worst) practices and to emulate and borrow from others.

Value of the project

In addition to the lessons presented above, the Internet Services Testbed produced valuable results for both the project participants and the broader community of people interested in using the WWW for public services.

Value to state and local government

- The project identified a series of management, policy, and technology barriers that public sector managers should consider in their planning and development efforts. The barriers are best described as the accumulated wisdom of the agency personnel who faced the realities of trying to create a Web service within a complex organizational and technological environment.
- The project resulted in four practical tools to support agencies in their efforts to use the Web as a service delivery mechanism: a World Wide Web Starter Kit, the Recommended Practices document, a cost/performance model to help estimate the cost and return on investment for Web services, and an online Internet Security Seminar. As a result, New York State now has the distinct advantage of a comprehensive set of best practice tools to guide any state or local agency through the process of Web service design, development, and management. All four products are available on the CTG Web site (<http://www.ctg.albany.edu/projects/inettdb/ismn.html>).

Value to the testbed agencies

In addition to the larger benefits listed above, the Testbed agencies gained valuable insights and tangible results.

- Six state agency Web site prototypes were created and are being put into production, all on a faster schedule than would otherwise have been possible. Prototyping has allowed the agencies to more easily refine their Web sites and to establish regular procedures for updating their services. The agency Web sites can be found on the WWW at the following addresses:
- The Testbed workshops and other group activities generated a supportive network of colleagues likely to continue to share knowledge and experiences in the future. This should further enable the agencies to explore Web-based services, especially opportunities for integrated service initiatives.
- Participating agencies began to understand new user-oriented ways of managing and organizing information. The definition and design tools used in the Testbed helped agencies articulate and refine their service goals, intended customers, and resource needs and to view the WWW as a new service delivery mechanism rather than simply a new technology.
- Organizational analysis tools used in the Testbed helped agencies recognize the need for a wide range of skills and responsibilities on their development teams. This tended to expand the size and scope of the agency teams which ultimately enhanced their ability to develop effective service-oriented Web sites.
- Technical presentations and hands-on tutorials gave agencies concentrated exposure to and practice with new technical tools. This helped them better understand the capabilities and limitations of several kinds of hardware and software. It also allowed them to consider vendor options and cost comparisons before committing to significant purchases.

Value to corporate partners

- Corporate partners presented their products and technical insights to the Testbed agencies in a series of formal and informal workshops. Subsequently, hundreds of public officials viewed the results of the application of these tools in the public demonstration and the prototype Web sites.
- This project also gave corporate partners the opportunity to better understand government's needs and

concerns with regard to Internet services. Delivering services via the WWW in a government setting raises important questions of equity, access, and responsiveness. Government budget cycles are such that agencies must often take a more incremental approach to Web-based services than their counterparts in the private sector. Hence, corporate partners began to understand how best to package their products and services for this market.

Value to the university community

- The Center successfully developed, tested, and evaluated a new Testbed methodology. This methodology involves several agencies applying a particular technology to their individual program goals within the context of a shared workshop and peer-support environment. It allows more agencies to participate in projects without compromising the quality of the investigation or the results. Since project results are based on a variety of agencies, they are more generalizable to the larger public sector than are the results of projects that focus on a single agency.
- Project results constitute a data set for faculty research and doctoral dissertations in the Information Science program. The data gathered from this project will represent the core findings of one dissertation and will serve to enlighten CTG's ongoing commitment to the refinement of our IT assessment methodology. In addition, the cost/performance model that was developed from the Testbed is the first such tool to be developed for use in the public sector.
- Graduate students gained experience in project management, teaching, and consulting, including opportunities to present technical material, act as mentors for agencies, and organize major portions of the project agenda.