
Delivering on the Web:
The NYS Internet Services Testbed

Project Report 96-1



**Center for Technology in Government
University at Albany / SUNY**

**This report is available on the CTG Web site
as a downloadable document.
It is located at**

<http://www.ctg.albany.edu/resources/pdfrwp/istfnlrp.pdf>

Note: It is the nature of the Web that links move or
become inactive over time.

The URLs provided in this report were all active and
relevant in December 1996.

Delivering on the Web:

The NYS Internet Services Testbed

Theresa A. Pardo
David R. Connelly
Sharon S. Dawes

Project Report 96-1

December 1996

Center for Technology in Government
University at Albany
Albany, NY 12222
phone: (518) 442-3892
fax: (518) 442-3886
e-mail: info@ctg.albany.edu
<http://www.ctg.albany.edu>

© 1996 Center for Technology in Government

The Center grants permission to reprint this document provided this cover page is included.

Table of contents

Executive summary	5
Project overview	9
Current environment	9
The Center for Technology in Government project.....	12
NYS agencies go online.....	18
The seven project agencies and their initial goals	18
Evolution of agency goals	19
Barriers to developing and delivering Web-based services	26
Management barriers	26
Technology barriers	29
Policy barriers	32
Practical tools for Web site development	35
Developing & Delivering Government Services on the World Wide Web:	
Recommended Practices for NYS	35
WWW Starter Kit.....	37
Cost/performance model for assessing WWW service investments.....	38
Online seminar on internet security topics	42
Developing and delivering Web-based services: lessons from the field.....	43
Major lessons.....	43
Value of the project.....	57
References	50
Appendices	
Appendix A. Project participants.....	51
Appendix B. Project timeline	54
Appendix C. Home pages of the six prototype Web sites	55
Appendix D. Related products	61

Executive summary

Government is all about information and service delivery. The World Wide Web, offering virtually unlimited access and almost instant feedback, seems perfectly suited for government work. By transcending time, place, and distance, the Web removes barriers that often hamper effective service. For these reasons, most government organizations are eager to use the Web to deliver services to citizens and to conduct internal business. However, the Web abounds with examples of premature, ineffective attempts to take advantage of its power to visualize and communicate information. Developing a service delivery strategy that incorporates the World Wide Web is neither simple, nor straightforward, nor inexpensive.

In late 1995, dozens of New York state and local government agencies identified a long list of learning objectives that became the agenda for the Internet Services Testbed Project at the Center for Technology in Government. Over the first six months of 1996, the Center worked with seven state and local agencies to assess the feasibility, costs, and benefits of Web-based services. The agencies included:

- ◆ Empire State Development, Office of Motion Picture & TV Development
- ◆ Governor's Traffic Safety Committee
- ◆ Hamilton County & the NYS Performance Measurement, Reporting, & Improvement System Project
- ◆ NYS Division of Housing and Community Renewal
- ◆ NYS Division of Military and Naval Affairs
- ◆ NYS Office of Alcoholism & Substance Abuse Services
- ◆ NYS Office of Real Property Services

The project activities were focused in two areas. First, to develop, test, and evaluate prototype Web sites for each agency and to identify the technology, management, and policy barriers they encountered and the lessons they learned. Second, to develop practical tools, based on the project experience, that would assist other organizations in their efforts to provide Web-based services. The project resulted in four such tools, all available on the CTG Web site (<http://www.ctg.albany.edu/projects/inettb/isgmn.html>).

- ◆ Developing & Delivering Government Services on the World Wide Web: Recommended Practices for New York State
- ◆ World Wide Web Starter Kit
- ◆ Cost/Performance Model for Assessing WWW Service Investments
- ◆ Online Seminar on Internet Security Topics

Six of the seven agencies successfully completed prototype Web sites during the project. Five sites were released on the Web by August of 1996, with the sixth following in January of 1997. The development and evaluation process uncovered a number of obstacles that the agencies worked to overcome. Those barriers and the key lessons learned are the main focus of this project report.

Barriers to developing Web-based public services

Management barriers. Overall, the management barriers encountered were more severe than the technology and policy barriers. Participants believed that these barriers resulted from a lack of understanding on the part of management, that the Web is a powerful but extremely complex new approach to providing services to customers. The lack of clear programmatic goals and organizational roles and responsibilities were significant barriers to success as was the sheer number of organizational units and individuals that needed to be involved in these efforts.

Technology barriers. The agencies faced a range of barriers as they worked toward establishing a technical environment to support the delivery of Web-based services. They dealt with technical infrastructures that were inadequate to support development of Web-based services. They also faced a new and rapidly changing product market. In addition, they found they had little relevant in-house expertise and insufficient time to develop it.

Policy barriers. Overall, policy issues represented the weakest barriers to project activities. The lack of internal policies, in fact, allowed a wide range of freedom in selecting objectives for Web-based services and in selecting and presenting content. However, the participants expected policy issues to become significantly more important in the future. First, as more sites come on line, the linkages among them are likely to raise policy questions related to data sharing between programs and agencies. Second, as individual sites mature, they will move beyond information dissemination into more transaction-oriented areas where policy questions about documentation, ownership, authenticity, privacy and other concerns will become critical.

Lessons from the field

The project produced key lessons about defining, developing, and managing Web-based public services.

This is a new kind of service, not just a new technology. The 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.

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.

It is easy to underestimate the managerial and technical complexity of Web-based services. Complexity stems from several sources: a high degree of public visibility, rapidly changing technologies, the need for incremental and iterative development processes, and the tightly interwoven threads of policy, management, and technology concerns.

Web-based services can be expensive. Because it is easy to use, people often tend to underestimate the cost of developing an effective WWW service. Even the smallest projects demand substantial human, technical, and financial resources. Personnel and technical infrastructure costs tend to comprise the bulk of expenses.

Managing information content is the most fundamental and often the most difficult aspect of developing and managing a WWW site. This activity entails selecting content that satisfies a clear service objective and making it accessible to a well-defined intended audience. Often existing information needs to be reformatted or “reengineered” to take advantage of the linkages, search features, and navigation aids that the Web provides. It is also usually necessary to maintain the same information in two or more formats for different audiences.

Effective Web-based services demand appropriate computing and communications infrastructure. The condition of an agency’s existing infrastructure, especially on the desktop, can present a significant threshold barrier.

The use of the Web presents new 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. Both statewide and agency-level information policies need to be evaluated and refined in order to fully employ the data sharing and business transaction capabilities of the Web.

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. Other applications (such as providing public access to internal databases) entail major security concerns. However, rather than shy away from these applications, agencies should 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 including other sites, white papers, tutorials, style guides, discussion groups, software, indexes, and search tools.

Project overview

Government is all about information and service delivery. The World Wide Web, offering virtually unlimited access and almost instant feedback, seems perfectly suited for government work. The Web can remove barriers that often hamper effective service. Rural communities are as easily reached over the Internet as any large city. Federal rules and regulations are as accessible in rural Montana as they are in Manhattan. State capitals, separated from citizens by long distances, no longer seem so far away. Local governments, with fairly modest effort, can reach much larger audiences both within and beyond their borders.

A public organization's internal information functions can also improve when the Web becomes the delivery mechanism. It can be used by agency staff to link remote offices to central agency databases, to link agencies with their suppliers and contractors, and to exchange information with other agencies and levels of government.

For all these reasons, most government organizations are eager to use the Web to deliver services to citizens and to conduct internal business. Flexibility in serving citizens and the ability to transcend physical and temporal boundaries are strong incentives for government to adopt this new technology. However, new tools bring with them new issues. Government's success in using the Web will depend as much or more on its ability to grapple with policy, management, and organizational challenges as it will on its ability to adapt to new technologies.

The current environment

The Internet has been described by William Gibson, creator of the term "cyberspace," as "...nothing less than this nation's last and best hope of providing something like a level socio-economic playing field for a true majority of its citizens." Others have asked if Web sites are nothing more than "...monuments to bureaucratic egos." As with most things, the truth probably lies somewhere in between. (Harris, 1995)

Electronic networks have become an increasingly important means of communicating in our society. The World Wide Web has progressed almost overnight from a scientific endeavor to the next supposed "revolution" in world history. A few years ago, government agencies used networks to

simply transfer data and text. Today the Web is quickly becoming the second home of federal, state and local government information. The “electronic town hall” is popping up everywhere. Internet-based government services can be accessed by customers 24 hours per day through commercial network services such as America Online or CompuServe, or through community networks. However, there is very little experience to date in using the Web as a service delivery channel and the traditional methods that agencies use to define, design, and develop information systems may not work in this highly public, networked environment.

Many public sector organizations are experiencing pressure to develop a Web “presence” on the Internet. In some cases, the pressure comes from the program staff who see an opportunity to enhance existing services or to deliver new services to customers. In others, it comes from the technical staff who see the possibilities afforded by these new technologies. In still other cases the pressure comes from agency leaders who see the importance of opening this new door to the public. In the ideal case, it is driven by all three: agency leaders, program staff, and technical staff working together with a shared vision of the opportunity and a shared understanding of the costs and risks.

Government services on the World Wide Web

What can government expect to do on the Web? Which services currently provided in person, through the mail, and over the telephone may become electronic services? How much business will move to the net? Will duplication remain a problem? Steven Clift, Director of Minnesota’s Northstar public access project, suggests a long list of services that state, federal, and local governments can provide over the Web. (Clift, 1996)

State

- ◆ Personal income tax filing
- ◆ Voter registration
- ◆ Motor vehicle and drivers license registration
- ◆ State park reservations
- ◆ Higher education class registration
- ◆ Job services, including job searches and training
- ◆ Birth and death records
- ◆ Occupational licensing

Federal

- ◆ Income tax filing
- ◆ Post office transactions, change of address etc.
- ◆ Social security and passport applications
- ◆ Medicare and Medicaid benefits
- ◆ Housing and loan programs

Local

- ◆ Library cards
- ◆ Pet licenses
- ◆ Payment of city fees or fines
- ◆ Property taxes
- ◆ Building permits
- ◆ K-12 school needs
- ◆ City ordinance permits

While these lists are not exhaustive, they do illustrate the wide variety of service options that the Web offers government. Citizens using these services would no longer be constrained by regular business hours and would be able to save the time of visiting various offices. Government saves by receiving information in structured digital form, thus reducing duplication and labor intensive processing. In the face of shrinking budgets, a technology that offers so much potential value has enormous appeal to government, citizens, and businesses alike.

Certainly the Web has the power to alter the way government interacts with the public. Everyone can tell a story about visiting five offices only to be told they must return to the first office they visited to fill out a form that the last office visited needs. The vision of government services on the Web would eliminate this seemingly age old problem. Everyone from job seekers, to drivers renewing licenses, to entrepreneurs looking for a business permit would simply go to one central point in cyberspace and fill out the proper electronic form. The relevant information would be dispersed to the various agencies involved in the transaction and all services would be provided electronically. In New York State, the Governor's Task Force on Information Resource Management is investigating an interface to government services through a "life-events" scenario, first introduced by the US Postal Service. Using this kind of interface, you could activate a button called "Recently Moved into the Area" and be prompted through a set of interactive screens that would allow you to register a car, contact the local schools, and learn more about your new community. While full implementation of this idea may be years away, the technology to build it is here today.

Web-based services demand more than new technology

Proposing and establishing a Web service is much more than arranging the proper technologies. Management and policy decisions are just as important to success or failure. According to Rick Schremp of the University of Colorado, "The thing we have to start recognizing is that cyberspace must be content-driven rather than technology-driven." (Harris, 1995) The issue here is not whether the technology is available to accomplish such a

vision—it is here, or at least coming very quickly. The more difficult and fundamental question lies elsewhere—do we have or can we develop policies, management tools, information products, organizational structures, and business processes to take advantage of this technology and direct its use to achieve important public goals? Will departments be willing to share pertinent and timely information? Will agencies be willing to relinquish solitary control over programs? Can traditional hiring and training practices allow the public work force to acquire and maintain new skills? Can information itself substitute for the person across the counter?

Government must also face the realities of regulating the use of this new medium. As access to the Internet increases so do the security risks. Every day, government deals with sensitive data regarding millions of citizens. As more and more agencies connect to the Web this information is potentially available to those never intended to access it. Other issues go well beyond security. The printed word now exists in a new medium which many of our laws and accepted practices do not contemplate. “Sunshine” laws may need revision. Copyright takes on a new meaning in cyberspace. You need only envision a public library that functions online to imagine all the difficulties that emerge with traditional notions of intellectual property.

Cost is another significant issue. A recent discussion on a government publications listserv focused on the cost of developing and managing a Web site. The reported cost of development ranged from \$2,500 to \$500,000. (Evans, 1995) Annual operating costs fell into an even broader range. Clearly, too little is known about how to estimate and manage the costs of Web-based services.

Rick Schremp argues that “Cyberspace isn’t a technology problem. It’s the solution that will enable government to continue to economically deliver vital services like education, social services, and adequate health care while making the interface between government and citizens easier and more rapid no matter where those citizens happen to live.” This brave new world of government service delivery may well come to pass, but it will demand significant changes in policies, practices, and expectations.

Center for Technology in Government project

Each year, the New York State Forum for Information Resource Management (the Forum) surveys its members to identify the topics and issues that most concern them as information professionals and public managers. The 1995 survey results showed that four of the top five issues were related to the Internet. In response, CTG selected the Internet as the context for a major project and worked with the Forum to define its goals.

To formulate objectives and priorities for this project, CTG and the Forum brought 170 people together in a workshop called “New York State on the Internet.” The attendees, representing state and local government and the private sector, helped craft an agenda for CTG’s Internet Testbed Projects. Participants focused on management, policy, and technology issues associated with using the Internet. They identified potential benefits and barriers to government’s use of the Internet, and defined some of the deliverables of the Testbed Projects.

The major expected benefits of using the Internet to deliver government services included the ability to provide ubiquitous access to vast amounts of information, eliminating duplication of data and effort, providing one-stop services to citizens, and making government services available 24 hours a day, seven days a week.

Security, both internal to an agency site and on the network itself, was identified as a major obstacle to making effective use of the Internet. Other identified barriers included lack of experience in managing networked information resources, resistance to change, and lack of knowledge about how to measure costs and benefits.

Finally, the participants identified learning objectives and products that would help the agencies progress in their use of the Web as a service delivery mechanism. A methodology was called for to identify customer needs and the potential of the Web to meet those needs. Staffing, standards, management approaches, sound information management practices, security measures, and cost and performance measurement were identified as important issues for exploration. The workshop participants wanted guidelines for design and implementation of Web-based services, recommendations for security measures, an analysis of possibilities for cross-agency data sharing and service integration, and an identification of products or services that should go on state contracts.

Using the workshop results as a framework, CTG issued a call for participation in an Internet Services Testbed in the late fall of 1995. Ten agencies applied for participation in the program. Seven agencies were selected and the project began in January 1996. These agencies were interested in reaching a variety of constituent groups through the World Wide Web.

- ◆ Empire State Development, Office of Motion Picture & TV Development
- ◆ Governor’s Traffic Safety Committee
- ◆ Hamilton County & the NYS Performance Measurement, Reporting, & Improvement System Project
- ◆ NYS Division of Housing and Community Renewal
- ◆ NYS Division of Military and Naval Affairs
- ◆ NYS Office of Alcoholism & Substance Abuse Services
- ◆ NYS Office of Real Property Services

The project team included other government and academic partners:

- ◆ NYS Archives and Records Administration
- ◆ NYS Forum for Information Resource Management
- ◆ NYS Department of Health
- ◆ NYS Department of Transportation
- ◆ Local Government Telecommunications Initiative at Hudson Valley Community College
- ◆ University at Albany faculty and staff
- ◆ CTG staff and graduate assistants

The project team was supported by nine corporate partners:

- ◆ AT&T
- ◆ Digital Equipment Corporation
- ◆ EMI Communications Corporation
- ◆ Eric Elgar
- ◆ Microsoft Corporation
- ◆ Silicon Graphics
- ◆ SUN Microsystems
- ◆ Unified Technologies

Digital Equipment Corporation provided software and training for Digital's Workgroup WebForum product used for communications among project participants. EMI Communications Corporation, Digital, Eric Elgar, Microsoft, Silicon Graphics, SUN Microsystems, and Unified Technologies all provided technology awareness presentations, including those presented at the Security Day Seminar in April 1996. Additionally, SUN Microsystems provided a firewall system in CTG's Government Technology Solutions Laboratory. AT&T's donation of multi-media workstations to CTG in 1995 provided platforms for both hands-on tutorials and demonstrations of the agency Web sites at the public demonstration.

Project objectives

The Web, because of its accessibility and visual appeal, has a special allure for all kinds of people and organizations. As a result, many people seem to make premature investments in a "Web presence" without fully understanding why, how, and for what benefit they might do this. The decision to provide services over the World Wide Web is, like other information technology (IT) decisions, a complex and expensive one. The project therefore followed a methodology designed to mitigate the risks associated with major IT investment by the public sector.

Often, technology enables the creation of new products and new processes that are substantial improvements in terms of quality and cost over other ways of doing the job. A well-accepted principle in IT management states

that successful technology applications flow from aligning the technology with the programmatic or business objectives of the organization. In order to reap the benefits of strategic technology applications, it is necessary to take a comprehensive look at the technology and the environment where it will be applied. The Center worked with the seven agencies to conduct this kind of assessment.

The project activities were focused in two areas:

- ◆ the development, testing, and evaluation of prototype Web sites for each of the participating agencies. Throughout this process, CTG worked with the agencies to identify the technology, management, and policy barriers encountered as well as to identify lessons they were learning,
- ◆ the development of practical tools, based on the project experiences, that would also assist other organizations in their efforts to provide Web-based services.

Project workplan and participant roles

Figure 1 shows the five phases of the project which included workshops, technology awareness seminars, and home-base assignments.

Ten events, including seven workshops, were conducted throughout the Internet Services Testbed Project. Each workshop focused on a major component of the development process. The workshops reflected the collaborative and cross-organizational nature of Web-based work. Electronic communication among project participants and access to the Web itself was provided by CTG through Internet access accounts with the Capital Region Information Service of New York (CRISNY). Digital Equipment Corporation provided group collaboration software that all participants could use to share ideas, questions, and discoveries.

Table 1 presents the variety of resources provided by public and private sector partners in support of the Internet Services Testbed Project. CTG coordinated the workshops, provided presentations and exercises in the workshops, and developed the practical tools with the assistance of the project agencies.

Figure 1.

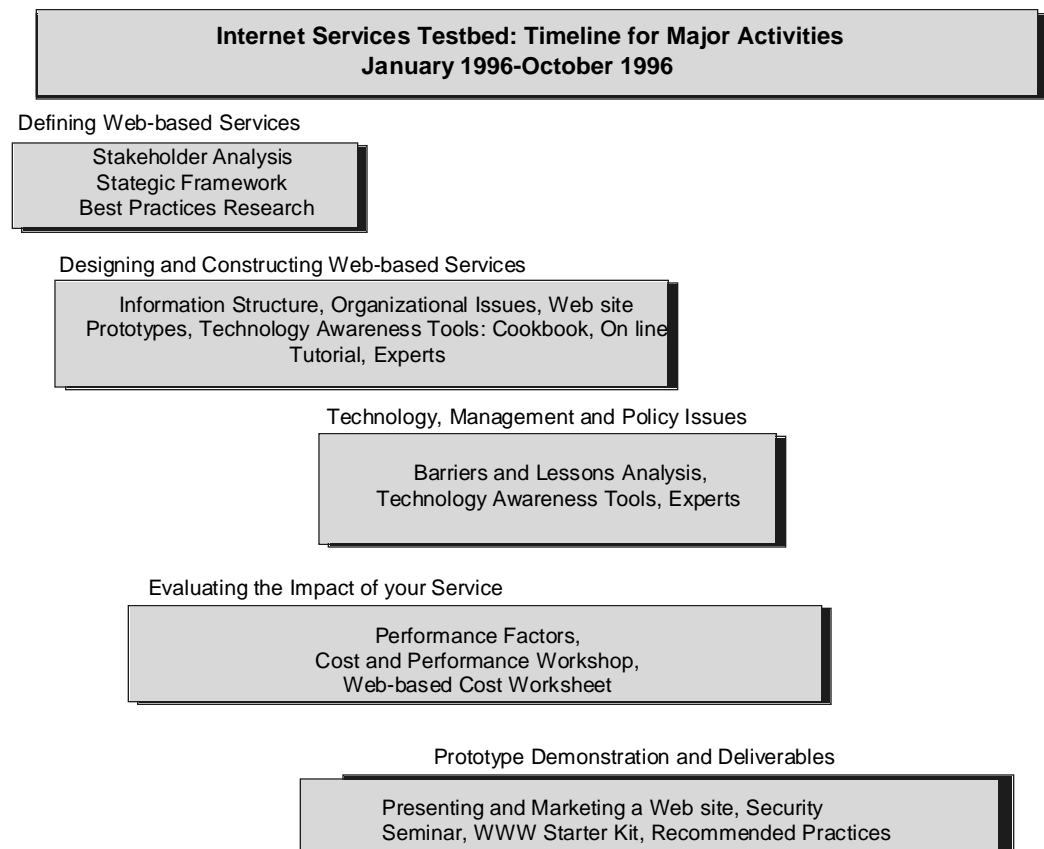


Table 1. Internet Services Testbed Project Milestones & Resources

October 6, 1995	Kickoff Workshop - Forum Network Services Committee & CTG Internet Testbed Project	<ul style="list-style-type: none"> • Local Government Telecommunications Initiative (LGTI) • State Archives and Records Administration (SARA) • NYS Forum for Information Resource Management • Department of Health • Office of State Comptroller • Town of Ramapo • NYNEX
January 8, 1996	Project Initiation Meeting	<ul style="list-style-type: none"> • Dr. Anthony Cresswell, School of Education, University at Albany
February 8, 1996	Strategic Framework for Internet Services	<ul style="list-style-type: none"> • Dr. Anthony Cresswell • NYS Performance Measurement, Reporting, & Improvement System Project • Digital Equipment Corporation • Capital Region Information Service of NY
March 14, 1996	Designing your Agency Web Site	<ul style="list-style-type: none"> • Governor's Task Force on IRM • LGTI
March 28, 1996	Web Server Options	<ul style="list-style-type: none"> • LGTI • SARA • University at Albany, University Business Systems • EMI Communications
April 2, 1996	Security Day Seminar	<ul style="list-style-type: none"> • NYS Department of Health • Digital • Microsoft • SUN Microsystems • Unified Technologies
April 11, 1996	Web Site Tools	<ul style="list-style-type: none"> • Silicon Graphics • NYS Forum for IRM • SUN Microsystems
April 25, 1996	Internet Connection Options	<ul style="list-style-type: none"> • LGTI • University at Albany, School of Business
May 25, 1996	Firewalls and CGI	<ul style="list-style-type: none"> • Sun Microsystems • Unified Technologies
June 6, 1996	Cost and Performance Modeling	<ul style="list-style-type: none"> • Dr. John Rohrbaugh, Dept. of Public Administration and Policy, University at Albany
June 20, 1996	Public Demonstration of Results	<ul style="list-style-type: none"> • Empire State Development, Office of Motion Picture & TV Development • Governor's Traffic Safety Committee • NYS Division of Housing and Community Renewal • NYS Division of Military and Naval Affairs • NYS Forum for Information Resource Management • NYS Office of Alcoholism & Substance Abuse Services • NYS Office of Real Property Services • AT&T
September 1996	Distribution of <i>Recommended Practices</i>	<ul style="list-style-type: none"> • Governor's Task Force on Information Resource Management

NYS agencies go online

The seven project agencies and their initial goals

The range of services that can be delivered with Web technologies is as varied as the agency programs themselves. The seven agencies in the Internet Services Testbed reflect the wide range of program areas that can take advantage of the Web. For many of the participants, the project offered the first opportunity to experience the Internet. For all, it was their first opportunity to experiment with the Web as a service delivery mechanism. Their initial project goals are outlined below:

- ◆ Empire State Development, Office of Motion Picture and TV Development (MPTV). MPTV planned to use the Internet as a marketing tool to showcase New York State and its resources for film and television producers. The Internet site would show locations and identify facilities and services available statewide. The site would deliver multi-media information illustrating the diversity and desirability of New York State sites as production locations.
- ◆ Governor's Traffic Safety Committee (GTSC). The Committee sought to focus on public information and education about highway and vehicle safety by developing Internet services such as online consumer information about car seats, licensing, rules of the road, accident reporting, and vehicle inspection and repair.
- ◆ Hamilton County and the NYS Performance Measurement, Reporting, and Improvement System Project. The staff of the NYS Performance Measurement, Reporting, and Improvement System Project were taking steps to implement a Center for Employment Related Education and Literacy (CEREL) within the University at Albany's School of Education. Project staff and county officials planned to construct an electronic bulletin board and private communications system for providers of adult education, training, and workforce preparation services to share client and program data. A main component of the electronic bulletin board would be a directory of services accessible to both service providers and customers.

- ◆ NYS Division of Housing and Community Renewal (DHCR). DHCR's Internet services plan included access to the agency's policies, laws, codes, court decisions, guidelines, fact sheets, and program applications. The project would also develop access to the agency's major databases (such as building and apartment information) and would link to other federal, state, and local housing resources. The agency also planned to explore the Internet as a way to disseminate software to program constituents.
- ◆ NYS Division of Military and Naval Affairs (DMNA). DMNA planned to explore five services including communications of local government requests for emergency and disaster assistance, transmission of vehicle emissions control data between DMNA facilities and the Department of Motor Vehicles, marketing of leasable DMNA facilities to paying customers, marketing recruiting opportunities in the military, and providing labor rates for construction projects for state agencies.
- ◆ NYS Office of Real Property Services (ORPS). The ORPS project plan included dissemination of information for taxpayers and communications and information sharing with local assessors and County Real Property Tax Directors. The project would also explore publication of large documents and automated publication of database information in addition to developing an ArcView or ARC/Info tool to publish geographically-based clickable image maps.
- ◆ Office of Alcoholism and Substance Abuse Services (OASAS). OASAS hoped to explore the use of the Internet for a variety of mission critical operations but would begin with a prototype Web page to demonstrate the utility of this technology to key customers. For purposes of this demonstration, OASAS selected the functions of its Bureau of Communications and Community Relations which has the principal responsibility of providing education and information services to both internal and external agency staff as well as the general public. The objective was to increase awareness and use of those information resources.

The evolution of agency goals

The project proceeded in a series of workshops where the participating agencies worked together and individually on service definition, development, refinement, and evaluation. The project methodology was designed to guide them through a process of aligning Internet technologies with the programmatic objectives of their organizations. The result was a multi-faceted analysis of each proposed project and in some cases major rethink-

ing of the original proposal and its feasibility given organizational and programmatic realities. A brief description of each of the tools used is presented in Table 2. A more detailed description can be found in Making Smart IT Choices on the CTG Web site (<http://www.ctg.albany.edu/resources/smartit.pdf>).

Table 2. Tools for Web Service Development Used in the Testbed		
Tool	What is it?	How it was used
Stakeholder Analysis	A structured assessment of the main logic of a program or systems initiative.	Stakeholders for each agency service objective were identified. The benefit to each stakeholder group was assigned. Analysis of the resulting benefits to each stakeholder group resulted, in some cases, in a clarification of mismatches between service objective and intended stakeholder as well as mismatches between stakeholder group and expected benefit.
Strategic Framework	An analysis of the internal and external factors that an organization must consider to achieve a compelling program or service objective.	Agency teams used the strategic framework in group sessions at the workshop, as well as in internal planning sessions. The result in some cases was a complete rethinking of the service objective for the project. In other cases, the tools served to focus the group on particular objectives and as a key piece of information in communication efforts with management.
Best Practices Research	Best practices research may take many different forms but the ultimate goals are the same- to learn from the experience of others and to avoid "recreating the wheel" or replicating mistakes that others have made.	Agencies conducted best practices research during project start-up and throughout the prototype development activities to identify the following: sites with similar objectives, sites with useful features, mistakes to avoid, and contacts in the webmaster community.
Information Structure	A graphical depiction of the structure and content of the Web site. (Including intended or possible links.)	Agencies used the graphics to focus group understanding on the structure and scope of the information and services to be provided and to test understanding of the information or processes represented. Through a process of review and refinement the structures were fine tuned into tools that were used as maps to guide the development of the sites.
Organizational Issues Questionnaire	A checklist for identifying and assigning traditional and newly evolving organizational roles and responsibilities.	The questionnaire was given to agencies to support their efforts in identifying the new responsibilities and roles their agencies would need to consider and to assist the participants in identifying the necessary skills.
Cost & Performance Model	A model is a small scale simplification of the problem being addressed, usually in the form of a system diagram, a set of equations, or a computer model (the simplest of these is a spreadsheet); used for "what if" analyses.	A cost and performance modeling workshop was conducted with all project participants. The participants identified cost and performance factors and brainstormed about costs for a range of implementation levels.
Technology Awareness Tools	Technology awareness activities are designed to acquaint participants with the capabilities and limitations of particular technologies.	Technology awareness was enhanced during the project through presentations and supporting materials on a variety of technologies ranging from basic presentation of information to the use of virtual reality as a navigation aid.
Prototyping & Presenting the Site	A prototype of a system is a quick-and-dirty implementation of a portion of a potential technology solution.	Agencies presented their Web site prototypes during the project workshops to gather feedback from colleagues. The prototypes served to increase awareness in the home agencies by initiating discussions of the effect of the proposed system on the organization: agency users, technical support staff, mainframe or other existing information systems, and internal and external customers.
Evaluation	A structured process of data gathering and analysis to assess outcomes and other results.	Participants brainstormed a set of barriers and lessons during one of the workshops. They were then asked to indicate the level of severity of each of the barriers and the value of each of the lessons learned in a survey questionnaire. Follow-up interviews were conducted with each agency team to elaborate on the survey responses and to evaluate the methodology employed during the project.

Over the course of the project, most of the agencies revised their service goals and changed the membership of their development teams. Virtually all of these adjustments were made in response to new insights gained during the workshops and the subsequent development work taking place in each agency. Six of the seven agency teams completed prototype Web sites (their home pages are presented in Appendix C) and all participated in the evaluation phases of the project which focused on barriers encountered and lessons learned.

Each of the seven agencies was engaged in a project which involved an innovative approach to delivering service. The tool set, selected from among the tools used at the Center to support sound IT decisions, was chosen to provide full coverage of management, policy, and technology considerations. Table 3 shows how the tools contributed to an integrated framework for innovation.

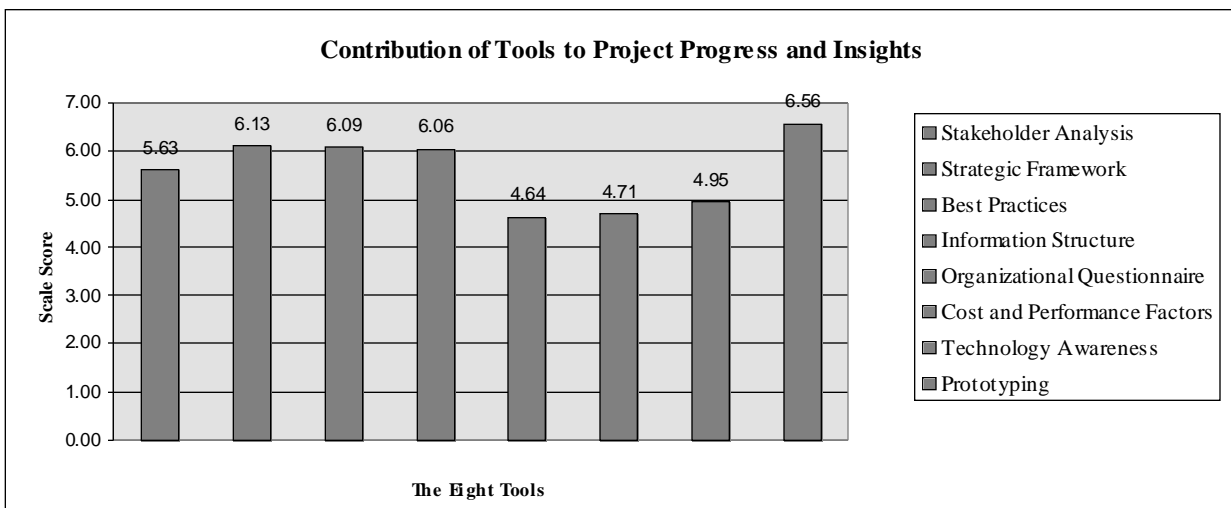
Table 3. Focus of Planning and Development Tools used in the Testbed Project			
Tool	Technology	Management	Policy
Stakeholder Analysis		√	√
Strategic Framework	√	√	√
Best Practices Research	√	√	√
Information Structure		√	√
Organizational Issues		√	√
Cost and Performance Factors	√	√	
Technology Awareness	√		
Prototyping	√	√	√

The agency participants represented a wide range of technology, management, and policy skills and background. We therefore expected that the tools would stimulate different actions and insights in each agency. To explore this expectation, a survey and group interviews were conducted at the end of the project. The survey was designed to identify the overall contribution of each tool to the progress of the project and the insights gained by the project teams as a result of using each tool. The interviews, conducted as a group with each project team, were designed to assess the value of each tool in assisting the participants to identify and overcome barriers.

All of the tools were highly rated by the agency teams. As Figure 2 shows, every tool was rated 4.64 or higher on a seven-point scale. In general, however, these results suggest different types of tools were useful for different reasons. Prototyping and presenting the site appeared to make the

greatest overall contribution to project progress and insight. The next group of tools (specifically, the stakeholder analysis, the strategic framework, best practices, and information structure) received similar scores and together helped agencies establish a vision and develop a plan of action. The organizational issues questionnaire, cost and performance model, and technology awareness events make up the third group, which participants identified as having relatively less impact on their projects. Overall, the use of prototyping and the set of planning tools provided consistent value across all the teams. The remaining tools varied in their value, which we attribute to their applicability in the specific agency environments.

Figure 2.



Prototyping

“Prototyping is the only way to develop a Web site.” All of the project teams supported this statement made by a member of the OASAS team. Prototyping and presenting sites for the purpose of gaining shared understanding, for critical review, and for generating support was highly valuable to the six project agencies that created a Web site. DHCR, for example, used prototyping extensively and found it to be a very effective method of introducing agency management to the Internet and getting approval for the project initially. “We found prototyping to be the best way to generate enthusiasm within the program areas for the project and to give program liaisons a concrete idea of what it was we were trying to accomplish,” was how one DHCR team member described their use of prototyping.

Unfortunately, the Hamilton County team did not have the opportunity to use prototyping to paint a picture that would generate clarity and support. The Hamilton County team was unable to produce a prototype to present to the Hamilton County Gateway Committee to build support. The team saw this inability to create a tangible focus for the committee’s attention as limiting their ability to get critical support for and feedback on the project.

The commitment to a public date for a presentation was identified by several of the agencies as being a primary motivating factor in the development of prototype sites. “Deadlines make things get done” was how one agency put it, another stated that it “forced them to stay focused.”

Producing the prototype for public presentation resulted in different approaches to maintaining focus on development. Three agencies adopted the use of a “quiet room” for their teams. The “quiet room” allowed the staff to remove themselves from their regular work location and to focus on the prototype. A second approach, considered less desirable, but also effective in maintaining focus, was to invest personal time in the development of necessary skills. Several agency staff stated that it was not unusual for personal resources to be invested in project start-up activities. However, they further stated that this was more necessary in this project than in previous projects. In some cases, agency participants invested their own dollars into reference materials and software to support the development process.

Stakeholder analysis, strategic framework, best practices, & information structure

Several teams indicated that they worked iteratively among these four tools. For example, the stakeholder analysis provided a list of customers to be served by the information structure and the strategic framework identified an approach or innovation that had to be investigated using best practices. Most teams reported that they recognized the value in revisiting these four tools on a regular basis, both as a Web site team and with their various managers. However, they also identified limitations in their ability to do so.

Those agencies operating under a top management edict to “get us on the Internet” found it particularly difficult to get managers to pay attention to the results of these planning and design tools, let alone participate in their use. One team, however, used the stakeholder analysis to respond with focus to this kind of directive. The team used the stakeholder analysis to narrow down the project to a reasonable size by forcing the “for who” and “for what purpose” questions. They consistently maintained that specific answers to specific questions were required before they could produce meaningful results.

These tools spoke primarily to the management and policy issues faced by the project teams. Who is being served, who is responsible for the affected service area, and what content must be deployed to provide service? A number of the teams identified early on through the use of these tools that they did not have the appropriate participants on their project teams. ORPS for example, returned to the agency after one workshop and brought program staff onto the team. DMNA added a systems person to their team. A number of the agencies added the public information office to the team.

Getting agencies to understand the content issues associated with the Web site was accomplished through the use of the information structure at several of the agencies. DHCR used it to identify overlapping information areas; at OASAS it allowed the Web site to be conceptually complete. Using this tool allowed everyone involved to “see” the whole and it helped them work as a team.

Organizational issues questionnaire, cost and performance factors, and technology awareness activities

Feedback on the value of these tools reflected the varying environments in which the agency teams worked. GTSC found the organization issues questionnaire to be primarily a reporting exercise as they had previously addressed the roles and responsibilities related to their site. However, they indicated that the small size of their organization might be the reason for their having addressed this sooner than others did. They further stated that it “enlightened” them to the fact that the success of the project rested on a small number of people.

ORPS, in the midst of the creation of a new group to address Internet issues, found the questionnaire to be “extremely helpful” in that it defined issues that needed to be considered. One agency did not use it at all, but instead adopted the “build it and they will come” approach. They felt it was most important for their management to support the service approach and, having accomplished that, to have management designate organizational roles and responsibilities.

The cost and performance factors workshop was designed to develop a cost/benefit analysis of Web-based service delivery. Several of the agencies explained their lower rating of the value of this tool as the consequence of having been given marching orders to “get us on the Internet.” The nature of these projects—developing prototype applications with emerging technologies—generated little demand from management for comprehensive cost/benefit analysis. However, most of the agencies expected that the maturation of the prototypes into fully functional service delivery mechanisms would depend on their ability to use this or a similar tool to present costs and benefits in support of further resource allocations.

The technology awareness events were also of varying value to participants. The DHCR team, for example, was made up of MIS staff who had been experimenting with HTML. The online tutorial in HTML was of limited value to them. However, they found the more advanced technology awareness activities to be very valuable in helping them establish a technology vision for their Web site. “Educated everyone as to the usefulness of the software,” was the opinion of one agency. “Who do we mean when we say ‘everyone?’” was one question posed when planning technology awareness events. Involving management in high level technology awareness events was suggested by one agency as a way to have managers share in establishing a technology vision in addition to a program vision. However, this can be a two-edged sword. One agency reported their management was disappointed in the simplicity of the prototype produced. The managers expected the agency team would develop a site on the order of CNN.COM or MSNBC.COM.

We found that the value to the agency of the technology awareness events had little to do with the size of the agency. Both large and small agencies found some value in even the most basic technology presentations.

Barriers to developing and delivering Web-based services

The CTG project team worked with the agencies throughout the project to identify the barriers they encountered and record the lessons they learned as Web service developers. Time was set aside in each workshop to discuss these issues. The agency teams also participated in a brainstorming session to identify and classify the barriers they encountered in their work. These items became the basis for a survey distributed to each participant and an interview with each agency team. The survey and interview results provided insight into the barriers the participants found most significant. This section discusses their assessment of these management, technology, and policy barriers.

Management barriers

Overall, the management barriers encountered were more severe than the technology and policy barriers. Participants indicated that these barriers resulted from a lack of understanding on the part of management that the Web is a powerful but extremely complex new approach to providing services to customers.

Management Barriers to Web-based Services
Lack of appreciation for the complexity of the task
Lack of clear organizational roles and responsibilities
Lack of clear program goals
Need to coordinate and communicate among an unusually large number of units

Lack of appreciation for the complexity of the task

The number one barrier to developing Internet-based services was the lack of appreciation for the extraordinary complexity of the task. This complexity is comprised of several factors: new forms of information presentation and management, new technical tools, and the fact that offering Web-based services to those outside the agency means adopting a new way of working together inside the agency. The project agencies reported that the

managerial complexity of this project was greater than in any of their previous experiences.

Developing Web-based services required the involvement of a cross-section of people from the public information office, the network services staff, the MIS staff, the program staff, and others. Success required identifying stakeholders who can benefit from the availability of Web-based services, defining the appropriate services, marshalling the appropriate organizational resources, and developing the guiding policies—all while mastering a suite of new technologies. Most participants were frustrated by the simplistic picture most people had of a “home page” in contrast to the complicated reality they were trying to harness in order to create Web-based services.

Lack of clear organizational roles and responsibilities

Most of the agency teams were initially made up of technical staff. However, these teams quickly discovered that representation from other areas of the agency was critical to project success. The complex nature of Web-based services required a cross-agency development team and a management team which included technical staff with a variety of skills, program staff with an understanding of the agency’s customers and service objectives, public information staff including graphic designers and editors, as well as top management. Early in the project a number of the teams returned to their agencies and recruited additional staff from these areas to ensure the required mix of skills. Once these players were identified however, the lack of clear organizational roles and responsibilities presented a new barrier to both development and ongoing management of the Web service. Agencies had difficulty determining who had responsibility for identifying information to be placed on or collected by the Web service. They encountered problems in determining who set the priority for material to be created or converted to Web-based formats. When the Web service was intended to cross program boundaries, it was difficult to establish who played a contributing role, who played a coordinating role, and who arbitrated disputed territory. All these are symptomatic of more far-reaching organizational change and service integration that the Web makes possible, but does not necessarily make easy.

Lack of clear program goals

In several of the agencies, the project was set in motion by the MIS staff who wanted to explore the networking opportunities afforded by Internet technologies. These agencies faced the challenge of getting management support for their efforts. In other agencies, the process was set in motion by a directive from management to the MIS staff to “get us on the Internet.” In these cases, the technical staff were unprepared to identify service

goals to guide their efforts and needed to convince program managers to become involved. The best practices reviews that agencies conducted early in the project taught them that sites that serve no real service objective quickly become stale and are a disservice to themselves and their customers. These teams were faced with both the need to respond to management's desire for a "home page" and their growing realization that they needed much more than a home page to be effective.

The selection of a target audience, service goals, appropriate content, level of interactivity, and the new ways staff would interact with customers over the Web are all management-level decisions and all of the project teams had some difficulty getting the appropriate managers on the team. At the project demonstration in June, a visitor pointed out that agency managers would never authorize a database application without being clear about what program area it would specifically support. However, many MIS groups say they are being asked to implement Web sites without similar guidance. As a result, the sites are unfocused or focus and content are being chosen by the technical developers.

Need to coordinate & communicate among an unusually large number of units

Whether initiated by a management directive or a technology visionary, a Web site must be established within an organizational context. Since a Web-based service required involvement from across the agency, staff who had not traditionally worked together on projects had to learn to collaborate with and trust one another. One participant noted the reversal of his agency's usual decentralized approach to a more centralized one due to the need to coordinate among the many staff involved in the effort. Another said that a success factor was getting a team who can "ignore the typical barriers between technical and policy types...get folks (on the team) who work well together, who are willing to share knowledge and experiences... and really work together to get something out there." In order to do this, team members must begin to communicate about and coordinate their work. One participant told us "We are used to operating up and down in our smokestacks. We know a lot about our own tunnels. But Internet technologies are in between - they cut across all of that - we have to communicate in between and up and down, and outside the agency as well."

A further challenge was the sheer amount of time that this level of coordination activity requires. In many cases, the project participants noted the challenges they faced in trying to carve out time in their already overloaded schedules to ensure that the necessary communications were taking place.

Technology barriers

The agencies faced a range of barriers as they worked toward establishing a technical environment to support the delivery of Web-based services. They dealt with technical infrastructures that were inadequate to support development of Web-based services. They also faced a new and rapidly changing product market and found they had little relevant in-house expertise and inadequate time to develop it.

Technology Barriers to Developing Internet-based Services
Lack of expertise and the time necessary to develop it
Need to know so many new technologies
Constantly changing and growing product market
Inadequate technical infrastructure

Lack of expertise and the time necessary to develop it

The leading technology barrier identified by the project participants was the lack of existing expertise in Internet technologies and the limited amount of time available to them to develop it. Although the project teams were constituted primarily of technical staff, these individuals, like many government technical professionals, were unfamiliar with Internet technologies. One project participant, the MIS Director at a mid-size agency, stated “traditional MIS skills were not appropriate” to make determinations regarding the technical options available. The traditional skills of systems management, design and development, and network design and management did not provide the expertise necessary to analyze and evaluate options related to Internet technologies. Prior experience in technology applications did provide a general framework for learning about Internet technologies, but the specific skills and knowledge gained through more traditional uses of technology was to a great extent, non-transferable.

A second participant noted that “due to the nature of Internet technologies our ability to build upon previous knowledge was much less than in other projects.” One agency reported that its technical staff was only able to stay “a half-step ahead” of the public information staff in providing technical support for desired features of the agency Web site.

To be successful, participants realized that they needed to build and maintain a high level of expertise. Various techniques were used by the project participants to overcome their initial lack of expertise. Training, particu-

larly inexpensive training, was difficult to find. Most agencies settled on buying reference materials and allocating time for learning. Project teams reported a need to make significant commitments of personal time in order to overcome the steep learning curve associated with Internet technologies. They indicated that the personal time commitments needed to become familiar with these technologies was greater than in any previous project.

Three agencies reported the use of a “quiet room.” In these cases, the staff who needed to become knowledgeable about new technologies were unable to do so effectively in their “home base.” The learning environment was characterized as “catch as catch can.” To overcome this barrier, these three agencies provided a way to remove staff from their regular work environment. Use of the quiet room allowed the staff to spend concentrated time on developing familiarity in the necessary areas. In all cases, the time spent in this special environment was limited to a day or two a week.

Need to know so many new technologies

Compounding the lack of applicability of their traditional technical skills was the need to know so many new technologies. Most agencies reported that this need was greater in this project than in any prior project they had undertaken.

Participants responded to this reality by adopting a phased approach to Web site implementation. Participants focused first on basic Web services such as marketing and information dissemination. Simple graphics and straightforward design approaches were adopted. Meanwhile, efforts were undertaken to become better informed about and experienced with technologies that would support interaction between the user and the Web site. The cost and performance workshop added additional insights into the resources associated with modest, moderate, and elaborate Web site implementations.

Even one of the most seemingly straightforward applications, information dissemination, requires the use of new technologies. For example, the Office of Real Property Services chose to provide Local Real Property Assessors online access to the Real Property Services Manual through its Web site. In order to take advantage of the hypertext features of the Web however, this existing document had to be reengineered for Web presentation. They realized that merely placing the 150 page manual online with no added features would have added no value to the publication. They needed to break the document into logical parts and build in links and search tools to help users take best advantage of the information. This task, ORPS discovered, was a huge one. Staff familiar with the publication and the necessary HTML tools reviewed the document and added the features that would ensure that users would find added value from accessing the manual online.

Constantly changing and growing product market

The rapid pace of change in existing Internet technologies and daily announcements of new products further compounded the barriers of lack of expertise, limited time, and the need to know a wide range of new technologies. The rate of introduction of new products is breathtaking. New versions of existing products may be released only months apart. New products that improve on “old” ones appear every day.

The daily introduction of new products designed to assist organizations with their Web sites places public sector developers in a difficult position. Limited budgets and purchasing restrictions do not provide enough flexibility to acquire, investigate, and assess many new tools. Public sector innovators often take advantage of free-trial periods to evaluate the many products on the market before making an investment. This approach has some important limitations, however. First, trial versions may not have all features. Second, the trial periods often expire before the agency can complete its evaluation and purchase the full-featured version of the product under the regular procurement process.

In order to mitigate the effects of this dynamic market, CTG provided participants with access to the Internet through the Capital Region Information Service of New York (CRISNY). CTG also provided the latest documented version of the Netscape browser and an HTML editor to support agency prototype efforts. This approach turned out to be beneficial to the participants as it obviated these preliminary selection decisions, enabled the agencies to focus on the basics of Web site implementation, and allowed them to begin to review the dynamic product market for opportunities to design the next implementation of their Web sites.

Participants found it a challenge to work with the tools selected for them by CTG while still keeping an eye on the constantly changing and growing product market. They had difficulty resisting the allure of these rapidly emerging technologies to ensure a stable and reliable service delivery environment. The agencies had to look to this market to remain aware of new opportunities, but they also had to resist the urge to implement each new technology as it was presented. They had to learn to balance their interest in new and emerging technologies with the need to provide service in a stable and reliable environment that customers can depend on.

Inadequate technical infrastructure

Technical infrastructure, the hardware, software, local and wide area networking available in the agencies, was a barrier to all project teams although the characteristics of their individual infrastructures varied widely. In one case the participants did not even have access to a desktop computer. In other cases, particularly the larger agencies, access to desktop

equipment and internal networking was not an issue, but for most participants from large and small agencies alike, access to the Internet from the desktop was not available when the project began. Their lack of access to desktop equipment, the Internet, and staff with relevant experience limited their ability to fully explore the service delivery possibilities available over the Web.

Various techniques were used to overcome the barriers presented by inadequate technical infrastructures. Several participants reported the need to commit both personal time and resources to access the Internet. In one case, a project participant brought his personal hard disk from home to the office so that adequate disk space would be available to store the necessary browser software. In another case, a staff member purchased a personal copy of the HTML editor so that he could continue to work on the agency's site after the demonstration version of the software expired.

The fact that CTG needed to purchase browsers and Internet access accounts on behalf of the project participants is probably the most telling comment on the inadequacy of the technical infrastructure in every agency at the time the project was initiated. Even for those agencies with well-established, fully deployed networks, the external orientation of Internet connections was brand new territory.

Policy barriers

Overall, policy issues were reported to be the weakest barriers to project activities. Most participants noted that the lack of internal policies, in fact, allowed a wide range of freedom in selecting objectives for Web-based services and in selecting and presenting content. While they would have liked some guiding principles, participants told us they were glad they were not hindered by premature or inappropriate policies. However, the participants expected that both a general government-wide information policy and agency-specific information policies will become more important in the future. They gave two reasons: (1) as more sites come on line, the linkages among them are likely to raise policy questions related to data sharing between programs and agencies; and (2) the maturation of their own sites will push them beyond information dissemination into more business areas where policy questions about documentation, ownership, privacy, and other concerns will become critical.

The early stages of these problems were evident in the project. Senior agency managers needed to become more familiar with these new technical capabilities, and were therefore often unable to give policy guidance about how to use them. Web services that involved service integration suffered from a lack of policies about data sharing. Agencies ran into problems trying to decide what kind of information, in what form, was appropriate

for dissemination over the Web. Existing policies on Freedom of Information, copyright, and liability seemed inadequate for the new environment. Finally, hopes for transacting business over the Web brought new questions about records management and documentation of government actions and decisions.

Policy Barriers to Web-based Services
Lack of familiarity with the capabilities of this technology means policy makers are unprepared to give policy guidance
Inadequate attention to the policy implications of content questions: Freedom of Information, records management, copyright, and liability issues
New records management challenges

Lack of familiarity with the capabilities of new technology means policy makers are unprepared to give policy guidance

As with most other technological advances, there is a dynamic interplay between what the technology can do and what government policy makers want to allow it to do. Usually technology advances more quickly than policy development. This project was no exception. Because the WWW places agency information and services in a new environment, policy makers need to be well educated about technological capacities in order to give sound policy guidance. While most governments strive for policies that are technology-neutral, our experience in this project shows that some technologies are more far reaching than others. The ubiquitous networking, communications, access, and data transformation capabilities of these new technologies represent a significant change in the nature of government information and therefore challenge the logic of policies that were devised mostly in the 1960s and 70s.

The participants were concerned that pre-existing information policies were not good models for the types of policies that are required to address this changing service delivery and technology environment. For example, they were particularly concerned that the cross-program and interagency nature of many service delivery objectives requires policies that promote the coordination of business functions and the sharing of information across program areas.

Inadequate attention to the policy implications of content questions

Many questions regarding content were posed by the project participants and most agencies struggled to find answers that were suitable for their situations. They noted that the lack of policies governing the content of Web sites would be an increasing barrier to expanded use of the Web as a service delivery mechanism. For example, they encountered or expected to encounter future issues related to Freedom of Information, copyright, and liability for information provided. Participants looked to policy makers for principles that would help them answer the following kinds of questions:

- ◆ What should the content of the Web site be? What information is appropriate for our customers and service delivery objectives? How is content to be selected?
- ◆ Can or should Web pages be copyrighted?
- ◆ Is a Web page or a Web site a record subject to the Freedom of Information Law?
- ◆ What should be the relationship between the Web version and other versions of the same information or documents? If they are different, which one is authentic?
- ◆ Does information on the Web site constitute “official” agency information?
- ◆ What external links are appropriate? What relationships should govern external linkages?
- ◆ What is appropriate information for the agency to collect from customers via the Web? How should personally identifiable information be handled?
- ◆ When both state and federal law govern a program, what role does the federal agency play in the policies governing the Web site?

There are no commonly accepted answers to these questions and it is likely they will continue to present challenges to government Web service providers for years to come.

New records management challenges

Records management programs and policies developed to support traditional paper-based operations are not readily transferable to an electronic environment where a record may be comprised of database entries, electronic templates, e-mail messages, graphic images, or combinations of these formats. As a result, it is increasingly difficult to identify, maintain, and access records to document transactions or support evidentiary needs. From an archival perspective, this also means that electronic records of enduring value may be lost to future generations. The increasing use of the Web as a direct service delivery mechanism makes even more important the growing demand for electronic records management policies and tools.

Practical tools for Web site development

The project resulted in four practical tools to assist other public organizations in their efforts to provide Web-based services to their customers. Each of these tools is available on the CTG Web site (<http://www.ctg.albany.edu/projects/inettb/isgmn.html>), and is discussed below.

- ◆ Developing & Delivering Government Services on the World Wide Web: Recommended Practices for New York State
- ◆ World Wide Web Starter Kit
- ◆ Cost/Performance Model for Assessing WWW Service Investments
- ◆ Online Seminar on Internet Security Topics

Developing & Delivering Government Services on the World Wide Web: Recommended Practices for New York State

Like the Testbed agencies, many government organizations that only a year ago had no knowledge of or experience with the Internet have suddenly been faced with demands to make their information and services available online. Their ability to respond has been made very difficult by the fact that the technologies of the Internet, including the WWW, are evolving very rapidly in terms of availability, functionality, and compatibility. As a result, agencies struggle with high expectations, new and unfamiliar tools, accelerating rates of technological change, and a need to combine skills and resources in unusual ways in order to succeed. These conditions led to one of the key deliverables of the Internet Services Testbed — a set of practical guidelines to help agencies negotiate this new territory.

The guidelines are based directly on the experiences of the Testbed agencies. The agencies used, evaluated, and refined all of the tools that are included and contributed many insights and suggestions that are incorporated in the final document. The guide is not intended to be an exhaustive treatment of all Internet services, tools, or technologies. Instead, it presents principles, planning tools, and good practice guidelines to help government managers decide how best to use the World Wide Web as a mode of service delivery. Each chapter outlines a key decision or action a government organization will face in designing or delivering a Web-based service. The guide covers such topics as how to define a service that is relevant to

customers, how to identify likely costs and benefits, how to assemble the right professional team, and how to manage information effectively in this new environment. Technology topics include how to decide whether to “make or buy” services, what are good design principles, and how to assess infrastructure needs. Appendices give examples and references.

The handbook emphasizes that the process of designing, developing, and then managing a Web Service is not linear. The document is organized around Figure 3, which helps to illustrate the iterative nature of the enterprise.

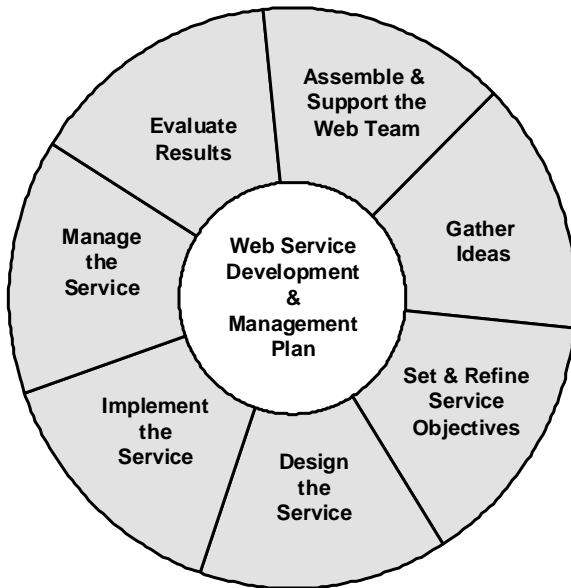


Figure 3.

The guide is available as a 94-page printed document and as an electronic file downloadable from CTG’s Web site. The introductory chapter is available as a hypertext document on the CTG Web site. The remaining chapters cover the following topics:

- ◆ Assembling the right project team discusses staffing-related topics such as understanding the unique characteristics of Web services, building a cross-functional team, clarifying team member roles, and providing specialized training.

- ◆ Gathering ideas: technology awareness and best practice reviews suggests

ways to understand the basics and explore the potential of the WWW by becoming familiar with the Web itself and by tapping the experiences of others.

- ◆ Setting objectives: Why should your organization have a Web service? presents some practical tools for setting objectives, identifying stakeholders, setting priorities, specifying resources, and defining costs, benefits, and performance measures.

- ◆ Design considerations presents guidance on selecting, structuring, and inter-linking the information content of a Web site.

- ◆ Implementing your Web site covers several aspects of the very challenging, time-consuming, and detail-oriented process of implementation including prototyping, technical infrastructure, testing, and marketing.

- ◆ Managing your Web service offers guidance for managing the impact of Web services on an organization and its customers.

- ◆ Evaluating the impact of your service recommends ways to answer the important bottom-line question: is the Web service effective?
- ◆ Appendices include definitions of commonly used terms, a NYS-specific Web page style guide, contact information for New York State organizations who can be resources on WWW topics, and a list of useful WWW sites and reference books.

World Wide Web Starter Kit

During the course of the Internet Services Testbed, many organizations requested information about how to get started with a Web site. Since the guidelines were planned as an end product reflecting the full experience of the Testbed agencies, the CTG project staff created an interim deliverable called “A WWW Starter Kit” which presents the essential first steps in the Web site development process. The Starter Kit is available as a hypertext document on the CTG Web site (<http://www.ctg.albany.edu/projects/inettb/startkit.html>).

The Starter Kit is designed to help agencies at the very earliest stage of WWW exploration when they often know little more than that they need to “be on the Internet.” The WWW Starter Kit was designed to help agencies avoid false starts and ineffective shot-gun approaches by offering a way to organize the exploration process. It contains information and links to selected resources for WWW site beginners that the Testbed agencies found very helpful in getting off to a good start. They were not chosen as the result of exhaustive analysis, but they were generally recognized as good, solid resources that are helpful in mastering the fundamentals.

The Starter Kit focuses mostly on the definition and design stage of Web site development, with some introduction to Web technologies. Its primary purpose is to help agencies begin to address these critical design questions:

- ◆ What information or information-based services of your agency are suitable for electronic delivery over the World Wide Web?
- ◆ Who wants this kind of information or service? Are these potential customers likely to be connected to the Web?
- ◆ Who will benefit from a Web-based service and how will they benefit?
- ◆ Who in your agency is responsible for the information resources you want to put on the Web? Are they on your team?
- ◆ What kind and level of skill and effort will it take to turn existing information resources into Web-friendly ones? Are those resources available?
- ◆ What will it cost in terms of dollars, people, and technology to build and operate an effective Web site?

The Starter Kit encourages agencies to become WWW content providers by first becoming active WWW users. It takes advantage of the fact that most of the information needed to develop and maneuver around the Web actually lies within it. Users are encouraged to visit and evaluate existing sites to see how similar organizations are using the WWW to deliver online information and services. They are directed to style guides and tutorials that help them understand that effective sites combine a clear purpose, thoughtful organization, substantive content, graphic arts, good writing, and ease of navigation. The Starter Kit encourages users to become involved in the online community by joining electronic discussion groups and listservs devoted to Web development topics. Finally, it identifies some government sites that have done a good job of identifying and presenting policy guidance on the use of the Internet and the WWW.

Cost/Performance model for assessing WWW service investments

Creating an effective Web service requires a significant investment of resources. It is easy to underestimate the costs and overstate the benefits because the technology is so attractive. Once an agency has investigated the capabilities that the Web offers, and decided that the technology can provide significant benefits to important stakeholders, the next question is “How much of an investment is it worth?” A Cost/Performance Model was developed to help agencies answer that question. The complete model and explanations can be found in *Developing & Delivering Government Services on the World Wide Web: Recommended Practices for New York State* and on the CTG Web site (<http://www.ctg.albany.edu/projects/inettb/SpreadSheets.html>).

The model serves two purposes. First, it identifies expected costs and benefits that are components of the investment decision. Second, it quantifies these factors in the form of explicit expectations about expenditures and performance improvements. Together, they enable a pre-implementation evaluation and a post-implementation assessment of whether the project has achieved its goals.

Performance measures

The benefits of a WWW initiative typically fall into three performance categories: services that are better, cheaper, or faster. WWW technologies can enable all three types of improvements, depending on the specific goals and objectives of the proposed service. The following list of sample performance improvements was drawn from a number of sources, including the experience of the Testbed agencies.

Cheaper (for customers, for general public, for other agencies, for own agency)

- ◆ Time savings: personnel
- ◆ Cost savings (direct): telephone, mailing, printing, travel

Faster (for customers, for general public, for other agencies, for own agency)

- ◆ Reduce response/waiting time: 24-hour availability; on demand
- ◆ Reduce information distribution time

Better (for customers, for general public, for other agencies, for own agency)

- ◆ Consolidation of services: one-stop shopping, fewer steps in a process
- ◆ Innovation: new services, new ways of using information
- ◆ Improved access to services: people use more appropriate services

Some measures will be relatively easy to describe in quantitative terms, especially those in the cheaper and faster categories. Others will need to be described in more qualitative terms that, nonetheless, can be translated into empirical measures that can be quantified. For example, “increased client satisfaction” can be operationalized by “an increase of at least 25 percentage points in the number of clients who answer ‘Satisfied’ or ‘Highly satisfied’ on the customer feedback questionnaire.”

Cost categories

In general, costs for developing an Internet-based service fall into five categories:

- ◆ Getting the organization ready to support the service
- ◆ Internet access for end-users of the system
- ◆ Training and help desk support for end-users
- ◆ Resources to develop the content of the service
- ◆ Computer facilities to host the system

In each of these categories, there may be one-time costs that are necessary to get the project started, as well as annual maintenance and development costs to operate the service and keep it current. The five categories of cost are identified in the worksheet presented in Figure 4.

Each category contains two types of costs: infrastructure and human resources. While it is relatively easy to predict the types of hardware, software, and communications equipment that will be necessary to develop the service, the harder-to-quantify human resource costs typically dwarf

those for the electronic infrastructure. In making estimates, agencies should account for all the staff time necessary to launch and operate the service. For example, there are two elements to consider in estimating training costs: the cost to buy or develop and deliver the training program, and the cost of having staff actually attend the training classes.

The cost worksheet can also be a useful tool for planning the evolution of a Web service. Consider completing a worksheet to represent the costs of a site which provides very modest services such as basic information and pop-up e-mail, then for a more complex site which provides interactivity such as online requests for information or online registration. Finally, complete a worksheet outlining the costs associated with an elaborate service which includes support for transactions and real time database queries. Outlining the costs associated with short term goals (6 months to 1 year) as well as with longer term goals (1 to 2 years) is also a useful way to plan the evolution of a Web service.

Figure 4.

Web Service Cost Worksheet		
	One-time Cost	Annual Cost
Organizational Readiness		
Planning for Internet Presence	1	
Training for Technology Awareness	2	
Access for Agency Staff and other users		
Hardware for End Users	3	
Software for End Users	4	
Network and Internet Access for End Users	5	
Other Vendor Services	6	
Human Resources		
Start-up Process for Equipment Procurement	7	
Establish and Manage Vendor and ISP Contracts	8	
End User Support		
Vendor Services	9	
Human Resources		
Establish and Manage Vendor and ISP Contracts	10	
Development and Delivery of User Training	11	
User Time in Training	12	
Help Desk for Users	13	
Content Development and Maintenance		
Hardware for Content Developers	14	
Software for Content Developers	15	
Network and Internet Access for Content Developers	16	
Other Vendor Services	17	
Human Resources		
Start-up Process for Equipment Procurement	18	
Establish and Manage Vendor and ISP Contracts	19	
Development and Delivery of Staff Training	20	
Webmaster	21	
Content Creators/Providers	22	
Content Coordinators	23	
Web Site Design and Development	24	
Editorial Review	25	
Program Area Liaisons	26	
Database Administration	27	
Other Management Support	28	
Other Clerical Support	29	
Host of Site-Infrastructure		
Hardware	30	
Software	31	
Network and Internet Access	32	
Other Vendor Services	33	
Human Resources		
Front-end Research and Technical Evaluation	34	
Start-up Process for Equipment Procurement	35	
Establish and Manage Vendor and ISP Contracts	36	
Development and Delivery of Staff Training	37	
Network Administrator	38	
Systems Administrator	39	
Server Manager	40	
Operations Staff	41	
Programming Staff	42	
Clerical Staff	43	
HUMAN RESOURCES SUBTOTAL		
INFRASTRUCTURE AND OTHER SUBTOTAL		
TOTAL COSTS		

Online seminar on internet security topics

An Internet presence opens an organization up to the world. Yet, this easy availability of information can also represent a liability in terms of privacy concerns and internal system integrity. Security breeches may range from the simple curious probing of a site to the outright malicious destruction of information. Any well designed and maintained WWW service must balance the need for security with the goal of access. These security issues were very important to the people who helped frame the objectives of the Internet Testbed.

Early in the Testbed, CTG hosted a one day seminar discussing security on the Internet. The seminar brought together nearly 200 government managers to hear security experts explain some of the key issues. The focus was on raising awareness about security issues and ways to manage security risks. The presenters emphasized the need to become aware of security threats and the ever increasing complexity of security issues. The audience was exposed to many available technologies as well as some of the organizational issues that must be considered when implementing a security plan. The following topics were covered during the seminar and are available in their full versions, including audio presentations, slides and handouts, on the CTG Web site at <http://www.ctg.albany.edu/projects/inettb/security.html>:

- ◆ Internet security as part of the overall security plan
- ◆ Risk assessment: the foundation for security planning
- ◆ Securing the server and LAN
- ◆ Methods for securing data transmission
- ◆ Methods for testing the security solution
- ◆ Monitoring the system/preparing for and responding to a break-in

Developing and delivering Web-based services: lessons from the field

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/inettb/isgmn.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:

NYS DHCR	http://www.dhcr.state.ny.us/
NYS ORPS	http://www.orps.state.ny.us/
Empire State Development	http://www.empire.state.ny.us/
Division of Military and Naval Affairs	http://www.dmna.state.ny.us/
Office of Alcoholism and Substance Abuse Services	http://www.oasas.state.ny.us/
Governor's Traffic Safety Committee	http://www.nysgtsc.state.ny.us/

- ◆ 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.

References

Clift, Steven. (1996, July 24). clift@northstar.state.mn.us "Government Services List- Update" GOVPUB Listserv.

Evans, James. (1995, November). "Government on the Web" *Government Technology*, pp. 30-1.

Harris, Blake. (1995, October). "Cyberspace 2000" *Government Technology*, pp. 34-5.

Appendix A. Project participants

Agency partners

Empire State Development, Office of Motion Picture & TV Development
Sandra Chizzolin, Associate Programmer Analyst
Ivan Kipness, Library Clerk II

Governor's Traffic Safety Committee
Kenneth Carpenter, Project Leader
Anne Dowling, Project Associate
Mark DuBuc, Project Associate
Sandra Fuller, Project Associate

Hamilton County & the NYS Performance Measurement,
Reporting, & Improvement System Project
Joyce Cook, Education and Training Coordinator
Del Cook, Soils and Water Engineer
Pauline Slack, Education and Training Director
Kate Toms, Consultant, NYS Literacy Center
Mary Toscano, Consultant, NYS Literacy Center
Ann Vandenberg, Consultant, NYS Literacy Center
Gary Washburn, Consultant, NYS Literacy Center
Richard Weiner, Consultant, NYS Literacy Center

NYS Division of Housing and Community Renewal
Linda Cardona, Director of Development
Audrey Dean, Associate Computer Programmer
Darryl Green, Associate Computer Programmer
Robert Kelly, Supervisor of Data Processing

NYS Division of Military and Naval Affairs
Paul Breslin, Major, National Guard
Michael Stenzel, Management Analyst
Daniel Travers, Director of Communications & Information Management
Eric Wiener, Energy Conservation Specialist

NYS Office of Real Property Services
Brian Bitteker, Internet Applications Developer
Dawn Farrar, Associate Real Property Information Systems Specialist
Steve Lynch, Senior Real Property System Specialist
Betsy O'Sick, Senior Real Property Information System Specialist
Fran Pinto, Internet Team Leader
Tom Rutnick, Real Estate Appraiser (MAS)
Wilma Warner, Senior Accountant

NYS Office of Alcoholism & Substance Abuse Services
Edward DeFranco, Director, Program Audit and Evaluation
Wendy Gibson, Director of Communications
Joseph Knych, Supervisor of Administrative Analysts
Laura Perry, Public Information Assistant
James Tansey, Chief of Data Processing

State Archives and Record Administration
Thomas Ruller, Associate Archivist

NYS Forum for Information Resource Management
Mandy McCord, IS Administrator

NYS Department of Health
Laura Iwan, Director of HEALTHCOM Services Bureau

NYS Department of Transportation
Ann Greenwald, Data Communication Specialist

Corporate partners

AT&T
University Equipment Donations Program

EMI Communications Corporation
William Gaudet, Senior Account Executive

Eric Elgar, Consultant

Digital Equipment Corporation
Reginald Height, Enterprise Software Sales Specialist
David Dumas, Senior Security Consultant

Microsoft Corporation
Connie Mitchell Dean, Government Account Representative
Tal Saraf, Senior Systems Engineer

Silicon Graphics
Florence Huban Matla, Account Manager
Edward Balduf, Systems Engineer

Sun Microsystems
Frank Wickham, Systems Engineer and Network Ambassador

Unified Technologies
Michael Jones, Senior Network Computing Adviser
Michael Fogel, Systems Engineer

Academic partners

University at Albany

Anthony Cresswell, Professor, School of Education

John Rohrbaugh, Professor, Department of Public Administration
and Policy, Rockefeller College

Dax Prather, University Business Systems, Finance & Business

Ranjana Syam, Graduate Student, School of Business

Ursala Markus, Graduate Student, School of Business

Hudson Valley Community College

Anthony Pascarella, Local Government Telecommunications
Initiative

Zbigniew Kaniewski, Local Government Telecommunications
Initiative

Center for Technology in Government

Donna Berlin, Internet Coordinator

Peter Bloniarz, Research Director

David Connelly, Project Management Assistant

Sharon Dawes, Director

Ann DiCaterino, Manager, Project Support

Kristine Kelly, Research Associate

Kai Larsen, Information Science Doctoral Program

Theresa Pardo, Project Coordinator

Derek Werthmuller, System Administrator

Appendix B. Project timeline

Date	Event
October, 1995	“NYS On the Internet” Strategic Planning Meeting
January, 1996	Internet Services Project Kickoff Meeting
February, 1996	Workshop # 1 - Strategic Framework for Internet Services
March, 1996	Workshop #2a - Designing your Agency Web Site Workshop #2b - Web Server Options Release of the Web-based WWW Starter Kit
April, 1996	Workshop #3- Internet Connection Options
May, 1996	Workshop #3 - Technical Awareness Presentation, CGI and Firewalls
June, 1996	Workshop #5 - Cost and Performance Factors for Developing and Operating Internet-based Services Public Demonstration of Results
August, 1996	Evaluation Interviews
September, 1996	Release of Developing & Delivering Government Services on the World Wide Web
December, 1996	Interactive Cost Worksheet for Developing and Operating Internet-based Services on CTG Web Site Final Project Report

Appendix C. Home Pages of the Six Prototype Web sites





Netscape - [New York State Division of Military and Naval Affairs Home Page]

File Edit View Go Bookmarks Options Directory Window Help

Location: <http://www.dmna.state.ny.us/>

WELCOME to the State of New York

Division of Military & Naval Affairs (DMNA) Homepage

[NEW YORK ARMY NATIONAL GUARD](#)

[NEW YORK AIR NATIONAL GUARD](#)

[NEW YORK STATE GUARD](#)

[NEW YORK NAVAL MILITIA](#)

[OTHER SITES](#)

[MEMBERS NEWS AND INFO](#)

[N.Y.S. EMERGENCY MANAGEMENT OFFICE](#)

[DIVISION OF MILITARY & NAVAL AFFAIRS](#)

[ORGANIZATION](#)

[CLIENTS](#)

[RECRUITS TO JOIN](#)

[OTHER GOVERNMENT AGENCIES](#)

[LOCATION MAP](#)

[EMERGENCIES](#)

[COMMUNITY INITIATIVES](#)

[INITIATIVES](#)

[NEWS/PRESS RELEASES](#)

JOHN H. FENIMORE, V
MAJ GEN, NYANG
THE ADJUTANT GENERAL

Get your Degree - Tuition Free!

WHAT & WHERE

Created by: M. J. Stenzel - [SEND COMMENTS](#)

New! [Reserve Forces Essential to DoD Missions](#); by American Forces Press Service (See note at the bottom of this page)

[GET YOUR DEGREE - TUITION FREE!](#)

ORGANIZATIONAL INFORMATION

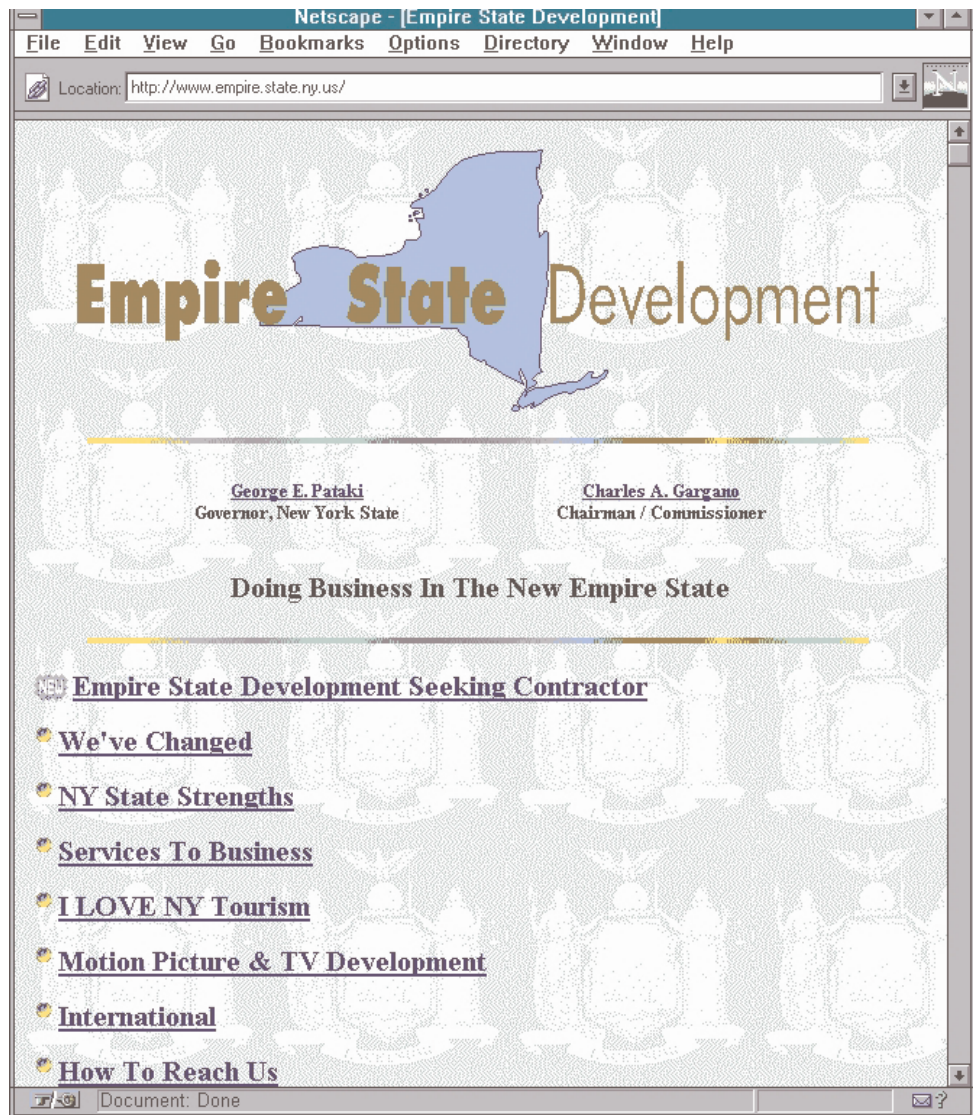
[Division of Military and Naval Affairs](#) | [NY Army National Guard](#) | [NY Air National Guard](#) | [New York Guard](#) | [NY Naval Militia](#) | [New York State Emergency Management Office \(SEMO\)](#)

CUSTOMERS

[Recruiting](#) | [Information for Military Members](#) | [Public Interest](#) | [Other Governmental](#)

1:09 Clock - 1/17

Document: Done







Appendix D. Related products

“A World Wide Web Starter Kit,” Center for Technology in Government, Albany, NY 1996. Electronic version at <http://www.ctg.albany.edu/projects/inettb/startkit.html>

“Security Day Seminar,” Center for Technology in Government, Albany, NY, 1996. Electronic version at <http://www.ctg.albany.edu/projects/inettb/security.html>

Bloniarz, Peter, and Kai Larsen, A Cost/Performance Model for Initiating World Wide Web Services, Center for Technology in Government, Albany, NY 1996. Electronic version at <http://www.ctg.albany.edu/resources/pdfrwp/ist004.pdf>

Dawes, Sharon S., Theresa A. Pardo, Peter Bloniarz, Ann DiCaterino, Donna Berlin and David Connelly, Developing & Delivering Government Services on the World Wide Web: Recommended Practices for New York State. Center for Technology in Government, Albany, NY, 1996. Electronic version at <http://www.ctg.albany.edu/projects/inettb/pract2.pdf>

DiCaterino, Ann and Theresa A. Pardo, ed., The World Wide Web as a Universal Interface to Government Services, Center for Technology in Government, Albany, NY, 1996. Electronic version at <http://www.ctg.albany.edu/resources/pdfrwp/ittfnlrp.pdf>

**Center for Technology in Government
University at Albany / SUNY**

**1535 Western Avenue
Albany, NY 12203**

Phone: 518-442-3892

Fax: 518-442-3886

www.ctg.albany.edu

www.ctg.albany.edu