

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 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.

#### 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.

### 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, particularly 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.

### 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.