Topic

Technology choices matter

Technology choices affect the present and the future

Insider's Guide to Using Information in Government

Strategy   Policy   Data   Cost   Skills   Technology

Technology choices matter

Technology choices affect the present and the future

- **Technology choices have long-term impact**
- **Mapping business processes**
- **Understanding user needs**
- **Infrastructure requirements**
- **Capabilities grow with technologies**
- **Improved customer service**
- **Streamlined administration**
- **Working with cutting-edge technologies**
- **Practical examples**
- **Technology links**

Today, more than ever before, government managers are realizing that certain technologies can help them do their jobs. These tools can reduce the complexity of accessing, viewing, and managing the vast sums of information collected and disseminated by government agencies.

Putting information, transactions, and services on the Web can improve government's responsiveness to citizens. Data repositories and data mining tools can help program managers view and evaluate information in ways that were impossible 10 years ago.

But implementing a new technology is not simple. Successful implementation depends on good planning and foresight, a thorough understanding of how the technology will be used, and a solid infrastructure. In other words, technology choices are choices about the present *and* the future. They are about business and work processes as well as software and processors. And they can have implications about the long-term direction of the organization.

Key Points

Technology choices...

• affect the present and the future

• depend on processes, users, and infrastructure

•can improve customer service and streamline administration

• can help attack complex problems

Technology choices have long-term impact

Whatever technology is chosen will have powerful long-term implications throughout your organization. It will undoubtedly influence almost every aspect of an organization, including:

- the choice and operation of other technologies
- work processes
- information flows

Once implemented, technology has a way of cementing into place. It becomes embedded in virtually every aspect of the organization, affecting the way people work. New technology comes with new business rules, practices, and processes that are very hard to change. That's why it is vitally important to be careful to pick an approach you can live with every day. And if you can't live with any of the options available to you, the best choice may be no new technology at all. Changes in process or policy may be more useful.

Mapping business processes

Technology plays a significant role in the way government does business. Adding new technology changes the way people work. It is important, therefore, to understand how people currently work and why they do the things they do.

Mapping out business processes allows you to identify how current technologies are being used to support those processes. It may also tell you how your current technologies are impeding your business processes. Before committing to a new technology, it is vitally important to first understand whether and how it will support or enable improvements to the current business processes. Will it provide significant or only moderate process improvement? Will the process need to be modified to fit the technology? Can the organization handle the necessary organizational changes that will be required? A resource that may be helpful in mapping out business processes is the Business Process Reengineering Assessment Guide.

Understanding user needs

No matter how large or small the technology initiative is, users must be an integral part of problem definition, planning, decision making, and testing. Wherever possible users should be made full and equal partners in the project team. Gone are the days when projects were initiated and designed by IT professionals on behalf of users. Today, projects must grow from user demand and be crafted on the comprehensive understanding of user needs. Users must be at the table when tough decisions are made about what to focus on first and what must wait. Recent cases in the news have

illustrated that dissatisfied users can derail even the most expensive technology projects—even after investments have been made and systems implemented.

For example, the US Department of Education recently created Access America for Students, a pilot Web site for student financial aid applications. According to the *Chronicle of Higher Education*, the project was ended because college administrators, as important users of the application, did not participate in the design and were reluctant to participate in the second phase of the project.

We have learned over the years that understanding user needs and responding accordingly generate more commitment to the project. If users know their concerns are being incorporated into the plan, they are far more likely to be open to the technology's potential value, and more likely to take ownership of it. Perhaps more important, the system is more likely to fit well with the real work of the organization. This article, **Human Error: The Defense Logistics Agency**, from *CIO Magazine* discusses some of the risks involved in the human side of projects.

Infrastructure requirements

Technology initiatives often must recognize and account for enormous diversity in organizational environments and infrastructures. This is true for modest application development or major projects driven by legislative priorities or executive vision.

There are various levels of staff expertise and resources throughout government agencies. Some have more technology resources and staff expertise than others. Just as some have high-end technology tools, others are still using processors they got in the early 90's. Staff skills and experience form an important part of the infrastructure as well. There may be large gaps between what staff can do and what a new technology requires of them.

The status of the technology infrastructure is a critical factor in decisions about which technology to choose for a particular project. An agency with a cutting-edge IT department and a seemingly unlimited IT budget, for example, will have one set of questions to answer with different choices to make in picking new technologies. Agencies facing a shortage of desktop equipment and few staff resources or time for necessary training will have an entirely different set of questions to answer and technologies to consider.

It is important to note also that having a modest infrastructure at the beginning of a well-funded technology project can be a great advantage. These conditions often allow the organization to leap forward because it does not have to deal with a substantial existing, often aging, infrastructure.

The following resources may be helpful in fitting a technology initiative into current conditions.

- Creating an effective technology program requires information on performance assessment, staff competencies, technology infrastructure inventory and goals, and funding sources.
- Preparing and managing an organization's business and technology plans can be very difficult. Washington State Department of Information Service's **Information Technology Planning and Assessment Guidelines** provides a practical approach to making technology investment decisions, introduces tools used to assist in the process, and includes a discussion of critical success factors.
- In order to create a successful technology infrastructure plan, two of the critical questions that must be examined are project goals and how to measure progress towards these goals.
- Colleges and universities face significant financial, technical, and human resource challenges that make it difficult to build and maintain a comprehensive technology infrastructure. Rider University solved the problem by forming a true partnership with Bell Atlantic Corporation.

Capabilities grow with technologies

Advances in technology have increased the capacity of government to use information effectively and to share it across agency and program boundaries. It is becoming easier to connect people to information they need to do their jobs better. Whether you are considering a new Web site, financial management system, or a new database, technology can significantly improve the way government workers communicate with colleagues and citizens to do their jobs.

The issues that arise from deciding to implement any of these technologies, however, are many and varied. Providing access to information 24 hours a day, seven days a week over the Internet or an intranet, for example, requires that you pay particular attention to many critical factors of design, including:

- whether expected users have access to the Internet, and what kind of access it is
- that the technology chosen can support the potential demand for your site
- that there are security measures in place to protect the data, its use, and the users
- that the work process can handle the shift from 9-to-5 to 24-by-7

Improved customer service

Putting information and services on the Internet, for example, can boost service to citizens. But there is more to the decision to go online than simply putting printed documents into HTML (Hypertext Marked up Language) and publishing them on the Web.

The shift from the actual 9-to-5 workday to a virtual 24-by-7 mode of operation may require significant changes to agency work processes. For example, an e-mail from a

citizen at 1 A.M. will most likely have to wait until 9 A.M. to be read. If real 24-by-7 response is expected, working hours, work load and work processes will have to be shifted to accommodate electronic transactions that take place after the traditional workday.

Consideration must be given to where information will be housed and what rules and technologies will govern access in and out of a site. Users will vary in their capacity to access the Internet. For example, some businesses will have faster connections than most residential connections. Project teams need to consider who will use the site and how they will connect to it.

Providing public access to information must also be carefully considered. The network providing that access must be able to accommodate the expected number of users, while providing the necessary security to protect the integrity of the site and its users. Consideration must also be paid to the bandwidth, firewalls, security, and redundancy that affect the accessibility and reliability of the Web site.

At the San Diego Supercomputer Center (SDSC) and the National Partnership for Advanced Computational Infrastructure (NPACI), researchers are using new Web-based tools that let researchers and citizens seamlessly access, integrate, analyze, and display government information right from their desktops. The article, **Putting Government Information at Citizens' Fingertips**, presents detailed information about this first-ever Digital Government Information Integration Testbed.

Streamlined administration

Intranet systems and connections to the Internet can allow people in different agencies and departments to easily communicate and work with each other. Web sites can be designed to link information housed in different legacy systems, provide new ways to look at information, and enable people to make better, more informed decisions about services and programs.

Issues to consider in building a sophisticated network are the potential number of users, the bandwidth required, and the nature of hardware and software that will use the network. The type of security protections needed will depend on whether the systems on the network will be accessible remotely, whether it will connect to the Internet, and whether it connects to a legacy system that houses the agency's vital information in the form of files and databases.

Web servers can provide universal access to information. It is no longer so important what model of computer and operating system your users may have, but whether they have a Web browser with Internet access. Such broad access allows you to focus your

attention more on giving users the information they need and less on where they are or what computer they are using. Information can be stored on a server located in a state agency in Albany and accessed just as easily in Syracuse, Buffalo, White Plains, Plattsburgh, or New York City. Government managers and employees on and off site can simultaneously view data from multiple programs or services from across the state.

The following articles and links illustrate some examples of using technology to streamline government.

- The United States Department of Housing and Urban Development makes its **GIS data available on the Internet** in order to aid state and local governments with their community development work.
- GIS applications are now getting out of the office to directly record information from the field using handheld computers and wireless communications to instantly update bodies of knowledge. The information gathered is now easily accessible in the World Wide Web.
- By using virtual private network (VPN) technology, government agencies are able to share information without compromising security.
- Intranets are being used to replace numerous disparate networks with one single network.
- Many governments have created, or are seeking to create, a presence on the Web, providing an abundance of best practice research for developing government web sites.
- Government agencies are attempting to link legacy systems and databases to Web-based applications and distributed databases in order to streamline government operations.
- Knowledge support technology tools can sometimes be used to assess the vast amount of data found in a state's various electronic systems.

Working with cutting-edge technologies

Much of the time, you can analyze the information you have by working with commercial software ranging from spreadsheets to large data warehousing systems. For more advanced needs, several government agencies have teamed up with academic researchers to help apply even more advanced technologies to their needs. These projects help government managers get the information they want, while at the same time helping university researchers develop the next generation of data analysis tools.

Organized efforts to link government practitioners with IT researchers can be found in the National Science Foundation's (NSF) program in Digital Government and the **Education, Outreach, and Training Program** (EOT) in NSF's Partnerships for Advanced Computational Infrastructure. In both of these programs, government agencies work hand-in-hand with academic researchers to develop new techniques and apply them to real-world needs of government agencies.

There are a number of benefits to having huge amounts of computing power available to support your analysis of the data. For example, using data mining techniques it is possible to look for patterns in the data that are only visible through a thorough analysis

of the fine structure of the information. For example, at the University of Pennsylvania, researchers from the National Scaleable Cluster Project (NSCP) are working with Pennsylvania's Department of Commerce and Economic Development to analyze the state's rich archives of job creation data to help design economic development programs that work for the state. The research aims to solve the problems of using information stored on multiple databases and in multiple formats. New ways of dealing with this information can lead not only to an analysis that is useful to the state, but also can help researchers design systems that are effective in such complex environments

Another use of significant computing power is to present information in ways that make it especially easy to use. Having powerful analytic capability means that you can visualize the information and manipulate it in ways that increase its utility. For example, the City of Philadelphia is using NSCP's visual display capabilities to view information about neighborhood characteristics in order to help understand the pattern of housing abandonments in the city.

Having state-of-the-art technologies also allows you to access large amounts of data in an online format, amounts much larger than would be available through commercial technologies. The National Archives and Records Administration is working with researchers at the San Diego Supercomputing Center to develop a new system for archiving the nation's electronic records. It will allow documents to be retrieved in a fraction of the previous time, while at the same time guaranteeing that these documents will be readable even as technology changes.

A number of similar experiments are just now getting started. A group headed by the National Response Center, for example, is looking at how advanced data technologies can be used to prepare for and respond to national and state disasters.

Also, an article in an electronic news service provided by the San Diego Supercomputer Center (SDSC) and the National Partnership for Advanced Computational Infrastructure (NPACI), describes how three communities are collaborating on a common architecture for long term digital archives.

The Center for Technology in Government (CTG) has studied the effect of information technology as part of our *Using Information in Government (UIG) Program*. The technology concerns laid out above surfaced in different ways as noted below.

Practical Examples

Mapping out the business process

Mapping out the current business process gives you a foundation for identifying how the process can be improved to fit with new technologies. For the Municipal Affairs Division of the Office of the State Comptroller, mapping out the work processes for handling technical assistance was resource intensive. But this work was vital to understanding how technology could be used to improve this core business process.

The Central New York Psychiatric Center found that major benefits were possible from only modest changes in their quarterly reporting process. After looking at how the current process works, they were able to define how applying technology would make the process more efficient.

Keeping your technology options open

Sometimes not committing to one specific technology vendor or another can provide your project with the latitude you may need for success. In developing the Kids Well-being Indicators Clearinghouse (KWIC), the NYS Council on Children and Families decided to use an open source server that did not make them dependent on any particular vendor's product or support.

Understanding the infrastructure

When the NYS Bureau of Shelter Services first began developing the Homeless Information Management Systems (HIMS), the first technology solution proposed was a Web-based application that could be accessed by homeless shelter providers to input and view data. Upon investigation, however, the project team learned that some of the homeless shelter providers were not connected to the Internet, some had policies that wouldn't allow access to the Internet, while others didn't know how to use the computers that were already on their desks. To address these limitations the HIMS project team modified the prototype plan. First they worked with the providers who could provide available data electronically. Second they are working on helping the remaining provider organizations find cost effective ways to improve their technological capacities.

The Office of the State Comptroller ran into a similar barrier when it wanted to develop a new technology system to better track information coming in and out of the Division of Municipal Affairs. Regional offices had electronic mail capabilities, but not all of them had access to the Internet. Before Municipal Affairs could roll out a new Web-based technology system that could be used by all the offices in the division, the regional offices need to gain access to the Web.

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Faced with the challenge of streamlining the reporting process with their satellite offices, the Central New York Psychiatric Center was charged with choosing a system that could improve communication across the organization. Through the *Using Information in Government Program* (UIG) workshop series, it developed a business case to support its idea to implement an intranet application that would take advantage of the infrastructure already in place.

Technology Links

Business Process Reengineering Assessment Guide

This guide from the Electronic College of Process Innovation provides the Government Accounting Office evaluators and other federal auditors with a generic framework to assess how well federal organizations are managing the risks associated with reengineering. The guide is not compliance-oriented and is not intended to prescribe specific steps for conducting a reengineering project. Rather, it represents a high-level view of what most reengineering practitioners consider to be important stepping stones to successful reengineering.

Human Error: The Defense Logistics Agency

The article from the May 2000 issue of *CIO Magazine* states that "the biggest challenge to integrating the enterprise isn't choosing the right hardware and software, or even crafting a sound business case. Whether it's a data warehouse, enterprise resource planning, knowledge management or a customer relationship management system, these projects flounder time and again because the people who have to use integrated systems can't, or aren't convinced that they ought to. The advice that follows is common sense."

Effective Technology Planning for the Technology Literacy Challenge

This is a guide for creating an effective technology plan for a school district. The guide contains information on planning and implementing a technology plan, performance assessment, staff competencies, technology infrastructure inventory and goals, and funding resources.

Information Technology Planning and Assessment Guidelines

This Washington State Department of Information Services guide helps with preparation and management of an agency's business and technology plans, investment priorities, current projects, and technology infrastructure. The Information Technology Planning and Assessment Guidelines provides a practical approach to making technology investment decisions, introduces tools used to assist in the process, and includes a discussion of critical success factors.

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Planning a District-Wide Technology Infrastructure

This online workshop for school and district leaders can help you "examine the critical questions, guiding principles, and essential technologies involved with creating school networks." Through six sessions, each one requiring tasks and varied assigned readings, participants should be able to address three main questions: What are your goals for technology? How will you assess your progress towards those goals? What technical information should you understand in order to implement your plans?

True Partnerships: The Key to Technology Infrastructure Challenges

A public-private partnership between Rider University and Bell Atlantic Corporation produced a next generation infrastructure for the campus. The "$4 million state-of-the-art campuswide fiber-optic information and communication network offering an array of video, voice, and data services to all faculty, staff, and students" was a new way of doing business for the university and offered a multitude of benefits.

Putting Government Information at Citizens' Fingertips

This article from EnVision, a quarterly science magazine from the San Diego Supercomputer Center (SDSC) and the National Partnership for Advanced Computational Infrastructure (NPACI), discusses how researchers are building the first ever Digital Government Information Integration Testbed that "provides powerful new Web-based tools that let researchers and citizens seamlessly access, integrate, analyze, and display the vast storehouse of government information right from their desktops."

Opening up GIS Borders: HUD taps ESRI to Make Federal Geographic Data Open to State Governments

This article from the *Federal Computer Week* discusses the decision of the Department of Housing and Urban Development to make its GIS data available on the Internet in order to aid state and local governments in their community development work.

Setting New Boundaries: Agencies Expand the Reach of GIS Via the Web and Handheld Computers

This *Federal Computer Week* article discusses the availability of Geographic Information Systems (GIS) data to government agencies and citizens as compared to the access limited to specialists before. "GIS applications are getting out of the office, venturing afield to directly record information using handheld computers and wireless communications to instantly update bodies of knowledge."

Virtual Private Network: to Protect and to Serve
This article from *Federal Computer Week* discusses the virtual private network (VPN) technology used by government agencies to share information without compromising security. Example of the Justice Department's Regional Information Sharing System (RISS) that "enables officers from more than 5,000 state, local, and federal law enforcement agencies to securely access criminal intelligence databases."

Navy Intranet Sets Sail
This *Federal Computer Week* article discusses an upcoming large Navy Intranet project. "The $6.9 billion Navy Marine Corps Intranet (NMCI) is supposed to replace up to 200 disparate networks within the Navy and Marine Corps with one seamless network."

Planning and Creating a Government Web Site: Learning from the Experience of US States
This article from the Institute for Development Policy and Management at the University of Manchester in the United Kingdom discusses best practices in government Web sites creation. It analyzes US state government Web sites regarding site design, content, layout, advanced display feature, semantics, etc. There are also reflections on lessons learned and advice to governments designing Web sites.

Web-based Applications and/or Networked Legacy Systems
This paper generated by the Center for Technology in Government at University at Albany discusses some technical aspects of Web-to-legacy integration and how to avoid possible traps. Throughout this report you will see how the evolution of linking legacy systems and databases to Web-based applications is increasingly needed to do business in the public sector.

Turning Data into Understanding: A Field Guide to Knowledge Support Technology
This PDF document, produced by the NYS Forum for Information Resource Management, is designed to "help government decision makers determine whether knowledge support technology tools can and should be used when they are faced with accessing the vast amount of data found in states' various electronic systems."

Education, Outreach, and Training Partnership for Advanced Computational Infrastructure
EOT-PACI is an organization dedicated to making emerging technologies accessible to learners and educators at all levels, and to forging an inclusive computing community. The mission of EOT-PACI "is to develop human resources through the innovative use of emerging information technologies to understand and solve problems." EOT-PACI is a joint effort of the National Computational Science Alliance (Alliance) and the National Partnership for Advanced Computational Infrastructure (NPACI). Both groups are funded by the National Science Foundation (NSF) and are charged with creating a national computing infrastructure to support the next wave of scientific discovery.

Archives II: The NARA Project at the San Diego Supercomputer Center
The San Diego Supercomputer Center (SDSC), in collaboration with the National Archives and Records Administration (NARA), is developing prototypes for collection-based persistent archive infrastructure.

New Consortium Brings New Technologies Into Crisis Management and Other Sectors
This article in Access Online, a Web-based newsletter from the National Center for Supercomputing Applications (NCSA) discusses an international collaboration among government agencies, academia, and the private sector. It looks at "how cutting-edge information technologies can help organizations prepare for, respond to, and mitigate disasters, including natural disasters and terrorist attacks involving chemical, biological, or nuclear weapons."

Persistent Digital Archives: A Knowledge-Based Approach
This article in Access Online, a Web-based newsletter from the National Center for Supercomputing Applications (NCSA) discusses the unique collaboration between the SanDiego Supercomputer Center (SDSC), the California Digital Library (CDL), and the National Archives and Records Administration (NARA) to develop a common architecture for digital archives.