Eight Imperatives

for Leaders in a Networked World:

[A Series of Guidelines for the Year 2000 and Beyond]

Imperative 2:

Use IT for Strategic Innovation,

Not Simply Tactical Automation

The Harvard Policy Group
on Network-Enabled Services and Government
John F. Kennedy School of Government

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Overview

"The time is ripe for public leaders to engage information technology issues more deeply, directly, and successfully."

PREFACE

As we enter the new millennium, everyone from futurists to the general public has observed that information technologies are changing our patterns of social, commercial, and political interactions. These changes raise profound opportunities and threats for people everywhere. It is a revolutionary period, with many issues not yet fully understood, let alone resolved.

Throughout this period, our public leaders—including elected and appointed officials and their overseers in all branches of government—have too often ignored technology issues or have delegated them to others. The conventional wisdom has been that technology is either not very important, or requires technical expertise rather than leadership, or is simply too risky for leaders to get personally involved.

These views are changing, however. Due primarily to the astonishing growth of the Internet and e-commerce, technology is now widely acknowledged as a critical force in shaping the future. The need for skillful and committed leadership has become obvious.

But the risks are still there.

As a result, public leaders—often under enormous and competing pressures—remain uncertain about how to successfully engage technology-related issues.

In response to these developments, Harvard University's John F. Kennedy School of Government assembled a group of distinguished public leaders to explore what was being learned about computer networking and its impacts on the roles and responsibilities of government.

The Harvard Policy Group on Network-Enabled Services and Government (HPG) includes legislative and executive leaders, private-sector and public-sector leaders, technology managers and general managers, and public officials from federal, state, and local governments in the United States and Canada. Working over a three-year period, the HPG concludes that the time is ripe for public leaders to engage information technology issues more deeply, directly, and successfully. To improve the quality of engagement, the HPG has developed a set of eight imperatives for those who seek to lead in this critical period. Each of the individual imperatives addresses a significant leadership responsibility and is the subject of a separate paper (for a list of the papers, see the back page). Taken together, the HPG papers provide a framework to guide those who seek to develop successful information age leadership strategies.

The report you are reading explores imperative #2: *Use IT for strategic innovation, not simply tactical automation.* It addresses how public leaders can respond to the increasing demands for rapid and significant innovation that are becoming the sine qua non of the information age.

The HPG was made possible through a partnership among the Kennedy School of Government, American Management Systems, Cisco Systems, and IBM's Institute for Electronic Government. The views in these papers are those of the individual members of the HPG and not the institutional views of their home organizations or project sponsors. But it would have been impossible for the group to learn and to produce what it has without the opportunity provided by this partnership to meet together and to share insights over an extended period of time.

We sincerely hope that these papers will prove helpful to leaders and to the public at large.

THE HARVARD POLICY GROUP ON NETWORK-ENABLED SERVICES AND GOVERNMENT
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Growing in importance since the beginning of the information revolution in the middle of the 20th century, innovation is now a driver for organizational success. In earlier eras, success depended mostly on control and continuity. While innovation was often perceived as beneficial, the pace of change was slow. As a result, organizations focused on perfecting previously learned behaviors. When it came to new ideas, they had lots of time to see what was working before they had to take action.

Now, however, failing to innovate quickly is often fatal. Many technology companies, for example, find that half of today's revenues come from products and services not even invented five years ago. Survival—at least in the business world—depends on continual innovation. For governments, of course, the consequences of lingering behind the leading edge of change are not as dramatic, at least in the short term. However, while a slower pace of change is unlikely to throw government agencies out of business, public leaders are coming under strong pressure to improve performance, and to catch up with newly established standards of e-commerce and e-government.

The purpose of this paper is to explore how and why innovation has become an important component of managing in government, and what you as a public leader should do about it.

Innovation

"....governments have lagged behind the private sector in exploring the possibilities offered by an increasingly networked world, and in effectively applying innovations that work."

THE PUBLIC SECTOR INNOVATION PROBLEM: SYSTEMIC PRESSURES FAVORING AUTOMATION AND AN INTERNAL ORIENTATION

Huge benefits are sacrificed if information technologies are used merely to automate existing processes, rather than redesign them. Digital networks empower leaders to craft new, more effective relationships throughout their organization and across organizational boundaries—relationships that not only improve traditional performance but also offer new and

transformed services. In the public sector, however, the systemic pressures working against such strategically significant innovations are strong. Risk aversion, conflict avoidance, limited funding, and scarce knowledge all serve to discourage rapid and fundamental change.

- Risk Aversion. Modern life depends on large government systems for national defense, water supply, transportation, banking, police protection, and other public services. We expect such systems to be reliable. While we also want these systems to be effective and efficient, major disruptions in service are unacceptable. When the downside risks of change are enormous—as they often are in government—a conservative bias is rational.
- Conflict Avoidance. Even successful innovations typically generate opposition. Some opposition arises because pilot projects are inevitably inequitable, treating test groups differently than control groups. Further opposition may come from those who do not like how the benefits from innovation are divided among service recipients, taxpayers, and government employees. Opposition is also generated (at least initially) by concerns that government may abuse its powers. Those proposing change thus find that controversy and conflict come with the territory, raising considerably the costs and risks to be considered.
- Limited Funding. While public leaders are feeling pressure to keep up with new standards of performance, they are also feeling the continuing pressures of fiscal constraints. The requirement to do more with less clearly calls for innovation, but any innovation must compete against existing programs, as well as other new developments, for limited resources. Budgets focused on program-by-program allocations make it particularly hard to fund some of the most important innovations, which often require enterprise-wide or cross-boundary investments.
- Scarce Knowledge. Compared to the time required for significant social change, the information age is still in its infancy. Governments are still struggling to understand how information technologies can best be used. Relatively little is known about what citizens really want governments to deliver online. Trends emerge and sometimes recede, but reliable knowledge about the future of e-government is scarce.

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In most cases, governments have lagged behind the private sector in exploring the possibilities offered by an increasingly networked world, and in effectively applying innovations that work. Risk aversion, conflict avoidance, limited funds, and scarce knowledge have pushed government toward projects that are internally-oriented, and that focus on automating existing processes. The challenge is to push back and to make room for innovations with an enterprise-wide, cross-boundary perspective.

WHAT TO AVOID: OVER-CAUTIOUS INCREMENTALISM AT ONE EXTREME, IMPULSIVE INNOVATION AT THE OTHER

In response to career-threatening penalties for failure, it is tempting for public leaders to avoid all but incremental moves toward digital government. Tempting, but wrong.

Society needs leaders with the ability to clearly communicate a vision for change that motivates and inspires others to push beyond their boundaries. In the past, better food and grooming for horses would never have produced the transport capacities of the internal combustion engine. Better ammunition for cavalry would not have produced the mobile firepower of the air force. Significant progress has long depended on leaders willing to explore the potential of risky and disruptive new technologies. And now, even more than before: nothing ventured, nothing gained. Public sector organizations will never reap the true value of digital networks so long as they limit themselves to the automation of existing relationships and processes.

"The key is to make the right kind of mistakes: small mistakes based on educated decisions and guided by a clear vision."

On the other hand, as much as we need leaders to push beyond automation, we also need leaders to avoid impulsive moves that threaten not only the project at hand, but other projects as well. New technologies can be very tempting. Proceeding without understanding and managing the risk factors of a project, however, often leads to failure—something all too common when it comes to information technology.

While ambitious goals are often the right goals—capable of inspiring supporters and shifting the terms of debate—successful implementation usually proceeds through small but quick steps, especially in government. It is important to recognize, however, that not every step in the innovation process will produce the expected or desired outcome. Nevertheless, every step can be a valuable step in the learning process. The reality is that we learn from mistakes and failures. The key is to make the right kind of mistakes: small mistakes based on educated decisions and guided by a clear vision.

Change

"Adaptation and change is now Job #1."

SUCCESSFUL INNOVATION: A FUNCTION OF ENVIRONMENTAL DEMANDS

Given that innovation is a critical element of success, what kind of leadership and resources are required to take advantage of information technologies? The answer depends largely on the degree of turbulence in the organization's environment. (See Figure 1)

If the organization is operating in a relatively stable environment, it can afford to pursue innovations that are small and relatively infrequent. Leaders may simply dedicate staff to scan for ideas and pass them back to the core organization for implementation.

However, as the environment demands more frequent change, leaders may need to augment staff efforts by pulling front-line personnel from their daily production work to participate in the search for improvements. Successful evolutionary changes typically rely on a bottom-up, consensus-building style of leadership, like that developed within the Total Quality Management (TQM) movement. TQM pushes the organization methodically up its learning curve. The key role for senior managers is to build an organizational culture that supports participatory and evolutionary innovation.

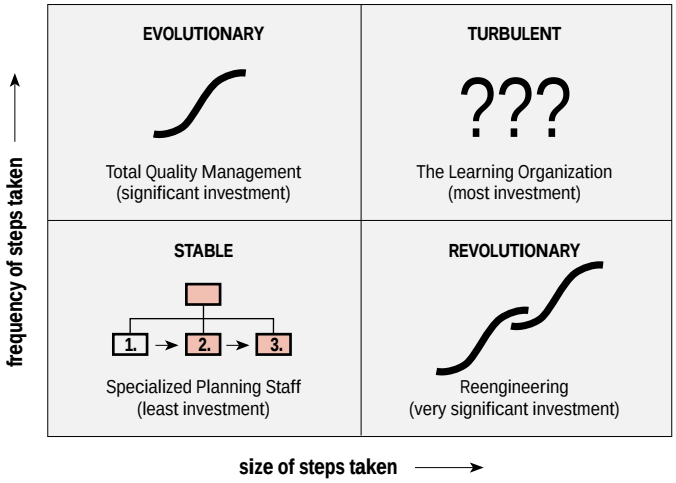

Figure 1: Organizational Innovation in Different Environments

If the organization's environment demands more revolutionary steps away from the status quo, however, a more aggressive leadership style is required. Revolutionary change—commonly initiated through reengineering or reinvention efforts[1]—is almost always controversial.

For these large and controversial changes—which can be viewed as leaps from one learning curve to a new one—leaders must get aggressively involved up-front and remain involved throughout the change process. The new methods of working must be protected from elements of the old culture.

Finally, at the extreme, if the environment is turbulent enough to demand large changes on a frequent basis, leaders not only need to be engaged in the change process, but must also be actively working to build an organization conducive to change. Success will require adaptive capabilities throughout the organization—within individuals and teams as well as within organizational systems and infrastructures. Creating the kind of learning organization needed to thrive in turbulent environments is an incredibly challenging task.

As the Information Age advances, organizations must adapt to growing demands for change. In the more stable environments of the past, leaders could focus on internal operations and continuity, giving less attention to external events or change. However, as environments grow more turbulent innovation is more important, requiring more resources as well as more directly engaged leadership. Adaptation and change is now Job #1.

Adapt

"Do not hunker down, but instead search hard for ideas that you can adopt, adapt, or develop."

GUIDELINES FOR USING IT FOR STRATEGIC INNOVATION

Given the critical role of innovation, what should be the elements of your "innovation strategy"? How can you make sure that you are not just changing for the sake of change, but focusing on innovations that are strategically significant? Consider the following eight guidelines as you develop your agenda.

1. Adopt an external, customer-centered focus.

Problem. To date, most governments have simply used the Internet as another delivery channel for traditional services.[2] While these efforts made some services available 24/7 and demonstrated the value of self-service, they failed to take advantage of the full potential of networks to meet public needs in better and dramatically more integrated ways. Too much effort has been devoted to the needs of governments as producers and not enough to the needs of citizens as consumers.

What to avoid. Do not simply automate existing services online, and do not limit the scope of your thinking to program-by-program initiatives. Big improvements in efficiency, effectiveness, and productivity can be realized by orienting new delivery channels toward customer needs and enabling citizens to do more on a self-service basis. These improvements, however, cannot be attained without coordination across organizational boundaries.

What to do. Push hard for an externally-oriented, customer-focused strategy that thoroughly addresses social needs and cross-boundary relationships. Treat those with whom you interact as valued customers, even when the transaction represents a regulatory obligation rather than a discretionary service. Organize online services around life events or business scenarios, and extend your customer-centered focus beyond client interface points to back-end and internal processes.

An Example. Internet Portals in Singapore and Virginia.[3] As a gateway or single point of entry to government services, Internet portals have become extremely popular. Serving as much more than a simple gateway, however, a portal offers an opportunity to reorient services around the needs of citizens. For example, governments in Singapore and Virginia have each designed their portals in intuitive and highly integrated ways. Singapore has organized its "e-citizen" portal around life events such as changing careers or retiring, while Virginia has launched the "My Virginia" services that allow citizens to personalize how they interact with the site. Both represent leading edge, customer-oriented practice.

For more information about Singapore's e-citizen site see, www.ecitizen.gov.sg
For more information about Virginia's My Virginia initiative see, www.state.va.us

An Example. Ontario Business Connects (OBC). OBC is a one-stop electronic service delivery infrastructure that enables businesses in Ontario to interact with all levels of government from a single web site. Using the Internet, businesses can access a wide-range of information (including planners, worksheets, and electronic forms), and initiate transactions such as registration renewals and permit applications at their convenience.[4]

For more information visit the OBC site at, www.ccr.gov.on.ca/obcon/welcome.htm

An Example. Singapore TradeNet. Host to one of the busiest ports in the world, the Singapore government handles millions of trade documents each year through a variety of government agencies. While shippers used to submit trade information through as many as twenty paper-based forms, today shipping companies use TradeNet to submit all required information on a single electronic form. The product of intense negotiations between government agencies, the TradeNet system accepts information, determines which agencies require what data, and routes the information to the appropriate authority. By not only collecting information electronically, but also reorganizing the workflow within each agency to accommodate a customer-focused system, the Singapore government is able to use this innovation to deliver dramatically improved services.[5]

2. Engage overseers in understanding and defining the value of innovation.

Problem. Without first-hand experience many government overseers—executive, legislative, and judicial officials, as well as the press and other opinion leaders—have difficulty understanding the extent and value of innovations made possible by computer networks. A history of failed projects has also left overseers wary of IT-based initiatives.

What to avoid. Governments will never use IT to innovate effectively if leaders fail to propose new ventures, or if they try to sneak new ideas through without support from a variety of overseers and the public.

What to do. Go to key overseers early and often to build the case for long-term, non-partisan IT-based experimentation and innovation. Engage overseers in an ongoing process to understand and define the value of innovation, keeping them engaged as projects progress. A knowledge-based economy and society cannot thrive without continued development of new knowledge. Fortunately, overseers and citizens are more receptive to IT-based innovations than they were just a few years ago.[6] Leverage this interest and get them engaged, using the press and public relations as appropriate.

An Example. Idaho E-government "Boot Camp" for Policy Makers. In an effort to get public sector leaders engaged in e-government, Idaho's Technology Resource Management Council hosted an e-government boot camp for the state's policy makers, including legislators, agency heads, and department heads. This one-day event gave participants an opportunity to interact with guest speakers on issues from privacy to rural connectivity to government funding. The boot camp also included "best practice" booths, in which current e-government initiatives were highlighted. With more than a third of legislators in attendance, the boot camp proved to be an excellent vehicle for engaging policy makers.

An Example. Defense Research and the Internet. As many people know, today's Internet grew from experiments in computer communications developed more than thirty years ago by the Defense Advanced Research Projects Agency (DARPA).[7] What they may not know is that throughout the Cold War, DARPA and the Department of Defense worked hard to educate the public and Congress on the need for defense research. Today, of course, defense is not the only government function needing extensive R&D, and therefore needing to learn the lessons of how DARPA educated its overseers.

More information on DARPA can be found at www.darpa.mil

An Example. Partnership for Intergovernmental Innovation (Pi2). Innovating is hard. Innovating across boundaries is even harder. Yet, to realize the value of networked e-government, leaders must recognize and support cross-boundary and enterprise-wide opportunities. Pi2 is a network of public sector officials experienced in managing innovative intergovernmental IT projects. As a group, Pi2 helps leaders to identify opportunities and overcome barriers that hinder cross-boundary initiatives. In the San Joaquin Valley, for example, Pi2

worked with federal, state, and local officials to explore ways in which technologies could be used to create sustainable economic development. As a result, in October 2000 President Clinton signed an Executive Order establishing an Interagency Task Force on the Economic Development of California's Central Valley.

For more information about Pi2 visit, www.napawash.org/pii

An Example. IT Fair for State Legislators. While serving as the CIO of Massachusetts and then California, John Thomas Flynn held IT Fairs in the State Capitol Building as a way to raise awareness amongst legislators. For two days he set up demonstrations and information booths, allowing the legislators and their staff to see first-hand what he was doing and what the technologies could do. Similar exhibits are used by organizations such as the National Association of Counties (NACo) as vehicles for keeping public officials informed and educated.

3. Nurture and support an innovations-friendly culture and workplace.

Problem. Government agencies often operate within conservative rule-bound cultures. Such cultures discourage staff from experimenting with new ideas or proposing innovative projects, and are a significant barrier to attracting creative, talented workers.

What to avoid. Do not ask people to be innovative without taking steps to create a supportive environment. Do not think of innovation as a series of individual projects, but rather as a part of your work culture—innovating once is relatively easy, but the challenge is to innovate continuously, to be an innovating organization.[8]

What to do. Recognize that innovative ideas can come from anywhere within your organization, and work to bring these ideas into the open. Take steps to not only be receptive to innovative suggestions, but to actively solicit them. Something as simple as a suggestion box or a series of luncheon meetings can be the source of a great new idea. Sending staff to seminars, conferences, and classes can also spark ideas, especially for cross-boundary innovations. Even redesigning workspace or enabling staff to work remotely (via telecommuting or mobile communications) can encourage creative experimentation. But be sure to try out some of the ideas that are suggested. If you are not prepared to try and to risk, do not even start. Clearly communicate that successful innovation is worth some degree of expected failure—support disciplined risk taking.

An Example. The National Partnership for Reinventing Government (NPR). Launched in 1993, the NPR was a task force of federal government employees seconded from different agencies to explore ways of improving government services. Stepping down as director in 2001, Morley Winograd noted that while the NPR had experienced both success and failure, one of its most significant impacts was to promote a culture that nurtured innovation.

"My proudest accomplishment is the way NPR changed the culture of government…delivering services to customers and empowering employees... One of the greatest lessons we learned was

from the private sector, which was that the best ideas come from listening to the front-line worker. The way to keep reinvention going is for government to listen to its front-line employees and listen to its customers." [9]

Examples of specific actions to promote an innovations-friendly culture included "Hammer" awards that recognized teams of federal employees who made significant contributions in support of reinventing government principles, and wallet-sized "permission cards" that explicitly empowered employees to try customer-oriented innovations (provided they were not illegal).

An Example. "Making a Difference" in the State of Missouri. While many public managers say they appreciate the role of staff in creating a learning organization, the State of Missouri supports its words with clear action. For example, the state's Information Technology Advisory Board recognizes staff who "have shown initiative, creative thinking, and/or extraordinary effort on projects, which have a positive impact on several or all agencies," with their *Making a Difference* award.[10] The state also invests in ongoing education for its IT staff, running IT training programs that allow staff to earn new certifications and explore new technologies. These initiatives go a long way in supporting an innovations-friendly workplace.

An Example. "The Best Idea that Did Not Work" in Hennepin County, Minnesota. As part of its internal employee recognition awards program, Hennepin County gives an award to the person/team that had the best idea that failed. Winners receive recognition and validation, while the mere existence of the award emphasizes the value of innovation.

4. Support R&D units to foster innovation, especially via fast followership.

Problem. Innovations need time, resources, and expertise. However, staff rarely have the slack in their schedule required to work on innovative ideas.

What to avoid. Do not accept the myth that people can easily experiment with new technologies in addition to performing their other duties. Innovation today is essential, but almost never easy or cheap. To innovate you will usually need some help from people who specialize in the innovation process.

What to do. You do not need to be on the "bleeding edge" all the time, but you do need to aggressively seek out and adopt innovative ideas once the "first mover" has proven the concept. Support the practice of "fast followership" by dedicating some staff and R&D resources to assessing what is happening outside your organization. Give innovators the resources and attention they need by creating special teams or using external innovation support units. At the same time, keep these efforts connected to operational reality by making resources available for line managers to participate in innovation projects.[11]

An Example. The Center for Technology in Government (CTG). The Center for Technology in Government is an applied research center housed at the State University at Albany and

funded through annual appropriations from the State of New York. Selected from proposals submitted by state agencies, the Center's projects bring agency personnel together with local government employees, faculty, students, and private sector vendors to explore how information technologies can be better used in the public sector. With a mission focused on innovation, the CTG gives state agencies the support and structure they need for exploring new ideas. Past projects include *Delivering on the Web: The New York State Internet Services Testbed*, and *Knowledge Networking in the Public Sector*.

For more information see the Center for Technology in Government site at www.ctg.albany.edu

An Example. Federal Reinvention Labs. From the early days of the National Partnership for Reinventing Government (then the National Performance Review), the federal government designated select groups within each agency as Reinvention Labs. The labs gave employees an environment open to innovation, as well as the leverage and leadership support needed to overcome many of the obstacles that often hamper innovation. For example, in the U.S. General Services Administration's Mid-Atlantic Regional Office, staff experimented with the use of computer networks as one way to improve workflow and communication across organizational boundaries.[12]

For more information on Reinvention Labs visit, www.napawash.org/waiver/labs/index.htm

An Example. The Fund for the City of New York. As a private organization established by the Ford Foundation more than 30 years ago, the Fund for the City of New York has a depth of experience helping governments and non-profits use technology to "streamline operations, expand services, and in general improve performance." Its independence from government also enables the Fund to disseminate its work and replicate it in other jurisdictions. For example, through its Center for Internet Innovation, the Fund developed the Domestic Violence Court System to help victims of domestic violence seek help. This innovation has since been adopted in three counties in Georgia and four counties in New York.

For more information visit the Fund's site at www.fcny.org

5. Use the budget process to identify and protect funds for innovation.

Problem. Government budgeting is often done on an program-by-program basis, focusing foremost on what it will cost next year to do what was done this year—on preserving the present rather than developing something new. This is understandable, but misses high-return opportunities associated with innovations that require cooperation across agency boundaries.[13]

What to avoid. Do not focus too heavily on program-by-program proposals, and thereby fail to analyze the budget as a portfolio of investments that balance risk and return across all projects. Do not focus innovation budgets on capital expenditures to the exclusion of personnel—this is especially important when funding cross-boundary initiatives.

What to do. Explicitly analyze how your budget addresses the need for innovation. Consider allocating 5-20 percent of your IT budget for innovation, with funding from line budgets as well as from R&D-oriented innovation funds that facilitate enterprise-wide, cross-boundary initiatives. But remember, for successful innovations to be sustainable they must eventually move to the main budget—revolving funds cannot sustain programs over the long term. Earmark e-government savings to fund new e-government initiatives—but be sure to establish benchmarks so that you can accurately identify savings.

An Example. Portfolio Budgeting in the State of Washington. In designing a rigorous and accountable IT budgeting process that also encourages innovation, the State of Washington has adopted a portfolio-based framework. Much as an individual investor has a portfolio of stocks, each agency has a portfolio of IT investments. By assessing each investment as part of a portfolio, agencies check to be sure new investments are aligned with agency goals and use "safe" projects to balance riskier initiatives that offer higher returns.

For more information on Washington's IT portfolio management visit, www.wa.gov/dis/MOST/portfolio/index.htm

An Example. Illinois VentureTech. VentureTech is Governor George Ryan's five-year strategy to develop and grow the technology and human capital necessary for Illinois to compete in the networked world. One of the pillars of this $1.9 billion initiative is an investment in the state government's information technology that focuses resources on e-government to "improve customer service, maximize taxpayer resources, and make the state more performance-driven, efficient, and accountable." By creating a central fund, Governor Ryan's strategy opens the door to cross-boundary innovations.

For more information visit, www.state.il.us/tech/venture.htm

6. Develop a flexible, standards-based IT architecture as a foundation for expansion and growth.

Problem. While electronic services benefit enormously from networking economies of scope and scale, the large infrastructures required for efficient electronic services can stifle innovation by becoming overly rigid.

What to avoid. If you do not standardize data and communication protocols, you will not be able to share resources broadly across program and jurisdictional boundaries. At the same time, if you let your information architecture become too rigid, you will lock yourself into a single vendor or outmoded ways of working. Avoid these extremes.

What to do. Maintain a balance between standardization and flexibility, first supporting experimentation, then standardization, and ultimately the elimination of outmoded practices. As a rule of thumb, the right time to standardize is when 15-25 percent of those that might use a particular resource or process are already doing so. This guideline facilitates efficiency and growth while allowing space for innovation. To avoid lock-in, use open-market

standards where possible. Watch the evolution of open-source software as open-source may offer the right balance between flexibility and efficiency.[14]

An Example. Quest Operating Rules. In the early 1990s, states began distributing government benefits electronically through the development of Electronic Benefits Transfer (EBT) systems. In 1996, the non-profit National Automated Clearinghouse Association (NACHA) assembled public and private stakeholders to establish Quest as a set of open standards for EBT systems to run over banking ATM networks and retail Point-of-Sale networks. The advantages of the Quest operating rules are twofold. First, as an open standard, the Quest rules ensure that a wide range of bank ATM and transactional networks can offer EBT services, thereby limiting reliance on a single financial partner. Second, Quest still enables public sector organizations to explore innovative ways of delivering other services electronically. In short, Quest helps ensure both interoperability and flexibility.

For more information about Quest visit, www.nacha.org/ebt

An Example. New York City's CAMIS. City Agencies' Management Information System (CAMIS) is a digital infrastructure used to share information across New York City agencies and to process transactions. At its core, CAMIS is a large database connected to thousands of workstations by a robust network. The real value of CAMIS, however, is the way the network and database have scaled and evolved. Originally designed to help process parking tickets, CAMIS has grown to support use by health inspectors, revenue collectors at Consumer Affairs, the Taxi and Limousine Commission, and citizens.[15]

An Example: The Certificate Arbitrator Model (CAM). The U.S. General Services Administration (GSA) developed CAM to ensure that users from multiple organizations could validate certificates in different Public Key Infrastructure (PKI) systems. To encourage adoption of the CAM model, GSA distributes the software program that supports CAM for free and according to an open-source license, giving users the right to access the underlying computer code (source code), and enabling users to modify the software to suit their needs.[16] By distributing the source code with the software, GSA is hopeful that more organizations will choose to adapt CAM to their system as a non-proprietary and open standard.

7. Establish practices that enable quick and iterative innovation.

Problem. Innovative projects with long timelines tend to lose momentum and support in political environments. Political overseers are very conscious of the electoral cycle and demand tangible results quickly.

What to avoid. Do not get caught up in "grand design" projects that fail to deliver early results. At the same time, do not rush a complex project into and through development for the sake of satisfying political overseers.

What to do. Establish modular designs and sound management practices that enable quick and iterative development steps. By moving in short spurts you can demonstrate, and then

build on, tangible successes, reducing confusion about project goals and solidifying support. At the same time, relatively short timelines force disciplined project management, minimizing the opportunity for the scope to grow out of control or expenses to escalate.

An Example. Pennsylvania's "Energy Bursts." Pennsylvania's e-government development strategy calls for the Office for Information Technology to identify projects that can be completed in 90-day increments. Development teams are given 90 days to meet their milestones, achieving a minimal level of functionality and demonstrating value. Future upgrades are also made in 90-day increments. For example, the state's PAOpen4Business web site is being developed within this management framework. Phase 1 of the project put the forms necessary for starting a business on the web site and phase 2 created an online "entrepreneur interview" to help prospective entrepreneurs identify and locate the necessary information and filing requirements. Future 90-day "bursts" will complete the online posting of all related forms and integrate data across state agencies. This model not only keeps Pennsylvania nimble and flexible as an innovating organization, it also energizes employees who see the value of their work immediately.

8. Form partnerships that support entrepreneurial new service delivery units.

Problem. Truly innovative ideas often need special skills and protection from the status quo culture—not just early on, but throughout development and growth to full-scale operation and delivery.

What to avoid. When new people and skills are part of an innovation, do not allow these new people—and their unsettling ideas—to go unprotected.

What to do. In many cases, e-government services should be developed and delivered by newly created organizations. New units are often quicker and more adept than old ones in responding to the challenges of service development and innovation. These organizations can be constructed within government, or in partnership with private or non-profit agents.[17]

An Example. ServiceArizona. Looking to deliver online services but lacking start-up resources, the State of Arizona Motor Vehicle Division approached IBM about building and maintaining a web site and dial-up service for online vehicle registration. In the model that has emerged, the State manages the backend database, system interfaces, and customer service, while IBM built and continues to manage the front-end application, including credit card transactions and security. Revenues from a transaction-based convenience fee were shared between IBM and the State (although the convenience fee has since been eliminated).[18] ServiceArizona has served as an entrepreneurial start-up supplying the resources and flexibility the project needed to succeed. In its first year, 5 percent of Arizona residents used ServiceArizona, giving it a 99 percent positive rating. For the state MVD, the cost of processing a vehicle registration is 76 percent lower than it was under the old face-to-face model.

For more information visit ServiceArizona at www.servicearizona.com

An Example. Conyers, Georgia. As the city council of Conyers, Georgia, prepared an information technology plan, they realized they did not have the financial or human resources to offer effective e-government services. Rather than trying to raise funds and hire staff, Conyers partnered with GovHost.com. GovHost built a site for Conyers that allows citizens to request city services, view property tax information, and complete permit requests. Other private companies are also helping to deliver government services online. For example, NIC (National Information Consortium) has partnerships with states and municipalities including Utah, Maine, and San Francisco, while Andersen Consulting (now Accenture) and Yahoo helped North Carolina build its award winning NC@Your Service site. Similarly, Cobb County, Georgia is one of the governments working with EzGov.com. While each partnership has unique qualities, they all take advantage of the focus and flexibility that entrepreneurial relationships can bring to the implementation of innovative services.

For more information visit, www.conyersga.com

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Governments have been built primarily for stability and equity, not adaptability and efficiency. In the Information Age, however, citizens now demand stability *and* equity *and* adaptability *and* efficiency. The primary need today is not for technical expertise so much as adaptive leadership. Do not hunker down, but instead search hard for ideas that you can adopt, adapt or develop. The guidelines summarized in Figure 2 are designed to improve your capacity for innovation.

1. Adopt an external, customer-centered focus.
2. Engage overseers in understanding and defining the value of innovation.
3. Nurture and support an innovations-friendly culture and workplace.
4. Support R&D units to foster innovation, especially via fast followership.
5. Use the budget process to identify and protect funds for innovation.
6. Develop a flexible, standards-based IT architecture as a foundation for expansion and growth.
7. Establish practices that enable quick and iterative innovation.
8. Form partnerships that support entrepreneurial new service delivery units.

In sum: Search hard for ideas that you can adopt, adapt, or develop.

Figure 2: Guidelines for Success in Focusing on Strategic Innovation in the Public Sector

"When all is said and done, successful organizations—including those in the public sector—need to become innovative learning organizations."

NEXT STEPS

While it is clear you cannot ignore the need to innovate, what should you do now? To begin applying the above principles in your own particular situation, consider the following next steps.

1. Assess how well you are doing with respect to innovation. How closely do your services and production methods reflect what is possible? How receptive are you and your organization to new ideas and experimentation? Is your level of effort and leadership style a good fit with the demands of your organization's environment?

You need to think explicitly about innovation. It may be helpful to organize an innovations audit to assess how you are doing. Comparing your organization against others can be extremely useful. For example, the Pew Memorial Trust, in conjunction with Governing Magazine and the Maxwell School of Citizenship and Public Affairs at Syracuse University, has developed a methodology for assessing government performance. These reports are sometimes controversial and incomplete, but they do include assessments of how well various jurisdictions are using information technology, and they can effectively serve to get things started.

2. Develop and allocate dedicated resources for innovation. To innovate you will need to make technology-related innovation the primary mission for some portion of your workforce, much as was done with DARPA and the Center for Technology in Government in New York State. You will also need to allocate and protect funds for innovation on an ongoing basis.

3. Protect innovation as a part of your personal strategy and organizational culture. For many public leaders and organizations, innovation must become a core capacity. It should not be just an occasional theme or concern for the R&D staff, but for everybody, every day. To manage the stresses of innovation, leaders must protect those who point out problems and propose new ideas, while simultaneously helping their organizations tolerate the stresses that arise from self-criticism. Leaders must keep these stresses at the right levels—neither so high that the organization breaks apart, nor so low that it avoids the hard work of innovation. Leaders who can consistently strike the right balance are essential.

Brief advice for a variety of stakeholders can be found in Figure 3.

• • •

In a world of ever-expanding computer networks, governments are being challenged to design and deliver services electronically. Progress is clearly being made, as governments are taking advantage of the web to launch a wide variety of e-government services. To succeed in the long term, however, government will need aggressive yet disciplined and continuing support for innovation. The job is not just to catch up, but to keep up, and where appropriate to push the boundaries. When all is said and done, successful organizations—including those in the public sector—need to become innovative learning organizations.

This report offers guidelines for meeting this challenge. We hope that public leaders—and their many overseers in the public at large—will find these guidelines useful.

Subsequent reports of the Harvard Policy Group on Network-Enabled Services and Government will explore other imperatives for the 2000s and beyond. Our next report will examine how to avoid the implementation problems that have plagued IT projects in the past, addressing implementation as a change-management problem and not simply as a technology issue.

The President. Use your "bully-pulpit" to support innovation and technology, backing your words through the budget process. Your leadership is essential in promoting cross-boundary innovation and in disseminating innovative ideas across government.

Legislators. When it comes to innovation, you need to educate the public as well as represent it. Fortunately, constituencies across the political spectrum are primed to support innovation in the context of e-government.

Governors. Innovation is critical for knowledge-based industries and economic development. Develop an economic agenda that highlights innovation.

Local government leaders. Communications infrastructure and education are determining where the good jobs go. Make sure your community keeps up, as it will become more difficult to catch up later.

Judges. Focus on finding ways to simplify or eliminate handoffs between stakeholders in the criminal justice system. Get involved with efforts to establish standards for a national integrated justice system.

Budget directors. Correct against over-cautious and inwardly focused budgets. Encourage cross-boundary IT initiatives through an innovations fund and a strong innovations portfolio.

Agency and program heads. Cultivate an organizational culture that is friendly to IT-based innovation. Support the participative methods of the "total quality management" movement.

Chief Information Officers. Become a knowledgeable advocate for "fast followership" of IT-based innovations and services among your colleagues. Support line managers who make reasonable proposals for experimentation.

Technology vendors. Help educate government and the public on the importance of balancing innovation and standardization in a knowledge-based society. Disseminate information about innovations to other jurisdictions.

Associations and interest groups. Promote "fast followership" by helping to assemble the in-depth information needed to disseminate best practices. Support innovators by offering awards or other means of public recognition.

The press. Analyze innovation in society and government, reporting especially on the human-interest stories of leadership and problem solving. Help inform the public that there is value in innovations that fail.

The public. Demand innovation from your government, recognizing that it often comes with uncomfortable anxieties and conflicts.

Figure 3: Advice for Stakeholders: How to Support Strategic Innovation

Appendix A

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Appendix B

READINGS AND RESOURCES

Altshuler, Alan A., and Robert D. Behn. *Innovation in American Government: Challenges, Opportunities, and Dilemmas.* Washington D.C.: Brookings Institution Press, 1997.

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Donahue, John D. *Making Washington Work: Tales of Innovation in the Federal Government.* Washington D.C.: Brookings Institution Press, 1999.

Light, Paul C. *Sustaining Innovation: Creating Nonprofit and Government Organizations That Innovate Naturally.* San Francisco: Jossey-Bass Publishers, 1998.

Mechling, Jerry, and Scot Barg. *Maximizing the Value of Public Sector Innovation.* Workshop Report. Cambridge, MA: JFK School of Government, 2000.

Osborne, David, and Peter Plastrik. *The Reinventor's Fieldbook: Tools for Transforming Your Government.* San Francisco: Jossey-Bass Publishers, 2000.

The Innovations in American Government web site includes many white papers, case studies, and other relevant resources on public sector innovation and technology throughout the world. www.innovations.harvard.edu

The Innovation Groups' web site includes news about public sector innovation, including a forum dedicated to innovation and e-government. www.ig.org

The Innovation Journal web site includes peer-reviewed articles and case studies on public sector innovation and technology. www.innovation.cc

Appendix C

GLOSSARY

Asynchronous Communication—A communication pattern in which the two (or more) parties involved are not communicating at the same time. Telephone conversations are an example of synchronous communication—both parties must be on the telephone at the same time. An email message is an example of asynchronous communication—one party can send a message and the other can read it hours or days later.

Broadband—A general term for high-volume, multiple-channel telecommunications capacity available via a single medium (e.g. a wire or cable). While narrowband (the equivalent of one telephone voice channel) is adequate for the transmission of text and numerical data, broadband connections allow the efficient and reliable delivery of voice, data, and video over one integrated network. Because multimedia content is seen as vital to businesses and consumers alike, electronic networks are increasingly moving to broadband, which in turn will have important long-term implications for commercial development and civic life.

Database—A set of data structured to support the storage, retrieval, and analysis of information, often custom-designed for specific business applications. Databases are central to information processing since they allow new and more efficient ways of assembling records and organizing work. A key step in developing databases is implementing consistent definitions or standards so that data can be meaningfully shared among users. Examples include standard charts of accounts for financial data, standard methods of coding geographical information, and standard templates for archiving audio and video material. (See also: Standards.)

Digital—Data that has been created, transmitted, or stored as a string of signals coded as "1"s (on) or "0"s (off). Data in digital form (text, numbers, graphics, voice, video, etc.) can be stored and processed by computers and communicated at high speed over electronic networks with complete accuracy and reliability. Exact copies of digital data can be made in which the nth copy is indistinguishable from the original.

E-government—A term commonly used to describe the interaction between government and citizens over the Internet. E-government has evolved rapidly from merely publishing or disseminating government information electronically, to online interactions and transactions between government and citizens. As governments begin to reorganize and integrate their work processes to take advantage of computer networks, e-government may come to define a new or transformed relationship between citizens and government enabled by networks.

Electronic Benefits Transfer (EBT)—Refers to the transfer of government benefits (funds or resources) to individuals through the use of a card technology. Individuals access their benefits through Automated Teller Machines or retail point-of-sale terminals.

Electronic commerce (or e-commerce)—Transactions where money is exchanged for valuable goods and services with either the money and/or the goods and services transported over computer networks.

Encryption—The act of scrambling information into a form called a cipher, usually to keep it from being read or modified by unauthorized parties. This is achieved through the use of algorithmic "keys" that scramble the information at one end and unscramble it at the other. Computer-based encryption can be used both for purposes that society wants to prevent (criminal and terrorist communications) as well as those it wants to support (private and secure social and commercial communications).

Fast Follower(ship)—In the context of innovation diffusion, a fast follower is one who adopts an innovation shortly after the initial innovator (or first mover), but appreciably before the majority of those who eventually implement the innovation. For a more detailed discussion of innovation diffusion see Everett M. Rogers, *Diffusion of Innovations*, Third Edition. New York: The Free Press, 1983.

Geographic Information System (GIS)—A set of hardware and software tools used to gather, manipulate, and analyze geographically referenced data. GIS are used by many government agencies. For example, transportation departments use GIS to determine the most efficient corridors for highway construction, and housing departments use GIS to help select the best locations for urban renewal projects.

Geographic Positioning System (GPS)—A system that uses satellites and small, portable receivers to determine the physical position of an object or person. Increasingly ubiquitous, GPS are used to track the locations of airplanes, boats, cars, and even individuals to within an accuracy of a few meters.

Hardware—Broadly, the physical components of information technology: computers, peripheral devices such as printers, disks, and scanners, and the cables and switches that link digital networks. The key components of computer hardware are microprocessor chips, which have doubled in productivity every 18 months, as measured by instructions executed per dollar (a phenomenon referred to as Moore's law). (See also: Software.)

HTML—Hypertext markup language. See: World Wide Web.

Information infrastructure—The interdependent capacities and standards for digital communication and data processing (both hardware and software) that support the flow of information, much as a highway infrastructure supports the flow of vehicles. (Hence, the vernacular catchphrase, "Information Superhighway," as a general reference to the interconnected system of computer networks exemplified by the Internet.) The ongoing expansion of this information infrastructure raises vital issues about when and how to establish and refine the technical standards on which it operates, including important related questions about funding, security, privacy, and collective democratic values.

Information technology (IT)—The umbrella term that encompasses the entire field of computer-based information processing: computer equipment, applications and services, telecommunication links and networks, digital databases, and the integrated technical specifications that enable these systems to function interactively. (See also: Information infrastructure.) The rapid development and expansion of these technologies over the last twenty years has ushered in the current historical period widely referred to as the "Information Age" or "Information Revolution," comparable in economic and social magnitude to the Industrial Revolution of the early 19th century. The profound transformations brought about by computer networking have made information processing (rather than industrial manufacturing) the key factor in economic productivity and global commerce, thereby supplanting large segments of the traditional blue-collar labor market with a white-collar force of information or knowledge workers.

Internet—The vast network-of-networks that uses open rather than proprietary standards to support computer-based communications at an incredibly large and efficient worldwide scale. Originally developed by the U.S. Defense Department for use in research in the 1960s, the Internet has become the foundation of our information infrastructure, an ever-expanding universe of network services and applications organized in geographically dispersed rather than centralized form.

Knowledge-based economy—A term used to describe an economy in which the defining factor of production is knowledge. The 19th century saw the rise of the industrial-based economy in which goods were produced in large industrial manufacturing plants. Today, a growing number of people produce, use, and share knowledge in their day-to-day work. Since information can be expressed digitally, computer networks have enabled the rapid growth of the knowledge-based economy.

Leadership—Any act by an individual member on the behalf of a group, with the intent to get the group to better meet its goals. Leadership for previously known problems relies heavily on authority and technical expertise, while leadership for new or adaptive problems relies on getting the group to confront the inadequacies of its old values and routines, and thereby develop more effective solutions. In general, the challenges of the information age (which involve a high degree of confusion and conflict resolution) call for adaptive leadership.

Marginal cost—The cost of the next in a series of products. Typically, first products cost more because of the expenditures required to set up the production process, with the unit cost then falling over time as the volume of activity increases. For most manufactured goods, however, diminishing returns-to-scale eventually cause marginal costs to rise. With information-technology products, by contrast, the dynamics are dramatically different: extremely high set-up costs (hundreds of millions of dollars for some software products) followed by almost zero costs for extra copies and no diminishing returns-to-scale for extremely high production volumes. Pricing policies for information goods are thus markedly different than for traditional industrial goods, and pricing policies in the economy at large are likely to change as the Information Age progresses.

Network—A set of communication paths (or channels) and the points (or nodes) they connect, including switches to determine which channel will be used when more than one is available. Computer networks, like telephone networks, can be thought of as telecommunications highways over which information travels. Networks benefit greatly from economies of scope and scale. Digital networks typically use packet-switching rather than circuit-switching to greatly increase efficiency and throughput. (See also: Switching)

Open-source—Computer programs that are distributed as open-source are distributed along with access to the source code—the program instructions as written by the programmer. Once distributed, the author of the program must allow users to modify the code and redistribute it freely, while users are prohibited from selling the program or any derivative thereof without the accompanying source code. The open-source nature of the program is usually protected by an open-source license such as the GNU General Public License (GPL). The rationale behind open-source is that a larger community of programmers will use, improve, and develop the program.

Pen-based Computer—A computer that the user interacts with via an electronic pen or stylus rather than a keyboard or mouse. Most PDAs (see below) or hand-held computers are pen-based computers.

Personal Digital Assistant (PDA)—A small hand-held computer that can be carried around by an individual, and that is most commonly used for personal management tasks such as storing phone numbers, reading email, or scheduling. As wireless technologies continue to develop, PDAs are also being used to communicate over networks.

Portal (or Internet Portal)—On one level, a gateway or single point of entry through which the user can access related information from a variety of sources. For example, many governments are launching portals as a single point of entry to government information. It is interesting to note, however, that as governments adjust to the concept of a single point of entry, they are beginning to rethink how they interact with constituents. Rather than organizing the user's experience around agency boundaries, they are breaking down these boundaries to organize information and interactions around the user's needs.

Productivity—The ratio of goods produced in relation to the resources expended in production. Increasing living standards largely depend upon increasing productivity. Production processes that use information efficiently will typically be much more productive overall than older industrial production methods. This is the principal driving force behind the commercial, social, and political changes catalyzed by information technologies.

Public goods—Goods with impacts that "spill over" beyond those directly involved in buying and selling, thus weakening market forces as the mechanism for efficient resource allocation. Computer-based services have the potential of providing many positive spillovers to the public sector, since the marginal cost of IT production over time is virtually zero. One of the paramount political questions of the Information Age is where to draw the boundary between public and private benefits and, therefore, who should pay.

Server—A computer program that provides services to other programs or computers. This term is also used to describe the computer on which such a program operates. In the "client-server" network model, client programs make requests from servers connected to the same network. On the World Wide Web (see below) a browser acts as a client program, making requests for files or other information from web servers. These servers can be located any place in the world that is connected to the Internet.

Smart Card—A small electronic device or token (often the size of a credit card) that stores information in a memory chip. Information can be added, read, or changed using a smart card reader.

Software—A catchall term for the sets of instructions (programs) used to operate computer hardware. Software production and maintenance today has become a primary determinant in the success or failure of business and government organizations.

Source Code—See: Open-source.

Standards—In the context of electronics, standardized technical specifications allow functions to be coordinated by automatically adhering to the set standard. Thus, standards for the voltages used for signaling allow devices to "talk to one another" in a consistent format, and standards for financial accounting allow for the meaningful aggregation and analysis of financial databases. With information technologies there is an inherent tension between the creation of new capabilities through innovation (a few people trying new ways to do things) and the subsequent applications of those capabilities through standardization (many people following established ways of doing things). Determining when and how to set standards is therefore a critical leadership issue, as is deciding whether such standards should be "open" for use by the general public or whether they should be protected by copyright or patent statutes.

Switching—The engineering mechanism that designates alternate channels or paths in a telecommunications network. Historically, telephone networks have used circuit-switching, where an entire channel between two connections is made available for the duration of the communication. Most computer networks, by contrast, have been designed to use packet-switching, which breaks up the transmitted data into individual units or "packets," each of which contains the destination address of the data. The packets are then independently routed through the network and reassembled by the computer at the destination address. Packet-switching allows data from multiple users to efficiently use the same path on the network. Major developments are now underway to enable packet-switched networks to carry digital voice and video more effectively.

Total Quality Management (TQM)—A management philosophy that became popular in the 1980s and 1990s. TQM is focused on continuously improving the performance of all individuals and processes in achieving customer satisfaction.

World Wide Web (www or Web)—Standardized tools and software that allow non-technical users to find, display, and communicate text, graphics, voice, and video located on the Internet. The Web's fundamental components include HTML (hypertext markup language), pointers or hyperlinks (that rapidly access specific material that may reside on computers halfway around the world), and browsers (software that allows users to display and interact with Web content). Web technology is credited with democratizing the Internet by simplifying and streamlining key networking tools and functions for the general public.

END NOTES

[1] See, David Osborne and Ted Gaebler, *Reinventing Government: How the Entrepreneurial Spirit is Transforming the Public Sector.* New York: Plume, 1993; and James Champy and Michael Hammer, *Reengineering the Corporation: A Manifesto for Business Revolution.* New York: Harper Collins, 1993.

[2] A recent Forrester report (Sizing U.S. E-Government, 2000) notes that government has yet to exploit the value of networked services.

[3] The "customer" focus of portal development was highlighted by Government Technology with their 2000 Best of the Web awards. The governments in North Carolina, Georgia, Seattle, and Douglas County, Nevada, were among the winners. Tod Newcombe, "Customer is KING in the Best of Web Contest," *Government Technology*, October 2000, (www.govtech.net/publications/govinternetguide/october2000/BOW.phtml).

[4] For more detail about Ontario Business Connects see the Lac Carling case study written by ONCE Corporation, "Establishing Ontario as the Preferred Jurisdiction for Business Formation and Economic Growth: Ontario Business Connects," 2000. Prepared for Lac Carling IV and available at www.policity.com/ESD/doc/LCIV/Obc.pdf.

[5] For more detail about the origins and development of TradeNet, see the Harvard Business School case study written by John King and Professor Benn Konsynski, "Singapore TradeNet (A): A Tale of One City," 1990, Case Number (9-191-009).

[6] A META Group study (*E-government: Creating Digital Democracy, 2000*) suggests that "elected officials are clearly the catalysts" behind the push to e-government. A report sponsored by NIC and conducted by the Momentum Research Group found strong citizen and business demand for e-government services (*Benchmarking the eGovernment Revolution: Year 2000 Report on Citizen and Business Demand*). A recent Hart-Teeter report prepared for The Council for Excellence in Government entitled *E-Government: The Next American Revolution* also notes strong public support for e-government.

[7] For more see Brian Kahin and James Keller, *Coordinating the Internet*. Cambridge: MIT Press, 1997.

[8] See Paul Light, *Sustaining Innovation: Creating Nonprofit and Government Organizations That Innovate Naturally.* San Francisco: Jossey-Bass, 1998.

[9] Morley Winograd quoted in Kellie Lunney, "NPR director touts reinvention's results," *GovExec.com,* Daily Briefing, January 9, 2001 (www.govexec.com/dailyfed/0101/010901m1.htm).

[10] For more detail about the "Making a Difference" award see, www.oit.mo.us/committees/itab/award.htm.

[11] The value of dedicating specialized teams and resources to innovation can also be seen in Kim Clark and Steven C. Wheelwright's discussion of development teams in the private sector. Clark and Wheelwright describe the potential of "heavyweight" development teams—teams with effective leadership, strong problem-solving skills, and the ability to integrate across functions—in driving change in mature organizations. See Kim B. Clark and Steven C. Wheelwright, "Organizing and Leading "Heavyweight" Development Teams." *California Management Review*, Spring 1992.

[12] An early assessment of Reinvention Labs was published by the U.S. General Accounting Office. U.S. GAO, *Management Reform: Status of Agency Reinvention Lab Efforts* (GAO-GGD-96-69).

[13] For more see Jerry Mechling and Victoria Sweeney, *Finding and Funding IT Initiatives in the Public Sector.* Sacramento: Government Technology Press, 1998.

[14] For more on open-source see Chris DiBona, Sam Ockman and Mark Stone, *Open Sources: Voices from the Open Source Revolution.* Cambridge: O'Reilly, 1999.

[15] For more information about CAMIS see Ruth Greenberg, "Collecting its Due," *CIO Magazine*, 01 February 1978, (www.cio.com/archive/020198_nyc_content.html).

[16] Open-source software is distributed with the source code, and gives the user rights and responsibilities including the right to modify and redistribute the software, and the responsibility to ensure the software (and any derived works) are distributed according to the original open-source license. The GNU General Public License is one of the most common open-source licenses. To read a version of the license visit, www.gnu.org/copyleft/gpl.html.

[17] For examples of organizations looking outside in order to deliver (and capture value from) an innovative idea, see Henry Chesbrough and Steven Socolof, *"Creating New Ventures from Bell Laboratories Technolgies: The Design and Experience of Lucent's New Ventures Group."* Unpublished, 1999. See also the Harvard Business School case written by Christina Darwall, "*Inxight: Incubating a Xerox Technology Spinout*," 1998, Case Number (N9-699-019).

[18] The original convenience fee of $6.95 was paid to IBM, and IBM accepted the credit card fees. In October 1998 all convenience fees were removed in accordance with guidance from the Governor and the Legislature. IBM now receives a percentage of the vehicle license tax, and MVD pays the credit card fees.

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