Eight Imperatives

for Leaders in a Networked World:

Guidelines for the 2000 Election

and Beyond

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

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Overview

"If you want to be an effective leader in our networked world, you need to engage IT issues."

PREFACE

As we enter the new millennium, everyone from social commentators to the general public has observed that information technologies are changing our patterns of social, commercial, and political interaction. These changes raise profound challenges and opportunities for people everywhere. It is a revolutionary period in history, with issues not yet fully understood, let alone resolved. It is a time when—ready or not—we are being forced to make choices that will ultimately redefine the essence of governmental institutions and governance itself.

Until quite recently, however, our public leaders—including elected and appointed officials and their overseers in all branches of government—have too often ignored technology-related issues or have delegated them to others. The conventional political wisdom has been that technology issues are either not very important, or require technical expertise rather than leadership, or are 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 as to how to successfully engage technology-related issues.

In response to these developments, Harvard University's John F. Kennedy School of Government assembled in 1997 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 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 has developed pragmatic guidelines for those who seek to lead in this critical period.

This report, the first in a series of nine guideline papers, provides an overview of the problem and summarizes eight imperatives for leaders and their followers in an attempt to illuminate the way to success. Papers to follow will individually explore each imperative.

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. Note that the views presented in these papers are those of the individual members of the HPG and not the institutional views of their home organizations or project sponsors. Without the opportunity to meet together and share insights over an extended period of time, it would have been impossible for the group to learn and to produce what it has.

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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Now that the 2000 campaign season is in full swing, picture this scenario: The media is out in force to cover the evening's big debate. As the lights come up in the studio, the moderator turns to the candidates, announcing that the first topic will focus on critical issues for the new millennium. She begins with the following question:

> *"Our present period in history is widely referred to as the Information Age—in contrast to the Agricultural and Industrial Ages that preceded it—because new capabilities for managing information are creating fundamental changes in the structure and functioning of society. How will you and the next administration respond to the challenges that these changes present?"*

If you're skeptical about this line of questioning, it's time for a reality check:

• Over the past decade, the portion of new capital investment devoted to information technologies has risen from under 10 percent to over 50 percent, making it the largest category of capital investment in the US economy by far.

• Companies in the information industry are now the preeminent generators of market value and wealth. Between 1995 and 1998, IT-producing industries, while accounting for only 8% of U.S. Gross Domestic Product (GDP), contributed on average 35% of the nation's real economic growth. Only about 38 countries have a GDP larger than Bill Gates' personal net worth.

• Banking transactions over the Internet cost only about 3 percent of those at traditional walk-in counters, suggesting the huge productivity gains possible from delivering services over computer networks.

• By the time U. S. Senator Blanche Lincoln of Arkansas begins her first re-election campaign, worldwide e-commerce will have grown to about 30 times what it was when she was first elected in 1998.

If any of these facts are not already familiar, you may find yourself unprepared for some of today's paramount leadership challenges.[1]

Many leaders are not yet ready to take on technology issues in a meaningful way. Even though most readily acknowledge that computers and networks have dramatically transformed the way organizations function as compared to just a few years ago, too few have become actively engaged in the public-policy concerns that technological progress has brought to the fore.

What we suggest is that a posture of disengagement—however valid it may have been in the past—is now outdated. Non-engagement has become a non-starter. People are rightfully demanding that government do better at keeping up with the times. But they also have strong doubts that government can or will do the right thing, and they're virtually certain that it won't do it efficiently.[2] To respond to these challenges while preserving our principles of democracy, we need leaders to help us craft a new and enlightened balance between private interests and the public good.

We are entering a period of historical change comparable to the one that inspired Hamilton, Madison, and Jay to pen the *Federalist Papers* in the late 1780's. Their task was to define a constitutional vision for a new kind of political community: a federal, democratic republic. The challenge for leaders today is to define an economic, social, and political vision for a new kind of society: a knowledge-based society. Leadership will be crucial.

The leaders of the future will come from concerned groups and citizens from across the spectrum of public life: politically elected and appointed executives, legislators and overseers, CEOs and CIOs of both government agencies and private businesses, general managers and civil servants, and interest groups ranging from professional associations to poverty fighters. While specialists will continue to be important, generalists will also be essential.

This paper is designed to help such leaders by defining key values at stake in a heavily networked world and then concisely summarizing eight imperatives for successful leadership. Subsequent papers will examine each imperative in greater depth.

Values

"The challenge for leaders today is to define an economic, social, and political vision for a new kind of society: a knowledge-based society."

VALUES AT STAKE

Peter F. Drucker begins his cover story for the October 1999 *Atlantic Monthly* by asserting that "[T]he truly revolutionary impact of the Information Revolution is just beginning to be felt." The advent of the Internet, he continues, is "profoundly changing economies, markets, and industry structures; products and services and their flow; consumer segmentation, consumer values, and consumer behavior; jobs and labor markets. But the impact may even be greater on societies and politics and, above all, on the way we see the world and ourselves in it."

What far-seeing thinkers like Drucker help us perceive is that rapid growth in information processing and computer networking is ushering in a social and cultural revolution on the

scope and magnitude of those brought about in ages past by the printing press and the steam engine.[3] We can already feel this impact in the mind-boggling proliferation of e-commerce, with the new breed of dotcoms generating over $3.1 billion over the recent Christmas season, a more than four-fold increase from the previous year.[4] We can also observe the establishment of cornerstones of e-government: voters in Arizona's Democratic presidential primary in March will have the option of casting their ballots online, the first official digital vote in the nation.

These examples are but the proverbial tip of the iceberg. The press abounds with stories of new businesses and services that digital technology has made possible. Proximity no longer needs to be the primary determinant of whom we sell to, purchase from, or consider part of "our community." Changes on all these fronts are occurring much faster than most analysts ever anticipated.

Consequently, basic civic and social values are very much at stake. The following are of particular significance:

Service effectiveness and efficiency. Computer networks allow the production and distribution of services to be organized in dramatically new ways. Everything from grocery shopping to postgraduate education to registering a new business or automobile can be handled with greater ease and effectiveness, often at a dramatically lower cost. If designed or managed poorly, however, production and distribution via online systems may merely entrench outmoded and unproductive work processes. *Economic productivity is at stake.*

Privacy and security. As inter-networked computers become ever present, vast quantities of data gathered about individuals can be accessed from virtually anywhere. This capability can be used to create far more productive work processes. But the open standards of digital networking also confront us with conflicts over principles of privacy and security. At one extreme, if individuals can't protect access to personal data, rights to privacy and curbs on the power of the state could be seriously eroded. At the other extreme, if individuals are able to restrict access unconditionally, public security measures to identify and prevent illegal activity could be compromised. Computer networking thus raises profound issues about who should be authorized by whom to do what on the network. We need to find solutions that respect individual rights while upholding community standards. We must make the technology fit the rights and not the rights fit the technology. *The constitutional balance between individual liberties and civil order is very much at stake.*

Equity and community. Computer networking is transforming the content and competitiveness of work, with jobs free to move around the globe. Perceptions differ on the large-scale social effects of this digitized economy. The pessimistic view sees displaced workers, frayed bonds of civic identity, and inequitable distributions of income and wealth. The optimistic scenario sees the greater productivity enabled by networking as the creator of tangible benefits throughout society—at least in the long term. To realize the optimistic vision, how-

ever, government leaders will need to forge sustaining partnerships with the private sector to create both educational and employment opportunities in accordance with the competitive dynamics of the global economy. *Social justice and cohesion are also at stake.*

Governance. Democratic governance resolves conflicts through the application of values determined by legislative and administrative processes and authorized by community electorates. Jurisdiction has traditionally been based on geography and vested in towns, cities, and counties within states and nations. In a networked world, however, interactions increasingly extend beyond the boundaries of existing jurisdictions, making it harder to resolve conflicts. Leaders need to address these cross-boundary phenomena by devising new approaches to governance. *Government's legitimacy and our ability to govern ourselves are at stake.*

In sum, information technologies are transforming human interactions. Jobs, organizations, families, communities, economies—all of our relationships and socialization patterns are changing. While we face the future with substantial optimism, we also feel undeniable anxiety about what lies ahead. Virtually everything is at stake. Although recent times have been unusually good, we worry that governments will not have the courage or capability in the future to do what will need to be done.

Leadership

"The question is not whether leaders will step forward to meet their responsibilities, but how they can do so in the best way possible."

THE NEED FOR ENGAGED LEADERSHIP

Times have changed. (See Figure 1.) Computer applications in 1970 and before focused on automating high-volume bureaucratic routines like payroll (at the far left or automation end of the applications spectrum). Benefits were high because work volumes were high; saving a few pennies per check on the payroll could add up if you wrote a lot of checks. Costs were low because work routines had already been well established; this made the programming problems easier to solve and also ensured that an authority figure (i.e., the boss) was readily available to resolve conflicts during implementation. The benefit-cost ratio and thus the demand for computing dropped off to the extent that work volumes were lower and/or the work was non-routine and raised difficult problems that required extensive negotiations to resolve (to the right, or innovations end of the applications spectrum). Automation made sense but true innovation was usually too difficult.

Over the years, however, the exponential growth of computing power—doubling every eighteen months, or over a million-fold in the last 30 years—has increased the benefit-cost ratio for all kinds of applications. The demand curve for applications has shot way up. With most of the automation of high-volume routines already completed, the focus is now on problems that were previously not feasible, moving out the applications spectrum to include low-volume, non-routine tasks and the fundamental redesign of work. For example, Amazon.com is not seeking to automate traditional bookstores, but to reinvent how we shop for books and other consumer goods, moving us away from brick-and-mortar stores to the point-and-click technology of e-commerce. The name of the game is innovation, and leadership is clearly required.

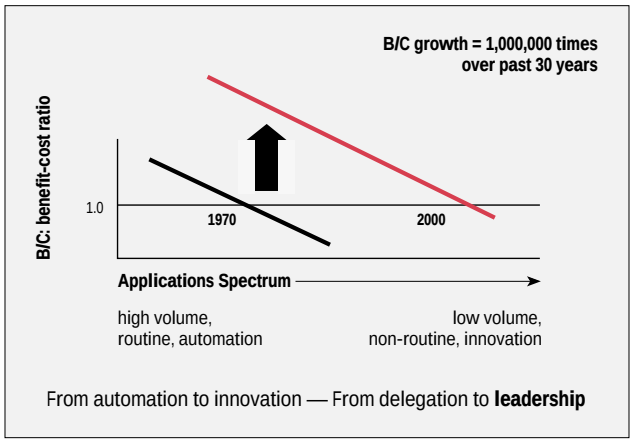

Figure 1: What's Changed: Shifting Demand for IT Applications, 1970-2000

Fortunately, leaders have recently become much more aware that IT issues demand a new approach, primarily because today's challenges—using networks to enhance productivity, improve services, protect privacy, and promote social equity—call first and foremost for resourceful political skills. While we have been living in a networked world for some time now, the institutional and organizational dimensions of the Internet and the broader Information Revolution are just beginning to emerge in to the mainstream. We need to build a social and political consensus around the kind of future we want, and then remove the governmental and broader governance barriers that hold us back from achieving that vision.

Today's needs for leadership are urgent and compelling. The risks, of course, are also formidable. In a networked world, however, the stakes are so high that the return-to-risk ratio is

much more favorable than it used to be. The era of delegation is over. The question is not whether leaders will step forward to meet their responsibilities, but how they can do so in the best way possible.

Imperatives

"Taken together, these imperatives form a useful framework for harvesting the benefits and avoiding the risks of the Information Age."

EIGHT IMPERATIVES FOR LEADERS

If you want to be an effective leader in our networked world, you need to engage IT issues. You need to play a key role in establishing strategic direction, implementing specific projects, and formulating new public policies. The following guidelines are designed to help you develop your action agenda. Each guideline is an imperative—something you as a leader *must* do. Each is vital in its own right. In addition, taken together, these imperatives form a useful framework for harvesting the benefits and avoiding the risks of the Information Age.

1. Focus on how IT can reshape work and public sector strategies

Problem. The knowledge required to succeed with IT is complex and rapidly changing. Given the large size of many agencies and the checks and balances established to foster debate and deliberation, governments tend to become inwardly focused and fail to keep pace with the innovation required in the Information Age.

What to avoid. Don't delegate all responsibility for technology to technologists, or focus on internal operations to the exclusion of externally oriented service improvements and building essential political support.

What to do. Learn how digital processing and communications are revolutionizing the workplace and the nature of work, ideally through becoming directly involved in IT projects and working with computer applications as part of your personal routine. (Using a laptop, personal digital assistant, e-mail, and/or the Web is a good way to get started.) Focus in particular on the strategic triad of: a) developing the organizational infrastructure and capacities you will need to function; b) adding value through network-enabled public services and regulations; and c) building support within your oversight community and the general public.

An example: Lessons from the first movers. While many leaders have not yet stepped forward on technology issues, some have. In doing so, they have gained valuable experience for

those now preparing for the next wave of problems and opportunities. While singling out elected officials may be controversial (especially in an election year), there is much to learn from US Vice President Al Gore, Governor Michael Leavitt of Utah, Supervisor Kate Hanley of Fairfax County, Virginia, Mayor Ron Gonzales of San Jose, State Senator Scott Howell of Utah, Philadelphia Councilman Brian O'Neill, and Congressman Tom Davis of Virginia. These leaders have been among the earliest in sensing and responding to the importance of information technology issues. They have repeatedly been willing to stand up and debate their views in public without benefit of staff or notes. While leaders need not be experts in technology per se, they must be knowledgeable about how technology reshapes work and the institutions of governance.[5]

2. Use IT for strategic innovation, not simply tactical automation

Problem. The enormous potential benefits of IT are often compromised if it is used merely to entrench old work processes and organizations rather than to fundamentally redesign them.

What to avoid. Don't focus on incremental improvements to the exclusion of more aggressive innovation.

What to do. Push for some strategic ten-fold improvements, and not merely for 10 percent. Foster and protect experimentation. Design an e-government strategy with wide opportunities for "anytime, anyplace" service. Explore service integration across program and organizational boundaries. Seek especially to develop rich and flexible technology-based options for self-service.

An example: Governor Gary Locke and the State of Washington. By and large, the private sector still leads in deploying newly conceived electronic services (Amazon.com, eBay.com). The public sector has moved more slowly, proceeding from simple information dissemination to recent support for transactions such as online auto registration. Leading jurisdictions, however, such as the State of Washington under Governor Locke and CIO Steve Kolodney, have been successful with more aggressive innovation. For two of the past three years, Washington has won the "Digital State" award from the Washington, DC-based Progress & Freedom Foundation. Governor Locke has focused clearly and consistently on education and infrastructure in order to prepare the state for a digital world.[6]

3. Utilize best practices in implementing IT initiatives

Problem. The failure rate of IT initiatives has often been daunting, even though the most difficult problems have been political rather than technological.

What to avoid. Don't approach IT as primarily a technology problem, and don't delegate IT projects predominantly to technology specialists.

What to do. Recognize that technology implementations are usually change-management problems. Place general managers and politically capable leaders in charge of most major IT initiatives. You need leaders who can authoritatively deal with organizational conflicts and budget issues.

An example: John Koskinen and the many lessons of Y2K projects. We've learned a great deal over the years about how to successfully implement technology-related initiatives. In particular, the recent experience with Y2K has drawn attention to the importance of politically-grounded project management and our dependence on interconnected computer systems. John Koskinen, as Chair of the President's Council on Year 2000 Conversion, used his broad managerial skills to mobilize the incredibly detailed and persistent activities required to resolve Y2K issues. Technology was important, but management was decisive.[7]

4. Improve budgeting and financing for promising IT initiatives

Problem. By focusing on incremental annual changes to existing programs, government budgeting makes it hard to invest in IT initiatives that offer high value but also require long-term, cross-agency innovation.

What to avoid. Don't rely too heavily on funding IT through the traditional tax-levy budget.

What to do. Analyze economic and budgetary trends to identify sources of financing appropriate for an increasingly electronic economy. Your analysis should explore the principle of letting the direct users of services pay when they are the ones that capture the benefits (i.e., user charges for service elements not inherently public in nature). Also, explore budget reforms to give greater emphasis to multiyear, cross-boundary service integration and innovation (via capital funds, revolving funds, shared-risk investments with the private sector, etc.).

An example: Ralph Shoemaker and the California Franchise Tax Board. In 1993, largely under the leadership of Deputy Tax Commissioner Ralph Shoemaker, the state of California pursued a shared-risk investment with the private sector for collecting business taxes. Instead of contracting only for the delivery of specified computer systems, California contracted to pay its partner out of the revenues to be collected if the applications were successful. Both the private sector partner and the government therefore had a strong incentive to improve the collection process so that the department could collect taxes that had previously been left uncollected. Working together they succeeded. The newly collected revenues served as the source of funding for this high-value investment.

5. Protect privacy and security

Problem. As technology expands online communications, volatile issues of privacy and security require careful respect for individual rights and responsibilities in the context of maintaining community standards and safety.

What to avoid. Don't misunderstand privacy and security issues, either by ignoring them or by allowing their volatility to paralyze efforts to develop new electronic systems and services.

What to do. At minimum, understand and implement the "fair information practices" and the "secure information practices" developed over the past twenty-five years. The greater challenges, however, involve heading off destructive controversies as much as possible through up-front planning and the involvement of stakeholders in case-by-case evaluations of the trade-offs inherent with electronic services.

An example: The European Union's process in addressing privacy and security issues. For more than a decade now, the European public sector has been more aggressive and comprehensive than the United States has been in addressing issues of privacy and security. While Europe emphasizes private sector abuses in contrast to U.S. emphasis on public sector abuses, their policy processes can serve as an important model in developing the consensus we need for effective action. The Europeans have worked hard to harmonize policies across regional boundaries, and they have also made it clear that privacy and security issues can often be cost-effectively resolved if addressed during systems design rather than only as a remedial action.[9]

6. Form IT-related partnerships to stimulate economic development

Problem. While the biggest IT benefits often require cooperation across the boundaries that separate one agency from another and the government from the private sector, sustaining cooperation among diverse entities is almost always difficult.

What to avoid. Those who ignore cross-boundary opportunities—especially now that the Internet has greatly reduced the obstacles to network interoperability—make a major mistake. Cross-boundary work is enormously more feasible than it used to be.

What to do. Mobilize public and private stakeholders for a specific initiative, such as strengthening a regional economy and/or a particular industry. In some cases, this work will merit development of entirely new institutions to design and deliver electronic public services.

An example: Prime Minister Lee Kuan Yew and Singapore as the "Intelligent Island." Beginning several decades ago under the strong leadership of then Prime Minister Lee Kuan Yew, the Singaporean government has worked with its private sector to invest in information infrastructure and other electronic commerce initiatives. For example, the TradeNet project implemented in 1987 has enabled shippers, receivers, bankers, insurers, port authorities, customs officials, revenue agencies, and others to use the electronic data interchange that now moves shipments in and out of Singapore twice as fast as before. Singapore has become the only tropical country in the world that is recognized as a developed nation. They are building a comprehensive information infrastructure to support their desire to become the

"Intelligent Island." Even though Singapore is small and quite different from us in their political culture, they offer important lessons about how to use IT for economic development.[10]

7. Use IT to promote equal opportunity and healthy communities

Problem. Recent decades have produced increasing inequality in the distribution of income and political influence. A "digital divide" threatens to widen these inequalities and potentially destroy the social cohesiveness of geographically based communities.

What to avoid. Don't try to duck these issues by assuming they're too unwieldy to remedy. At the other extreme, don't attempt massive fixes by trying to tax activities that can easily flee to low-tax jurisdictions.

What to do. Clarify what "universal service" could and should mean in a world of broadband digital networks. Judiciously develop the kinds of net-based education, job development, and community engagement that are becoming essential for economic and social success.

An example: The Congress and "E-rate." E-rate is a federally mandated subsidy for low-cost Internet connections to schools and libraries. It demonstrates how technological initiatives can be implemented to promote social equity and community cohesion. E-rate is a reasonable first step, but much remains to be done. We don't know yet how best to support cyberspace and physical communities in a world of global computer networks.[11]

8. Prepare for digital democracy

Problem. Digital networking is expanding across regional and national boundaries to produce serious problems for policy making and regulatory agencies. Whose values should govern when a person from Los Angeles takes what is claimed to be pornographic pictures of people in Toronto, especially when the pictures are stored on servers in Asia and sold to someone in Germany with money transferred to confidential bank accounts in the Caribbean? How should the governing values be determined and enforced?

What to avoid. Don't take an isolationist posture in response to growing problems of global interactions. And don't think of Information Age governance simply in terms of electronic voting.

What to do. Experiment to make online participation in "the conversation" of politics easier and also more meaningful. Develop initiatives to help legitimize digital communities and give stakeholders a role in setting standards and regulations. For example, note that the development of electronic medical records will involve stakeholders far beyond the reach of any single state or even the entire US medical community. In cyberspace deciding who has the authority to look at a medical record or prescribe a medication is fundamentally a problem of global governance.

An example: Many experiments in digital democracy. Many efforts have recently been initiated to explore the political, or "input," side of government in contrast to the service delivery, or "output," side. The US Department of Agriculture's Agriculture Marketing Services, for example, is developing an online rulemaking process, expanding by orders of magnitude the feedback available on proposed regulations. The State of Virginia recently launched its Virginia Regulatory Town Hall website designed to help citizens take a more active role throughout the many steps involved in designing new regulations. The City of Santa Monica, CA, is expanding its web-based and email communication with citizens, building on the very early and innovative success of its Public Electronic Network (PEN) project. A collection of vendors, government agencies, and other interested parties have created QUEST, a program of standards and protocols to deliver government benefit programs through the automated teller machines of bank networks and point-of-sale devices at supermarkets and other retail outlets. And as a final example—for now—the Internet Council for Assigned Names and Numbers (ICANN) has been organized as a nonprofit institution established under US law to govern the worldwide assignment of Internet addresses.[12]

Public leaders can—and must—come to grips with the challenges and opportunities of the Information Age. The eight imperatives summarized here (see Figure 2) can serve as a framework for those seeking to be leaders in the year 2000 and beyond. These guidelines can also be useful for the press and the public.

For the transition to electronic services:

1. Focus on how IT can reshape work and public-sector strategies
2. Use IT for strategic innovation, not simply tactical automation
3. Utilize best practices in implementing IT initiatives
4. Improve budgeting and financing for promising IT initiatives

For emerging challenges to governance:

5. Protect privacy and security
6. Form IT-related partnerships to stimulate economic development
7. Use IT to promote equal opportunity and healthy communities
8. Prepare for digital democracy

In sum: Get involved! Your leadership is required for the world of 2000 and beyond.

Figure 2: Eight Imperatives for Leaders in a Networked World: A Summary

The first four imperatives focus primarily on the design and deployment of electronic services and regulations. These are topics where substantial recent experience can be brought to bear. They raise important and urgent concerns of the "next step" variety. *Leaders not mastering these imperatives are in danger of falling visibly behind the curve.*

The final four imperatives focus on the changing nature of commerce, communities, and democracy. These imperatives raise fundamental challenges to our processes of governance, with scarce recent experience to draw on for guidance. *Over the next decade and more, these governance issues will demand the very best we have to offer in terms of good judgment and leadership.*

Legislators. Find ways to support public sector innovation and to partner with the private sector for economic development.

Governors. Develop a trusted chief operating officer (COO) for internal reform while also pursuing external initiatives for infrastructure and economic development.

Mayors. Organize regional efforts for continuing education, information infrastructure, and economic competitiveness.

Budget directors. Ensure that your budget planning identifies and protects IT-based investments for long-term, cross-program infrastructure and work redesign.

Agency and program heads. Provide electronic access to existing services on a "one-stop, non-stop" basis; then stay close to your customers by using technology to design efficient and flexibly integrated services.

Chief Information Officers. Remember that your job is not technology per se, but technology in support of organizational strategy and change management; good infrastructure and good relationships with management will be critical.

Technology vendors. Help educate the public and the market, especially on the need for faster innovation, better infrastructure, improved social equity, and public-private partnerships with shared risks and returns.

Associations and interest groups. Mobilize grassroots support on a global basis while also developing scorecards to disseminate "best practice" within your community of interest.

The press. Educate the public through coverage of major yet often overlooked issues of service redesign and governance.

The public. Your welfare—and that of your children and your children's children—will largely be determined by the quality of jobs and lifestyles in the Information Age. To succeed, you will need governments that will innovate and work with the private sector to develop a caring but competitive Information Age economy.

Figure 3: Advice for Stakeholders

Next Steps

"It is time for a new generation of leaders to cope with new problems and new opportunities. For there is a new world to be won." *John F. Kennedy*

NEXT STEPS

Leadership in the Information Age requires ongoing involvement, not just an initial effort to understand the issues. Next steps include:

• Continuing to educate yourself. One of the most valuable ways to keep in touch with digital technology is to acquire familiarity with computers, both in the workplace and as part of your daily routines. Anyone personally using the Internet for up-to-the-minute news and information, reference material, electronic shopping, and instant communications will appreciate in short order how powerful it can be. Much can be learned by keeping up with the technology coverage that now appears regularly in general-interest publications such as Business Week and the New York Times. There is also a wealth of material on the political and organizational impacts of technology in books, trade periodicals, and academic journals. For non-specialist leaders, perhaps the most important activity is to develop a circle of advisors with a good combination of technical, programmatic, and political experience and expertise.

• Assessing your present environment. You can learn a great deal by taking stock of how technology is being used and managed in your own organization. Who are the people and political/organizational processes with the most influence on computer issues? How much attention do these people give to the strategic options opened up by information technologies? How does your organization stack up against best practice in related settings? What can you learn from external clients, stakeholders, and overseers?

• Picking a good target for action. As we have stressed, gaining knowledge about technology isn't an end unto itself—what's vital is translating knowledge into effective strategies and policy initiatives. You will need early on to involve stakeholders and key allies in developing an e-government agenda that is bold enough to generate excitement yet feasible enough to deliver results. For some leaders, this may require focusing on a single system or centerpiece initiative. For others, it may be best to develop a more comprehensive agenda. Although the specifics will vary, the ultimate aim is to turn talk into action.

As we proceed into the new millennium, we need public leaders who will get more directly and effectively engaged with technology issues. Different stakeholders may emphasize different things. (See Figure 3.) In general, however, as John F. Kennedy emphasized during his 1960 presidential campaign, there is a new world to be won.

The purpose of this report has been to introduce some essentials for winning this new world. In subsequent reports, we will provide more detail. But there is no need to wait. The election of 2000 has arrived.

Appendix A

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Hon. Marlin Schneider	*State Representative, State of Wisconsin*

Mr. Larry J. Singer	*President, Public Interest Breakthroughs, Inc.*
Mr. Phil Smith*	*(former) Director, State Federal Relations, State of Iowa*
Ms. Anne F. Thomson Reed	*Chief Information Officer, US Department of Agriculture*
Hon. Barbara Todd	*Commissioner, Pinellas County, Florida*
Mr. Richard J. Varn	*Chief Information Officer, State of Iowa*
Hon. J.D. Williams	*Controller, State of Idaho*
Mr. Terry Wood	*(former) Councilman, City of Jacksonville, Florida*
Mr. Robert J. Woods*	*(former) Commissioner of Federal Telecommunication Services, US General Services Administration*
Mr. Gregory Woods	*Chief Operating Officer, Student Financial Assistance, US Department of Education*

**Former HPG Member*

Appendix B

READING AND RESOURCES

Public sector leaders need to engage issues of information technology directly and effectively. A short list of helpful readings and resources should include:

Heifetz, Ronald A. *Leadership Without Easy Answers.* Cambridge: Belknap Harvard, 1994.

Industry Canada. *Preparing Canada for a Digital World, Final Report of the Information Highway Advisory Council.* Ottawa: Industry Canada, 1997. available from http://strategis.ic.gc.ca/SSG/ih01650e.html

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National Performance Review. Access America. Washington, D.C.: The Review, 1997. Also see the NPR website: http://www.npr.gov/

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Shapiro, Carl, and Hal R. Varian. *Information Rules: A Strategic Guide to the Network Economy.* Boston: Harvard Business School Press, 1999.

Tapscott, Don. *The Digital Economy: Promise and Peril in the Age of Networked Intelligence.* New York, New York: McGraw Hill, 1996.

Appendix C

GLOSSARY

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.

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).

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.

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.[13]

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)

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 spill-overs 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. 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.

Software—A catch-all 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.

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.

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] Capital investment data from *The Emerging Digital Economy II,* U.S. Department of Commerce, June, 1999, p.22 and the Executive Summary. For one perspective on the wealth of Bill Gates, see: *web.quuxuum.org/~evan/bgnw.html.* The banking transaction cost estimates are taken from a research note by the Gartner Group, "The Benefits of Alternate Channels in the Branch," May, 1999. The note estimates that a transaction handled by counter tellers is between $1.00 and $2.00 per transaction, while a similar transaction conducted over the Internet costs between $.02 and $.05. For an International Data Corp. estimate of worldwide e-commerce growth, see "Setting the E-Commerce Agenda," *Government Technology,* November 1999, 42.

[2] In 1958, when the American National Election Study first asked about public trust, 73% of Americans said they trusted government in Washington to do the right thing just about always or most of the time. By 1980 and again in 1994, the "trust percentage" had dropped to 25%. Harris Poll data in the mid-1990s suggested that the public's confidence in people running Congress and the federal Executive branch had dropped to only one in ten expressing a great deal of confidence. See Joseph S. Nye, Jr, Philip Zelikow, and David King, eds. *Why People Don't Trust Government* (Cambridge: Harvard University Press, 1997), especially Chapters 3 and 8.

[3] See Peter F. Drucker, *Management Challenges for the 21st Century.* (New York: HarperBusiness, 1999). For a view focusing on economics and management, see: Don Tapscott, *The Digital Economy: Promise and Peril in the Age of Networked Intelligence* (New York: McGraw Hill, 1996). For a view focusing on politics and government, see: Elaine Ciulla Kamarck, and Joseph S. Nye, Jr., *democracy.com? Governance in a Networked World* (Hollis, NH: Hollis Publishing Company, 1999).

[4] According to BizRate.com, e-commerce retail business over the recent Christmas season totaled $3.17 billion on 33.9 million orders. Their comparable retail business number for 1998 was $730 million.

[5] For the work of Vice President Gore and the National Partnership for Reinventing Government, see: *www.npr.gov;* for information on Governor Leavitt see: www.governing.com/poy/ptleav.htm, for State Senator Howell, see: *www.govtech.net/publications/eCommerce /dec98/toc/toc.shtm,* and for information on Utah as a "smart state" see: *www.state.ut.us*; for a brief bio on Supervisor Hanley see: *www.co.fairfax.va.us/gov/bos/chair/bio.htm,* for information on Mayor Gonzales and San Jose, CA see: www.sjmayor.org; for Councilman O'Neill see: "Past President, Future Leader," *Government Technology,* December 1999, 118; and for U. S. Rep. Tom Davis see: *www.house.gov/tomdavis.*

[6] For information on Governor Gary Locke of Washington see: "Locke proposes measures to speed telecommunications in rural areas," *(www.governor.wa.gov/press/00011301.htm),* and other press releases at *www.governor.wa.gov/press/press.htm.* For information on Chief Information Officer Steven Kolodney and Washington's Digital State awards see: *access.wa.gov/news/news0912.asp.*

[7] *Government Executive* magazine, through its website (GovExec.com) has chronicled three years of coverage of the Y2K issue and the leadership John Koskinen provided it as "Y2K czar." See especially the articles from 2-5-98, 3-19-98, and 5-1-98 when Koskinen was sounding the battle cry for a comprehensive, cross-boundary approach to the problem *(www.govexec.com/tech/year2000).* Also, for an early and comprehensive articulation of a vision for IT in government that underscores change, involvement of general manager leadership in IT initiatives, and information and IT as strategic resources, see the Vision statement for the Government Information Technology Services (GITS) Working Group *(gits.gov/docs/vision.html).*

[8] For more information on the California Franchise Tax Board see: *www.ftb.ca.gov.* Also see: Jerry Mechling and Victoria Sweeney, "Finding and Funding IT Projects, Part 3: Performance Contracting," *Government Technology,* March 1998, *(www.govtech.net/publications/gt/1998/mar/financing/financing.shtm)* and: Ralph Shoemaker, "Problem solving partnerships and joint-ventures to share risks and benefits in developing large system technology projects," *(www.arnet.gov/References/Best_Pract_Docs/textsource/caftb.txt).*

[9] For information on EEU privacy and security policies and their potential impacts see: Deborah Hurley, "Security and Privacy Laws: The Showstoppers of the Global Information Society," in *Masters of the Wired World.* ed. Anne Leer. (London ; Alexandria, VA : Financial Times/Pitman, 1999), and: Commission of the European Communities, "Proposal for a Regulation of the European Parliament and of the Council on protection of individuals with regard to the processing of personal data by the institutions and bodies of the Community, and on the free movement of such data," 1999. *(europa.eu.int/eur-lex/en/com/pdf/1999/en_599PC0337.pdf)*

[10] For information on Singapore and their IT-based economic development strategy see: Infocomm Development Authority of Singapore (IDA) website: *www.ida.gov.sg/Website/IDAhome.nsf/Home?OpenForm.* The Harvard Business School Case Program also has several case studies on Singapore, e.g.: Lynda M. Applegate, Boon-Siong Neo, and John King, "Singapore TradeNet: Beyond TradeNet to the Intelligent Island," 1995. *(www.hbsp.harvard.edu/hbsp/prod_detail.asp?196105)* and Lynda M. Applegate, Boon-Siong Neo, John King, and Carin-Isabel Knoop, "Singapore Unlimited: Building the National Information Infrastructure," 1996. *(www.hbsp.harvard.edu/hbsp/prod_detail.asp?196012).*

[11] For more information about E-rate see: *www.ed.gov/Technology/erateforms/slcmai1a.html.*

[12] For an introduction into the USDA's online rulemaking initiatives, see: *www.ams.usda.gov/ip/activities.htm.* Information on the State of Virginia's new regulatory town hall website can be found at: *www.state.va.us/governor/newsre/site1229.htm,* and the website itself, at *www.townhall.state.va.us.* For an historical view of the PEN program in Santa Monica, see the Kennedy School of Government case study written by Pamela Varley, "Blip on the Screen–or Wave of the Future? 'Electronic Democracy' in Santa Monica," 1991, Case number: C16-91-1031.0, *(www.ksgcase.harvard.edu/pdetail.asp?PID=1031.0).* For more recent initiatives in Santa Monica, see their website: *pen.ci.santa-monica.ca.us/cm/index.* For information on QUEST members and operating rules see: *www.nacha.org/ebt/ebtmems.htm,* and the related item: *www.nacha.org/ebt/ebt-charter.htm.* For more information on ICANN, see *www.icann.org.*

[13] For a further explanation of adaptive leadership and its suitability to complex times, see Ronald A. Heifetz, *Leadership Without Easy Answers* (Cambridge: Belknap Harvard, 1994).

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Imperative 1:

Focus on How IT Can Reshape Work and Public Sector Strategies

The Harvard Policy Group
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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 #1: *Focus on how IT can reshape work and public sector strategies.* It addresses how public sector leaders should apply core concepts of organizational strategy and structure in a world of powerful computer networks.

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
CAMBRIDGE, MASSACHUSETTS
DECEMBER 2000

JERRY MECHLING, JOHN F. KENNEDY SCHOOL OF GOVERNMENT
LYNDA APPLEGATE, HARVARD BUSINESS SCHOOL

The year 2000 has ushered in a new millennium, a presidential election, and continued problems and opportunities as we pick up speed in the transition to a knowledge-based society. We are at a turning point, with leaders confronted with dauntingly complex and changing issues, including technology issues.

Given all the turmoil, it is essential for leaders to focus on the right problems. On one hand, as a leader you can no longer ignore technology or delegate it exclusively to the IT community. On the other, you cannot personally solve every technology problem, and it is clear you should not even try. Your problem is not technology per se.

As a leader, your fundamental problem remains—as it always has been—to help the people you are leading succeed. What is new is that success now requires helping your people to adapt their strategy and structure to a world of powerful computer networks.

Focusing on strategy and structure can make admittedly difficult IT leadership problems more manageable. The purpose of this paper is to explore how and why this is so, and what you should do about it.

Values

"People are confused, people are conflicted, and societal values are very much at stake."

TRANSITION TO THE KNOWLEDGE-BASED ECONOMY: PROBLEMS OF DISTRACTION AND DRAG

The knowledge required to succeed with IT is complex and rapidly changing. On the technology front we face hardware choices: new processors, displays, printers, scanners, digitizers, routers, gateways, wireless networks, data storage devices, and more. We also face software choices: new operating systems, office suites, geographic information systems, relational databases, data mining tools, voice recognition, encryption and digital signatures, application service providers, and more.

Related to technological issues are organizational issues: personnel issues, budget issues, security issues, job development issues, equity issues, trade issues, legal issues, political issues, and more. People are confused, people are conflicted, and societal values are very much at stake.

Given the tug and haul of constant change and conflicting interests, leaders find it difficult to focus or to take decisive action. Distractions abound and hesitation is natural in an environment defined by uncertainty and complicated tradeoffs.

Distractions are especially severe in the public sector, where organizations cannot simplify decisions by focusing on a single market niche. Public organizations are mandated to spread their attention across incredibly complex, contested, and interrelated problems such as crime, poverty, and the environment.

Organizational drag compounds these difficulties. Given the large size of many public agencies—along with the checks and balances designed to foster debate and deliberation—governments tend to grow cautious and inwardly focused. They find it extremely hard to innovate at the pace required today. In the tumultuous shift to a knowledge-based economy, with digitized information and globally interconnected networks, governments are finding it increasingly difficult to cope.

To succeed, governments need leaders able to focus on the right IT-related problems long enough and effectively enough to make a difference.

Technology

"If a shallow no to technology is dangerous, so is a shallow yes"

WHAT TO AVOID: EXCESSIVE DELEGATION AND MAGIC BULLETS

In the public sector, significant change is difficult, and failed change is often punished strongly. Little wonder that many leaders have tended to sidestep the work involved in using information technologies, or have delegated it to others. Not so long ago, delegation was a safe answer—and probably good enough.

But it is clearly not good enough now. Excessive delegation forces organizations to respond to IT issues without the full complement of experience, authority, and judgment required for success. Since organizational change is the core problem, those with authority over personnel, finances, and other resources must be fully engaged. You cannot take your hands off the steering wheel just as your vehicle enters a dangerous stretch of the road.

But an equally wrong answer is to view technology as a magic bullet. If a shallow no to technology is dangerous, so is a shallow yes. Leadership to help the organization adapt to information age challenges requires commitment and work from all quarters, not just directives from on high. Leaders must be engaged, and must keep their staff engaged.

Do not be misled: there are no magic bullets, no quick-and-easy solutions to information age challenges. As has long been the case, success requires visionary and committed leaders to blend a variety of specialties and skills together. The difference now is that technology skills are an essential part of the blend.

Rewards

"...the job of the leader is first to understand the risks and rewards of IT-enabled workflow, then act."

OPPORTUNITIES FOR NETWORK-BASED COORDINATION OF WORK

Figure 1 below suggests how information technologies can be used to coordinate work more productively. In the figure, the numbered boxes represent steps in a workflow or production process. For example, the six-step process at the top of the figure might represent the traditional workflow for determining eligibility for a social welfare program or for delivering financial support as authorized by such a program.

Note that the steps in such work processes are not executed by a single person operating alone, but by a variety of specialists: case workers, accountants, office support staff, and others. For most tasks, specialists are more productive than generalists. However, dividing tasks among many people makes the challenge of assembling finished products or services more difficult. Handing off work from one person to another often causes delays and other problems, even when workers are trying their best to cooperate.

To resolve these problems, organizations have developed elaborate hierarchies of managerial authority. Rules or "standard operating procedures" assist in coordinating the flow of work, with the scope of assignments for a given worker based on the number of procedures that the worker can learn to apply. If a worker cannot resolve a problem using previously learned rules, work is pushed to someone else, since searching through paper-based files for guidance usually takes too long. Conflicts and ambiguities are resolved by managers (represented by gray boxes at higher levels in the figure) with the authority to interpret rules and keep the work flowing.

Information technology can be extremely helpful in managing and coordinating such workflows. Computers operating on properly structured sets of rules can quickly look up guidance for the next step. Thus, the scope of work and/or the span of control can be increased, reducing the need for workers to hand things back and forth. Workers answering customer service calls, for example, can look up answers to questions in real time rather than telling callers to go elsewhere or call back later. Bureaucratic barriers or "stove-pipes" are broken down, and customers receive better service.

Even when the work must be handed off, IT networks can still improve efficiency. Often, steps in the workflow do not have to be completed in sequence. Networks enable workers to reorganize work and undertake steps in parallel, even sharing work across organizational boundaries or outsourcing it to another organization. Network-enabled work also allows workers and clients to work at a distance—no longer spending valuable time traveling to meet—and to work from less expensive locations. For some work, interactions may not require participants to engage one another at the same instant. Email or voice mail systems allow users to send and receive messages at whatever time is most convenient. Such "asynchronous" communication reduces interruptions that would otherwise disrupt concentration.

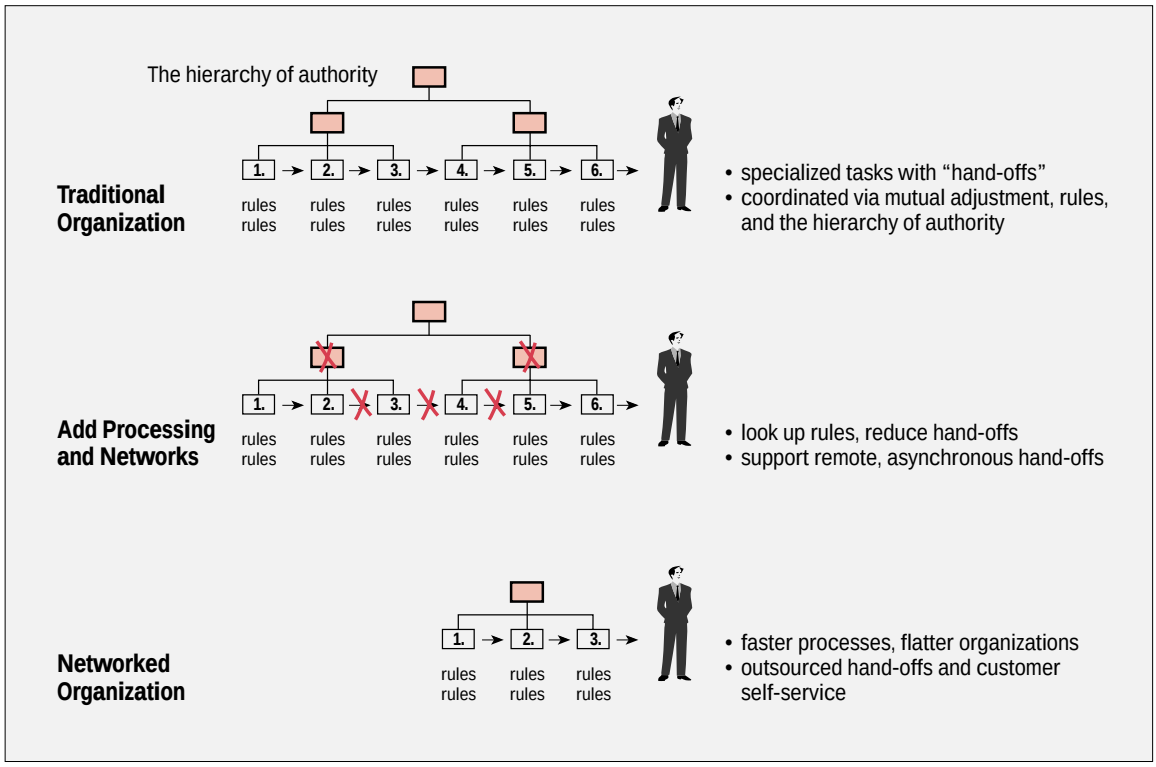

Figure 1: The Move to Net-based Work Coordination

The biggest efficiency gains from network-based work coordination are often derived from self-service models. Pushing steps in the workflow from staff to customers not only saves staff time, it can also improve service quality. With online permitting services, for example, rather than receiving a completed permit application in the mail or taking a request over the telephone, government workers can receive the required information electronically as entered by the applicant at a time convenient for the applicant.

In these and other ways, IT can improve productivity and enable the organization to offer highly customized services that are also widely accessible. To gain these improvements, however, organizations must invest in information assets (computers, data, and networks) and endure the pain of shifting from one pattern of work to another, and from one organizational structure to another.

In resolving these challenges, the job of the leader is first to understand the risks and rewards of IT-enabled workflow, then act. What is at stake is not only the organization's productivity, but also its strategy or position in the world. "Strategy," in this sense, is the pattern of relationships the organization establishes (with whom it interacts, what it offers and receives, and how it pursues those relationships).

The long-term impacts of computer networking on work and strategy are becoming clear—and will prove to be crucial. Efficient communication allows more of the organization's work to be coordinated through voluntary market-like exchange, and less through command-and-control structures. Efficient communication also facilitates innovation. As social relationships become more complex and interdependent, the challenge to governments is to "steer more and row less."[1]

Networking

"The need to focus on **strategy** and structure is not **new** in itself, but the ways in which both are shaped by computer networking is very new—and very **powerful**."

GUIDELINES FOR FOCUSING ON HOW IT CAN RESHAPE WORK AND PUBLIC SECTOR STRATEGIES

To help your people succeed in a knowledge-based economy, you need to focus on how information technologies can be used to change strategy and structure in public sector contexts. But how can you make this advice operational? Consider the following seven guidelines as you develop your personal agenda.

1. Develop a personal network of information, advice, and support

Problem. Leaders get their information more from talking to others than from written reports. Unfortunately, many public sector leaders have failed to assemble a circle of advisors with the depth and breadth required for responding effectively to the challenges raised by information technology.

What to avoid. Do not be without a Chief Information Officer (CIO) you can trust as a competent and loyal advisor on issues of policy and operations, as well as on issues of technology. At the same time, do not make your CIO your only advisor on technology issues.

What to do. Develop an effective and broadly-based professional relationship with your CIO. Also develop a circle of other technology-savvy advisors. Some of these people might serve on an informal "kitchen cabinet." Others might be assigned more formal and public responsibilities. You might also find it worthwhile to serve personally on one of the advisory groups that are more or less continually being developed on behalf of governors, mayors, professional associations, and others.

An Example. The Canadian Information Highway Advisory Council. As the government of Canada began to develop their national IT strategy, they assembled an Advisory Council of respected individuals from outside the government. This group explored IT issues from the perspective of the entire society, not just the government. About 30 in number—and able to fit around one large table—the Council met approximately once a month for two years to produce a public report, with analysis and support provided by government staff. The Council's charter was then extended another two years to assess the progress made (and not made) on their original recommendations. While blue-ribbon panels such as the Advisory Council are sometimes unproductive, they are often better than bureaucratic insiders at educating stakeholders, focusing public attention on important issues, and avoiding the turf battles that can plague government-only projects.[2]

For more, visit the Council's site at strategis.ic.gc.ca/SSG/ih01015e.html

An Example. The Georgia Technology Authority (GTA). The State of Georgia is recognized as a leader in the development of e-government. One reason for their success has been the effective use of advisory boards, which bring a diverse set of experiences to bear. Building on this success, Georgia recently established the Georgia Technology Authority. The GTA consists of a 12-member Board of Directors, and is mandated to bring "a coordinated and comprehensive IT vision to state government by providing agencies with technical assistance in strategic planning, program management, and human resources development." Each member of the Board must come from the private sector, and must have experience in managing large IT enterprises.

For more, visit the GTA at www.gagta.com

2. Use the technology in your personal routines

Problem. The information that organizational leaders find most valuable is often qualitative information from outside ("soft" information), while IT-based systems have historically worked with quantitative information from inside ("hard" information). Recent technology developments counteract this problem by offering a much richer array of data and tools, but many leaders feel too busy or too far behind the times to try them.

What to avoid. Do not get all of your IT experience second, third, or fourth hand. Delivering a few prepared speeches on IT topics is better than nothing, but it will not give you the frequent exposure to IT issues that you will need.

What to do. Remember, users are choosers! Work at least a few digital tools into your daily routines—perhaps web browsing for news and policy research, receiving the Webopedia "Word of the Day" by email, and/or using a personal digital assistant to help with your schedule and e-mail. Learning about technology by using web-based distance learning technologies is another great way to learn by doing. Many executives stay in touch via e-mail, voice mail, and electronic briefings. These activities can be valuable on their own, and they also provide symbolic leadership along with a relatively painless way to keep up with ever-evolving IT-related developments.

An Example. Governor Angus King of Maine. Since coming to office in 1994, Governor King has effectively worked to ensure that Maine's state government is taking advantage of information technologies. According to the Governor, part of the reason he has been able to move so quickly on his technology agenda is the fact that he personally uses the technology every day. In the Governor's own words:

"I had never used a computer before I was 45 years old. Then I started my own business from scratch and I couldn't afford clerical help, so I bought a Macintosh—and it changed my life. I taught myself to do spreadsheets, correspondence, business cards, graphics, you name it. And I became a real believer in the power of this technology. I think part of the reason I have been able to push technology so far and so fast in state government is because it's something that I do and that I am interested in. I have been getting MacWorld magazine for years, and for fun I read about what's out and what's going on out there." [3]

An Example. Prime Minister Tony Blair of Great Britain. Admitting that he and many in his Cabinet are novices in the realm of computers, Tony Blair arranged for himself and several of his Ministers to participate in computer training sessions. After one session, Blair commented, "I should have done this ages ago but I just put it off. I started realizing what it can do, but I must admit I was always a bit scared of the technology. It was an incredible experience and a lot easier than I expected."[4]

3. Develop support in a networked world—the advocacy role

Problem. To succeed with major IT initiatives, public agencies need support from varied external sources including budget offices, accounting offices, regulators, legislative committees, client groups, labor groups, privacy advocates, industry, taxpayer groups, and the press. External support is often lacking, at least partly because bureaucratic cultures have been designed to focus inwardly on control rather than outwardly on innovation and coalition building.

What to avoid. Do not limit your IT agenda to what you can accomplish internally. At the same time, do not underestimate the difficulty of mobilizing external support in a world suspicious of governmental power and performance.

What to do. Leaders must become persuasive advocates for IT initiatives. They need to seek external support early in the process. They need to educate overseers as well as the general public. They need to actively market their plans, explaining why serious change is required, what benefits it will bring, and what costs and opposition may stand in the way. Nothing will erode trust faster than allowing supporters to be surprised by something for which you have not prepared them. Talk about your plans in public forums and listen to the responses you get. Make your plans and progress widely accessible and visible over the Internet or through traditional media. Directly address concerns such as privacy and security. While information about your plans and progress can be used by opponents as well as supporters, it can be surprisingly powerful in reaching and mobilizing supporters who would otherwise not have the time to stay involved. A good marketing campaign can help you build a lot of momentum—momentum that can help you overcome other obstacles along the way.

An Example. Governor Michael Leavitt and State Senator Scott Howell of Utah. These two officials—from different parties in the same state—are ahead of the curve in understanding technology and supporting their initiatives with the kind of hands-on skill and personal involvement that clearly communicates the nature of their knowledge and commitment. We have all seen public officials who can deliver a good speech but cannot handle follow-on questions that probe their level of knowledge. In contrast, Governor Leavitt and Senator Howell are particularly effective in question and answer sessions with all sorts of audiences. They use these sessions to advocate the use of technology as a strategic advantage for the state. Perhaps we do not need every leader to exhibit this level of knowledge and advocacy, but we clearly need more than we have now.[5]

An Example. Mayor Stephen Goldsmith of Indianapolis/Marion County. Under Mayor Goldsmith, the government of Indianapolis/Marion County was aggressive and forthright when presenting controversial ideas for reform to the public. Focusing on how technology could be used as an engine for economic development, the government advocated for investments in technology, while avoiding many of the controversies that can accompany

such investments. The Mayor was also one of the first to use the website as an advocacy and communication tool, fielding electronic complaints and questions directly through his office.

For more, visit Indianapolis' website at www.indygov.org

4. Identify how information technology can be used to add value—the analytic role

Problem. Public organizations find it hard to evaluate and demonstrate the value of their activities, both because they deal with contentious problems and because many of their interactions with the public serve to enforce mandatory regulations rather than deliver discretionary services. Private companies can focus their value analysis on revenues and customers. Public agencies, in contrast, need to assess value on a broader basis, including a diverse array of impacts on taxpayers, public employees, direct clients, and other stakeholders. The analyst role in the public sector is critical but difficult.

What to avoid. Do not ignore questions of value as too hard to analyze, and do not focus excessively on internally generated measures of success.

What to do. Analyze what is going on "out there." Seek especially to understand the perceptions of different stakeholder groups and opinion leaders, and to benchmark how other organizations handle electronic services. Since technology can improve service efficiency, accessibility, integration, and customization, finding out which factors are most important in your own particular situation requires careful analysis.

An Example. And Justice for All. The University at Albany's Center for Technology in Government (CTG) developed a comprehensive guide to help justice officials advocate for integrated information systems. Convincing others of the value of such systems is often difficult. The *And Justice for All* guidebook helps by showing leaders how to highlight and measure the value of integrated information systems. Measures of value include customer satisfaction, cost-efficiency, time savings, dollar savings, improved conviction rates, and quicker case dispositions.

For more, visit the CTG at www.ctg.albany.edu/projects/doj/dojmn.html

An Example. Iowa's Return on Investment Program (ROI). In Iowa, information technology projects are assessed in terms of the benefits to both government and citizens. In addition to analysis focused on "hard" costs and benefits such as hardware and staff time, Iowa's ROI analysis estimates the costs and benefits associated with factors that are more difficult to quantify (and often ignored), including the risk to citizen health, impact on security and safety, and the time/energy of citizens. By calculating the ROI for a project in this way, the Governor and legislators get a more complete picture of the relative value of each project. By analyzing all IT projects in the same way, the ROI process also helps guide policy makers in prioritizing projects and allocating budgets.

For more, visit www.state.ia.us/government/its/

5. Build capacity as a learning organization—the managerial role

Problem. In the Information Age, both public and private organizations need to adapt to continuing advances in technology. While success has always required a balance between continuity and change, the need for change is becoming dramatically more important. Public sector organizations, however, often find change difficult—their capacity to innovate limited by their relatively large size and heavily regulated environment. Leaders in all branches of government must have strong management skills to help their organizations overcome these factors.

What to avoid. Do not conceive of the technology challenge merely as a one-time requirement to catch up; and do not underestimate the capacities of your people to continue to learn and adjust—if you give them the room and leadership to do so.

What to do. Get a CIO who recognizes that the e-government challenge is as much about organizational change as about technology itself. Next, tap into the natural enthusiasm and skills of your general managers and workers by involving them directly in IT projects. Invest in education, especially in distance education opportunities, to show your people how the outside world is using information technologies. Ensure that your Personnel Department is emphasizing the importance of learning as part of everyone's job performance—job descriptions should include an expectation for ongoing education and learning.

An Example. Washington State Digital Government Academy. The state government in Washington established the Academy to bring agency staff, private sector experts, and citizen users together in collaborative efforts to design, build, and launch web-based public services. Conceived as a laboratory for learning, the Academy gives staff a chance to get outside their home environment, and interact with leading-edge industry experts and those who will use their applications on a daily basis. The Academy also promotes organizational learning, disseminating applications developed in the Academy to multiple agencies. Examples include programs to develop "e-form" and "e-permit" applications for use throughout state and local governments in Washington.

For more, visit the Academy at www.wa.gov/dis/e-gov/academy

An Example. City of New York Executive Order No. 43. Executive Order No. 43 contains at least three technology-oriented initiatives to build organizational capacity as a learning organization. First, it establishes a Technology Steering Committee and CIO charged with coordinating, integrating, and overseeing investments in information technology. Second, it creates an Office of Technology and gives it a mandate to identify best practices in the area of information technology, and to serve as a clearinghouse for City agencies. Finally, it empowers the Technology Steering Committee to establish sub-committees, including a sub-committee on staff recruitment, retention, and training.

For more, visit the Committee site at www.nyc.gov/html/doitt/html/tsc.html

6. Pursue investments that scale up: infrastructure, standards, and cross-boundary opportunities

Problem. Computer networks offer huge economies of scale and significant opportunities for process reorganization, but only if data and networks are standardized to operate across a large community of users. Achieving such standardization is often difficult, however, and—if done prematurely or too rigidly—may cost too much in terms of foregone downstream innovations.

What to avoid. The first step in developing e-government services is often letting individual programs and agencies offer their own services over networks, but do not stop there. Program-by-program services alone will fail to reach the bigger opportunities for cross-program integration, standardization, and infrastructure development.

What to do. Pursue options to scale electronic services up to larger and broader communities of workers, suppliers, and clients. This requires massive yet flexible information infrastructures, constructed through cooperation across the boundaries separating programs, agencies, jurisdictions, and even entire sectors of the economy. Cross-boundary initiatives are difficult, to be sure, but will be the most important IT agenda items for the next decade or more.

An Example. North Carolina information infrastructure. For the past twenty years, leaders in North Carolina have supported the development of information infrastructure, especially infrastructure for digital communications. While the state and the Governor have been prime movers, the focus has not been on individual agencies or even on the state government as an entity, but rather on infrastructure for all government work—federal, county, local, and state. The road has not been entirely smooth for leaders in North Carolina. Nevertheless, within this initiative, North Carolina built the nation's first state-wide digital network in 1986, partnered with the private sector to build the first general service broadband network—the North Carolina Information Highway—in the early 1990s, established the North Carolina Geographic Information Co-ordinating Council in 1991, and launched the NC @ Your Service Internet portal in 2000. North Carolina has been the "anchor tenant" in many of these projects, guaranteeing the usage needed to drive down risks and costs so that private partners and local governments could join in, further reducing costs.

An Example. Smart Access Common Identification Card. As agencies began exploring the use of smart cards for physical and digital identification, the U.S. General Services Administration was asked to head up a government-wide effort to explore smart card technologies. As part of this effort, the Smart Access Common ID Card project was launched to develop common application specifications that ensure interoperability across agencies, while also providing a platform for agency specific applications and re-engineering. By ensuring interoperability, the Smart Access Common ID Card project serves as a foundation for future cross-agency process reengineering efforts.

For more on the Smart Access Common Identification Card project, visit smart.gov

7. Reorganize work with fewer and/or remote and/or asynchronous "hand-offs"

Problem. Many public services were designed originally for face-to-face delivery techniques. These techniques have become too clumsy and costly given the realities of new computer networks.

What to avoid. Do not distribute computer-based tools to your organization without a plan and approach for improving the division of labor and workflow.

What to do. So far as possible, digitize the information required for service production so it can be readily shared over networks. Then redesign the workflow to limit the number of hand-offs, take advantage of work that can be done in parallel, and reduce travel and interruptions for government staff and clients. Focus on creating opportunities for "one-stop, non-stop, self-service government" as "self-service" is the most powerful way to capture the efficiency benefits of information technology.

An Example. The U.S. Social Security Administration (SSA). While the SSA has long served clients on a face-to-face basis, it used to require citizens to make multiple trips to a local office. Citizens would wait in line for up to 40 minutes, then be told to return about ten days later, since SSA workers could not retrieve the required paper-based information any faster. To improve service and manage a growing caseload, the SSA has worked to develop computer-based filing in support of its local offices. The SSA now offers one of the world's largest and best received 1-800 telephone operations, and has recently added web-based alternatives. Although there have been some bumps in the road—e.g. allowing clients to retrieve their own benefits information via a web-based form was scuttled due to potential breaches of confidentiality—the SSA has shown that agencies can streamline work dramatically through technology-enabled improvements in workflow.[6]

For more, visit the SSA at www.ssa.gov

An Example. San Diego Water Department (SDWD). For years the SDWD recorded all information related to the region's water infrastructure in detailed maps distributed to work crews in huge books that weighed about ten pounds each. Crews marked the maps to reflect any changes that resulted from work being done, and passed these changes to a central location for interpretation, receiving updated maps every 3-18 months. Not surprisingly, the errors and lags that resulted from transcribing the data created significant problems for crews, who often found that facility details differed from their maps. In 1998 the SDWD worked with the San Diego Data Processing Corporation to develop a computer-based infrastructure management system. The new system included portable pen-based computers, complete with Geographic Positioning Systems (GPS) and Geographic Information Systems (GIS). The new system not only informs the crew about the infrastructure at a facility, but also enables them to make changes when appropriate. More important than the

technology, however, is the change in workflow. Rather than scribbling notes on maps and passing them to a data entry center for interpretation, work crews now input the data themselves, uploading all changes on a daily basis. This change ensures that work crews have accurate data when they leave for a job. It also redefines their job by making them responsible for the accuracy of the data.[7]

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To succeed in the public sector, leaders must adapt to a networked world. The need to focus on strategy and structure is not new in itself, but the ways in which both are shaped by computer networking is very new—and very powerful. On a more personal level, leaders must also find ways to keep abreast of new developments. Seven guidelines are summarized in Figure 2.

1. Develop a personal network of information, advice, and support
2. Use the technology in your personal routines
3. Develop support in a networked world—the advocacy role
4. Identify how information technology can be used to add value—the analytic role
5. Build capacity as a learning organization—the managerial role
6. Pursue investments that scale up: infrastructure, standards, and cross-boundary opportunities
7. Reorganize work with fewer, and/or remote, and/or asynchronous "hand offs"

In sum: Develop network-based strategies and structures!

Figure 2: Guidelines for Success in Using IT to Reshape Work and Public Sector Strategies

Next Steps

"You will have to develop your vision, communicate it to those who must share and support it, and get cracking.

NEXT STEPS

What should you do immediately? That, of course, will depend on where you stand on the above and other guidelines. In general, you will have to develop your vision, communicate it to those who must share and support it, and get cracking. For many public leaders, three related agendas will be important.

1. *Your personal agenda.* You will need to develop a vision that inspires and guides you and others. In developing your vision, you will need to analyze and argue about IT issues enough to become comfortable with your stances and with the kinds of support and opposition they generate. Getting time for hands-on experience with digital technologies may be extremely helpful. Getting knowledgeable advisors you trust will be essential.

2. *Your administrative agenda.* You will need to put some early projects and organizational structures in place to generate action. Early steps are likely to include benchmarking and planning studies along with building-block investments in services and infrastructure. Web-based initiatives have been successfully used as confidence-builders. Remember that the most significant value will come from reorganizing work processes. If you have not already developed an enterprise-wide IT strategy, now is the time to get moving.

3. *Your public agenda.* If information technologies are going to be truly strategic for your institution, you will need an external agenda as well as an internal one. How can you communicate and share your vision with others? How can you mobilize support? How can you respond to opposition? How can you develop a strategy that will survive in the long-term? Once you have begun to explore these questions, finding answers is often not all that difficult. Implementation is—of course—usually much tougher, and will be the real test of your leadership. Nevertheless, a good marketing plan can go a long way in building support.

Brief advice for a variety of stakeholders can be found in Figure 3 (next page).

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As we proceed into the 2000s, we need leaders who will engage technology issues effectively. We need leaders who will overcome the distractions and drag of public sector problem solving, and focus skillfully on using technology to improve the strategies and structure of public sector organizations.

This report offers guidelines for meeting these needs. 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 year 2000 and beyond. Our next report will examine how to use IT for strategic innovation, not simply tactical automation.

Onward!

The President. Building a successful, networked nation depends on long-term, public-private, cross-jurisdictional initiatives. Your leadership is essential for successfully working across boundaries.

Legislators. Start with a technology strategy for your own office—e.g., perhaps use videoconferencing to increase your virtual presence in the home district while simultaneously remaining available for work in the legislature.

Governors. Promote service that is "online, not in line"—or, more inclusively—"one-stop, non-stop." From the very beginning of your administration, seek to gain the cross-agency cooperation you will need to achieve this goal.

Local government leaders. Take advantage of the huge opportunities raised by jurisdiction-wide portals for customer service, and by linking IT investments to economic development.

Judges. The judicial system is ripe for your leadership as the natural conservatism within the legal culture begins to yield to the incredible information-intensity of the work and opportunities involved.

Budget directors. Use your resource allocation muscle to invest in IT-related productivity improvements and enterprise-wide standards for electronic services.

Agency and program heads. You are ground zero for IT-related workflow redesign and productivity improvement; step forward to make it happen, especially through customer self-service.

Chief Information Officers. You have the charter for IT-based strategy, where key moves will often require you to develop portals and other initiatives for enterprise-wide efficiencies and accessibility.

Technology community. Work with others to educate the market, since an educated market will raise all boats.

Associations and interest groups. Document best practices and offer seminars to help agencies learn how to redesign workflow and develop a technology strategy.

The press. Use your flair for human-interest stories to explore where your community stands in relation to others in preparing for global electronic commerce.

The public. Test whether your leaders can stand up—without staff or written speeches—to make a credible case for what they are trying to accomplish with information technology.

Figure 3: Advice for Stakeholders: How to Use IT to Reshape Work and Public Sectors Strategies

Appendix A

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Appendix B

READINGS AND RESOURCES

Davenport, Thomas H. *Process Innovation: Reengineering Work Through Information Technology.* Boston: Harvard Business School Press, 1993.

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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 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).

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)

Pen-based Computer—A computer that the user interacts with via an electronic pen or stylus rather than a keyboard or mouse. Most PDAs 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. 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.

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.

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]The concept of steering versus rowing was first made popular in a public sector context by David Osborne and Ted Gaebler in *Reinventing Government: How the Entrepreneurial Spirit is Transforming the Public Sector.* (New York: Plume, 1993).

[2]For more detail on the Canadian Information Highway Advisory Council, see the Kennedy School of Government case study written by Eli Turk, "Canada's Strategy for the Information Highway," 1999, Case Number: (unassigned).

[3]Brian Miller, "Interview: Maine Governor Angus King," *Government Technology,* March 1996, (www.govtech.net/publications/gt/1996/mar/interviewmar/interviewmar.shtm). Governor King was also quoted as saying "I'm convinced that no leader can lead on IT issues if they themselves don't know the technology works. The fact that I'm a pretty serious computer nut—and everybody knows it—has helped in all kinds of ways. It's helped in terms of leading by example. It's helped because the IT people know I appreciate and understand what they're doing and what some of the issues are. It's also helped me to ask the right questions." Andrew Noel and Shane Peterson, "The Word on Digital States," *Government Technology,* October 2000, (www.govtech.net/publications/gt/2000/oct/WordOn/index.shtm).

[4]Ewen MacAskill, "Blair conquers his fear of IT," *The Guardian*, 30 October 1999, (www.guardianunlimited.co.uk/Archive/Article/0,4273,3922998,00.html).

[5]For more on Governor Leavitt see: www.governing.com/poy/ptleav.htm. For more on Senator Howell see: www.govtech.net/publications.eCommerce/dec98/toc/toc.shtm.

[6]For more detail on the SSA's early attempts to bring services online, see the Kennedy School of Government case study written by Zach Tumin, "Social Security on the Web: The Case of the Online PEBES," 1998, Case Number: (unassigned).

[7]For more detail see the Kennedy School of Government case study written by Ed Barker, "SWIMming in San Diego: Hand-held Computing and Enterprise Systems in the San Diego Water Department," 2000, Case Number: (unassigned).

EIGHT IMPERATIVES FOR LEADERS IN A NETWORKED WORLD

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THE HARVARD POLICY GROUP
ON NETWORK-ENABLED SERVICES AND GOVERNMENT
JOHN F. KENNEDY SCHOOL OF GOVERNMENT

CAMBRIDGE, MASSACHUSETTS

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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"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
CAMBRIDGE, MASSACHUSETTS
JANUARY 2001

JERRY MECHLING, JOHN F. KENNEDY SCHOOL OF GOVERNMENT
LYNDA APPLEGATE, HARVARD BUSINESS SCHOOL

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.

• • •

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.

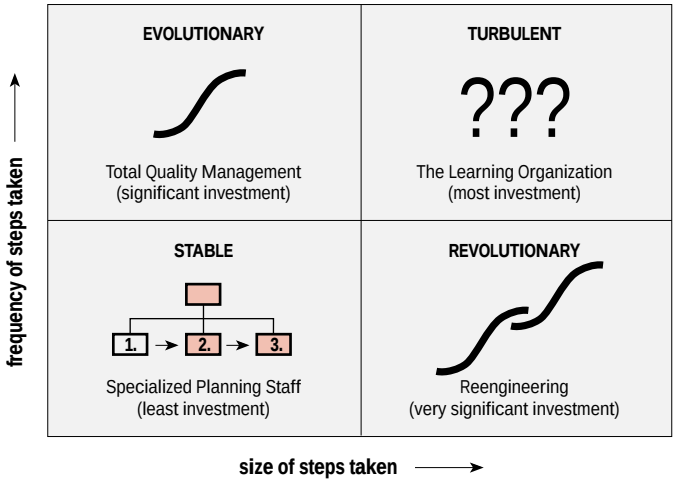

Figure 1: Organizational Innovation in Different Environments

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.

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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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Mr. Robert Reisner	*Vice President, Strategic Planning, US Postal Service*
Hon. Marlin Schneider	*State Representative, State of Wisconsin*
Mr. Larry J. Singer	*Chief Information Officer, State of Georgia*
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Mr. Terry Wood	*Councilman, City of Jacksonville, Florida**
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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.

EIGHT IMPERATIVES FOR LEADERS IN A NETWORKED WORLD

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THE HARVARD POLICY GROUP
ON NETWORK-ENABLED SERVICES AND GOVERNMENT
JOHN F. KENNEDY SCHOOL OF GOVERNMENT

CAMBRIDGE, MASSACHUSETTS

Eight Imperatives

for Leaders in a Networked World:

[A Series of Guideline Papers for the Year 2000 and Beyond]

Imperative 3:

Utilize Best Practices for Implementing IT Initiatives

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

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"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 #3: *Utilize Best Practices in Implementing IT Initiatives.* It addresses how leaders can avoid critical implementation problems by using proven—if not yet widely applied—strategies for managing IT implementation. The central theme is to approach IT implementation primarily as an organizational change challenge, not simply a technology issue.

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
CAMBRIDGE, MASSACHUSETTS
MARCH 2001

JERRY MECHLING, JOHN F. KENNEDY SCHOOL OF GOVERNMENT
LYNDA APPLEGATE, HARVARD BUSINESS SCHOOL

In recent years, public leaders around the world have increasingly recognized that information technologies (IT) are powerful tools for improving organizational strategy and performance. As we discussed in reports on Imperatives #1 and #2,* these leaders have begun to identify and develop innovative, high-value IT projects that will fundamentally change the way public sector organizations work. At the same time, however, such projects have historically come in late and over budget and have often failed altogether.[1]

In response, public oversight agencies such as the U.S. General Accounting Office and the Treasury Board Secretariat of Canada have published guidelines and methodologies to help governments implement IT initiatives more successfully.[2] While these tools have been used with much success, many IT initiatives continue to fall short of their initial promise.

In large measure, these implementation problems exist because too many organizations conceive of, organize, and implement IT projects first and foremost as technology efforts. Admittedly, the technology decisions and issues in major IT initiatives require careful attention. The "showstopper" problems, however, are almost always the problems that flow from the politics of organizational change. IT implementations can be greatly improved when change-related issues get the kind of attention they deserve.

The purpose of this paper is to explore the implementation challenges posed by IT projects and to describe what public leaders should do to manage such projects successfully. The ideas presented here are based not only on sound theory but, most importantly, on the recent experience of leading public-sector organizations.

Implement

"...implementation risks are substantially higher than they need to be."

THE IMPLEMENTATION PROBLEM: IGNORING ORGANIZATIONAL AND BEHAVIORAL CHALLENGES

For many years, IT projects were left largely to technology experts. While general managers and political leaders were usually involved in approving such projects, they typically delegat-

**Imperative #1: Focus on How IT Can Reshape Work and Public Sector Strategies* and *Imperative #2: Use IT for Strategic Innovation, Not Simply Tactical Automation*, are available at www.ksg.harvard.edu/stratcom/hpg

ed implementation to technologists. However, as IT became deeply embedded in strategy and organizational processes, general managers took a renewed interest in technology implementation efforts. In addition, as projects missed timelines and budgets, leaders recognized the complexity involved and the strong project management tools and skills required, including financial controls, human resource management, time allocation, project review, and oversight.

Of the top 10 factors listed by The Standish Group as "factors that cause projects to be challenged," only two (Technology Incompetence and New Technology) are "technology" problems. The rest require project-management and change-management skills.

- Lack of user input
- Incomplete requirements and specifications
- Changing requirements and specifications
- Lack of executive support
- Technology incompetence
- Lack of resources
- Unrealistic expectations
- Unclear objectives
- Unrealistic timeframes
- New technology

Source: The Standish Group, *CHAOS*, 1995.

While technological complexity and project management must still be addressed, it has recently become clear that the most significant challenges are related to interpersonal and organizational politics. Today, almost all IT projects undergo a technical-feasibility study to uncover potential problems and to ensure that the project can work technologically. Furthermore, almost all IT projects today include a financial assessment to clarify the financial costs and revenues associated with the project. What remains rare, however, is for those planning IT projects to undertake an equally rigorous up-front assessment of behavioral and organizational feasibility. Will the people involved in the project have the knowledge and skills, including change-management skills, to do what is required? Will they have the incentives required to support new behaviors? Understanding such "people" factors is just as important as understanding the "technology" factors.[3]

Without a strong response to the challenges of change management, implementation risks are substantially higher than they need to be.

Potential

"...the real potential of IT will never be gained if the more challenging projects are ignored."

WHAT TO AVOID: LIMITING IT PROJECTS BY SIMPLY AUTOMATING EXISTING PROCESSES

Since IT projects that involve significant organizational change are hard to implement, it is tempting to focus on lower-risk projects that simply automate existing processes. However, given the integral role IT now assumes in organizational strategy and processes, focusing on these projects ignores the organizational-change challenges associated with all IT projects today.

Moreover, the real potential of IT will never be realized if enterprise-wide investments, workflow reengineering, and other challenging initiatives are ignored. New technologies must not be used simply to automate existing workflows but, rather, to reorganize work and strategy in ways that fundamentally transform government operations—integrating workflow across (and outside) government in recognition that citizens interact with government as a single enterprise. Leaders need to understand and appreciate the value that can be created when technology is used to redesign workflow from an enterprise perspective. While such changes will often be difficult to implement, their potential benefits may very well justify the risks involved. The goal is to balance risk against return—not merely to minimize risk.

Organize

"Organize your major IT projects first and foremost as organizational change initiatives."

SUCCESSFUL IMPLEMENTATION: MANAGING CONFUSION AND CONFLICT

Successful IT implementation requires that leaders and other stakeholders combine their knowledge of what to do with the motivation needed to get it done. If participants are too confused, they will not know what to do or how to do it. If they are too conflicted, they will not believe that the project is in their interest. To manage these problems, leaders need strong interpersonal and political skills as well as the organizational authority needed to make these skills effective.

For leaders, a first step is to understand the patterns of confusion and conflict associated with a given project. Different patterns will then require different types of leadership (see Figure 1).

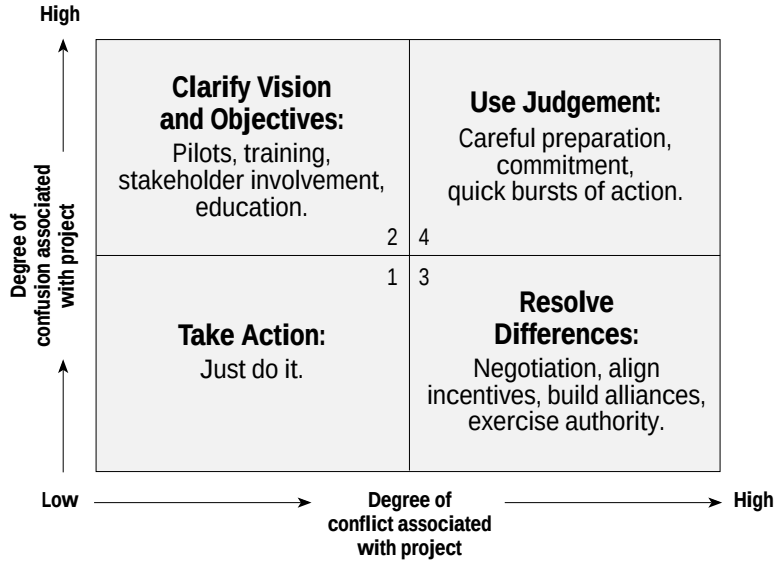

Figure 1: The Implementation Leadership Matrix

Projects with low levels of confusion and conflict: Projects in the bottom left quadrant of the matrix are relatively straightforward—and also relatively rare. Most stakeholders understand and support the work to be done. The guideline here is to "just do it." This advice is especially important for infrastructure that will be valuable regardless of how the strategic vision is eventually shaped. Life in the public sector is too difficult to let the easy ones get away. Unfortunately, as mentioned above, most public-sector technology efforts do not fall in this quadrant—which is probably why you are reading this report in the first place.

High confusion projects: When confusion is high (top left quadrant), serious work is required to clarify the vision. Leadership for these projects is largely an educational and communicative challenge; you must work with those directly affected by the project to define and communicate the vision, the business objectives, and the implementation requirements. In doing so, you may find that planning exercises, training programs, pilot projects, and other tools are useful for helping stakeholders move from confusion to clarity. Public relations and marketing can also be powerful tools. Guidelines #2 and #3 (below) should be especially useful when confusion is high.

High conflict projects: When the problem is conflict rather than confusion (bottom right quadrant), leaders must work to understand the sources and strength of opposition and then move to resolve differences. Leaders must understand how quickly stakeholders can absorb change and then provide the right amount of pressure to achieve that rate of change. In many cases, IT-enabled work may overcome conflicts by producing enough efficiency to create win-win-win situations for service recipients, taxpayers, and employees alike. In settings where serious opposition remains, however, leaders may need to use their skills and authority to overcome, rather than convert, those in opposition. Guidelines #4 and #5 (below) should be especially useful when conflict is high.

Projects with both confusion and conflict: Unfortunately, some of the most valuable IT initiatives—e.g. enterprise or other cross-boundary projects with significant changes in workflow—involve high levels of both confusion and conflict (top right quadrant). While the benefits of such initiatives may be large, overcoming the barriers that hamper cooperation across organizational boundaries is difficult. Good judgment is especially essential in settings that are both confusing and conflicted, and discretion can be at least as important as valor. Stopping or cutting back can be the wise road in some cases. In other cases, however, the leader must motivate the group to fight through uncertainty and opposition. Careful preparation and commitment is critical. Likewise, implementation should be quick and forceful, in order to reach a relatively safe position where value has been created and supporters feel justified and encouraged to maintain support. Guidelines #6 and #7 are specifically directed at these challenges.

• • •

While there are many opportunities to create value through simple automation, more substantial value is created primarily by enabling people to transform how government does business internally (within enterprise boundaries) and externally (with key stakeholders). As such transformations often require people to change their responsibilities and their relationships with each other, they also tend to generate confusion and conflict. Understanding the challenges of confusion and conflict will not ensure successful implementation, but ignoring them will certainly guarantee failure. Leaders need to arm themselves with the tools, strategies, skills, and authority needed to cope—first and foremost by organizing major IT projects as organizational change initiatives.

Succeed

"To succeed, leaders must understand and resolve issues of confusion and conflict."

GUIDELINES FOR IMPLEMENTING SIGNIFICANT IT-BASED INITIATIVES IN THE PUBLIC SECTOR

Having committed to addressing the behavioral challenges associated with IT, and having identified potential sources of confusion and conflict for a particular project, what can you do to implement successfully? Consider the following seven guidelines in developing your agenda.

1. Copy without embarrassment: Look, learn, and do.

Problem. Given the size and contentious nature of most public sector environments, change is always difficult, with risks increasing significantly when projects are based on untested models.

What to avoid. Do not make IT implementations any harder than they need to be by getting captured by the "not invented here" mentality. Do not blithely assume that the particular circumstances of your organization make the experience of others irrelevant. By all means copy, but do so carefully, focusing on the critical success factors that can be gleaned from those you are copying from.

What to do. Keep things as simple as possible by aggressively learning from others and building on standards set elsewhere. When software has evolved to become a commodity, be sure to buy rather than build—looking at application service provider (ASP)-based solutions for enterprise systems. Consider adapting your work processes to fit the software rather than customizing the software to fit the way you presently work. A strategy that follows the pioneers quickly—while avoiding their mistakes—can work wonders to gain value at relatively low risk.

An Example. NASIRE's Open-Source Application Development Project. Members of NASIRE's Open-Source Application Development Project (Arkansas, Georgia, New Jersey, Pennsylvania, and Washington) are in the planning stages of a project that will conduct pilot exchanges of public-domain e-government components and applications.[4] These pilots will serve as the foundation for a catalog or clearinghouse of government-specific components and applications assembled by states and their corporate partners in the implementation of e-government initiatives. In addition to these pilots, a small group of engineers and technicians are also developing a concept for a proposed inter-state application development environment. In this environment, staff from different jurisdictions will work together to support the development of e-government applications. While still in the early stages,

this project highlights the potential value of sharing and reusing knowledge, components, and applications.[5]

For more information about NASIRE's Open-Source Application Development Project, visit www.nasire.org/hotIssues/dg/index.cfm

An Example. Reusing Software Code at the U.S. Department of Defense. Writing quality software takes a significant amount of time and effort. Recognizing that the reuse of proven code could save time and money while simultaneously improving quality and reliability,[6] the U.S. Department of Defense launched the Software Reuse Initiative. This initiative explores and documents the benefits of software reuse, promoting reuse throughout the DoD. For example, the Army Tactical Command and Control System (ATCCS) reused code across five systems at an estimated cost savings of $479.9 million. Similarly, the Navy experienced a 26 percent reduction in required labor hours to develop and maintain its Restructured Tactical Data Systems.[7] Reusing code is not always simple, but it can be extremely effective.[8]

For more on the Software Reuse Initiative, see dii-sw.ncr.disa.mil/reuseic

An Example. Australia Post and SAP.[9] Once Australia Post decided to use SAP as its enterprise financial-control and materials-management system, implementation required less than six months. A critical success factor was their commitment to keeping application modifications to a minimum. Rather than customizing the software to match their business processes, Australia Post reorganized their business to work with the application. This decision also created downstream benefits by making subsequent system enhancements much easier to implement.

2. Mobilize and maintain broad support in shaping the vision.

Problem. Many public organizations use steering committees as up-front overseers to guide and prioritize e-government efforts.[10] But implementation also requires participation and support from many stakeholders. Unfortunately, stakeholders are often busy with their own concerns and may be largely in the dark about what needs to be done and why. Confusion can easily bring implementation to a halt.

What to avoid. The most common mistakes derive from a vision and/or business plan that has not been sufficiently clarified. You need a unifying vision, both to inspire stakeholders and to guide the day-to-day decisions of the project team. While the vision will evolve over time, it should be suitably aligned with defined business objectives. If not, the scope of the project is likely to change so often that nothing will get completed.

What to do. Clarify the vision and business case to market the project and mobilize support. Engage others in shaping the project, coming back to the vision and business case when support is waning. Keep supporters actively engaged to keep the project focused and energized throughout implementation. Never stop communicating.

An Example. The Texas Electronic Government Task Force. Electronic government means many things to many people. Yet, for any specific initiative to succeed, everyone involved must agree upon a single vision and a defined set of business objectives. When the membership of the Texas Electronic Government Task Force was defined, it not only included members from across state government, but also from local governments, businesses, and the public. By bringing diverse stakeholders together, the Task Force was able to create a shared vision for Texas Online. Building on this success, the Texas Online Commission (which succeeded the Task Force) was established to ensure that a broad set of overseers continued to play an active role in guiding and supporting the project team.

For more information on the Texas Electronic Government Task Force and the Texas Online Commission, see www.dir.state.tx.us/egov

An Example. A Transition Organization for Singapore's TradeNet. When Singapore decided to build an industry-wide IT platform to facilitate the processing of trade documentation (TradeNet), leaders realized that no single organization could accomplish the trade process redesign independently—management and execution of the trade process extends across many government agencies and private companies. Two high-ranking and powerful public leaders—Philip Yeo, chairman of both the Economic Development Board and the National Computer Board, and Yeo Seng Teck, chairman of the Trade Development Board—assumed responsibility for gaining commitment from the necessary parties and for providing project leadership. In order to keep stakeholders involved and engaged, they established the TradeNet Steering Committee specifically to represent the interests of stakeholders to the TradeNet project. This quasi-governmental committee proved instrumental in bringing the varied interests together and maintaining focus on a shared vision and set of business objectives throughout the design of TradeNet. During the implementation phase a formal organization—Singapore Network Services (SNS)—was formed from the Steering Committee membership to become the ongoing management unit.[11]

An Example. Driving E-government in the United Kingdom. As Prime Minister of the United Kingdom, Tony Blair has actively promoted a vision of the nation as a leader in e-commerce and e-government. The organization of his executive branch clearly reflects his intention to keep the country's leadership engaged in implementing this vision. In fact, there are three executive leaders responsible for driving the e-government agenda: the e-Minister is responsible for daily political leadership across government and for advancing the government's objectives on e-commerce; the Minister for e-Government has responsibility for the delivery of e-government objectives, including the objective to have all services online by 2005; and the e-Envoy focuses on the business community, promoting UK e-commerce abroad and ensuring that the benefits of e-commerce are spread throughout society. The Prime Minister also receives monthly progress reports on the UK Online strategy to ensure that the dialogue continues throughout implementation.[12]

3. Engage users, including citizens, in making objectives operational.

Problem. The size, complexity, and culture of systems development efforts has often led to limited input from users. This, in turn, has resulted in poor design trade-offs and an absence of user buy-in.

What to avoid. Do not assume you understand what the user thinks. Imposing too many choices on users is a serious problem if the resulting system is not user-friendly. Equally dangerous, however, is involving users in an undisciplined process that takes forever and becomes overly political.

What to do. Establish channels in the development process for incorporating the knowledge and concerns of stakeholders in a disciplined way, being sure to solicit input from those who will be directly involved in using the system. When engaging users do not simply ask them what they think but, instead, give them enough instruction and time to form a considered opinion before they offer their input. While this process may initially slow things down, it will save time later when fewer aspects of the system need to be reengineered. Better designs are created when downstream users can react before upstream mistakes are finalized. Better trade-offs are also made when the interests of all stakeholders are visible during the implementation process. Train people how to use the system as soon as possible, both to encourage adoption and to resolve problems early.

An Example. Co-location and the San Diego Water Department (SDWD). When the San Diego Water Department was implementing a computer-based system to support the field crews that maintain the county's massive water and sewer infrastructure, it decided to co-locate the development team with those who would actually use the system. As Analyst Brian McKee noted, "We went from our ivory tower… and set up right next to the valve-fitter guys. We had a team of tech guys out there, and we went on a lot of ride-alongs to find out what they did. As we developed the product, we showed them the initial screens and told them that if there's anything on here that you're not going to use, we'll get rid of it. So they started scratching things off. Now, when you look at the screen, it's only got the data on there that they're interested in looking at." Members of the crew also noted that moving the development team to the field made a big difference. Engaging the field crews in the development process gave them experience with the system that proved invaluable when it came time for the full roll-out.[13]

An Example. Evolutionary Prototyping. The example above demonstrates the methodology of "evolutionary prototyping." This methodology enables the implementation team and user community to educate each other. Best used when users do not know what the technology can do for them, evolutionary prototyping moves through an iterative succession of simulations or prototypes in arriving at a final system. Users work with the latest prototype and offer feedback on what works for them and what seems to be missing or inadequate. The learning loop is complete when the implementation team redesigns the next prototype based on real user feedback.[14]

An Example. Washington State's Digital Academy. The Digital Academy is a place where agency staff, private-sector experts, and citizen-users collaborate to design, build, and launch web-based public services. Conceived as a laboratory for learning, the Academy gives staff a chance to get outside their home environment and interact with those who will use their applications on a daily basis. Early implementation efforts include "e-form" and "e-permit" applications.

For more information, visit the Academy at www.wa.gov/dis/e-gov/academy

An Example. The People's Panel. As the UK government developed an online application for citizens to notify various government departments of a change of address, they enlisted the help of the People's Panel, a sample of 5000 citizens representing a cross-section of the UK population. During several half-day workshops, a sample from the People's Panel was asked to use several prototype applications and offer feedback on each. The government has since used the People's Panel to understand citizen demand and to prioritize projects for electronic services. By using this representative sample, the government can not only get input from users, but also from those who are not currently using electronic service delivery channels.

For more information about the People's Panel,
visit www.cabinet-office.gov.uk/servicefirst/index/pphome.htm

4. Assemble a diverse team under a project manager with organizational authority.

Problem. Significant IT initiatives almost always involve changes that have the potential to disrupt the work and organizational relationships among groups and individuals.

What to avoid. Do not entrust the project to a team narrowly staffed by technologists and consultants or without the expertise and authority needed to influence front-line personnel and other stakeholders.

What to do. All development teams must have the technical and business expertise required to implement a new IT project. Successful teams also include "boundary spanners" that represent the interests of and have the power to influence key stakeholder groups that must come together. Form a balanced project team, including people with knowledge and influence over the business operations to be affected. When teams include members from different organizations, project leaders must actively encourage discussion of interests and cultural differences. For projects involving workflow redesign, it is usually wise to put a respected line manager in charge. The project manager must have the respect of team members as well as access to the organizational resources and incentives needed to resolve conflicts.[15] It is also helpful to assign an independent, well-respected person or group to assess the quality of results when milestones are reached. Feedback from these quality assessments can be used to build team strengths and address team weaknesses.

An Example. John Koskinen and Y2K. We have learned a great deal over the years about how to successfully implement technology-related initiatives. In particular, the experience with Year 2000-readiness has drawn attention to the importance of politically-grounded project management. It is widely acknowledged that, as Chair of the President's Council on Year 2000 Conversion, John Koskinen's use of his broad managerial skills and political position were instrumental in mobilizing the incredibly detailed activities required to solve Year 2000 issues. At the same time, Year 2000 issues required managers and technical employees throughout government to work together in cohesive teams. According to Anne Reed, former CIO at the U.S. Department of Agriculture, this experience has helped forge stronger relationships between the business staff and technology staff—relationships that are helping advance more recent e-government initiatives.[16]

An Example. Training and Certifying IT Project Managers. Recognizing that managing IT projects requires strong project-management skills, governments in Michigan, Minnesota, and Kansas City now offer courses to employees to build the necessary IT project-implementation competencies. In Michigan, for example, employees can take courses on software risk management, IT contracting, and project leadership/communication. State employees in Minnesota can also take a course that covers how to use customer needs to frame goals, how to develop a project team, and how to evaluate project results. Similarly, the city of Kansas City, Missouri, requires all the assistant directors, business analysts, programming leaders, and internal business consultants in the IT department to take a week-long certified course from the Project Management Institute.

For more information about the programs in Michigan, Minnesota, and Kansas City, visit

Michigan www.state.mi.us/cio/opm/
Minnesota www.doer.state.mn.us/tdrc/courses/pj_manage.htm
Kansas City www.kcmo.org/index.htm

An Example. Managing Cultural Differences to Launch My California. In January 2001, the State of California recast its fragmented web presence and launched *My California*—a powerful Internet portal that was built in 110 days using some of the best web technology on the market. For a state where the Governor did not have an email address the previous year, a number of factors were critical to the project's success, including deadlines set by the Governor and the advice of Silicon Valley executives on the Governor's Web Council. According to Arun Baheti, Director of eGovernment for the State of California, "one of the most gratifying and important success factors was the way in which the development team came together." With over 100 people drawn from more than 15 different organizations (many of them competitors), the number of different organizational cultures coming together could have torn the project apart. Working together in a single space, however, the amalgamation of talent soon developed a culture of its own. Individuals began physically

reorganizing themselves by functional teams, mixing members from different corporate organizations. As these teams worked together, old cultural differences gave way to a new integrated team perspective. Isolating factors that make such a meshing possible is always difficult and inevitably context specific. What seems clear in this case, however, is that the existence of a firm deadline and the visible commitment of the CEO from each organization (including the Governor), along with a multi-organizational team composition, encouraged development of a shared goal and a common set of values that quickly brought the implementation team together.

For more information, visit *My California* at my.ca.gov

An Example. Using "War Rooms" to Coordinate Canada's SIGNET Renewal Project. In 1998, testing confirmed that SIGNET—the computing environment that allows the Canadian Department of Foreign Affairs and International Trade and eleven other departments to exchange messages around the world—was not Year 2000-compliant. One of the critical success factors of the project designed to correct this problem was ongoing communication within a mixed team of consultants and staff responsible for user education, implementation, development and infrastructure, and quality assurance. To provide this communication, twice-weekly "war room" exercises opened the floor to any team member who saw a problem that needed to be addressed. Since senior management always attended these meetings, action steps were quickly identified and approved.[17]

5. Maintain pressure for progress, accelerating the cycle of innovation.

Problem. People have a tendency to avoid the tough work of organizational change and to smooth things over to keep relationships comfortable. As a result, they will not progress as fast as they would if placed under a certain amount of pressure, even though they may well resent such pressure when it is applied.

What to avoid. Seeking only to preserve smooth personal relations may lead to a flawed implementation. Seeking to resolve conflicts by relying too heavily on the leader's formal authority may also hinder an implementation.

What to do. Apply pressure by setting firm but realistic deadlines. Help everyone understand the urgency of the situation by presenting real comparative data when you have it, using internal and external benchmarks to motivate change. While using pressure for change is often essential, periods of pressure and change need to be balanced by periods of relief and stability.

An Example. The Push for Electronic Service Delivery. Over the last year, many governments have announced aggressive goals for delivering services online. For example, the Australian government aims to have 100 percent of its services available electronically by the end of 2001, while the U.S. government is aiming for October 2003 as the date for enabling citizens to do business with the government electronically. While it is unclear whether these goals are realistic, it is clear that governments are using public expectations,

private-sector accomplishments, and inter-governmental comparisons to apply pressure and to accelerate the cycle of innovation. As Prime Minister Tony Blair noted in moving the British government's target date forward,

"I want the UK to be the world's leading Internet economy. Businesses and individuals across Britain are responding to this challenge, getting the UK online. I am determined that Government should play its part, so I am bringing forward our target for getting all Government services online, from 2008 to 2005." [18]

An Example. Leveraging Public Report Cards. When Governing Magazine publishes its extensive report cards on U.S. cities and states, those who do well are quick to tout their accomplishments. Far from resting on their laurels, however, officials in Phoenix, Arizona —after finding out they received an "A" and ranked first in the nation in 2000—stressed the need to start preparing for the next test. As City Manager Frank Fairbanks noted, "Whatever we did yesterday, we've got to do better tomorrow."[19] After receiving a B+ in 2001, Iowa Governor Tom Vilsack used the grading process to push for improvement, noting that, "While we're pleased with the results, we can continue to improve the way we invest tax dollars and achieve results Iowans value."[20]

An Example. Using Citizen Feedback to Drive E-Government in New Jersey. During the fall of 2000, New Jersey conducted surveys and focus groups to understand the impact of the Internet in New Jersey and to identify how the state might use the Internet to serve its citizens. The results have proven to be a powerful tool in illustrating the importance of e-government, in creating a sense of urgency, and in driving the e-government agenda forward. State officials have been able to press for support and funding of e-government initiatives by highlighting results that show 76 percent of New Jerseyans support the idea of state government giving residents the option of Internet-delivered services, with a majority preferring to contact government through the Internet (as opposed to by telephone or in person) for services such as recreational activities and educational programs.

6. Kaizen: Implement in short, quick bursts or building blocks.

Problem. While large IT projects tend to take a long time to implement, potential supporters often have short attention spans or are distracted by other issues. Projects that cannot be implemented within a political cycle are thus vulnerable to death by delay.

What to avoid. Do not exacerbate project risks by succumbing to the temptations of grand designs and scope creep. At the same time, do not avoid all large projects without carefully assessing whether the returns may be worth it.

What to do. Whenever possible, break up larger projects into smaller ones with short timeframes and deliverables that are visible and motivating. These small building block projects should have a demonstrated benefit in the short term while also advancing progress toward accomplishing longer term objectives. Dedicate staff for intensive work on these short projects.

Make changes in similar "bursts," linking the bursts to breakthrough service and productivity improvements. Reward staff for successfully meeting short deadlines.

An Example. Pennsylvania's "Value Bursts." Pennsylvania's e-government strategy calls for the Office for Information Technology to focus on projects that can be completed in 90-day increments. Development teams are given 90 days to meet their milestones, thereby achieving a minimal level of functionality that demonstrates value. Future upgrades are also made in 90-day increments. For example, the state's PAOpen4Business web site is being developed within this framework. Phase 1 put the forms necessary for starting a business on the web site, phase 2 created an online "entrepreneur interview" to help prospective entrepreneurs find information and filing requirements. Future 90-day "bursts" will complete the posting of all related forms online and will integrate data across state agencies.

An Example. Online Drivers' License Renewal in Tennessee. On August 28, 2000, the State of Tennessee announced that it had awarded a contract to the National Information Consortium (NIC) to build a front-end interface for a new Internet portal. Looking to generate momentum, Tennessee stipulated that NIC had to deliver an application for renewing drivers' licenses within the first 45 days of the contract. Exactly 45 days after the contract was signed, Governor Sundquist was the first person to renew a drivers' license online in the State of Tennessee, and, in the first week alone, more than 1000 people either renewed their license or registered a change of address. As the state and NIC futher develop Tennessee's Internet presence, they continue to launch applications in short bursts of time. Learning from this experience, Tennessee is following a similar strategy for IT systems outside of their portal initiative. For example, future development of their TennKids system —a distributed system supporting multiple state and local agencies in serving the social needs of children—will be developed in "modules" of no longer than four months.

7. Use a "slow trigger, fast bullet" approach for the toughest projects.

Problem. Some IT projects promise enormous value if implemented, but they can be inherently risky and not easily broken down into safer pieces. These "bet the farm" projects raise challenges somewhat similar to those facing General Eisenhower as he prepared his troops to invade Europe during World War II. Certainly, the levels of confusion and conflict to be confronted on D-Day were immense, but the offensive would not have been successful if it had been split into smaller pieces over a longer period of time.

What to avoid. The classic mistakes are either missing the big opportunity due to a lack of nerve or acting impulsively without the backup needed to see things through. Either choice risks failure—not only of the project at hand but of related projects as well.

What to do. Before you begin implementation, thoroughly gauge reality to assess the motives of stakeholders and the degree of support and opposition you will face. Prepare as fully as

possible for predictable problems and develop a team fully committed to success. This is the "slow trigger." Then, when you commit to implementation, go as fast as possible to a place where the project has produced visible value that can sustain supporters. This is the "fast bullet." As did Eisenhower (and also Colin Powell during the Persian Gulf conflict), attack massively, and do not get stuck on the beach.

An Example. E-government in Manitoba, Canada. In 1995, while other jurisdictions were launching individual electronic services through kiosks and early web sites, a group of government officials in Manitoba were crafting a larger vision of how electronic services might revolutionize the relationship between government and citizens. Partnering with IBM, this group knew that the time was not ripe for the kind of revolutionary change they envisioned. Over the next three years, however, they continued to work with IBM to articulate the vision, define the business processes, understand the technologies, and lay out the structure they would need. Finally, with all the pieces in place, Manitoba tendered an e-government contract to begin implementing their revolutionary vision. By laying a foundation for their vision, rather than focusing on incremental experiments, Manitoba was able to move quickly and produce value early once the decision to go forward was made.

An Example. One EASE E-Link in New Jersey. One EASE E-Link (OEL) is a single point of entry for doing business with social-service agencies in New Jersey. The product of a cooperative effort between three state departments, OEL currently allows more than 2000 case managers and 800 social service agencies in 17 of New Jersey's 21 counties to identify the services for which a client is eligible; identify service providers; share client information; and, in the near future, complete certain applications. According to OEL Director Bill Kowalski, however, the key to achieving success for this large and politically complicated project was starting with a smaller pilot project. When the idea of sharing information between the state and social service agencies was first broached in the mid-1990s, there was general enthusiasm among the key stakeholders. However, after a consultant's report indicated the project would require significant financial and human resources commitment waned, and the project nearly died. Working together, undeterred individuals from three state departments crafted a common vision for OEL and launched a smaller pilot project with Atlantic County, NJ. As the pilot evolved, proponents of OEL used the success of the pilot to win support from the Governor and other political stakeholders. Once this support was secured, OEL's proponents were then able to use the groundwork laid with the pilot to move quickly and offer its services to every county in the state. While the value of "starting small to prove the concept" was not lost on OEL's proponents, Kowalski notes that they were still overly aggressive with the state-wide rollout of OEL. Despite the success of the pilot, there were still technical and organizational challenges that needed to be worked out before expanding the project so quickly.

For more information visit One EASE E-Link at www.oel.state.nj.us

An Example. Throwaway Prototyping. Throwaway prototyping involves producing a simulation system that can be used for testing. For example, in the One EASE E-Link (OEL) project (above), the project team was not sure if the pilot being used in Atlantic County, NJ would serve the needs of the social services community. Trying a prototype with some basic functionality can help identify the direction the project should take. Based on insights from experience with the first prototype, the project team may decide to develop another throwaway prototype with different options. Alternatively, the prototype may prepare the team enough to commit to a fully functional version of a new system. As it turned out, the client-server technology on which the original prototype for OEL was based proved to be unacceptable. Fortunately, Internet technology was gaining prominence at the time, enabling the implementation team to throw the old pilot away and try a new one.[21]

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Over the past decade, public sector leaders have improved their ability to manage significant IT implementations. Traditional project management tools and methodologies have helped, especially with problems of sheer size and complexity. The key challenges that remain, however, are typically associated with the politics of organizational change, not technology. To succeed, leaders must understand and resolve issues of confusion and conflict. Seven guidelines are summarized in Figure 2.

1. Copy without embarrassment: Look, learn, and do.
2. Mobilize and maintain broad support in shaping the vision.
3. Engage users, including citizens, in making objectives operational.
4. Assemble a diverse team under a project manager with organizational authority.
5. Maintain pressure for progress, accelerating the cycle of innovation.
6. Kaizen: Implement in short, quick bursts or building blocks.
7. Use a "slow trigger, fast bullet" approach for the toughest projects.

In sum: Leaders must respond to the organizational and behavioral challenges of major IT implementations.

Figure 2: Guidelines for Implementing IT Initiatives in the Public Sector

"Make explicit that which is often overlooked or dismissed."

NEXT STEPS

What can you do to prepare for the next significant IT implementation? In general, you need to proactively manage the confusion and conflict associated with IT implementations. To apply the above guidelines to your own setting, consider the following next steps.

1. Assess your track record on IT implementations. Before making or even proposing change, understand where you are today. Is your organization successful in implementing IT initiatives on time and within budget? How does your success compare to that of your peers? Do your current practices address the organizational and political dimensions of IT implementation?

2. Explicitly address organizational and political issues. More than likely, your current methodology considers financial and technical feasibility as part of the implementation planning process. Go beyond these to also discuss how you will use a vision and business objectives to maintain support and keep your project focused. Demand a clear statement of how the development team will be assembled, how conflicts will be resolved, and how users will be engaged in the process. In short, make explicit that which is too often overlooked or dismissed.

3. Prepare for a future dominated by enterprise and other cross-boundary projects. We are moving from just putting things on the Internet to initiatives that require enterprise-wide integration and organizational restructuring. These new initiatives are more difficult, raising the levels of potential conflict and confusion. But now is not the time to shy away. Highlight the value of IT and maintain pressure for progress. Adopt strategies that plan across boundaries, then move to demonstrate value in steps that are as quick and decisive as possible.

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

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As governments move further into electronic service delivery, implementation challenges will continue to grow. We need leaders who can accurately assess and effectively address organizational and political barriers.

This report offers guidelines for meeting these needs. 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 year 2000 and beyond. Our next report will examine how to improve budgeting and financing to identify and fund promising IT initiatives, especially cross-boundary and multi-year projects.

The President. As enterprise-wide projects become more important, highlight the need for public leaders to stay engaged and to effectively address challenges associated with organizational and political barriers. Maintain pressure for fast development cycles, looking for quick demonstrations of value.

Legislators. Provide disciplined but realistic oversight, focusing on keeping projects in line with their business objectives. Demand to see more than just financial planning.

Governors. Emphasize the need for your executive team to work together in an enterprise-wide planning process. Actively participate in setting the vision and business objectives for e-government.

Local government leaders. In addition to developing an enterprise-wide plan (see Governors above), work to establish the ties that make cross-jurisdictional implementations possible.

Judges. Justice is one of the areas that has seen a fair amount of success in implementing large, cross-boundary IT initiatives. Share the knowledge gained from these successes and maintain the pressure for progress.

Budget directors. Along with the CIO, you need to lead the enterprise planning process. Give project managers the authority they need for implementation, holding them accountable for business results, not just finances.

Agency and program heads. Implementations will succeed or fail based on your ability to manage the confusion and conflict of organizational change. Assemble a balanced development team, make sure the vision is clear, and keep the project moving forward quickly and decisively.

Chief Information Officers. Along with your CFO, build a strong executive team for enterprise planning. Use methodologies that ensure your managers address the organizational change dimension of IT implementations.

Technology community. Use your extensive experience with IT-based institutional reform to help governments become more realistic about what it takes to implement; developing application service provider (ASP)-based, enterprise solutions may be an important strategy.

Associations and interest groups. Make fast follower strategies as productive as possible by aggressively identifying and sharing best practices.

The press. Follow up to see if the promises of e-government have been implemented, reporting realistically on the successes as well as failures.

The public. Look for results, not just promises: easier access, better customization, greater productivity, better overall value. These are the signs of effective implementation.

Figure 3: Advice for Stakeholders: How to Implement IT Initiatives in the Public Sector

Appendix A

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Mr. Richard J. Varn	*Chief Information Officer, State of Iowa*
Hon. J.D. Williams	*Controller, State of Idaho*
Mr. Terry Wood	*Councilman, City of Jacksonville, Florida**
Mr. Robert J. Woods	*Commissioner of Federal Telecommunication Services, U.S. General Services Administration**
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Appendix B

READINGS AND RESOURCES

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The OECD Programme on Public Management and Governance is undertaking a project to explore the management of large public-sector IT projects. Information about the project as well as reports submitted by participating countries can be found at www.oecd.org/puma/Risk/index.htm

The Standish Group produces an annual report (*CHAOS*) that includes detailed information on IT project success and failure. For more information, visit the Standish Group web site at www.standishgroup.com

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.

Kaizen—Originally defined in Masaaki Imai's book *Kaizen: The Key to Japan's Competitive Success*, *kaizen* refers to a process of continuous improvement through small sustainable steps.

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.[22]

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.

Prototype—A pre-production, functioning model of a system or application. A prototype is generally used for the evaluation of design, performance, or production potential.

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.

Scope Creep—The gradual accumulation of new or expanded requirements after a project plan (project scope) has been agreed upon by all parties. Scope creep is a significant risk to implementation success as it increases cost and extends project timelines.

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.

Slow Trigger, Fast Bullet—An analogy used to describe an implementation strategy in which careful project planning and preparation (the slow trigger) is followed by swift and decisive action steps (the fast bullet) that quickly move the project to a stage that safely demonstrates value.

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]According to a report by The Standish Group, in 2000, only 28% of all IT projects were deemed to have accomplished their objectives within the allotted budget and timeframe. The Standish Group International. *CHAOS.* West Yarmouth, MA: The Standish Group International, 2001. For more detail, see www.standishgroup.com

[2]*Executive Guide: Improving Mission Performance through Strategic Information Management and Technology*, U.S. General Accounting Office (GAO/AIMD-94-115, May 1994); *Assessing Risks and Returns: A Guide for Evaluating Federal Agencies' IT Investment Decision-making*, U.S. General Accounting Office (GAO/AIMD-10.1.13, February 1997); *Information Technology Investment Management: A Framework for Assessing and Improving Process Maturity*, U.S. General Accounting Office (GAO/AIMD-10-1-23, May 2000); *The Enhanced Framework for the Management of Information Technology Projects*, Canadian Treasury Board, 1996 (www.cio-dpi.gc.ca/emf/Publications/Publicationsplash_e.html).

[3]In a Research Note titled "Identifying and Assessing E-Government Inhibitors" (November 2000), Gartner Group recommends that leaders include social and political issues in an early analysis of factors that might delay or derail e-government initiatives.

[4]Project members will report early results to NASIRE's 2001 mid-year conference in May 2001.

[5]A similar initiative was undertaken by IBM between 1995 and 1998; the San Francisco Project created a core set of frameworks for common business needs (warehousing, accounting, order processing) that could be extended and customized to meet the needs of individual businesses. In essence, the San Francisco Project provided 40 percent of the business functionality (that which was common for all businesses), allowing individual businesses to develop the other 60 percent (that which is customized and the basis of competitive advantage). Such sharing is significantly easier with the evolution of object-oriented programming.

[6]In a 1991 report, the Software Engineering Laboratory of the National Aeronautics and Space Administration's Goddard Space Flight Center estimated that the reuse of software code resulted in a 35% reduction in effort needed to deliver a line of code and an 87% increase in quality (reduction of errors). See U.S. General Accounting Office, *Issues Facing Software Reuse* (B-252542, 1993). In a 1996 report sponsored by the Department of Defense, researchers documented significant reductions in cycle time, cost, and risk as well as improved return on investment from software reuse. See Applied Expertise, Inc, *Software Reuse Benchmarking Study: Learning from Industry and Government Leaders*, January 1996 (dii-sw.ncr.disa.mil/reuseic/lessons/benchmark/html).

[7]Department of Defense Software Reuse Initiative, *Software Reuse Executive Primer*, April 1996 (dii-sw.ncr.disa.mil/reuseic/pol-hist/primer).

[8]Recently *CIO Magazine* reported that a private company, Code Power, is going to sell reusable source code. Partners in the venture include Sun, Oracle, and Globix. John Edwards, "Source Code Sell-Off," *CIO Magazine*, 1 January 2001.

[9]Originally founded as *Systemanalyse And Programmentwicklung*, *SAP* has since been renamed *Systeme, Anwendungen, Produkte in der Datenverarbeitung* or *Systems, Applications and Products in Data Processing*.

[10]NASIRE estimates that 25 states in the U.S. had such committees. Eric Kulisch, "The art of the deal," *civic.com*, 4 December 2000.

[11]For more detail about the implementation 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). Also see the accompanying Teaching Note written by Professor Lynda Applegate, "Singapore Series," 1995, Case Number (5-195-025).

[12]For more detail about the United Kingdom's e-government efforts, see www.e-envoy.gov.uk.

[13]For more detail see the Kennedy School of Government case study written by Ed Barker, "Swimming in San Diego: Hand-held Computing and Enterprise Systems in the San Diego Water Department," 2000, Case Number (unassigned).

[14]Steve McConnell, *Rapid Development* (Redmond, WA: Microsoft Press, 1996), pp. 435-40.

[15]The value of a diverse development team with clear authority 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.

[16]*Government Executive* magazine, through its web site GovExec.com, has chronicled three years of coverage of the Y2K issue and the leadership John Koskinen provided as "Y2K Czar." See especially the articles from 2-5-98, 3-19-98, and 5-1-98 when Koskinen was sounding the battle cry for a comprehensive, enterprise-wide approach to the problem (www.govexec.com/tech/year2000). For a discussion of lessons learned from Y2K see also Colleen O'Hara, "Lessons Learned: The real Year 2000 fallout? It taught IT managers how to manage big problems." *Federal Computer Week*, 10 January 2000 (fcw.com/fcw/articles/Manlessons.asp).

[17]For more detail about the implementation of the SIGNET Renewal Project, see Government of Canada, Enhanced Management Framework Division of the Chief Information Officer Branch, Treasury Board of Canada. "Management of Large Public IT Projects: Canada." Country Report Submitted to the OECD Expert Meeting, October 2000. (www.cio-dpi.gc.ca/emf/new-nouveau/lrg-public-it-grnd-ti/lrg-public-it-grnd-ti_e.html)

[18]British Cabinet Office, "Government to speed up introduction of online services," Press Release, 30 March 2000.

[19]Anonymous, "City Deserved Grade A," *The Arizona Republic*, 01 February 2000, B6.

[20]Office of Governor Tom Vilsack, "Iowa Earns B+ in State Management Survey," 30 January 2001.

[21]Steve McConnell, *Rapid Development* (Redmond, WA: Microsoft Press, 1996), pp. 569-73.

EIGHT IMPERATIVES FOR LEADERS IN A NETWORKED WORLD

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THE HARVARD POLICY GROUP
ON NETWORK-ENABLED SERVICES AND GOVERNMENT
JOHN F. KENNEDY SCHOOL OF GOVERNMENT

CAMBRIDGE, MASSACHUSETTS

Eight Imperatives

for Leaders in a Networked World:

[A Series of Guideline Papers for the Year 2000 and Beyond]

Imperative 4:

Improve Budgeting and Financing for Promising IT Initiatives

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 #4: *Improve budgeting and financing for promising IT initiatives.* In this report we suggest how government can identify valuable IT projects that are often overlooked in the traditional budget process—especially projects that require innovation and coordination among multiple agencies over several budget cycles. We also highlight some creative financing tools that can be used to support attractive but difficult-to-fund projects.

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
CAMBRIDGE, MASSACHUSETTS
APRIL 2001

JERRY MECHLING, JOHN F. KENNEDY SCHOOL OF GOVERNMENT
LYNDA APPLEGATE, HARVARD BUSINESS SCHOOL

Government budgets are the result of a powerful and often brutally contested decision-making process in which programs face stiff competition for limited funds. As a result, the answer to many budget requests—and especially requests for new funds—is a disappointing "no."

For many requests, of course, "no" is the right answer. The budget process must reject some proposals in order to make room for others. "No" is the wrong answer only when the budget fails to reflect society's true priorities—when high-value initiatives are discarded in favor of those with less value.

But does government budgeting suffer from this sort of problem when considering IT? Are valuable IT-related initiatives overlooked as a result of the budget process? The short answer is "yes." While government funding for IT continues to grow, it is still significantly lower than in the private sector.[1] More importantly, while governments are using IT to do many good things, budgets often fail to fund some of the most valuable IT-related opportunities, especially multi-year initiatives and those that require coordination among multiple organizations.

This paper explores why budgeting and financing IT is difficult in government then recommends guidelines to address the problem.

Budget

"...governments miss some of the most promising IT investments because budget preparation is not organized to look for them."

GOVERNMENT BUDGETING AND FINANCING FOR IT: PROBLEMS OF MYOPIA

When governments build their budgets, they focus heavily on program-by-program estimates of what it will cost next year to do what they are doing this year. This annual (or biennial) process of decomposing the enterprise budget into smaller pieces simplifies choices and helps manage the enormous complexity of government.

But the same process that simplifies budgeting also tends to miss some of the most promising IT initiatives, such as:

• *Enterprise-wide integration and other cross-boundary initiatives.* The primary value of IT is not in automating existing services and processes, but in transforming the way government works—breaking down boundaries and coordinating services across agencies and jurisdictions. A program-by-program budget focus may miss valuable opportunities to integrate services across program, jurisdictional, or sectoral boundaries.

• *Initiatives with longer timelines.* While huge IT projects are giving way to projects that can be divided into smaller parts so as to quickly deliver value, many IT-related projects still require multi-year support through development, maintenance, and eventual retirement. An annual or biennial budget cycle may miss longer-term opportunities and fail to account for a system's full lifecycle.

• *Groundbreaking initiatives.* The most valuable e-government proposals are often aimed at fundamentally reinventing services. A process focused on incremental changes to the previous year's budget may miss key opportunities for such radical innovation.

• *Initiatives with non-financial benefits.* Many of the benefits of IT-related projects—productivity gains, service improvements, enhanced customer satisfaction, and service equity—are difficult to quantify in financial terms. When budget analysis focuses almost exclusively on whether front-end costs can be covered by downstream savings, governments may under-invest in non-financial benefits.

In general, governments miss some of the most promising IT investments because budget preparation is not organized to look for them. And even when attractive investments are identified, it can be difficult to finance them through the traditional tax-levy budget.

Do More

"We need budgets that do more than occasionally make room for exceptional projects."

WHAT TO AVOID: RUSHING AHEAD WITHOUT CORRECTING FOR "BUDGET MYOPIA"

The myopic nature of traditional budgeting makes it hard to fund high-value IT initiatives. Many stakeholders in the budgeting process are so deeply immersed in the process that they fail to recognize the biases of program-by-program, year-at-a-time budgeting. They are not disturbed when innovative IT-related initiatives are not funded because they were not encouraged to look for them in the first place.

Other stakeholders are looking to integrate services across traditional boundaries, but give up when they see how hard it is to fund such projects. For example, the U.S. federal government spends hundreds of millions of dollars supporting state and local governments in pursuing IT-related projects in areas such as education, social services, and public safety. However, since the budget process is agency-based, state and local governments cannot use the money to fund high-value initiatives that integrate programs. The constraints of the past squeeze out opportunities for the future.

Still other stakeholders fight with some success for particularly attractive IT projects. Such project-by-project success, however, fails to correct for the ongoing budgetary bias against multi-year or enterprise-wide initiatives.

We need budgets that do more than occasionally make room for exceptional projects. We need to change government budgeting so it more consistently supports the innovative, cross-boundary, multi-year potential of IT.

Counteract

"We need to counteract the program-by-program, year-at-a-time biases that can cause traditional budgeting to miss so many good opportunities"

A LENS FOR BRINGING HIGH-VALUE IT INTO FOCUS

Despite their flaws, traditional budgets are of critical importance in government. They serve to focus resources on public priorities as identified through a democratic decision-making process. The challenge, as highlighted below in Figure 1, is to adjust the focus so they can more easily "see" high-value IT investments.

Focus of Traditional Government Budgeting	Characteristics of High-Value IT Investments
single-year (or biennial) expenditures	multi-year investments
program-by-program performance	enterprise or cross-boundary performance
financial costs/benefits	financial and non-financial costs/benefits
level of effort within existing workflows	changes in the flow of work
ongoing operations	"start-up" operations
control	innovation

Figure 1: Traditional Government Budgeting versus High-Value IT Investments

Earlier reports in this series focused on the transformational nature of high-value IT projects.* Value is achieved through redefining and reinventing how government works. Traditional budgeting, however, is designed primarily for accountability and control, not innovation. Governments seek to avoid risks rather than profit from them. As a result, they often overlook the highest-value IT initiatives while spending money on safer but less valuable ideas.

As the value created by networks becomes evident, however, public leaders are looking for a better lens with which to search for and analyze projects with the characteristics described in the right hand column of Figure 1, especially innovations that redesign and integrate services across the boundaries of existing programs and agencies.

While the time may be ripe for such budget reform, it will not be easy. It will take a significant educational effort to highlight the need for reform in the first place. Furthermore, past efforts to insert more analysis and cross-boundary focus into budget preparation have bogged down, at least partly under the difficulties of assembling the information needed for analysis. While the challenges are still formidable, today's information technology makes it much easier to gather and analyze the necessary data.

Other factors may also help refocus budgeting on high-value IT. First, many program-specific IT initiatives have now been completed, making enterprise and other cross-program work visible as a logical next step. Furthermore, the risks of many enterprise-wide projects have been reduced by the fact that other institutions—largely, but not exclusively in the private sector—have forged ahead and proven their feasibility.

New financial tools are also making a difference. Many governments are exploring how to pay for IT through capital funds and leasing. Governments are also financing IT through more aggressive public-private relationships. These include share-in-revenues and share-in-savings agreements along with advertising and user fees. In the future, many IT initiatives in government may be based on non-tax financing.

As e-government continues to evolve and grow in importance, we need to counteract the program-by-program, year-at-a-time biases that cause traditional budgeting to miss so many good opportunities. This can be done partly through better budgeting and partly through better financing.

**Imperative #1: Focus on How IT Can Reshape Work and Public Sector Strategies* and *Imperative #2: Use IT for Strategic Innovation, Not Simply Tactical Automation*, are available at www.ksg.harvard.edu/stratcom/hpg

Solution

"The solution we need is to modify budget methodologies and to rely more heavily on creative financing."

GUIDELINES FOR BETTER IT BUDGETING AND FINANCING

In general, to improve how governments use IT we need to update the traditional budget process and take advantage of tools for creative financing.

1. Educate stakeholders to get the right people focused on the right issues.

Problem. IT budgeting is too often dominated by technology-oriented people and focused on the costs of technology. The challenge is to reach program managers along with executive and legislative overseers. These stakeholders need to understand and make judgments on the risks, returns, and tradeoffs associated with IT, especially for projects involving work redesign and cross-boundary service integration.

What to avoid. Do not allow budget discussions to focus exclusively on immediate financial costs and benefits. Work with the budget analysts to include a broader set of factors including productivity gains, improvements in customer satisfaction, and economic development.

What to do. Educate those who should be involved in IT budgeting—including budget analysts, executive leaders, and legislative overseers—highlighting how to assess the risks and returns of IT investments. Focus a significant portion of budget discussions on IT-related opportunities for transformational change.

An Example. Engaging HUD Managers through Decision-Support Software. Until recently, the U.S. Department of Housing and Urban Development (HUD) allocated their IT funds by giving each program a percentage of the total IT budget for their own initiatives. Since the programs made decisions in relative isolation, however, IT budgets in the aggregate typically failed to address HUD's enterprise-wide priorities. Today, HUD uses a decision-support application (ExpertChoice) to help the agency make better IT investments. According to Debra Stouffer, Director of HUD's Office of IT Reform, the decision-support software helps HUD identify priority projects by engaging senior managers in a collaborative process of weighting objectives and criteria—both tangible and intangible—from an enterprise-wide perspective. Having ranked their criteria, managers can also use the software to explore test scenarios and "what if" exercises, debating fully the risks, rewards, and tradeoffs involved. By promoting debate and discussion, the new process also gives the final decisions greater credibility and executive support.

An Example. Using Budget Instructions to Educate Stakeholders. In issuing annual budget instructions, the Office of Financial Management in the State of Washington highlights the importance of IT and the need to link each agency's strategic plan to its IT investments. For example, in the 2001-2003 Operating Budget Instructions,[2] a section is dedicated to how

the strategic plans submitted as part of each agency's budget help drive capital and technology planning enterprise-wide, and how they are used by the Information Services Board in the IT portfolio management process (see page 7 below).

An Example. U.S. Congressional Internet Caucus. In 1996 a small group of legislators established the U.S. Congressional Internet Caucus as a bi-partisan group to educate their colleagues on the promise and perils of the Internet. Today, the Internet Caucus has more than 150 members. Working with the Congressional Internet Caucus Advisory Committee —a group of public interest, non-profit, and industry representatives—the Caucus hosts a regular speakers series and other events. Since 1996 similar educational groups have also been established in legislatures across the country and around the world.

2. Budget for IT-related strategic and organizational change.

Problem. While IT has become important in most organizations, it is widely considered a support tool rather than a strategic asset. As a result, budgeting fails to explore how IT can be used for strategic and organizational change.

What to avoid. Do not handle technology budgeting in isolation. If the IT budget is to identify high-value projects, it must be integrated with strategic planning and must be the product of a leadership team with financial, technological, and business responsibilities.

What to do. Develop a budgeting process that allocates significant time and resources to exploring how IT initiatives—especially enterprise-wide initiatives—could advance your mission, strategy, and organization. For example, look for ways to measure the contribution of IT to productivity improvements, enhanced quality, and customer satisfaction.

An Example. Georgia's Strategic Information Systems Planning Methodology. In August 2000, the Georgia Technology Authority (GTA) released a new IT strategic planning methodology for state agencies in Georgia. To ensure that "public policy goals, program goals, and documented business needs drive the selection of technology," each agency must now submit an annual strategic plan to the GTA. These plans are used to evaluate procurement and budget requests. The GTA also uses agency plans for enterprise-wide IT planning and for identifying opportunities for collaboration across agency boundaries.

For more on Georgia's strategic planning methodology, visit www.gagta.com

An Example. The U.S. General Accounting Office's IT Investment Management Framework. The 1996 Clinger-Cohen Act requires agencies to adopt a result-oriented perspective when funding IT, and introduces rigor into how agencies analyze IT investments.[3] The U.S. General Accounting Office (GAO) subsequently published its IT Investment Management Framework to help agencies select and manage IT investments. Within that framework, the GAO argues that projects should be assessed by a combination of program, financial, and IT managers. The GAO recommends that each agency establish an IT Investment Board whose members represent both IT and business knowledge. Each Board would have funding authority and

would be responsible for ensuring that the agency's budget is consistent with its mission and strategic goals. The GAO further recommends that the IT Investment Board receive formal sponsorship from the organization's chief executive—going so far as to incorporate the need for such support in the employment contracts of all chief executives.[4]

3. Budget for a portfolio of IT investments that balances risk against return.

Problem. Government budgeting is concerned—sometimes obsessively—with the costs and risks of specific projects. Considered in isolation, however, IT investments involving multi-year and cross-boundary coordination appear risky and may therefore be rejected—even though the risks may be more than offset by the potential for value creation.

What to avoid. Do not downplay costs or risks, but do not let the risks of individual projects discourage you unduly from investing in high-value IT. The risk of not spending on technology—and thus falling behind in productivity—is probably the larger risk for most governments today.

What to do. Consider IT investments as part of an overall portfolio of commitments, with elements of higher risk offset by elements of lower risk. Highlight how individual investments fit into the overall portfolio and how the portfolio contributes to your strategy and business objectives. Do not limit your thinking to individual programs or agencies. While portfolios are important for each program, enterprise-wide portfolios are perhaps even more important.

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. Within this framework, each agency has a portfolio of IT investments. Agencies check to be sure that new investments are aligned with strategic goals, using "safe" projects to offset the risks often associated with projects that offer higher returns.

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

An Example. Managing IT Investments in the U.S. Federal Government. In outlining its recommended framework for managing IT investments, the General Accounting Office (GAO) identifies "developing a complete investment portfolio" as a critical step.

"An IT investment portfolio is not just a collection of projects but a conscious, proactive look at how the organization expends its limited resources on IT, what beneficial impacts these investments have on the organization, and a continuous search for investments that will better achieve the organization's mission…Taking a portfolio perspective enables the organization to consider its investments in a comprehensive manner so that the investments address the strategic goals, objectives, and mission of the organization. The organization develops its IT investment portfolio by combining all IT assets, resources, and investments owned by an organization, considering new proposals along with previously funded investments and identifying the appropriate mix of IT investments that best meet its mission needs and improvement priorities." [5]

4. Budget for the "net total value" of IT, not just cost reduction.

Problem. When assessing the benefits of IT, traditional budgeting tends to focus on how projects reduce near-term costs to the government. This perspective tends to ignore value created in the long-term or through improvements in service, equity, privacy, and security. It also ignores benefits to other agencies and the public at large.

What to avoid. When assessing IT's return on investment (ROI), do not ignore non-financial or qualitative results. These factors may prove decisive and often speak directly to strategic objectives.

What to do. Explicitly consider the full social costs and returns of IT. For example, what will the project do for service effectiveness and access? Will other programs benefit, perhaps through future uses of the information or infrastructure created? Can benchmarks be set to measure performance down the road?

An Example. Iowa's Return on Investment Program (ROI). In Iowa, information technology projects are assessed in terms of the benefits to both government and citizens. In addition to "hard" costs and benefits (e.g. hardware and staff time), Iowa's analysis estimates costs and benefits that are more difficult to quantify (and often ignored), including risks to citizen health, impacts on security and safety, and the time and energy required by citizens in fulfilling their roles in the process. By calculating ROI in this way, Iowa policy makers get a more complete picture of each project. This analysis helps in prioritizing projects and allocating budgets.

For more information, visit www.state.ia.us/government/its/

An Example. Cost/Benefit Analysis and Risk Assessment for IT Projects in New Jersey. In 2000, New Jersey's Office of Management and Budget worked with the State CIO to implement a new Cost/Benefit and Risk Analysis (CBRA) tool for prioritizing information technology projects. Using the CBRA tool as part of the budget preparation process, agencies were required to complete a standardized set of spreadsheets detailing the costs, benefits, and risks associated with each project. Costs were reported in the context of the system's lifecycle (development, training, operation, and maintenance), while benefits included both tangible and intangible benefits (e.g. better service, improved internal performance). Risk analysis focused on traditional areas of project failure including strategic alignment with mission, managerial commitment, operational impact, project management, technical capacity, and technical conformity with standards. While New Jersey plans to improve the CBRA for 2001, the experiment proved successful in focusing the budget process on the broader impacts of IT projects.

An Example. The Balanced Scorecard. Developed by Robert Kaplan and David Norton, the balanced scorecard is a tool to help managers look beyond the financial bottom-line, focusing on elements to measure customer satisfaction, internal business processes, and employee

learning and growth.[6] While public managers have adapted the balanced scorecard in different ways, the common thread is a desire to measure and track value more accurately. For example, the U.S. Department of Defense's Health Affairs program uses a balanced scorecard as part of a methodology to quantify the impact of its benefits system.[7] If appropriately connected to the budget process, a balanced scorecard can measure value that might otherwise be excluded from decision-making.

An Example. Activity-Based Costing in Texas. To deliver smaller, smarter government, Texas needed to know the true costs of its services. In response, the state Legislature called on the Comptroller to implement a pilot test of activity-based costing (ABC). ABC is a methodology that traces the full range of direct and indirect costs associated with delivering a service. While many of the savings identified in Texas were captured as improved service—and were not easily translatable into cost reductions—by accounting for all resources, including items such as fringe benefits, overhead, and depreciation of equipment, ABC enabled Texas to identify hard dollar savings within the five pilot agencies. For example, the study suggested that replacing the Department of Transportation's call center with a web-based system could save more than $240,000 per year.

For more detail on the ABC pilot, see www.window.state.tx.us/specialrpt/abc

5. Budget for enterprise and other cross-boundary initiatives.

Problem. Traditional program-by-program, year-at-a-time budgeting does not pay much attention to finding and funding the type of cross-boundary IT initiatives that will transform government.

What to avoid. Do not think that setting up an enterprise-wide IT office to coordinate IT investments is enough if you do not also give it substantial budgeting authority. Individual agencies may cooperate with enterprise-wide initiatives, but rarely will they be able to fund them. When enterprise-oriented IT executives need to plan and implement projects, do not make them spend their time begging individual agencies for financial support.

What to do. Make sure the CIO has the power to review agency IT projects and direct financial resources toward cross-boundary initiatives. In this context, establish centrally allocated IT innovation or infrastructure funds. If possible, also establish legislative committees to encourage cross-boundary investments.

An Example. Pennsylvania's Investment Review Program. According to Charles Gerhards, Deputy Secretary of Technology for the Commonwealth of Pennsylvania, centralized funding has been integral to the success of inter-agency projects. Projects such as the integrated criminal justice computer network (JNET) succeeded in large part because of the budget authority vested in the Office for Information Technology—an annual budget that has grown from $20 million to $137 million in the past six years. Pennsylvania's Investment Review Program also helps drive inter-agency initiatives. Under the IRP, IT proposals greater than $250,000 are evaluated by the Office for Information Technology in search of cross-

agency opportunities. When these opportunities are identified, the budget office places the money in one budget under the authority of Gerhards, rather than distributing smaller amounts to each agency. In Gerhards' opinion, "the number-one reason we've been able to succeed in a lot of these projects is this funding model."[8]

An Example. Illinois VentureTech. VentureTech is Governor George Ryan's five-year strategy to develop the technology and human capital necessary for Illinois to compete in the networked world. A $1.9 billion investment, VentureTech is a centralized innovation fund aimed at developing the workforce, advancing technology research, wiring communities, and promoting e-government. According to state CTO Mary Barber Reynolds, centralized funds such as VentureTech are especially valuable because they can be used to reward people who work together across organizational boundaries.[9]

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

An Example. Wisconsin Joint Committee on Finance. In Wisconsin, as in many jurisdictions, budgeting is complicated by the need for the House and the Senate to approve the budget separately. Oftentimes this requirement leads to each chamber making different trade-offs and compromises. In an effort to coordinate budget deliberations, representatives from the House and Senate in Wisconsin sit on a Joint Committee on Finance. This committee is especially valuable for enterprise-wide IT projects, as the relevant legislators can jointly and comprehensively consider the merits of each proposal.

An Example. U.S. Federal E-government Fund. In recent years, cross-boundary IT initiatives in the U.S. federal government have been supported with "pass the hat" funds raised by interagency councils.[10] In his 2001 budget proposal, however, President Bush has proposed an e-government fund for interagency initiatives with the potential to transform government's ability to meet citizen needs and expectations. While the level of investment is still a subject of debate, it is widely acknowledged that establishing the centralized fund is important for advancing e-government as an enterprise-wide challenge.

6. Leverage multi-year funding vehicles such as capital budgets and leases.

Problem. For many IT projects, costs must be incurred up-front while benefits are realized over a longer period of time. Such projects require bridge financing that is difficult to secure within year-at-a-time government budgeting.

What to avoid. Do not analyze or try to finance multi-year IT investments solely in the context of an annual (or biennial) budget. When alternative longer-term financing sources are used to align costs with benefits, do not overlook future lifecycle costs that occur from implementation through to the retirement of the system.

What to do. Use multi-year financing vehicles such as leasing and share-in-savings agreements to finance projects where up-front costs lead to downstream benefits. When using

debt financing to align costs with benefits, remember that debt is always followed by interest charges that make total costs higher than they would have been without borrowing.

An Example. Massachusetts Capital Budget. Observing that many IT projects had attractive return-on-investment (ROI) ratios when they were viewed as traditional capital investments, Massachusetts executives asked the legislature to finance those projects using capital funds. It worked—at a time when legislative support for operating budgets was weak, the legislature was receptive to the bond proposal. The result was the Information Technology Bond Bill, enacted in 1992 to fund over twenty IT projects. Building on the success of these capital projects, Massachusetts passed another IT bond bill in 1996—this time with 112 projects totaling over $300 million. Without capital budgeting, the state may have had to postpone or do without some highly valuable investments.

An Example. Using Capital Notes in Hennepin County, Minnesota. For major expenses such as medical equipment and large pieces of IT, legislation in Hennepin County permits the board to issue capital notes valued up to one percent of the County's annual budget in any given year. The cost of the equipment is then paid over its useful life. For smaller IT purchases, the County uses a leaseback program where departments must cover the depreciation expense of all equipment each year. The depreciation expense revenues collected by the IT department are then accumulated and used to replace the equipment at the end of its useful life.

An Example. "Renting" Enterprise Applications: Application or Managed Service Providers (ASPs or MSPs). To spread costs and share risk, governments have been renting personal computers (PCs) for several years. A related phenomenon is now gaining momentum with enterprise software applications. Rather than fronting expensive development, implementation, and maintenance, governments are turning to application and managed service providers (ASPs and MSPs) to host and manage enterprise applications. For example, the U.S. Department of the Interior's Minerals Management Service hired Usinternetworking Inc. to host and manage a new PeopleSoft application. According to project director Ken Madsen, "Since PeopleSoft is not an application unique to us, we figure we can take advantage of the economies of scale that come with this arrangement and lower our costs."[11] Similarly, the State of Virginia opted for an ASP-solution for its e-procurement system eVA. Rather than building from scratch, Virginia agreed that AMS would deliver and host the ASP-solution at no cost to the state in return for a share of transaction and registration fees. Finally, in British Columbia, Canada, municipal governments across the province are working togeth-er through a non-profit called CivicInfo to build and deliver electronic services. Pooling their resources, municipal governments are using an ASP model to share costs and related infrastructure.

For more about Virginia's eVA e-procurement system, visit www.eva.state.va.us
For more about British Columbia's CivicInfo site, visit www.civicinfo.bc.ca

An Example. Ralph Shoemaker and the California Franchise Tax Board. In 1993, largely under the leadership of Deputy Tax Commissioner Ralph Shoemaker, the Franchise Tax Board (FTB) pursued a shared-risk investment with the private sector for collecting business taxes. Instead of contracting for the delivery of specified computer applications, the FTB contracted to share the increased revenues generated if the applications were successful. Both vendor and government thus had a strong incentive to revise work processes so the department could collect revenues that were previously uncollectable. Working together they succeeded, bringing in revenues to fund this high-value technology investment.[12]

7. Use non-tax financing tools including fees and public-private partnerships.

Problem. The traditional tax levy budget in most governments is under enormous pressure that is likely to grow even worse. Relying too heavily on traditional financing will thus make it impossible to fund enough high-value IT initiatives.

What to avoid. Do not assume that taxes are the only appropriate revenue source for government IT. Other sources may be available and—in some cases—more appropriate. At the same time, do not jump at new revenue sources without carefully considering the trade-offs.

What to do. To the extent that private users (rather than the general public) benefit from an IT-related initiative, consider financing it through private funds (rather than public taxes). Private support could include fees and/or a variety of public-private partnerships (e.g. shared ownership, share-in-savings, sponsorship, and advertising). These non-traditional financing options are likely to be controversial, but may also be effective. As new funding models arise, learn from others and consider the implications for your own jurisdiction. Will the revenue be consistent? What authority must be shared? What are the implications for privacy, access, security, or equity? Make sure the business case is clear for the project and for the financing model chosen.

An Example. Advertising and Sponsorship in Honolulu. When Honolulu built its Internet portal, it decided to keep transaction costs at a minimum by allowing advertising and sponsorships on the site. While the deputy director of Honolulu's Department of Information Technology, Courtney Harrington, acknowledges that unforeseen issues may yet arise, there have not been many complaints to date. At the same time, however, "revenues from advertising aren't adding up to much." Other jurisdictions considering advertising or sponsorships include Florida, Ohio, Fairfax County, and Salt Lake City. Virginia Governor James Gilmore, for example, will release guidelines for advertising on state web sites in Spring 2001. Meanwhile, Iowa is reviewing responses to an RFP for sponsorship of its web site.[13]

An Example. LaGrange (Georgia) Internet Television Initiative. In 1998, city officials in LaGrange partnered with Charter Communications—the local cable provider—to create a $9.5 million hybrid fiber-optic and cable network that connects every home and business

in the city to the Internet. Forming another partnership with WorldGate Communications, in 2000 the city provided every home with a wireless keyboard and TV-based Internet service. Since the city does not collect property taxes, it is funding the first-year costs ($300,000 operating and $125,000 capital) using profits from the sale of telecommunications services to businesses. Because of this project, La Grange was awarded the World Teleport Association's "Intelligent City of the Year" award for 2000.

An Example. Value Engineering in the U.S. Department of Education. The U.S. Department of Education (DoE) has engaged in share-in-savings (SIS) arrangements with financial institutions to recover payments from defaulted student loans. While these initiatives might be more accurately described as share-in-revenue arrangements, a recent DoE project to re-engineer loan administration is being financed through a pure share-in-savings model. Partnering with Andersen Consulting (now Accenture), the Department has improved efficiency and enhanced productivity by reorganizing the business processes for loan servicing. Under the "value engineering" arrangement, DoE pays for the contract out of savings realized through re-engineering. While still early, the contract projects savings of more than $31 million, with Accenture's share capped at $14 million.[15]

An Example. ServiceArizona. Lacking start-up resources for developing online services, the State of Arizona Motor Vehicle Division approached IBM about establishing a web site and dial-up service for vehicle registration. In the model that has emerged, the State manages the back-end database, system interfaces, and customer service, while IBM built and manages the front-end application including credit card transactions and security. Revenues from a transaction-based fee are shared between IBM and the State. As an entrepreneurial start-up, ServiceArizona has supplied the resources and flexibility needed for success. In its first year, five 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 now 76 percent lower than it was under the old face-to-face model.

For more information, visit ServiceArizona at www.servicearizona.com

An Example. In-Q-Tel. In-Q-Tel is a private not-for-profit "venture capital" firm chartered by the U.S. Central Intelligence Agency (CIA) to promote the development of information technologies that support its mission of gathering foreign intelligence to protect national security. Cutting-edge information technology has always been a competitive edge for the CIA. As the speed of IT innovation accelerated through the 1990s, however, the CIA needed to find new ways to turn private-sector capacity, creativity, and expertise toward Agency goals. Through venture funding of promising IT initiatives, In-Q-Tel gives the CIA a means to do this.[17]

For more information about In-Q-Tel, visit www.in-q-tel.com

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Opportunities for using IT to transform government are many and growing. But they are often expensive and risky, requiring multi-year investments and coordination across program, agency, and jurisdictional boundaries. Funds for such initiatives are tight. While more money is likely to become available as the pressure for e-government rises, the solution we need is to modify budget methodologies and to rely more heavily on creative financing. Key guidelines are summarized in Figure 2.

1. Educate stakeholders to get the right people focused on the right issues.
2. Budget for IT-related strategic and organizational change.
3. Budget for a portfolio of IT investments that balances risk against return.
4. Budget for the "net total value" of IT, not just cost reduction.
5. Budget for enterprise and other cross-boundary initiatives.
6. Leverage multi-year funding vehicles such as capital budgets and leases.
7. Use non-tax financing tools including fees and public-private partnerships.

In sum: Improve traditional budgeting and use creative financing where appropriate.

Figure 2: Guidelines for Implementing IT Initiatives in the Public Sector

Next Steps

"What steps should you take to improve how you budget for and finance IT?"

NEXT STEPS

What steps should you take to improve how you budget for and finance IT?

1. Assess how effective you are at getting good IT projects funded. Before you make the case for changing how you budget for IT, find out where you stand. Take stock of your current IT initiatives and compare them with those of e-government leaders. Do you have the right infrastructure and enterprise-wide applications? If not, think about why such initiatives are not being funded.

2. Assess and improve how you "make the case." Make sure your budgeting examines multi-year, cross-boundary initiatives from the perspective of all relevant stakeholders. Who is involved in analyzing your IT portfolio? What is the relationship between your CIO and other executives? Are IT projects considered in the light of your strategic vision and business priorities? After answering these questions, explore the "total value" of your IT and assess your risks in the context of a full and balanced portfolio of IT projects.

3. Look beyond the tax-levy budget for funds. Broadly-based e-government does not emerge easily from within traditional budgets. You may need to reach out and tap private resources through capital budgets, leases, fees, advertising, and other creative financing.

Brief advice for a variety of stakeholders can be found in Figure 3 (next page).

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As the tie between IT and government strategy becomes increasingly strong and clear, it is important to make funding available for IT. To meet this challenge, we can correct the program-by-program, year-at-a-time myopia that causes budgeting to overlook some of the most valuable IT investments, especially multi-year and enterprise-wide innovations. We can also use creative financing options available outside the tax-levy budget.

This report has offered guidelines for finding and funding high-value IT initiatives in government. Subsequent reports will explore other imperatives for successful leadership in a networked world. Our next report will examine the challenging privacy and security issues that e-government is bringing to the fore.

The President. The White House is perfectly positioned to help find and fund enterprise-wide and other cross-program initiatives. Use your budget authority to promote high-value initiatives.

Legislators. Do not prevent cross-program integration through accountability that is too narrowly defined, or otherwise make innovation harder than it already is. Do not overlook the benefits that are difficult to quantify.

Governors. Use your authority to promote high-value, cross-boundary initiatives, creating a central fund for these if necessary.

Local government leaders. Explore funding models outside the traditional tax-levy budget. Make sure these new models promote high-value projects and encourage cooperation with other jurisdictions.

Judges. Given the proliferation of budgeting authorities within the criminal justice system, encourage cooperation across organizational boundaries. Take advantage of the Center for Technology in Government's study *And Justice for All: Designing Your Business Case for Integrated Justice Information*.

Budget directors. Coordinate budget planning with strategic planning. Work with your CIO to ensure that high-value IT opportunities are not overlooked.

Agency and program heads. Work with other agencies, especially when centralized pools of money are available. If you do not have a centralized fund, contribute when the "hat is passed" for cross-boundary investments.

Chief Information Officers. Work closely with your CFO and other executives to establish IT as a strategic tool and to focus on IT-enabled strategic opportunities within the budget process.

Technology community. Help educate legislators and other budget participants about the strategic value of IT and the constraints of governmental budgeting.

Associations and interest groups. Develop better forms of cost-benefit analysis and other ways to make the case for IT-related initiatives.

The press. Look for stories of "cross-boundary" IT initiatives and of valuable IT initiatives that are stuck in bureaucratic politics and the budget process.

The public. Keep up the pressure to do more with less – demand and expect government to invest in high-value IT initiatives.

Figure 3: Advice to Stakeholders: How to Improve Budgeting and Financing for Promising IT Initiatives

Appendix A

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Hon. Barbara Todd	*Commissioner, Pinellas County, Florida*
Mr. Richard J. Varn	*Chief Information Officer, State of Iowa*
Hon. J.D. Williams	*Controller, State of Idaho*
Mr. Terry Wood	*Councilman, City of Jacksonville, Florida**
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Appendix B

READINGS AND RESOURCES

Barrett, Katherine, and Richard Greene. *Powering Up: How Public Managers Can Take Control of Information Technology.* Washington D.C.: CQ Press, 2001.

Center for Technology in Government. *And Justice for All: Designing Your Business Case for Integrating Justice Information.* Albany, NY: Center for Technology in Government, 2000.

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Mechling, Jerry, and Victoria Sweeney. *Overcoming Budget Barriers: Funding IT Projects in the Public Sector.* Cambridge, MA: Program on Strategic Computing and Telecommunications in the Public Sector, Harvard University, 1997.

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Appendix C

GLOSSARY

Application Service Provider (ASP)—A third-party organization that provides software-based services to clients from a single location over a wide-area network. Represents an outsourcing option for governments who cannot or do not want to deliver and support enterprise applications. Also referred to as Managed Service Providers (MSP) when the software is both delivered and managed by the third-party organization.

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).

Enterprise Application—A software application that is used throughout an organization (or enterprise). For example, payroll systems or resource management systems that are used by multiple departments or an online payment processing application that is used across organizational boundaries are all enterprise applications. Such applications are important for realizing economies of scale and for ensuring information can be shared.

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.

Kaizen—Originally defined in Masaaki Imai's book *Kaizen: The Key to Japan's Competitive Success*, *kaizen* refers to a process of continuous improvement through small sustainable steps.

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.

Lifecycle Costs—The costs of developing, maintaining, operating, and eventually retiring an IT system or application. When budgeting for IT initiatives, stakeholders often focus on development costs, overlooking future costs that can represent a larger percentage of the full lifecycle costs.

Managed (or Management) Service Provider (MSP)—See: Application Service Provider (ASP).

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.

Prototype—A pre-production, functioning model of a system or application. A prototype is generally used for the evaluation of design, performance, or production potential.

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.

Scope Creep—The gradual accumulation of new or expanded requirements after a project plan (project scope) has been agreed upon by all parties. Scope creep is a significant risk to implementation success as it increases cost and extends project timelines.

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.

Share-in-Savings/Revenue—A financing strategy whereby government compensates a private-sector partner with a share of funds saved/raised as a result of the partnership. This financing strategy is commonly used when the private-sector partner agrees to cover the up-front costs of a project. It is also used to align incentives with desired outcomes.

Slow Trigger, Fast Bullet—An analogy used to describe an implementation strategy in which careful project planning and preparation (the slow trigger) is followed by swift and decisive action steps (the fast bullet) that quickly move the project to a stage that safely demonstrates value.

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] According to a study by the market-research firm Input, e-gov expenditures are growing at 10 percent a year while traditional government IT budgets are growing at just 5 percent a year. These increases compare with private-sector e-business investments that are growing at a rate of 20-25 percent a year. Reference to study from Input in Joshua Dean, "Federal spending on e-gov efforts expected to grow," *GovExec.com*, 7 December 2000 (www.govexec.com/dailyfed/1200/120700j1.htm).

[2] To view the budget instructions visit www.ofm.wa.gov/budinst01-03/budinst01-03part1/budinst01-03part1.htm

[3] Other laws and executive orders that support the move toward greater structure, accountability, and strategic focus include the Government Performance and Results Act (1993), the Paperwork Reduction Act (1996), and Executive Order 13011 (1996) which states that executive agencies shall "refocus information technology management to support directly their strategic missions, implement an investment review process that drives budget formulation and execution for information systems, and rethink and restructure the way they perform their functions before investing in information technology to support that work."

[4] United States General Accounting Office. *Information Technology Investment Management: A Framework for Assessing and Improving Process Maturity.* Exposure Draft. May 2000. (GAO/AIMD-10.1.23).

[5] United States General Accounting Office. *Information Technology Investment Management: A Framework for Assessing and Improving Process Maturity.* Exposure Draft. May 2000, p. 9 and 65. (GAO/AIMD-10.1.23).

[6] Robert S. Kaplan and David P. Norton. *The Balanced Scorecard: Translating Strategy into Action.* Boston: Harvard Business School Press, 1996.

[7] For more examples see Jonathan Walters, "The Buzz Over Balance," *Governing Magazine*, May 2000.

[8] Quote from Steve Towns, "Dollars and Sense: Several States are attempting to overhaul funding for enterprise IT projects," *Government Technology*, January 2001.

[9] Quote from Steve Towns, "Dollars and Sense: Several States are attempting to overhaul funding for enterprise IT projects," *Government Technology*, January 2001.

[10] In 1995 the Information Technology Innovation Fund was established to support government-wide IT investments in the U.S. federal government. Supported by the General Services Administration, the ITIF was funded with money funneled from agency fees paid to the GSA for administering the procurement of long-distance telephone service. After the rules that required agencies to use the GSA for purchasing long-distance service were changed, the GSA decided to stop supporting the fund, noting that it was no longer fair to support a cross-agency fund with money from a select group of agencies.

[11] Quoted in Heather Hayes, "Available for rent: Enterprise applications," *Federal Computer Week*, 20 March 2000.

[12] For more information on the California Franchise Tax Board, visit www.ftb.ca.gov. Also see Ralph Shoemaker, "Problem solving partnerships and joint-ventures to share risks and benefits in developing large system technology projects," at www.arnet.gov/References/Best_Pract_Docs/textsource/caftb.txt

[13] Information about Honolulu's experience can be found in Ellen Perlman, "Taking the Ad Plunge," *Governing Magazine*, November 2000 (www.governing.com/11talk.htm), and at www.govads.com. Other articles about advertising on government websites include, Dibya Sarkar, "Mixed messages: Are ads a great moneymaker, or a conflict of interest for public sites?" *civic.com*, 8 January 2001, (http://www.fcw.com/civic/articles/2001/jan/civ-mixed-01-01.asp); Dibya Sarkar, "Ohio takes a commercial break," *civic.com*, 8 January 2001 (www.fcw.com/civic/articles/2001/jan/civ-mixedbx2-01-01.asp); Joni James, "State Weighs Selling Ads on Web Site," *Wall Street Journal*, 20 September 2000; and Dibya Sarkar, "Survey: Ads better than fees," *civic.com*, 21 September 2000 (http://www.fcw.com/civic/articles/2000/0918/web-govads-09-21-00.asp).

[14] For more information, see Daniel Keegan, "Internet for Everyone: Georgia City Finds a Way," *civic.com*, 1 May 2000 (fcw.com/civic/articles/2000/may/civ-comm1-05-00.asp); Dibya Sarkar, "Ga. Town 'Intelligent City of the Year,'" *civic.com*,

22 August 2000 (fcw.com/civic/articles/2000/0821/web-city-08-22-00.asp); and Michelle Delio, "A City With a Broadband Future," *Wired News*, 22 August 2000 (www.wirednews.com/news/culture/0,1284,38346-2,00.html).

[15] Acquisition Solutions and Mary Beaulieu, "Share in Savings: Summary of Interviews and Comparison to Federal Agencies' Missions." Prepared for the Council for Excellence in Government and the Federal Technology Service. December 2000. See also, Greg Langlois, "An equal slice of success: Education share-in-savings contract grades A," *Federal Computer Week*, 14 May 2001.

[16] 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.

[17] See also, Rick E. Yannuzzi, "In-Q-Tel: A New Partnership Between the CIA and the Private Sector," *Defense Intelligence Journal*, 9:1 (Winter 2000). Available at www.cia.gov/cia/publications/inqtel/index.html

EIGHT IMPERATIVES FOR LEADERS IN A NETWORKED WORLD

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THE HARVARD POLICY GROUP
ON NETWORK-ENABLED SERVICES AND GOVERNMENT
JOHN F. KENNEDY SCHOOL OF GOVERNMENT

CAMBRIDGE, MASSACHUSETTS

Eight Imperatives

for Leaders in a Networked World:

[A Series of Guideline Papers for the Year 2000 and Beyond]

Imperative 5:

Protect Privacy and Security

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

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"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 #5: *Protect privacy and security.* It describes how leaders should approach the privacy and security impacts of electronic services in the context of other concerns such as access, efficiency, and equity. It emphasizes the need for a transparently fair and considered policy-making process that seeks common ground where possible, but makes difficult decisions when necessary. It is clear that the terrorist attacks of September 11, 2001, are motivating new policies and investments to make systems and society more secure. The urgent need for action creates an equally urgent need for insightful analysis and understanding of the interrelated impacts and the many gains and losses made newly possible with the design and delivery of electronic services.

The HPG was made possible through a partnership among the Kennedy School of Government, American Management Systems, Cisco Systems, EDS, IBM's Institute for Electronic Government, the MITRE Corporation, and Unisys. 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. However, 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 public and private-sector leaders and to the public at large.

THE HARVARD POLICY GROUP ON NETWORK-ENABLED SERVICES AND GOVERNMENT
CAMBRIDGE, MASSACHUSETTS
DECEMBER 2001

JERRY MECHLING, JOHN F. KENNEDY SCHOOL OF GOVERNMENT
LYNDA APPLEGATE, HARVARD BUSINESS SCHOOL

Technological advances like computer networks have the potential to either support or erode our values. While our future depends, in large measure, on our technological capabilities, it depends even more on how we apply them. Consider the following fictional scenarios:

• As an ambulance rushes an unconscious patient to the hospital, doctors prepare to save him by accessing an online database with data on his pre-existing heart condition. During the same month, people with similar heart conditions are denied jobs when prospective employers gain access to a similar database.

• Taking a break from his job, a computer technician hacks into a local government database that holds the credit card numbers of citizens who paid parking tickets online. In the next town, where citizens cannot pay tickets online, a computer technician spends 40 minutes of her lunch hour waiting in line at city hall to pay a parking ticket.

• In response to a terrorist bombing, a town installs video monitors and face-matching technology as a deterrent; subsequently the public feels safer and terrorist incidents diminish. In a similar town, similar technologies fail to catch terrorists, but usage is expanded greatly as a tool to combat a variety of less serious offenses such as car thefts and pick pocketing.

Whatever you think about the above scenarios, it is clear that computer networks are redefining what information can be collected and who can get access to it. In response, governments are being forced to reexamine their information management policies.

Most government information management policies have focused on data about individuals. Over the years, governments have established rules, standards, procedures, and policies for how information can be collected, analyzed, stored, shared, and discarded. These rules have been created to promote values such as access, efficiency, equity, privacy, and security.[1]

As paper-based processes now give way to IT-based processes, the fundamental challenge remains the same: how to promote values that are sometimes in competition. The difference today is that enormous volumes of information can now be collected, used, reused, combined, recombined, and shared instantly and over large distances. While the new information capabilities can be used for dramatically more efficient, convenient, and, in some cases, life-saving services—an obviously positive outcome—they can also be used in ways that challenge traditional assumptions about how to assess and balance different interests and values.

In the first four of our "Eight Imperatives for Leaders in a Networked World," we focused on how IT is shaping government service delivery—what we refer to as the "e-government" agenda. This report begins our exploration of the final four imperatives—the "e-governance"

agenda. The issues here are more controversial and less clear, and significant influence flows from outside the jurisdictional boundaries of the governments involved. The e-governance agenda is generally less understood than the e-government agenda, and is less likely to offer progress through consensus-supported incremental change.

In this initial paper of our e-governance sequence, we focus how to protect privacy and security in a world of e-services.

"... how can we govern the new technology-enabled patterns of human interaction while preserving or even augmenting the values we hold dear?"

DISRUPTIVE CHANGES AND TRADEOFFS IN A WORLD OF PERVASIVE NETWORKS

Human interactions inevitably generate conflict as well as cooperation. The role of governance is to resolve such conflicts so as to define and protect the public interest. Wise governance promotes the values held by individuals and groups within society, making tradeoffs that favor one over the other when necessary to advance the greater good of society as a whole.

New information technologies are generating new patterns of human interaction. These new patterns are forcing us to reconsider how we assess and balance many critically important values.

Such challenges are clearly evident in the health care industry. New technologies can give health care workers timely access to patient files so as to improve service and save lives. Hospitals can use similar records to speed reimbursements while reducing administrative costs and errors. Insurance companies can likewise process claims more efficiently while simultaneously reducing fraud. On the other hand, these same technologies can give employers inappropriate access to the health records of prospective employees, or give marketers inappropriate access to lists of potential consumers. Electronic records are also vulnerable to large-scale destruction and misuse both inside and outside the health care system.

In designing Information Age health services then, special care must be taken to balance the values and interests of various stakeholders. What should be the rights and responsibilities of health care consumers versus health care producers? Of health care consumers and producers versus government regulators? Of individuals versus the various groups to which they belong? How should we measure and—when necessary—trade off access versus efficiency versus equity versus privacy versus security?

In some cases, privacy and security are clearly in competition. To protect security we authenticate individual identities, confirm in advance that these individuals are authorized

to take the type of actions they propose to take, and maintain records to hold individuals accountable for their actions after the fact. These steps to preserve security reduce the scope of anonymity that has traditionally been an important protector of privacy.

What even this cursory look at the health care system illustrates is the need to learn how information technology will affect the balance among different stakeholder interests and values. It is clear that ignoring the interrelated impacts of IT risks leads to severely undesirable outcomes. Similarly, focusing on one stakeholder group or value to the exclusion of others will be a mistake. We clearly want to stay alert to possibilities for win-win improvements, where smart choices can create value without a need for agonizing tradeoffs. If anonymity protects individual freedoms but is risky to community security, might we protect those same freedoms by using IT to make government transparent and accountable and avoid most of anonymity's downside risks? The broad and fundamental question is, how can we govern the new technology-enabled patterns of human interaction while preserving or even augmenting the values we hold dear?

Unfortunately, the issues involved are too uncertain and contentious to yield answers that are both simple and useful. The changes under way are so continuously disruptive that answers that may appear to work today will likely have become outdated by the time this report is made public.

> The analysis in this paper is weighted heavily towards issues of privacy and tradeoffs between privacy and other elements of information policy. The majority of this paper was compiled before September 11, 2001, and therefore many of the issues being raised in response to the events of that day are not covered here in depth.

So, instead of answers, what we offer here is a framework for analyzing the effects of information technologies on different values and stakeholders. Drawing heavily on recent experience in many governments, we build on this framework to provide guidelines for addressing privacy and security in a networked world.

Security

"In combination, these conditions create potentially devastating threats to privacy and security."

WHAT TO AVOID: GETTING BLINDSIDED ON THE ROAD TO E-SERVICES

As the Information Age progresses, the pressure to deliver services electronically is growing. The unit costs of face-to-face service can often be cut by as much as 90 percent when offered on a self-service basis over networks.[2] From an efficiency standpoint, access to information across organizational, physical, and temporal boundaries can be hugely beneficial.

In the rush for efficiency, however, other values can be overlooked. These can surface later—often negatively—as "unintended consequences." Early mistakes with electronic services can produce an opposition that makes further progress impossible or may lock government into inefficient systems on a long-term basis.

Privacy and security have emerged as two of the most difficult information-related issues. In part, this is because:

• *They have often been considered secondary concerns for the designers of e-government services—at least until recently.* Many government managers have focused on efficiency and customer satisfaction while considering privacy and security as someone else's problem.

• *Stakeholders tend towards strongly-held, polarized positions.* This makes compromise difficult and slow to arrive at. Stakeholders have rarely been pulled together for realistic exploration and assessment of options and tradeoffs, although recent terrorist activities are forcing reassessments and will lead to new responses.

• *Governments tend to build large, interconnected systems with multiple components.* Understanding the downstream impacts of different design choices is challenging and complex. Furthermore, once the systems have been built it is difficult to "graft on" privacy and security protections on an after-the-fact basis.

• *Privacy and security are subject to more than government actions and policies.* In a networked world, privacy and security are affected by third parties both known and unknown to government officials, including telecommunications companies and public and private service delivery partners.

In combination, these conditions create potentially devastating threats to privacy and security. In the rush to deliver e-services, it is all too easy to get blindsided and blown off the road.

"We need help in understanding what is possible, in clarifying our values, and resolving our conflicts"

Conflicts

WHAT TO DO: PUSH FOR TRANSPARENCY AND WELL-BALANCED PROGRESS

Much is at stake as information technologies continue to evolve. While connectivity and information density should eventually improve service productivity and access—perhaps enormously—significant impacts on equity, privacy, security, and other important values are also likely. As electronic services become more prevalent, it will be critical to understand how different stakeholders and values are being influenced. It will be equally important to

make decisions in a manner that is broadly understood and seen as legitimate. Figure 1 outlines some of the more significant concerns and possibilities.

How can we secure the positives and avoid the negatives?

VALUE	Possible Positive Impacts	Possible Negative Impacts
Access	• Anytime, anywhere access	• Unauthorized, undetectable access
Efficiency	• Reduced unit costs through self-service, economies of scale, etc.	• Rigidities through improper automation of the status quo
Equity	• More low-cost services	• An aggravated "digital divide"
Privacy	• Context-appropriate access tools • Context-appropriate anonymity	• Loss of privacy through record linkages • Big Brother knows all
Security	• Better access tools • Better audit trails	• Vulnerable to interdependencies and uncontrolled access
Other	• More transparent government	• Market domination that improperly erodes "the commons"

Figure 1: Possible Impacts of Electronic Services on Different Values

Advancing successfully will require careful navigation. It will be difficult to secure the positives while avoiding the negatives. The issues to be reconciled are powerful and—at least so far—relatively unstable. Different people are concerned about different values and issues, or in different ways at different times.

While too narrow a focus on any one element is likely to lead to bad results, so is sticking too long with the status quo. For example, we clearly need the service efficiency that could come with information-age health care. However, if electronic services produce overly easy or uncontrolled access to health care information, patients may refuse to talk candidly to their doctors; as a result, both efficiency and privacy could be lost.[3] At another extreme, if health-care focuses too much on privacy, emergency room doctors may not get access to crucial information about the patients they are treating, and as a result efficiency (not to mention lives) could also be lost.

Good decisions will depend on good leadership. We need help in understanding what is possible, in clarifying our values, in uncovering win-win opportunities, and in resolving our conflicts. Fundamentally, we need to push for progress that strikes broadly supported and wise choices among competing concerns.

Wisdom

"... allow diverse stakeholders to understand the wisdom of the decisions and the fairness of the process."

GUIDELINES FOR PROTECTING PRIVACY AND SECURITY

In responding to privacy, security, and related challenges, leaders need to push for transparency and well-balanced progress. But how can you make this advice operational? Consider the following seven guidelines.

1. Adopt existing practices and standards where appropriate.

Problem. While new technologies highlight new issues, many previously identified practices have yet to be widely adopted. For many governments, a path to significant improvement in privacy and security has been well-charted but not well-traveled.

What to avoid. Do not fall behind through ignorance of constitutional guidelines, laws, regulations, or the experience of others. At the same time, do not adopt externally generated guidelines without carefully considering your own context. Some "good" practices are out of date.

What to do. Explore and—where relevant—adopt or adapt principles and practices that have been validated as good ways to address privacy, security, and other information concerns. Talk regularly with peers to ensure you stay current. Practices and standards are often based on strong historic precedents such as Fourth Amendment protections against unreasonable searches and seizure,[4] but continue to emerge and evolve.

An Example. The Five Goals of Security. While different authors use different terms, five goals are broadly accepted as critical for information security:[5]

1. *Availability:* Timely and reliable access to data and services.
2. *Confidentiality:* Access available only to intended users.
3. *Authentication:* Confirmation that a person is who they claim to be or—more generally—that a statement claimed to be true is in fact true.
4. *Integrity:* Data protected against unauthorized modification or destruction.
5. *Non-repudiation:* Proof that an action (viewing a file, sending an email) occurred and that identifiable users were party to the action.

Technologies continue to change, but the above goals remain critical. Some security practices—such as training employees to manage their passwords properly—are powerful and relatively easy to implement, yet still widely ignored.

An Example. The U.S. Code of Fair Information Practices. Developed by an advisory committee in 1973,[6] the five principles articulated in the U.S. Code of Fair Information Practices have been reflected in subsequent guidelines such as the OECD Guidelines on the Protection of Privacy and Transborder Flows of Personal Data and the EU Directive on Data Protection. Some have argued that technological changes have made these principles obsolete.[7] Nevertheless, it is important to understand them before deciding on your own policies. The five principles are:

1. There must be no personal data record-keeping systems whose very existence is secret.
2. There must be a way for individuals to find out what information is being kept about themselves and how it is used.
3. There must be a way for individuals to prevent information obtained for one purpose from being used for other purposes without their consent.
4. There must be a way for individuals to correct or amend records of identifiable information about themselves.
5. Any organization creating, maintaining, using, or disseminating records of identifiable personal data must assure the reliability of the data for their intended uses and must take precautions to prevent misuses.

An Example. *Drafting and Communicating Privacy Policies*. Despite the attention being given to information policy, separate studies by Brown University and the Civic Resource Group revealed that most local, state, and federal websites did not post privacy or security policies.[8] A December 2000 study by the National Electronic Commerce Coordinating Council (NECCC) came to a similar conclusion, finding a surprising lack of privacy statements on state and local government websites.[9] In recommending good privacy practices, the NECCC study identified Iowa, Virginia, Maine, Utah, and Idaho as jurisdictions with noteworthy policies that answered four key questions that citizens tend to ask, namely:

1. What information is collected about me?
2. Is the information accurate?
3. How is the information used?
4. Is the information I provide shared with other parties and if so, with whom?

2. Educate and involve stakeholders in exploring and assessing privacy and security.

Problem. As relationships change among information access, efficiency, equity, privacy, and security, it is difficult to keep up with and understand what is possible. Recognizing and developing shared interests is a challenge when stakeholders rarely work together. It is hard to put the puzzle together when the pieces are not on the same table.

What to avoid. Do not expect easy consensus on information issues; progress will likely require firm decisions in the face of ongoing opposition. At the same time, do not run roughshod over minority views; people need time to become convinced that tradeoffs are being made carefully and fairly.

What to do. Speak to stakeholders separately but also bring them together in the design process. While disaster stories and crises may be useful to get attention, be sure to share and analyze realistic cost/benefit and risk data in exploring tradeoffs. Get leaders involved in pilot projects—nothing educates like first-hand experience.

An Example. Record Linkage in Canada. In 2000, Canada's Privacy Commissioner revealed that the federal government had constructed a database on more than 33 million people that linked information from multiple agencies. While the database was not secret and served many valuable purposes—including research and program analysis—it was immediately denounced as an "Orwellian" abuse of power and eventually destroyed. Recognizing that the benefits of record linkage could be lost if public sentiment focused solely on potential abuses, Ivan Fellegi—a pioneer in linkage research—has advocated for a broad and open discussion of responsible data stewardship. By bringing together stakeholders, including the general public, Fellegi seeks to explore the risks and rewards of record linking in an open, transparent, and responsible environment, thereby hoping to avoid situations like the one in Canada.[10]

An Example. Difficulties in Consolidating State Computer Operations in Wisconsin. When Wisconsin Governor Scott McCallum proposed allocating $132.4 million to establish a Department of Electronic Government, privacy advocates highlighted the abuses that might result if a single agency controlled all data without effective safeguards in place. In response, the Governor agreed to work with stakeholders to minimize risks to personal privacy, establishing a Privacy Information Officer with the ability to sue the state or its agencies over privacy-related matters. Underscoring the difficulty of gaining a sustained consensus on these issues, the Joint Committee on Finance later approved the Department of Electronic Government but not the Privacy Information Officer.[11]

An Example. U.S. Department of Health and Human Services. In 1996, the U.S. Congress passed the Health Insurance Portability and Accountability Act (HIPAA) requiring the Department of Health and Human Services (HHS) to establish standards—including a unique health identifier for individuals—for exchanging and analyzing administrative and financial health care information. Realizing the potential implications of such an identifier, HHS decided not to engage in traditional rule making—i.e. issuing a proposed rule, accepting comments, then issuing a final rule. Instead, they held extensive public hearings to explore the issues in greater depth. After these hearings, HHS determined that—until comprehensive privacy legislation is in place—the risks are too great to proceed with a unique health identifier.

For more information about related HHS decisions, see the "Statement for the Record on a National ID Card" given by HHS before the House Committee on Government Reform and Oversight. www.hhs.gov/asl/testify/t980917a.html

3. Give adequate executive-level attention to information policy issues.

Problem. Privacy, security, and other information policy issues have often been seen as something to delegate to project managers and specialists. This has given these issues lower priority and narrower attention than they deserve.

What to avoid. As information issues develop a higher profile, leaders are beginning to take notice. However, it is not enough merely to delegate these issues to one or more senior-level managers "in addition to your other duties."

What to do. Information policy—which seeks the right balance among access, efficiency, equity, privacy, security, and other values—requires substantial and sustained attention at senior levels of the organization. Like it or not, the chief executive must "own" the ultimate decisions to be made.

An Example. The Advent of the Chief Privacy Officer (CPO). Realizing the importance of information policy, organizations around the world are beginning to appoint capable executives to high-level information policy positions. For example, in 2000 IBM appointed Harriet Pearson to such a position in order to unify the privacy aspects of its business. Similarly, at the U.S. Internal Revenue Service, Privacy Advocate Peggy Irving is no longer buried in the Information Systems division but now reports directly to the Commissioner. In 2001, the State of Utah became one of the first states to appoint an independent Chief Privacy Officer. Beyond privacy alone, the State of Iowa has appointed senior-level executives for privacy and other executives for security and access to records.[12]

An Example. Enterprise-wide Information Security Officers. While many organizations have traditionally employed information security officers (ISOs), in 2000, New York State became one of the first U.S. states to establish a central office to coordinate security on an enterprise-wide basis.[13] In 2001, the Texas legislature approved $600,000 to establish an information technology security office in response to an independent study highlighting security problems. Texas hopes that an enterprise-wide security office will deal with security on a more proactive and effective basis.[14]

An Example. New York State's Committee on Open Government. Responsible for overseeing the state's Freedom of Information Law, Open Meetings Law, and Personal Privacy Protection Law, New York State's Committee on Open Government must balance many competing interests. While the Committee is primarily advisory in nature, it exerts considerable influence on information access and privacy by furnishing the Governor and Legislature with a public annual report.

For more information about New York State's Committee on Open Government, visit www.dos.state.ny.us/coog/coogwww.html.

4. Plan for privacy and security before collecting data and/or building systems.

Problem. Government information systems and business processes are difficult to change once established. Retrofitting systems for privacy, security, and/or other concerns is therefore extremely expensive.

What to avoid. Do not assume that you can "work out the kinks" in privacy and security at the end of the development process.

What to do. Build privacy and security into the design of electronic services from the beginning. Engage a diverse array of leaders in early privacy and security reviews. Understand competing values as fully and as fairly and as early as possible.

An Example. Privacy Impact Assessments. A Privacy Impact Assessment (PIA) is a process for evaluating how a system can meet privacy standards before, during, and after development. Much like an Environmental Impact Assessment, some governments are requiring PIAs before approving new projects. The U.S. CIO Council has highlighted the PIA of the Internal Revenue Service as a "best practice." The Government of Ontario, Canada, also requires a PIA prior to approving projects that may affect client privacy.

For more information about the IRS Privacy Impact Assessment, see cio.gov/docs/IRS.htm
For more information about Ontario's Privacy Impact Assessment, see www.gov.on.ca/MBS/english/fip/pia

An Example. Privacy and Public Access to Electronic Case Files Subcommittee. The purpose of the U.S. federal judiciary's Case Management/Electronic Case Files (CM/ECF) project is to support electronic filing and management of court documents. Recognizing the privacy, access, and security issues, the Judicial Conference of the United States—the policy-making arm of the U.S. Courts—formed a subcommittee to solicit opinions. Combining face-to-face hearings with web-based submissions, the subcommittee has heard from more than 240 individuals and organizations. As subcommittee chair Judge John W. Lungstrum notes, "The Judiciary faces a sensitive and very important policy decision, and it believes that the decision should be based on as wide ranging and open a process as possible."[15]

For more information about the Subcommittee, visit www.privacy.uscourts.gov

An Example. Planning for Security at NASA. The U.S. National Aeronautics and Space Administration (NASA) has separate e-procurement systems for medium and large contracts. Recognizing that the security needs for these systems would differ, NASA dedicated time during the design process to address the security goals for each. As a result, the Electronic Procurement System (EPRO) for larger procurements has additional security solutions

including digital signatures for authentication, identification, and non-repudiation.[16] As the CIO Council notes:

> *"Government organizations are beginning to recognize the importance of including security considerations in up-front planning for web-based information services. One cannot simply make a priori decisions about security requirements; each service should be examined on an individual basis. The most important first step is to create a security plan. The purpose of the plan is to analyze what can go wrong and to determine responses that reduce the likelihood and consequences to an acceptable level."* [17]

5. Look to harmonize information policy with other jurisdictions.

Problem. As networks enable cross-boundary information flows, privacy, security, and other issues are increasingly cross-boundary issues. Analysis and governance must respond to these cross-boundary developments.

What to avoid. Do not act locally on information issues without thinking globally and in the longer-term. You may miss the most important elements of a good solution.

What to do. Look to participate in multi-jurisdictional and public-private forums for political mobilization, standard setting, and best practice development. While governance will always involve governments, industry and other groups must also be recognized as powerful and legitimate stakeholders.

An Example. The U.S./Canadian Public Key Infrastructure Liaison Group. The governments of Canada and the United States are each employing public key technology to build a trusted open network environment for transacting business electronically with private companies, members of the public, and other governments. To explore collaboration, the two countries established a Public Key Infrastructure (PKI) Liaison Group between their respective federal governments. This group shares information on PKI matters and looks for opportunities for collaboration.

For more information about the Liaison Group,
see www.cio.gov/fpkisc/US-Canada/index.htm

An Example. Privacy in Europe and the United States. The European Union has worked to harmonize information policy laws throughout Europe. For example, the EU Directive on Data Protection that took effect in October 1998 is designed to harmonize the privacy laws of member countries. Such harmonization stands in contrast to the conflicts between the EU and the United States on privacy issues. While the "safe harbor" provision has created an uneasy truce that is allowing commercial flows to continue without massive interruptions, the EU, the U.S., and other governments will need to collaborate with diverse stakeholders to find long-term solutions to a variety of cross-border information issues.

An Example. The Privacy Diagnostic Tool. Developed in partnership with the Ontario Information and Privacy Commissioner, PricewaterhouseCoopers, and Guardent, the Privacy Diagnostic Tool (PDT) is a self-assessment program used to help organizations gauge their privacy readiness. Using internationally recognized privacy standards, the PDT software outlines ten principles based on fair information practices and asks the user a series of yes/no questions to assess their level of compliance.

For more information about the PDT, visit www.ipc.on.ca

6. Support the development of new technologies and techniques.

Problem. While industry-developed technologies and techniques will continue to shape privacy, security, and related issues, the private sector alone cannot absorb all the risks of development. Without public sector support—including appropriate guidance and regulation—development will miss the mark.

What to avoid. Do not assume that the private sector will develop all needed privacy and security technologies and techniques on their own. On the other hand, avoid isolation from the private sector's enormous potential to develop powerful new innovations.

What to do. Continue to provide public sector support and guidance for fundamental pre-market research. This is perhaps especially true for privacy and security enhancing technologies and for applications related to smart cards, PKI, and networking protocols.

An Example. Using Peer-to-Peer Technology at FedStats.net. Peer-to-peer (P2P) technology is used to share information between computers directly—enabling one computer to search and retrieve information from all others in the same community without the need for storing the information on a large central server. Experimenting with how P2P technology might be used in the public sector, the Federal Interagency Council on Statistical Policy ran a pilot called FedStats.net to link data from multiple sources. Using the pilot, individuals could find and share information on all computers in the defined community. While the security risks of the pilot were minimized by using non-sensitive data, groups at the Defense Advanced Research Projects Agency (DARPA) and elsewhere are now working to make P2P secure enough for many other applications.[18]

An Example. Ontario's Use of the Platform for Privacy Preferences (P3P). Developed by the World Wide Web Consortium (W3C), P3P is a standard to enable users to determine whether a website manages personal data in a manner acceptable to the user. P3P-enabled sites make their information management policies available so web browsers can compare a site's policies against the user's preferences, thus allowing the user to make an informed decision on whether to visit the site. While the W3C is an organization dominated by its private sector members, Ontario's Privacy Commissioner is also active in the W3C, helping ensure that public sector interests are well represented.[19]

To learn more about P3P, including a list of P3P-compliant sites, visit www.w3.org/P3P

An Example. Cryptography, Anonymizers, and Infomediaries. The idea that technology infringes on security and privacy is popular but only partially accurate. Technologies can also enhance security and privacy. For example, there is a substantial market for the cryptography that secures data in storage and in transmission. Similarly, there is a growing market to provide anonymous web-browsing and emailing services. Database technology makes it possible for infomediaries to aggregate the data of individual consumers in order to serve as their agents in marketing their personal data or in protecting such data from disclosure.[20] The public sector can often play an important role in helping these entrepreneurial markets develop.

7. Use IT to enhance privacy and security, not just maintain them.

Problem. With all the concern about technological threats to privacy and security, the potential of IT to improve privacy and security gets scant attention.

What to avoid. Do not use technology merely to automate old paper-based processes, and do not settle simply for solutions that do no harm.

What to do. Aggressively develop new IT capabilities to enhance privacy, security, access, and other values.

An Example. Internal Revenue Service Form 4506. When someone wishes to purchase real estate in the United States they usually sign IRS Form 4506, giving the mortgage company access to their tax records as part of the mortgage approval process. The old paper-based version of this form gave mortgage companies access to more than 200 pieces of information, did not explicitly restrict them from selling this data, and was not dated. But when the IRS created an electronic 4506 form, the Privacy Impact Assessment process was used to correct for these concerns. The electronic form thus limits access to the 26 data elements actually required for mortgage review, limits the rights of mortgage companies in disclosing this information, and dates the form to allow for eventual expiry. Electronic services offer many such opportunities to protect privacy and security much better than before.

An Example. Property Assessments in Allegheny County. In most counties in the United States, property assessment information, complete with the names and addresses of property owners, is public information. The goal was to allow the public to ensure that no one receives favorable treatment. When Allegheny County, Pennsylvania, posted a searchable database of property assessment information on their web site, it quickly became one of their most popular services. However, responding to critics who feared that such information could be used to track down intended victims, the county passed an ordinance removing the “owner name” field from the search screen. The public can still search the paper files by name, but they cannot search by name anonymously on the Internet.[21]

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As private and public services move to electronic channels, concerns about privacy and security are difficult to resolve. This is partly due to the rapid pace of technology and other changes and partly due to the depth and diversity of the values involved.

In many cases, the best way forward may be through watchful waiting and persistence in building a consensus. When decisions must be made without consensus, we need to proceed in ways that allow stakeholders to understand the logic and fairness of the process. This will require good leadership as emphasized throughout the Eight Imperatives reports, and an energetic push for transparency and well-balanced progress.

Key guidelines are summarized in Figure 2.

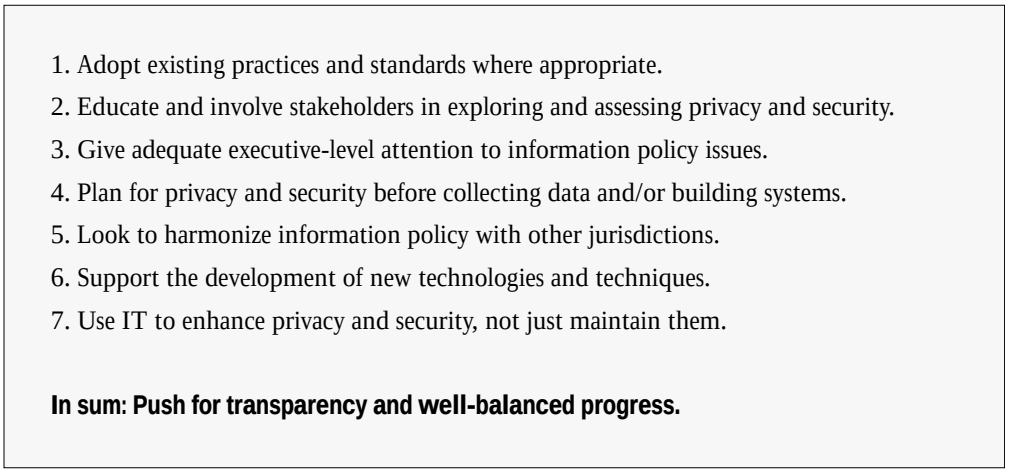

Figure 2: Guidelines for Protecting Privacy and Security

Next Steps

"What should you do next to protect privacy and security?"

NEXT STEPS

What should you do next to protect privacy and security?

1. Take stock of how you handle privacy and security today. Before making changes, look at how your institution handles privacy and security today. Who are the responsible parties? What processes are in place to assess privacy and security and other values such as access, efficiency, and equity? Are the issues well understood by policy-makers? Is the policy-making process well understood and respected by stakeholder groups?

2. Plan ahead and get out in front. Be proactive, not reactive—privacy and security are not issues that can be avoided. Establish procedures such as Privacy Impact Assessments to assess and balance values early (and throughout) the development of IT-related systems. Avoid having to handle privacy and security problems on a retrofit basis, as after the fact add-ons are far too expensive both economically and politically.

3. Adopt an outward looking approach. Traditional boundaries between agencies, municipalities, states, and even nations are newly permeable. Governance in a networked world must therefore address the cross-boundary aspects of privacy and security. Even more than before, think globally and act locally.

Brief advice for different stakeholders can be found in Figure 3 (next page).

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In the past few years, governments have made great progress in delivering services online. Much of this has been generated on a program-by-program, agency-at-a-time basis. While we need to continue with such program-by-program work, the future agenda will be dominated by work requiring cross-boundary cooperation where jurisdiction is unclear. For example, terrorism and other pressures will clearly demand urgent action. The problems that are emerging will be challenging, to say the least. Good governance will require us to design our options and make our choices in ways that are widely seen as appropriate and fair.

This report has offered guidelines for protecting privacy and security in the context of other and often-competing values. Our next report will examine how information technologies are creating new needs for public-private cooperation on issues of economic development.

The President. The critical technology agenda is now a "cross-boundary" agenda where your leadership—augmented by a newly-created federal CIO—is required for e-government progress that protects privacy and security while also improving access, efficiency, and equity.

Legislators. Some of you may naturally gravitate to issues of accessibility, some to privacy, and some to security. But all should educate your peers and the public on the need for balance, and not just wade in with single-issue advocacy.

Governors. Develop the long-term, bipartisan consensus needed to secure public-private cooperation in the context of the global shift to electronic commerce. Create an open and informed policy environment—your best protection against spur-of-the-moment decisions.

Local government leaders. Delivering services at the local level, you are at the frontlines in balancing values such as privacy, security, and access. Work with other municipalities and with states to coordinate your efforts.

Judges. Integrated criminal justice systems are at the forefront of efforts to balance the rights of society to security against the rights of individuals to privacy. Educate the legal community broadly on e-government issues and share your knowledge.

Budget directors. You are in the driver's seat for investments in cross-boundary and self-service systems that promote access and efficiency while simultaneously raising concerns about privacy and security; be sure your assessment process is balanced and palpably fair.

Agency and program heads. Accept accountability for addressing privacy and security issues, educating yourself and others on the risks, rewards, and tradeoffs involved. Build steps for addressing privacy and security early into all decision-making processes.

Chief Information Officers. More than anyone else you must educate decision-makers on the risks, rewards, and tradeoffs involved with issues of access, efficiency, privacy, security, and equity. Work with other jurisdictions to identify best practices and standards that enable effective but protected information sharing across boundaries.

Technology community. Your success will rise and fall with that of e-commerce, and e-commerce will rise only when the public trusts that privacy and security issues are appropriately handled. Work within your community to advance best practices and standards.

Associations and interest groups. E-government issues—including privacy and security—require a wise balance of innovation and standardization. Your groups should offer key support and partnerships with government to encourage innovation and set standards.

The press. The public needs to understand and decide its priorities on interrelated issues of access, efficiency, equity, privacy, and security. This requires effective and long-term education that you are well positioned to provide. Go to it.

The public. When it comes to access, efficiency, privacy, security and the relations among them, we cannot have everything, but we can have much more in the future if we make wise choices about how to use new technological capabilities. Educate yourself and participate in the politics of choice.

Figure 3: Advice to Stakeholders for Protecting Privacy and Security

Appendix A

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Mr. Howard A. Peters III	*Secretary, Department of Human Services, State of Illinois*
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Mr. Phil Smith	*Director, State Federal Relations, State of Iowa*
Ms. Anne F. Thomson Reed	*Chief Information Officer, U.S. Department of Agriculture*
Hon. Barbara Todd	*Commissioner, Pinellas County, Florida*
Mr. Richard J. Varn	*Chief Information Officer, State of Iowa*
Hon. J.D. Williams	*Controller, State of Idaho*
Mr. Phillip J. Windley	*Chief Information Officer, State of Utah*
Mr. Terry Wood	*Councilman, City of Jacksonville, Florida*
Mr. Robert J. Woods	*Commissioner of Federal Telecommunication Services, U.S. General Services Administration*
Mr. Gregory Woods	*Chief Operating Officer, Student Financial Assistance, U.S. Department of Education*

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Appendix B

READINGS AND RESOURCES

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The National Association of State Chief Information Officers' (NASCIO) Digital Government Working Team has struck a series of issue teams including a team to explore privacy and personalization and a team to explore security and reliability. For more information, see www.nascio.org/hotIssues/dg/index.cfm.

The Center for Technology in Government has published a number of practical studies on creating and using electronic records including, *Gateways to the Past, Present, and Future: Practical Guides to Secondary Uses of Electronic Records and Models for Action: Developing Practical Approaches to Electronic Records Management and Preservation.* www.ctg.albany.edu/creating-using_e-records.html

Other Links of Interest:

Electronic Privacy Information Center www.epic.org

Online Privacy Alliance www.privacyalliance.org

Coalition for Sensible Public Records www.cspra.org

Appendix C

GLOSSARY

Application Service Provider (ASP)—A third-party organization that provides software-based services to clients from a single location over a wide-area network. Represents an outsourcing option for governments who cannot or do not want to deliver and support enterprise applications. Also referred to as Managed Service Providers (MSP) when the software is both delivered and managed by the third-party organization.

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).

Enterprise Application—A software application that is used throughout an organization (or enterprise). For example, payroll systems or resource management systems that are used by multiple departments or an online payment processing application that is used across organizational boundaries are all enterprise applications. Such applications are important for realizing economies of scale and for ensuring information can be shared.

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.

Kaizen—Originally defined in Masaaki Imai's book *Kaizen: The Key to Japan's Competitive Success*, *kaizen* refers to a process of continuous improvement through small sustainable steps.

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.

Lifecycle Costs—The costs of developing, maintaining, operating, and eventually retiring an IT system or application. When budgeting for IT initiatives, stakeholders often focus on development costs, overlooking future costs that can represent a larger percentage of the full lifecycle costs.

Managed (or Management) Service Provider (MSP)—See: Application Service Provider (ASP).

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.

Prototype—A pre-production, functioning model of a system or application. A prototype is generally used for the evaluation of design, performance, or production potential.

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.

Scope Creep—The gradual accumulation of new or expanded requirements after a project plan (project scope) has been agreed upon by all parties. Scope creep is a significant risk to implementation success as it increases cost and extends project timelines.

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.

Share-in-Savings/Revenue—A financing strategy whereby government compensates a private-sector partner with a share of funds saved/raised as a result of the partnership. This financing strategy is commonly used when the private-sector partner agrees to cover the up-front costs of a project. It is also used to align incentives with desired outcomes.

Slow Trigger, Fast Bullet—An analogy used to describe an implementation strategy in which careful project planning and preparation (the slow trigger) is followed by swift and decisive action steps (the fast bullet) that quickly move the project to a stage that safely demonstrates value.

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] The majority of the research and discussion leading to this paper was conducted prior to the terrorist attacks on the World Trade Center of September 11, 2001. Note, then, that this paper refers to security in the context of control over access to information stored on networks and not in the context of personal or national security. This is not a paper primarily about the use of IT to protect IT-related infrastructure, to permit stronger policing and homeland defense, or to detect and disrupt terrorist networks throughout the world. It is rather a paper about how IT-based services designed primarily for efficiency and effectiveness can produce strong impacts on privacy and on security that need to be considered in designing and deploying such services.

[2] In a research note Gartner Group estimates that a transaction handled by counter tellers at a bank costs between $1.00 and $2.00 per transaction, while a similar transaction conducted over the Internet costs between $.02 and $.05. Gartner Group, "The Benefits of Alternate Channels in the Branch," May 1999.

[3] The Canadian Medical Association has recognized this threat and is lobbying the Government of Canada for legislative changes that would limit data mining by drug companies and hospital foundations. See Anonymous, "Canadian doctors raise questions about data mining," *CBC.ca*, 17 August 2001 (cbc.ca/cgi-bin/templates/view.cgi?/news/2001/08/15/Consumers/medicalprivacy_010815).

[4] See analysis of the Fourth Amendment at: http://caselaw.lp.findlaw.com/data/constitution/amendment04/.

[5] For more detail on the goals of security, see chapter 4 of Jean Camp, Trust and Risk in Internet Commerce, Cambridge, MA: MIT Press, 2000 (ksghome.harvard.edu/~.jcamp.academic.ksg/trustRisk).

[6] U.S. Department of Health, Education, and Welfare, Secretary's Advisory Committee on Automated Personal Data Systems, "Records, Computers, and the Rights of Citizens," 1973.

[7] For example, see John Gaudin, "The OECD Privacy Principles: can they survive technological change?" *Privacy Law and Policy Reporter*, Australasian Legal Information Institute (www.austlii.edu.au/au/other/plpr/1996/68.html).

[8] See, Darrell M. West, "Assessing E-Government: The Internet, Democracy, and Service Delivery by State and Federal Governments," September 2000 (www.insidepolitics.org/egovtreport00.html).; Civic Resource Group, "Cities on the Internet 2001: E-Government Applied," August 2001 (www.civicresource.com).

[9] National Electronic Commerce Coordinating Council, "Privacy Policies: Are You Prepared. A Guidebook for State and Local Government Version III," December 2000.

[10] Ivan P. Fellegi, "Record Linkage and Public Policy: A Dynamic Evolution," In Wendy Alvey and Bettye Jamerson (eds), *Record Linkage Techniques, 1997*. Washington D.C.: Federal Committee, 1997. For more on record linkage see also United States General Accounting Office, "Record Linkage and Privacy: Issues in Creating New Federal Research and Statistical Information," April 2001 (GAO-01-126SP).

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[12] Ellen Perlman, "The Privacy Czars," *Governing Magazine*, July 2001.

[13] John Marcotte, "Surfing the Digital Beat," *Government Technology Magazine*, May 2000.

[14] Dibya Sarkar, "Texas setting up security office," *Federal Computer Week*, 5 June 2001.

[15] Administrative Office of the U.S. Courts, "Judiciary to hold Public Hearing on Internet Access to Court Documents," News Release, 16 February 2001 (www.privacy.uscourts.gov/Press.htm). The final report of the committee, Report on Privacy and Public Access to Electronic Case Files, was released in July 2001 and is available at www.uscourts.gov/Press_Releases/att81501.pdf.

[16] CIO Council, Security, Privacy, and Critical Infrastructure Committee, *Securing Electronic Government*, CIO Council, 19 January 2001.

[17] CIO Council, Security, Privacy, and Critical Infrastructure Committee, *Securing Electronic Government*, CIO Council, 19 January 2001.

[18] Dan Caterinicchia, "Computers with a view: Feds exploit Napster-style technology," *Federal Computer Week*, 14 May 2001.

[19] Along with The Center for Democracy and Technology, Ontario's Information and Privacy Commissioner published a report titled "P3P and Privacy: An Update for the Privacy Community." March 2000. The report is available at www.cdt.org/privacy/pet/p3pprivacy.shtml.

[20] For a more detailed discussion of how technology is reinventing the privacy debate read Toby Lester, "The Reinvention of Privacy," *Atlantic Monthly*, March 2001.

[21] Jeffrey Cohan, "Council votes to hide names on Web site," post-gazette.com. 20 June 2001 (www.post-gazette.com/regionstate/20010620countycouncil0620p2.asp).

EIGHT IMPERATIVES FOR LEADERS IN A NETWORKED WORLD

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THE HARVARD POLICY GROUP
ON NETWORK-ENABLED SERVICES AND GOVERNMENT
JOHN F. KENNEDY SCHOOL OF GOVERNMENT

CAMBRIDGE, MASSACHUSETTS

Eight Imperatives

for Leaders in a Networked World

Imperative 6:

Form IT-Related Partnerships to Stimulate Economic Competitiveness

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

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"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 explains and elaborates imperative #6: *Form IT-related partnerships to stimulate economic competitiveness.* It explores what government must do, even in a world shaken by terrorism and recession, to become an effective partner with the private sector in the transition to a knowledge-based, global economy. In a networked world, leaders must reform not only government services, but also—and more importantly—the structure and competitiveness of the entire economy.

The HPG was made possible through a partnership among the Kennedy School of Government, American Management Systems, Cisco Systems, EDS, IBM's Institute for Electronic Government, the MITRE Corporation, and Unisys. 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. However, 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 public and private-sector leaders and to the public at large.

THE HARVARD POLICY GROUP ON NETWORK-ENABLED SERVICES AND GOVERNMENT
CAMBRIDGE, MASSACHUSETTS
MARCH 2002

JERRY MECHLING, JOHN F. KENNEDY SCHOOL OF GOVERNMENT
LYNDA APPLEGATE, HARVARD BUSINESS SCHOOL

Over the last twenty years, computer networks have led to huge shifts in communication patterns and the organization of work. We have enjoyed record setting economic growth and witnessed what some have called the "death of distance."[1] In the industrial economy, with production based on physical resources and energy, success depended on "location, location, location." In the post-industrial economy, with production based on codified knowledge requiring almost no energy to be instantaneously transported around the world, location is no longer as important. The fundamentals of commerce are shifting.

Adapting to the new fundamentals is critical for government as well as for business. Governments—especially those without access to rich natural resources—are being offered new ways to help their economies compete and prosper. At the same time, they face new threats to job security along with related political and social conflicts. These challenges are exacerbated by the economic downturn and terrorist threats of 2001. Governments need to respond, but find themselves less powerful relative to private and non-profit institutions than they have been in the past, and often without jurisdictional authority over many of the important conflicts that need to be resolved.[2]

This report explores critical and challenging roles for government in a world of knowledge-based economies and global electronic commerce.

Success

"Success is no longer based on fixed variables such as physical geography and natural resources."

THREATS AND OPPORTUNITIES IN A KNOWLEDGE-BASED ECONOMY

In the past, money spent on an automobile bumper paid for the mining, transportation, and energy required to smelt and bend heavy and relatively scarce metals. Today, money spent on bumpers pays for the chemical engineering needed to make them from light and relatively abundant plastics. As costs shift from physical materials and physical processes to knowledge that can be codified and processed over computer networks, jobs can be moved around the world much more easily than ever before.

The threat from knowledge-based production is that good jobs are now free to be located elsewhere; successful areas are newly vulnerable to becoming ghost towns. On the other hand, new opportunities now also exist for communities to compete for jobs that were formerly beyond their reach. Success is no longer based on fixed variables such as physical geography and natural resources. The dominant need now is for skilled workers who can innovate and coordinate their activities through communications networks.[3]

Wired Magazine's Criteria for High-Tech Success:

When Wired Magazine published their list of the 46 locations "that matter most in the new digital geography," they rated each according to four criteria that made Silicon Valley successful:

- The ability of area universities and research facilities to train skilled workers or develop new technologies;
- The presence of established companies and multinationals to provide expertise and economic stability;
- The population's entrepreneurial drive to start new ventures;
- The availability of venture capital to ensure that the ideas make it to market.

Source: Venture Capitals, Wired Magazine, July 2000.

Government

"... Government cannot cede all innovation and economic reform to corporations and other non-governmental organizations."

WHAT TO AVOID: GOVERNMENT-ONLY AND GOVERNMENT-ABSENT APPROACHES

With jobs changing and moving to new locations, companies and workers are turning to government for protection.

However, government cannot play the all-important role it once did in providing jobs and shaping economic development. Government no longer wields as much economic power as it once did; even the U.S. Department of Defense is too small—relative to spending on

global consumer electronics—to shape high-tech development as it did in the years of the Cold War. Constrained by size and numerous legal and political checks and balances, governments are not a consistent source of the innovations needed to drive knowledge-based economies. Government does not work in "Internet years," where what was formerly a year's worth of innovation can now be developed in two months. Relying too much on government would slow things down, locking the economy into soon outmoded patterns of work. Economic success in the Information Age will continue to depend on the private and non-profit sectors.

At the same time, government cannot cede all innovation and reform to corporations and other non-governmental organizations (NGOs). The basic research needed for long-term growth is often too risky to be funded at the corporate level. Further, economic development depends on communications, intellectual-property protection, and education. These are widely shared services that depend on government and government-funded investment. We need government to protect equity, privacy, security, and other values that are systemically left unprotected by private markets.[4]

So government-only and government-absent economic development are both deeply flawed. How can we do better?

Balance

To succeed, government will have to act judiciously, working with others to balance needs and maximize value for the entire society."

GOVERNMENT'S ROLE AS A PARTNER IN THE SHIFT TO GLOBAL ELECTRONIC COMMERCE

Organizations around the world are aggressively using technology to redesign and relocate work. This is happening at the level of task, work process, department, enterprise, and even entire industries.

As redesign and relocation proceeds, four activities are required for success. Each depends on collaboration and partnership between the public and private sectors:

• *Attracting and retaining financial investment, especially in new ventures.* Governments have traditionally attracted private sector investment through incentives such as tax policies. In the new economy, these policies need to be analyzed and updated. Much may be done through industry-cluster approaches to help existing and new businesses grow.[5] Facilitating access to private venture capital may also be critical.

• *Developing skilled human resources, especially for knowledge work.* The biggest need for the new economy is skilled labor. Governments need to work with providers of education and job training to support lifelong and business relevant learning. Governments also need to support the entertainment and cultural attractions sought by knowledge workers.

• *Providing access to modern communications, especially broadband infrastructure.* Governments need to work with industry to ensure that citizens and workers have access to the wired and wireless Internet and, increasingly, to broadband applications that provide realistic virtual interactions.

• *Supplying effective and efficient governance and government services.* As business institutions "go global," governments must cooperate with private and non-profit sectors to develop cross-jurisdictional standards and more broadly based modes of conflict resolution. At the same time, government should consider local differences that may be used to create niche advantage within the global environment. Government must "get its own house in order," lest governmental inefficiency drag down the overall economy.

In sum, government will have to act judiciously, working with others to balance needs and maximize value for the entire society. The partnerships needed for the economy to fully blossom in the competitive new economy are highlighted in Figure 1.

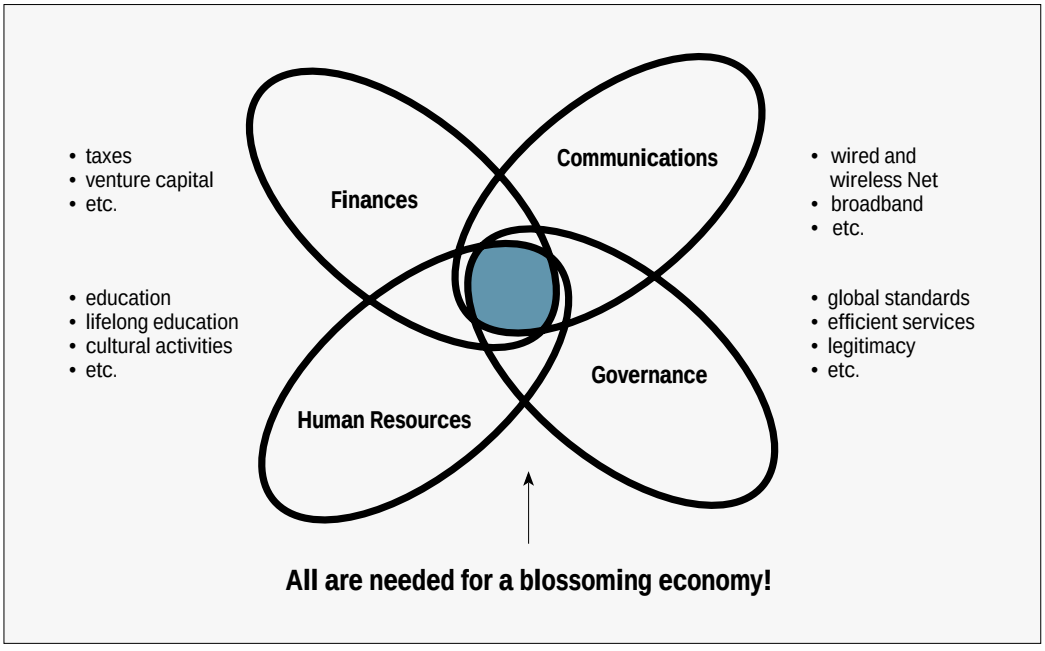

Figure 1: Public-Private Partnerships for Economic Development

Partnership

"A true partnership involves shared risks and rewards, not win-lose propositions."

GUIDELINES FOR IT-RELATED PARTNERSHIPS TO IMPROVE ECONOMIC COMPETITIVENESS

To support Information Age economic competitiveness and development, consider the following guidelines.

1. Analyze competitive positions and industry clusters.

The problem. When jurisdictions seek development, they often fail to focus on their competitive advantage for particular firms and "clusters" that might strategically locate or expand in their area.

What to avoid. Do not pursue an unfocused strategy of tax breaks for any firm that might bring jobs. Random incentives will not provide the synergies gained through related, clustered businesses.

What to do. For key industries, bring leaders together to understand competitive forces and dynamics. While networks make coordination at a distance easier, businesses still like to be near strategic partners, and people like to be near professional and social peers.

An Example. Pittsburgh Digital Greenhouse. Pittsburgh has adopted a strategy to cluster around System On Chip (SOC) technology in the digital multimedia and networking markets. Rather than pursuing a wide array of companies, a state-sponsored non-profit—Digital Greenhouse (PDG)—is cultivating companies and individuals associated with SOC technologies. Building on a small number of start-ups and university research centers already located in the area, the PDG has attracted more than 20 other firms to the cluster. After joining the PDG and assessing the Pittsburgh area, companies such as Sony, Casio, and Cisco Systems are building or analyzing the possibility of building design centers in Pittsburgh.

For more about the Pittsburgh Digital Greenhouse, visit www.digitalgreenhouse.com

An Example. Hong Kong Cyberport. Hong Kong's Cyberport seeks to establish a strategic cluster of IT firms and workers. Constructed to provide tenants with access to leading-edge communications, the project will include both business and residential facilities in an IT community on the waterfront. Still under construction, Cyberport has already attracted high-profile tenants including Cisco Systems, Microsoft, IBM, Hewlett-Packard, Yahoo!, and Oracle.

For more information, visit www.info.gov.hk/itbb/english/cyberport/index_n.htm

2. Provide access to advanced telecommunications services.

The problem. The information infrastructure of today is a far cry from the robust and resilient broadband capabilities we will soon need. While many in the private sector have

invested heavily, advanced computing and telecommunications services have yet to reach many businesses, individuals, and jurisdictions.

What to avoid. Do not allow the information highway to pass you by. Communications capacity is essential in the knowledge economy.

What to do. Use the "anchor-tenant" capabilities of government to insure that information infrastructure is strong and accessible. Support the supply side of the equation, but also work to promote demand, especially via education. These ideas are not new, but are especially important for the present economic transition.

An Example. LaGrange (Georgia) Internet Television Initiative. In the early 1990s, community leaders in rural LaGrange participated in a study that warned that their community would be bypassed by knowledge-based industries unless they could offer broadband communications. As a result, they negotiated a partnership with the local cable provider, Charter Communications, to create a $9.5 million hybrid fiber-optic and digital cable network connecting every home and business to the Internet. To encourage investment by Charter, the city offered tax-exempt financing by purchasing the infrastructure and then leasing the faster, upgraded system back to Charter. Savings generated by this type of financing were used to create broadband capacity for city services. Via another partnership—this time with WorldGate Communications—the city provides a free broadband Internet service and wireless keyboard to every home and business with cable TV. LaGrange is using digital cable and Internet to offer access to knowledge-based work opportunities. Because of this project, La Grange was awarded the World Teleport Association's "Intelligent City of the Year" award for 2000.[6]

For more about the LaGrange Initiative, visit http://www.lagrange-ga.org/homepage.cfm

An Example. Telecommunications Open Partnership for Arizona (TOPAZ). When the rural community of Douglas, Arizona, failed to attract a new business because it could not provide broadband, state officials decided to intervene. A multi-million dollar initiative called TOPAZ now provides high-speed telecommunications to as many as 750,000 people in Arizona's rural communities. While focused initially on populations of 500 or more, officials hope the program will soon reach smaller communities and tribal lands.[7]

More information about TOPAZ can be found at gita.state.az.us/GITA/default.asp

3. Build human capital through workforce development and e-learning.

The problem. Few jurisdictions have enough workers with the mix of skills required for a knowledge-based future. The Information Age economy needs workers to be well-educated throughout childhood, with education and re-education continuing on a lifelong basis.

What to avoid. Do not focus solely on education for new industries and young workers. Education throughout the economy and throughout the workforce may be more important than training for specific "new economy" jobs.

What to do. Invest in education, including the technology-augmented education (e-learning)[8] needed to reduce barriers of cost, distance, and time. Provide education, training, and other information support for lifelong productivity and for efficient career and job changes.

An Example. Pinellas County College University Center. Looking to build a highly educated workforce, Pinellas County, Florida, has partnered with nine of the state's universities to provide career-relevant undergraduate and graduate courses through a local facility or College University Center (CUC). Combining face-to-face interaction with distance learning, the CUC aims to help one million people earn degrees in areas such as information systems, business management, and computer and information science. According to Barbara Sheen Todd, county commissioner, "It's really bringing together all partners [who] can make a difference for economic development in the 21st century."

For more about the Pinellas County College University Center, visit www.cucspjc.edu

An Example. Centennial Campus at North Carolina State University. Centennial Campus is a "technopolis" that allows academics, government researchers, and industry tenants to work in close proximity. Buildings in the complex are organized according to technology areas, with academics, government researchers, and industry tenants housed together to foster interaction. The campus is now home to more than 100 large and small companies, government agencies, and North Carolina State University units.

For more information about Centennial Campus, visit centennial.ncsu.edu

An Example. Technology Employees in Coos Bay, Oregon. Coos Bay is a community of 40,000 located on the Oregon coast. Long dependent on logging and fishing, Coos Bay has suffered high unemployment since the mid-1980s. Recently, however, CyberRep.com—a company providing support for firms such as Microsoft and Barnes & Noble—relocated in Coos Bay. This decision was heavily influenced by Stephen Kridelbaugh, President of Southwestern Oregon Community College, who committed to training employees for free. As John Stadter, General Manager for CyberRep.com's Coos Bay operation notes, "When you're moving to an area, especially a rural one, one of your biggest concerns is, 'Will I be able to get good, trained people?' [Kridelbaugh] really took that off the table in a big way."[9]

4. Improve the cost-effectiveness of public services.

The problem. With the costs of government at roughly one-third of the gross domestic product, there is a growing demand for increased value from government services. Unfortunately, too many businesses believe they don't receive much value from government, and have come to view it as excessively bureaucratic and inefficient.

What to avoid. Do not allow your government to lag too far behind in the race to offer Information Age services. More demanding expectations for service and efficiency are now being established around the globe.

What to do. Use technology and modern management to dramatically improve government, especially those services delivered directly to businesses and their employees.

An Example. Joint Venture Silicon Valley and Smart Permit. In 1993, suffering from a lingering downturn in the California economy, civic leaders from Silicon Valley established the non-profit Joint Venture Silicon Valley (JVSV) to organize citizens to advance the local economy. JVSV soon decided to pursue an "electronic community" based on "an advanced information infrastructure and the collective ability to use it."[10] One of JVSV's most successful efforts has been the Smart Permit project. Through collaboration between industry and twenty-nine cities, Smart Permit is establishing an online permitting system—a change deemed critical to the region's competitive position. Smart Permit will allow businesses to use the same Internet-based permitting procedures regardless of municipality.

For more information about JVSV and Smart Permit, visit www.jointventure.org

An Example. Smart Region Hampton Roads. Located in Virginia, the Hampton Roads region consists of several large and growing cities. Residents tend to work and play throughout the region with little concern for municipal boundaries. Smart Region Hampton Roads (or Smart Region) is a cooperative effort by leaders of business, government, and education to coordinate efforts and pool resources, especially for economic development. An early project uses technology to coordinate government services from a regional perspective:

> *"Imagine—instead of sorting it out through an array of web sites…you pay your property taxes on that house in Virginia Beach, apply for your business license in Hampton, pay the blasted parking ticket you got in any jurisdiction, and pay your child's little league fees in Newport News…All in one place."*[11]

For information about Smart Region Hampton Roads see www.smartregion.org

5. Leverage existing strength through IT-based reforms, especially for smaller firms.

The problem. Paying too much attention to the "squeaky wheel" of distressed firms may cause governments to miss opportunities to expand in areas that are relatively strong.

What to avoid. Do not base your development too heavily on the largest firms, even when they look like they can be expanded. Smaller firms may be more effective in an innovations-dominated economy, and their diversity may also provide stability.

What to do. Look to "grow" your strong local firms, especially those that have not yet taken advantage of the global reach made possible through information technologies. Identify your niche and build on strengths.

An Example. "Economic Gardening" in Littleton, Colorado. Long dependent on aerospace giant Martin Marietta (today part of Lockheed Martin), Littleton decided in 1990 to focus on local companies and entrepreneurs rather than outside corporations. Likening their efforts to those of a gardener, Littleton now hosts more than 18 telecommunications companies, many of them "home-grown." For example, Echo Star, once a small local satellite antenna company, is now a major provider of satellite-delivered cable television with more than 1100 employees. Relying on educational programs, knowledge sharing, and business

networking, Littleton's "gardening" focuses on infrastructure, quality of life, and the business-related intellectual environment.[12]

For information on Littleton's "gardening," visit www.littletongov.org/bia/NewEcon

An Example. The Columbus, Ohio, Office of International Business. The city of Columbus established the Office of International Business (OIB) to help local entrepreneurs compete in global markets. Staffed with trade experts, the OIB works with local firms to identify overseas opportunities and also promotes Columbus-based businesses in foreign markets. The OIB has built a clearinghouse of information for doing business around the world, including country profiles, comparisons, and business links.

For more information about the OIB, visit edps.td.ci.columbus.oh.us/oib/index.htm

An Example. Boosting Tourism using the Internet. Tourism generates big revenue for many communities. In New Mexico, the state's Department of Tourism hopes to support their $3 billion tourism industry through web-based services. Using software from WebSportsman, New Mexico offers a database to connect visitors with local outfitters and guides for activities such as fishing, camping, and boating.[13] Similarly, in West Virginia, tourists can use an online travel planner developed by the state's Division of Tourism to plan hikes, trips to Civil War sites, even visits to glassmaking studios.

New Mexico's Department of Tourism is at www.newmexico.org
West Virginia's Wild and Wonderful site is at www.callwva.com

6. Create new strength to attract and develop new industries and workers.

The problem. Many jurisdictions that have traditionally been geographically disadvantaged have not yet thought hard about how to succeed in the Information Age.

What to avoid. Do not focus too heavily on the geographic elements of your economic package. In a networked world, new opportunities can often be created to compete successfully for knowledge-based jobs.

What to do. Augment your strengths, correct your weaknesses, then actively sell the improved package to the businesses and workers who might locate in your area.

An Example. New Brunswick, Canada, Enters the Call Center Industry. In the late 1980s, New Brunswick's outlook was bleak. Long dependent on fishing, agriculture, and logging, unemployment hovered near 15 percent. In 1987 Premier Frank McKenna was elected, promising jobs in a new information economy. While many were skeptical, McKenna believed that New Brunswick's bilingual workforce, low costs, and cutting-edge fiber-optic communications would be attractive to businesses dependent on call centers. After establishing an Information Highway Secretariat to head their new economy drive, New Brunswick attracted more than 80 call centers. Leveraging their newly found technological expertise, they have since diversified to include aerospace, engineering, and software firms. All told, New Brunswick's IT sector has grown from 3 small firms to more than 200 companies.[14]

An Example. Being Creative in North Adams, Massachusetts. Historically the home to creative thinkers such as Ralph Waldo Emerson and Herman Melville, North Adams and the Northern Berkshires had, until recently, depended on industries such as textiles and timber. With many of these operations closing, North Adams is again turning to its creative roots. Converting old mills into modern office space, the area is attracting a steady stream of information-economy entrepreneurs looking for less urban settings. Highlighted by the new Massachusetts Museum of Contemporary Art, the new business culture in North Adams is a "laboratory for the development of high end graphics, animation, multimedia technology and sophisticated telecommunication systems that will translate visual and performing arts into new media formats for an international marketplace."[15]

For information about North Adams, visit www.bcn.net/nadams/index.html

An Example. Speaking Many Languages in Iowa. Recognizing the global nature of the 21st century economy, the state of Iowa has added a language translation tool (Babel Fish from AltaVista) to its web site. Visitors to the site can now choose content in English, French, German, Spanish, Italian, Portuguese, Korean, Japanese, or Chinese. Although certainly not 100 percent accurate, the translations project a user-friendly image of Iowa for people and companies looking to do business internationally.[16]

To try out the translator, visit www.state.ia.us

7. Focus especially on regional collaboration.

The problem. While economic regions are natural labor markets and players in global electronic commerce, they find it difficult to act collectively due to internal conflicts and politics.

What to avoid. Do not let fragmentation keep you from regional economies of scale for resources such as shared labor pools and continuing education.

What to do. Form non-partisan partnerships to encourage regional development, especially to strengthen long lasting and relatively immobile assets such as workforce skills and industry clusters.

An Example. Creating a Smart Region in the Mid-Atlantic States. First conceived by U.S. Representative Curt Weldon of Pennsylvania and Da Hsuan Feng (now at the University of Texas at Dallas), the HUBS program brings hospitals, universities, businesses, and schools together with government in technology partnerships in eastern Pennsylvania, New Jersey, Delaware, and Maryland. For example, HUBS has encouraged Defense Telcordia Inc. of Morristown, New Jersey, to work with Galaxy Scientific Corporation of Warminster, Pennsylvania, and the Army Space and Missile Defense Command's Advanced Technology Directorate. Similarly, HUBS has helped Palm, Inc. to collaborate with two Pennsylvania school districts to explore how hand-held technology might benefit education.[17]

For more information about HUBS, visit www.hubs.org

An Example. NASA and Virginia's Center for Innovative Technology. Virginia's Center for Innovative Technology (CIT) is a state-chartered nonprofit to promote economic devel-

opment. Working with NASA's Mid-Atlantic Regional Transfer Center and the Technology Commercialization Center (TeCC), the CIT is helping businesses market technologies developed at NASA's Langley Research Center. Through CIT and TeCC, regional businesses can license and market products based on NASA-developed technology or work with NASA to develop commercial products.

For more information about Virginia's CIT, visit www.cit.org
For more information about NASA's Mid-Atlantic TeCC, visit www.teccenter.org

An Example. Sustainable Economic Development in the San Joaquin Valley. The San Joaquin Valley is a California region of nine primarily agricultural counties where population growth is outstripping economic development. Aided by the newly organized Partnership for Intergovernmental Innovation (Pi2), federal, state, and municipal officials have worked with San Joaquin's industry and non-profit sectors to produce a White House Executive Order establishing an Interagency Task Force on the Economic Development of California's Central Valley. This task force is only the second of its kind, and leaders are optimistic that the region is now on a road to sustainable growth.

For more information, visit http://www.house.gov/dooley/empowerment.html

8. Address equity and other risks.

The problem. Global electronic commerce has powerful effects, some potentially negative. For example, if the knowledge-based economy only helps upper middle-class North Americans, it will neither be socially justifiable nor politically sustainable.

What to avoid. Do not ignore people who have often been left out of old-style economic development plans. Given Information Age communications, inclusion and progress may now be entirely feasible.

What to do. Reach out to underserved areas, both rural and urban. Direct attention to issues—such as equity, privacy, and the environment—that that have often not made it to traditional development agendas. Take full advantage of how the new technologies can often create "win-win" opportunities.

An Example. Chicago's CivicNet. CivicNet is a public-private partnership to bring high-speed communications to every neighborhood in Chicago. The city of Chicago will serve as "anchor tenant," pooling demand across city agencies to pay for a critical fraction of the network bandwidth. This will allow the contractor to sell the rest to others in the community. The project will create a 100 percent fiber network for all of Chicago and is designed to attract business into areas that previously lacked high-speed communications.[18]

More information on CivicNet is available from: http://www.ci.chi.il.us/CivicNet/

An Example. Canada's SchoolNet. Recognizing the importance of educating all Canadians for the new economy, the Canadian government launched SchoolNet to connect all schools and libraries to the Internet by March 31, 1999. Working with provincial and territorial

governments, the education community, and the private sector, SchoolNet made Canada the first country to meet this goal. Building on success, SchoolNet is now mandated to extend connectivity to every classroom.

For more information about SchoolNet, visit www.schoolnet.ca

An Example. PEOPLink. PEOPLink is a non-profit to help artisans in remote regions of the world to market their products on the Internet. Funded in part by the InfoDev Program of the World Bank and the U.S. Agency for International Development (USAID), PEOPLink supplies artisans with digital cameras and trains them to take pictures suitable for display on the PEOPLink web site. Through these efforts, PEOPLink is empowering economically poor regions to use the Internet to capture the benefits of world trade.

For more information about PEOPLink, visit www.peoplink.org

• • •

The theme of these guidelines is to develop government's role as a partner with the private and non-profit sectors. Government can no longer be the sole, or even prime mover for economic development. Nor can development succeed in the absence of solid governmental regulation and infrastructure. Economic reality requires partnerships, and a true partnership involves shared risks and rewards, not win-lose propositions. Key guidelines are summarized in Figure 2.

1. Analyze competitive positions and industry clusters.
2. Provide access to advanced telecommunications services.
3. Build human capital through workforce development and e-learning.
4. Improve the cost-effectiveness of public services.
5. Leverage existing strength through IT-based reforms, especially for smaller firms.
6. Create new strength to attract and develop new industries and workers.
7. Focus especially on regional cooperation.
8. Address equity and other risks.

In sum: Facilitate win-win partnerships to support the transition to global electronic commerce.

Figure 2: Guidelines for Economic Competitiveness

Next Steps

"How well are you prepared for the future?"

NEXT STEPS

A knowledge-based economy is based on information transmitted as bits on a network rather than physical materials to be carted from place to place. To prepare for the future, public leaders need to focus on the transition of the overall economy and society, not just government services.

What should you do next?

1. *Assess your competitive status and outlook.* How has your economy performed over the past decade? How well are you prepared for the future? What have been the trends in per capita income and why? What is the outlook for critical industries and clusters?

2. *Understand how development affects key stakeholders.* Armed with information from the above, test whether leaders will support a serious effort to prepare for a knowledge-based economy. From where can you rely on support? From where can you expect uncertainty or opposition?

3. *Pursue in-depth analysis and consensus building.* Hard work will be required to clarify your opportunities and build trust and support for investment. This work should proceed on a long-term, non-partisan basis.

Brief advice for different stakeholders is contained in Figure 3 (next page). The time has come to turn ideas into action.

• • •

As the Information Age matures, many governments have yet to address the right problems. Many focus solely on how to make government more productive. While this work is necessary, even bigger and more important opportunities relate to how to make the entire economy more productive. We need leaders to guide us through difficult issues related to infrastructure, education, innovation, and equity.

This report has provided guidelines for stimulating economic competitiveness and development. Our next report will examine how to use information technologies to promote equity and healthy communities.

The President. In an unstable post Cold War world, your leadership is required if government is to make the infrastructure, education, research, and other investments needed for a global knowledge economy.

Legislators. Focus on cross-jurisdictional authorization and laws to improve competitiveness, especially within metropolitan and global markets.

Governors. You must champion the development of information infrastructure and human capital, especially to strengthen regional business opportunities.

Local leaders. Build business by cooperating within your region to develop a communications infrastructure and a knowledge-based workforce.

Judges. Educate yourself in electronic commerce in order to interpret laws in the context of new economic and technological issues.

Budget directors. As electronic commerce grows, adjust tax and revenue policies and evaluate IT projects for total social benefits, not just government cost reduction.

Agency and program heads. Use technology to improve customer service and cost-effectiveness, especially for businesses important to the jurisdiction's economy.

CIOs. Work with the business community in developing shared standards, especially for services related to authentication, security, privacy, and continuing education.

Technology community. Document the case for global e-commerce, especially the need for information infrastructure, education, and government research.

Associations and interest groups. Pursue the global and electronic dimensions of your interests, especially the need for harmonization across governments.

The press. Cover the changing nature of work and economic relationships, including the role of governments in the transition to a global knowledge economy.

The public. Demand win-win partnerships between government and the private sector. Work to keep your skills current and to become more technologically savvy.

Figure 3: Advice to Stakeholders for Stimulating Economic Competitiveness

Appendix A

MEMBERSHIP OF THE HARVARD POLICY GROUP ON NETWORK-ENABLED SERVICES AND GOVERNMENT

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Appendix A

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Mr. Howard A. Peters III	*Secretary, Department of Human Services, State of Illinois*
Mr. Robert Reisner	*Vice President, Strategic Planning, U.S. Postal Service*
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Appendix B

READINGS AND RESOURCES

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For a rich source of research on economic development, see *EDA Reports & Publications*. U.S. Department of Commerce, Economic Development Administration. http://www.doc.gov/eda/html/1g3_researchrpts.htm

Appendix C

GLOSSARY

Application Service Provider (ASP)—A third-party organization that provides software-based services to clients from a single location over a wide-area network. Represents an outsourcing option for governments who cannot or do not want to deliver and support enterprise applications. Also referred to as Managed Service Providers (MSP) when the software is both delivered and managed by the third-party organization.

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).

Enterprise Application—A software application that is used throughout an organization (or enterprise). For example, payroll systems or resource management systems that are used by multiple departments or an online payment processing application that is used across organizational boundaries are all enterprise applications. Such applications are important for realizing economies of scale and for ensuring information can be shared.

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.

Kaizen—Originally defined in Masaaki Imai's book *Kaizen: The Key to Japan's Competitive Success*, *kaizen* refers to a process of continuous improvement through small sustainable steps.

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.

Lifecycle Costs—The costs of developing, maintaining, operating, and eventually retiring an IT system or application. When budgeting for IT initiatives, stakeholders often focus on development costs, overlooking future costs that can represent a larger percentage of the full lifecycle costs.

Managed (or Management) Service Provider (MSP)—See: Application Service Provider (ASP).

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.

Prototype—A pre-production, functioning model of a system or application. A prototype is generally used for the evaluation of design, performance, or production potential.

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.

Scope Creep—The gradual accumulation of new or expanded requirements after a project plan (project scope) has been agreed upon by all parties. Scope creep is a significant risk to implementation success as it increases cost and extends project timelines.

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.

Share-in-Savings/Revenue—A financing strategy whereby government compensates a private-sector partner with a share of funds saved/raised as a result of the partnership. This financing strategy is commonly used when the private-sector partner agrees to cover the up-front costs of a project. It is also used to align incentives with desired outcomes.

Slow Trigger, Fast Bullet—An analogy used to describe an implementation strategy in which careful project planning and preparation (the slow trigger) is followed by swift and decisive action steps (the fast bullet) that quickly move the project to a stage that safely demonstrates value.

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 infor-

mation 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

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EIGHT IMPERATIVES FOR LEADERS IN A NETWORKED WORLD

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THE HARVARD POLICY GROUP
ON NETWORK-ENABLED SERVICES AND GOVERNMENT
JOHN F. KENNEDY SCHOOL OF GOVERNMENT

CAMBRIDGE, MASSACHUSETTS

Eight Imperatives

for Leaders in a Networked World

Imperative 7:

Use IT to Promote Equal Opportunity and Healthy Communities

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

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

PREFACE

As we proceed further into 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.

Until recently 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. Having worked 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 leadership imperatives for 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 leadership strategies in a networked world.

The report you are reading explains and elaborates imperative #7: *Use IT to Promote Equal Opportunity and Healthy Communities.* After reviewing trends over the past several decades toward less equality and less cohesive communities, it suggests a series of steps to better understand and counter these developments. Leaders need to aggressively explore how networking can be used to support both physical and virtual communities.

The HPG was made possible through a partnership among the Kennedy School of Government, American Management Systems, Cisco Systems, EDS, IBM's Institute for Electronic Government, the MITRE Corporation, and Unisys. 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. However, 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 public and private-sector leaders and to the public at large.

THE HARVARD POLICY GROUP ON NETWORK-ENABLED SERVICES AND GOVERNMENT
CAMBRIDGE, MASSACHUSETTS
JULY 2002

JERRY MECHLING, JOHN F. KENNEDY SCHOOL OF GOVERNMENT
LYNDA APPLEGATE, HARVARD BUSINESS SCHOOL

While the gap between rich and poor narrowed considerably through the first two-thirds of the 20th century, it has grown consistently since then. In the United States, between 1979 and 1997 (the most recent year for which we have data) the average after-tax income of the wealthiest 1% rose by $414,000, the income of the middle fifth increased $3,400, and that of the bottom 20% decreased by $100.[1]

During roughly the same period, local communities—long the dominant focus of economic, social, and political interactions—have become weaker. They don't claim our attention as they once did. Neighbors don't seem as important to us as they once did. People have moved from stable roots and familiarity within smaller communities, to serial residency and anonymity within large metropolitan regions. They identify with their communities less. Except when threatened by outside forces, they trust their governments less.[2]

Given our longstanding traditions of equal opportunity and healthy communities, these are disappointing, perhaps even dangerous trends. But will they continue? If so, what can be done about them?

Why

"What we need is to better understand what is happening and why."

GREATER INEQUALITY AND WEAKER COMMUNITIES

Relationships in family, work, neighborhood, and other communities define much of our lives. Communities provide protection, production, recognition, validation, and other support. In defining and pursuing the "good life," we are greatly influenced by what others think and by comparing our own situation with theirs. We forge our identity through interactions with the community, motivated by a powerful need to belong.

Until recently, communities have been predominantly structured by physical interactions and physical acts of production. People talked and worked together. Individual roles differed, as did shares from collective production: We certainly weren't all paid the same. We commonly justified mild and even dramatic income differences as long as they weren't too dramatic. After all, results are an incentive. If people aren't accountable for results, they won't work as hard. Ultimately, without individual accountability, the entire community will suffer.

But in most modern societies, some inequalities are constrained by demands for fairness and cohesiveness. Particularly under democracies, communities have regulated the market

to protect those who couldn't protect themselves. Communities have provided education or transportation or other services at subsidized rates to "level the playing field" and to help disadvantaged individuals join the mainstream of economic life. And sometimes the community has forcibly transferred income or services from the "haves" to the "have nots." Government provides a safety net and narrows the gap between rich and poor.

In the U.S., however, trends toward equality no longer hold. Over the past thirty years, those in the middle and lower income groups have gained but little in real income and have lost ground to those in the wealthiest groups. In the meantime, our sense of belonging within local communities has also eroded. Life has become busier and more fragmented. People have become less invested in their neighbors. The post 9/11 mood has spurred new feelings of solidarity, but will the cohesiveness last?

Shifts to a knowledge-based economy contribute to these long-term trends. Tasks relying on cognitive skills and higher levels of education may continue to widen the gap between high-paid and low-paid performers. A digital divide may exacerbate the economic divide.

If these trends continue, the negatives of a maturing information age may soon outgrow the positives. Economic growth may not be able to compensate for what is being lost in our social and community lives.

On the other hand, it is possible that trends of the last thirty years or so may not continue. Throughout history, inequality has been based on an ability of the few to control factors of production such as land or capital. In a knowledge economy, codified knowledge is the key factor for production. But codified knowledge may be difficult for a small group to control because it is too easily copied and shared over networks. As the saying goes, "Information wants to be free." Networking that improves production may ultimately benefit all and may also foster a robust sense of belonging within physical as well as virtual communities.

What we need is to better understand what is really happening and why. How can we gain the benefits but avoid the risks as communication shifts to information systems?

Judgement

"... Careful judgement is required."

WHAT TO AVOID: INACTION OR IMPULSIVE ACTION

While leaders are worried about inequality and our eroding sense of community, investments in corrective programs are few and far between.

There are many rationales for inaction. Some people have simply not noticed the trends. Others see trends, but don't see them as a problem, at least not yet. Still others think the problems will go away as technology grows cheap enough to bridge the "digital divide." Some are concerned that government is financially powerless to act. In some communities, leaders seem helplessly resigned to a slow slide to economic and political stagnation.

Even leaders who are committed to action worry about the difficulties involved. For many, government appears too slow to exert much influence on a world of rapidly changing technologies. Government intervention could easily make things worse rather than better. Government could politicize things that shouldn't be politicized, or rush in with tax-funded programs that may primarily serve to push firms to move to lower-tax jurisdictions.

While threats to national security may have produced an upsurge of trust in government, trends over recent decades seem to be reorienting power away from government and towards the private and non-profit sectors.[3] Political support for government-mandated regulation and redistribution is generally low. Government capacity for tax-funded new job or community development programs is also generally viewed as low. In many settings, watchful waiting may be wiser than rushing in, with small efforts better than large ones. Careful judgment is required.

Balance

"... a constantly readjusting balance between individual accountability and community support."

WELL-CONSIDERED, BALANCED ACTION

Rather than inaction or impulsive action, we need well-considered, balanced action. But what will this mean?

To begin, leaders must manage risks as well as returns. We don't have large reservoirs of capacity and support to fall back on if we fail. Failures to reduce inequality or develop the community could make it difficult or even impossible for future projects to succeed.

To minimize risks we need to carefully prepare, then move decisively once we are ready. Small, quick projects will be less risky than large, slow ones. Lessons from early projects must be learned and shared as efficiently as possible.

To create fair and strong communities we must balance freedom and individual accountability against standards and community support. Too much reliance on individual freedom and markets will eventually lead to too much inequality and divisiveness. Situations offering huge economies of scale cannot be expected to regulate themselves. At the other extreme,

too much government regulation and community control will eventually stifle incentives and productivity. Governments mired in political debate will not be able to innovate fast enough. These concepts are summarized in Figure 1.

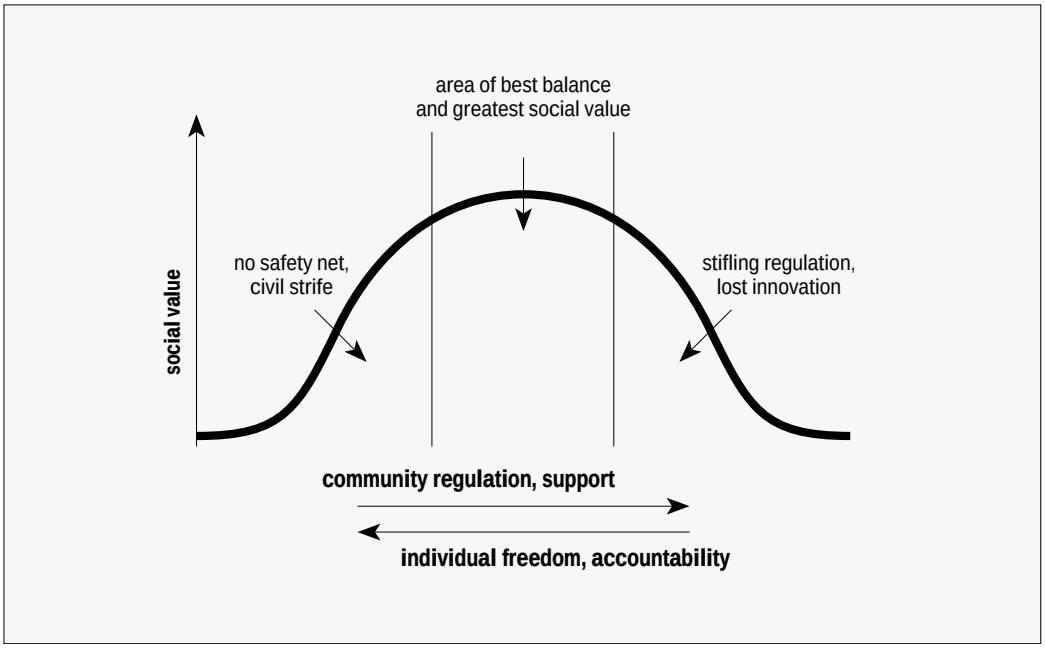

Figure 1: Balancing Individual Accountability and Community Support

To find and maintain balance, we need to learn how networks create leverage for change. A network—once built and developed—can be adapted to new uses or users at low marginal cost. This is the very definition of economies of scope and scale. The benefits of the network grow exponentially, with slow absolute growth at first. Then, when a "critical mass" or "tipping point" is reached…growth explodes.

This critical mass phenomenon can be used to benefit infrastructure, services, and social capital. The "tipping point" principle also occurs in social psychology, leading to dramatic changes in behavior once a certain level of acceptance has been achieved. We need to learn how
network-based applications might leverage these forces to reduce inequality, strengthen communities, and produce other value. If we can do this, we may yet be able to counter the negative elements of the information age via well-considered, balanced action.

Analyze

"...carefully analyze problems and opportunities, then act forcefully."

GUIDELINES FOR PROMOTING EQUAL OPPORTUNITY AND HEALTHY COMMUNITIES

So, how can we use the power of networks to promote equal opportunity and healthy communities? Consider the following eight guidelines.

1. Seek to measure and understand important social and economic trends.

The problem. Given the agency-oriented, internal focus of most government analysis, leaders may be left blind to broad-based problems in the external community and economy.

What to avoid. Beware of analysis that is too narrowly focused or fails to explore underlying causes and remedies.

What to do. Develop measurement and analytical programs including surveys to address important dimensions of community strength and weakness, especially regarding issues related to equity and citizen satisfaction.

An Example. City of Seattle Community Information Technology Indicators Program. Developed under the City of Seattle Citizens Technology Literacy and Access initiative in cooperation with the volunteer Citizens Telecommunications and Technology Advisory Board (CTTAB) and Sustainable Seattle, this program is designed to help understand the impacts of information technology on the vitality of the region. It is hoped that this research will encourage more effective resource allocation. Research topics include: Seattle Technology Residential Survey, Neighborhoods and Technology, Non-Profits and Technology, and Phase I: Indicator Development.

For more information visit: http://www.cityofseattle.net/tech/indicators/

An Example. Studies of the impacts of the Internet. Some governments are moving to learn how computer-mediated communications impact community, culture, and governance. In a government-funded study, researchers of Nanyang Technological University of Singapore recently explored how the Internet impacts children's activities and use of media. Among other things they found that "an increase in Internet use depressed television viewing, but stimulated newspaper reading, radio listening, and socializing with friends." Such studies can create a more informed basis for monitoring and managing computer-mediated communications.

For more information see: http://www.ascusc.org/jcmc/vol7/issue2/singapore.html

2. Improve life-long e-learning for a digital world.

The problem. The most important access issues are not to technology or information, but rather to education and jobs. Indeed, many think that the digital divide is a "literacy" problem more than an "access" problem.[4]

What to avoid. Do not ignore the need to reform education or to link it on a life-long basis to the world of work.

What to do. Provide at least basic access to e-learning in all communities. Then follow up with training and content for key stakeholders including teachers, administrators, employers, and parents, as well as students.

An Example. The Kentucky Virtual High School. Organized by the Kentucky Department of Education, the Council on Postsecondary Education, and major educational partners, the KVHS allows every Kentuckian to enroll in for-credit enrichment or college preparatory classes. Ranging from basic to advanced levels and taught by Kentucky certified teachers, courses are delivered online to schools, homes and other places with Internet access.

For more information on the Kentucky Virtual High School, visit: http://www.kvhs.org/

An Example. The Oklahoma VISION project. This project, led by a public/private consortium, is a statewide effort to produce digital infrastructure for communication, instruction, and accountability among teachers and students, teachers and parents, schools and districts, and districts and state agencies. Stemming from the Virtual Internet School in Oklahoma Network Act, VISION brings together hardware companies, content purveyors, application service providers, and policy leaders to demonstrate a new end-to-end educational infrastructure offering lowered cost and improved quality of service.

For more information, see:
www.onenet.net/onenetnews/category2/sub3/vision_project.htm

3. Protect the public's interest in open access to information services and infrastructure.

The problem. When networking economies of scope and scale are powerful, open standards and public access will often be required to protect the public interest.

What to avoid. While much investment in information infrastructure and related services will be private, avoid letting proprietary interests prevent fair and equitable use by the public.

What to do. Use regulatory and other powers as needed to develop and protect access to "universal service." Government may often need to serve as the "anchor tenant" for new investments in infrastructure, and may also need to update intellectual property policy to adjust to the new realities of an information-based world.

An Example. Section 508 requirements. In 1998, Congress amended the Rehabilitation Act to require Federal agencies to make their information technology accessible to people with

disabilities. Section 508 was enacted to eliminate barriers and encourage technologies promoting equal access.

For more information see: http://www.usdoj.gov/crt/508/508home.html

An Example. The E-rate program. Created as part of the Telecommunications Act of 1996, the E-rate program provides discounts of up to 90 percent of the costs of Internet access and infrastructure for schools and libraries. The independent non-profit corporation that administers the program paid out $2.22 billion in 2000, from a fund based on telephone bill taxes. While the program's future is in doubt, it has done much since its establishment to extend Internet connectivity to schools.

For information see: http://www.fcc.gov/learnnet/

4. Develop and deploy e-services to reach those who need them most.

The problem. While e-services may often be a good way to reach disadvantaged individuals and communities, the design and deployment of such services has often proceeded quite slowly.

What to avoid. Do not assume it is too costly to provide high-end applications for low-income populations. In fact, the reverse may be true, especially if easier-to-use interactivity leads to greater use of self-service applications.

What to do. Accept the challenge of designing e-services for disadvantaged communities. Use the broadly based productivity gains from e-services to focus on expanding opportunities for low-income populations.

An Example. e-NC. The purpose of e-NC is to use the Internet to improve the quality of life for all North Carolinians, especially those in rural areas. The Rural Internet Access Authority leads this grassroots initiative, with support from the N.C. Rural Economic Development Center, the legislature and state government, the telecommunications industry, non-profit organizations, and individuals. In its first year, e-NC has achieved its goal of making local dial-up Internet access available from every telephone exchange in North Carolina. Future goals include high-speed Internet access (at least 128K for residential customers and at least 256K for business customers) to all North Carolinians at competitive prices by 2003.

For more information on e-NC, visit: http://www.e-nc.org/

An Example. Telemedicine in Alaska and elsewhere. Because today's high-tech medicine requires specialized expertise, telemedicine is increasingly important, especially for remote locations. Lieutenant Governor Fran Ulmer of Alaska and others have provided leadership in developing wireless and other telemedicine techniques for Alaska. Texas, North Carolina, and Iowa are also serving as early movers in this critical public policy and service delivery arena.

For information see: http://www.telemedicine.alaska.edu/

An Example. The E-Community Connect (ECC) program in NYC. The City of New York helps overcome the digital divide in the Washington Heights section of upper Manhattan by providing access to the Internet and—more importantly—to training and community-specific content developed through partnering with community organizations.

5. Use networks to facilitate participation in local communities and institutions.

The problem. Technology has by and large not been used to help people manage their local lives more easily and in smaller units of time.

What to avoid. Don't give up on the concept of "community networks." Economies of scope and scale make locally oriented applications increasingly cost-effective.

What to do. Form public-private collaborations to help a variety of local institutions—churches, community centers, and small businesses—gain access to digital infrastructure and applications.

An Example. Smart City Cornwall. Cornwall, Ontario, a Canadian city of approximately 50,000, has aggressively sought to use intelligent systems and broadband communications to compete successfully for jobs and lifestyle in the information age. Under the leadership of Mayor Brian Sylvester, Cornwall has developed one of the fastest growing economies in Canada, focusing on job development, health care, and on a variety of tools to make it easy for citizens to participate productively and enjoyably in the life of the community.

For more information, see: http://www.smartcitycornwall.com/ and also http://www.thevillagehub.ca/

An Example. Austin, Texas. Austin has used the region's strong technical literacy and economic vitality to provide Internet access to low-income areas. With local government supporting such initiatives, Austin has become a leader in exploring the social and community-building potential of information technologies.

To examine what Austin has done, visit: http://www.ci.austin.tx.us/neighbor/default.htm

An Example. Gyandoot India Community-Owned Rural Internet Kiosks. The goal of this 2000 Stockholm Challenge IT Award-winning initiative is to establish community-owned and sustainable information kiosks in a poverty stricken rural area of Madhya Pradesh, India. Based on input from villagers, the kiosks provide access to information and records that were previously either difficult or impossible to obtain. The network of 31 kiosks now serves nearly half a million residents.

For more information, visit: http://gyandoot.nic.in/gyandoot/intranet.html

6. Use networks to strengthen social capital within virtual communities.

The problem. As life has become more frenetic and less locally oriented, many people feel a reduced sense of belonging, security, and commitment to their communities.

What to avoid. Do not think of network-based support only in terms of local communities and jurisdictions. Distant and virtual communities, dispersed jurisdictions and work groups, professional associations, ethnic, cultural, and other groups can offer many rewarding opportunities for developing social capital.

What to do. Invest in learning how groups relying heavily on computer-mediated communications can grow to become supportive, well-governed communities.

An Example. My Connected Community. My Connected Community (known as mc2) is a program funded by the Victoria, Australia, "Connecting Communities" policy to encourage community groups to create their own online communities.

"The My Connected Community program helps Victorians to get online, stay in touch, and build Internet skills and experience" said Marsha Thomson, Minister for Information and Communication Technology. "More than ever, the Internet is part of our everyday life, and the Bracks Government is committed to helping all community members to benefit from getting online."

Ms. Thomson has invited all Victorian community organizations to apply for funding, particularly those supporting hard-to-reach citizens including people from non-English speaking or indigenous backgrounds, people with disabilities, and people earning low incomes.

For more information on My Connected Community, visit: http://mc2.vicnet.net.au/

An Example. The Association of Computer Machinery's Special Interest Group on Supporting Group Work. ACM's SIGGROUP is organized to explore virtual communities and the tools that may assist in their formation, operation, and governance. The group has encouraged and evaluated the development of software. It has also organized conferences and publications that have not only researched developments related to virtual communities but have also applied them to their own multi-national "virtual" community.

For more information see: http://www.acm.org/siggroup/index.html

7. Develop an equitable revenue model for information age government.

The problem. Net-based activities may escape taxation more readily than traditional commerce, thereby reducing government funding for services to low-income populations.

What to avoid. Beware of too great a reliance on taxing sales, bank accounts, or other activities and assets that can easily be moved outside the jurisdiction.

What to do. Explore new revenue models for government, evaluating and responding to what could be lost and gained as economic activity becomes knowledge-based and global.

An Example. Ken Blackwell and business information for the State of Ohio. As in many states, the Ohio Secretary of State is responsible for business registrations and related information. As he entered office, Blackwell commissioned a performance audit that documented that many businesses had to wait several hours to get through to the Secretary of State's

office on the telephone. In offering computer-based approaches to extend access and improve service, Blackwell revised the fee structure to allow his office to cut tax-levy funding by roughly two-thirds while simultaneously improving responsiveness and customer satisfaction. According to one published study: "Ohio service on researching a corporate name and status is easier to use, better presented, with more information. It is one of the best in its class."

For more information see: http://www.state.oh.us/sos/Goals_Acc.htm

An Example. Tradable Universal Service Obligations. Universal service (i.e., the delivery of services to an entire population) is a goal of most telecommunications policies. Professor Jon Peha of Carnegie Mellon University has proposed "a novel policy to motivate private-sector operators of basic infrastructure to expand infrastructure into previously underserved regions."[5] Through this policy, telecommunications firms gaining access to state-controlled resources would also receive tradable obligations from the state in the form of commitments to service and milestones to be met. By specifying the ends (service commitments and milestones) rather than the means to achieve them (infrastructures and protocols), government can maintain competitive pressures while minimizing subsidies. With tradable obligations, firms are encouraged to develop more cost-effective strategies because they can adapt them over time to allow the most cost-efficient producer to meet the obligations.

For the full argument see: http://www.ece.cmu.edu/~peha/trade.pdf

8. Broadly engage the community in articulating future goals and plans.

The problem. The first movers to computer networking have largely been driven by market pressures and do not represent all the interests—especially the public interests—that the community should consider.

What to avoid. If government is too slow to respond to the digital world, developments could solidify in ways that are far less than optimal and very difficult to change.

What to do. Engage diversity. Community organizations, advocacy groups, and those who at present are not heavy network users will be important in defining our aspirations and investment goals.

An Example. Canada's Broadband planning process. In preparing for broadband infrastructure and applications, Canada's National Broadband Task Force has self-consciously sought to address cultural and political concerns in addition to issues of economic competitiveness. The Task Force is broadly representative of Canadian stakeholder groups and leaders.

For more see: http://broadband.gc.ca/english/resources/BroadbandSummary.pdf

An Example. Virginia's Digital Community Leadership Guidebook. While many governments are still building their e-government agenda from the inside out, some are aggressively reaching to engage a diversity of outside stakeholders in planning and development activities.

The Commonwealth of Virginia is one such government, producing guidebooks for leadership at:

http://www.councils.cit.org/ecommunities/pdf/guidelines.pdf, especially pages 34-40.

• • •

Digital infrastructures are owned more by the private sector than earlier infrastructures such as those for transportation or analog communications. In a world of bigger and sometimes better markets the role of government has become less dominant, if not fundamentally less important. But we must remember that market forces alone will not solve some of our most critical problems related to equity and community. To maximize success, governments will need to carefully analyze problems and opportunities, then act decisively and with laser focus. Guidelines are summarized in Figure 2.

1. Seek to measure and understand important social and economic trends.
2. Improve life-long e-learning for a digital world.
3. Protect the public's interest in open access to information services and infrastructure.
4. Develop and deploy e-services to reach those who need them most.
5. Use networks to facilitate participation in local communities and institutions.
6. Use networks to strengthen social capital within virtual communities.
7. Develop an equitable revenue model for information age government.
8. Broadly engage the community in articulating future goals and plans.

In sum: Careful judgment needs to precede forceful action; market forces alone will not produce equity or strong communities.

Figure 2: Guidelines for Promoting Opportunity and Community

Next Steps

"How well are you prepared for the future?"

NEXT STEPS

To nurture equal opportunity and healthy communities, what should leaders do next? Three steps can get you started.

1. *Orient to the problem.* Issues of equality, trust, and community are often relatively invisible and unexamined. An essential but often overlooked starting point is simply to begin the conversations and exploration required for understanding relevant trends. Measure what is happening.

2. *Analyze and build support for future goals.* For many jurisdictions, starting by analyzing and building support for the future is likely to be better than rushing too quickly into risky and often controversial policies, especially those that rely on tax-based transfers from the rich to the poor.

3. *Then get into gear.* While some communities are pessimistic about the future, few are truly helpless. The information age is based on widespread and relatively inexpensive resources. Leadership is the most critical ingredient for future success.

• • •

While most people are optimistic about the prospects for long-term economic growth, they are often pessimistic about a future beset by low social cohesiveness and trust. But the same information infrastructure and education required to develop economically can also be used to support social capital, inclusion, and participation. While rapid social change seems inevitably linked to anxiety, there is much we can do to benefit from a knowledge-based world while at the same time protecting against the risks. The future is ours to make.

This report has provided guidelines for promoting equal opportunity and healthy communities. Our next and final report in this series will explore how to prepare for the changing nature of democracy in a digital world.

The President. Using IT to develop inclusive and supportive communities requires new collaboration among the public, private, and non-profit sectors. Presidential leadership is needed to mobilize aspirations and resources.

Legislators. Locally elected legislators need to focus community attention on the need for social capital and inclusiveness as the information age matures.

Governors. Much as the President provides a focal point nationally, governors play a similar role at the state level. Governors need to mobilize stakeholders to explore issues of social capital and community.

Local leaders. While local leaders must skillfully address anxieties raised by rapid change, local success will require wise adaptation more than stubborn resistance to change.

Judges. Judges foster community through their critical role in conflict resolution. Judges must evaluate how judicial processes might best be revised to respond to emerging new patterns of conflict.

Budget directors. Resource allocation needs to meet challenges requiring private and non-profit as well as public resources. Develop an understanding of these needs and respond.

Agency and program heads. IT can be used to reach those who find traditional services difficult or even impossible to access. Your responsibility is to make sure that this potential access improvement materializes.

CIOs. IT managers have responsibility for using IT to revise business processes; in the future, CIOs must also use IT to support both real and virtual communities.

Technology community. The risks of technology must be addressed, including threats to jobs and social capital. The technology community must be a trusted partner in addressing these risks, and not seen as an opportunist.

Associations and interest groups. Groups must provide leadership in exploring how non-geographic communities can use IT to strengthen social capital and governance.

The media. "Provide light and people will find their own way." The media's searchlight is needed on issues of equity and community in a network-based world.

The public. Look for net-based ways to participate in geographic and virtual communities of importance to you.

Figure 3: Advice to Stakeholders for Promoting Opportunity and Community

Appendix A

MEMBERSHIP OF THE HARVARD POLICY GROUP ON NETWORK-ENABLED SERVICES AND GOVERNMENT

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Note: Organizational affiliations and position titles reflect the professional status of HPG members and alumni at the time of their initial association with the group.

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Appendix B

READINGS AND RESOURCES

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Appendix C

GLOSSARY

Application Service Provider (ASP)—A third-party organization that provides software-based services to clients from a single location over a wide-area network. Represents an outsourcing option for governments who cannot or do not want to deliver and support enterprise applications. Also referred to as Managed Service Providers (MSP) when the software is both delivered and managed by the third-party organization.

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).

Enterprise Application—A software application that is used throughout an organization (or enterprise). For example, payroll systems or resource management systems that are used by multiple departments or an online payment processing application that is used across organizational boundaries are all enterprise applications. Such applications are important for realizing economies of scale and for ensuring information can be shared.

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.

Kaizen—Originally defined in Masaaki Imai's book *Kaizen: The Key to Japan's Competitive Success*, *kaizen* refers to a process of continuous improvement through small sustainable steps.

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.

Lifecycle Costs—The costs of developing, maintaining, operating, and eventually retiring an IT system or application. When budgeting for IT initiatives, stakeholders often focus on development costs, overlooking future costs that can represent a larger percentage of the full lifecycle costs.

Managed (or Management) Service Provider (MSP)—See: Application Service Provider (ASP).

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.

Prototype—A pre-production, functioning model of a system or application. A prototype is generally used for the evaluation of design, performance, or production potential.

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.

Scope Creep—The gradual accumulation of new or expanded requirements after a project plan (project scope) has been agreed upon by all parties. Scope creep is a significant risk to implementation success as it increases cost and extends project timelines.

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.

Share-in-Savings/Revenue—A financing strategy whereby government compensates a private-sector partner with a share of funds saved/raised as a result of the partnership. This financing strategy is commonly used when the private-sector partner agrees to cover the up-front costs of a project. It is also used to align incentives with desired outcomes.

Slow Trigger, Fast Bullet—An analogy used to describe an implementation strategy in which careful project planning and preparation (the slow trigger) is followed by swift and decisive action steps (the fast bullet) that quickly move the project to a stage that safely demonstrates value.

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] The Congressional Budget Office, Historical Effective Tax Rates, 1979-1997, Preliminary Edition, May 2001. http://www.cbo.gov/ftpdoc.cfm?index=2838&type=1. While intergenerational movement is higher in the U.S. than many other places, with options for upward (and downward) mobility—the gap between rich and poor is clearly growing.

[2] The erosion of social capital is forcefully presented in Robert Putnam's book *Bowling Alone: the Collapse and Revival of American Community*, Simon and Shuster, 2000. Efforts to measure and develop public policy responses are described and analyzed through the Saguaro Seminar at: http://www.ksg.harvard.edu/saguaro/putnam.html. The September 11, 2001 attacks on the World Trade Center and the Pentagon generated a swell of community consciousness that may or may not result in permanent change. Putnam's analysis has generated considerable attention and controversy, especially his public policy recommendations.

[3] See John Donahue and Joseph Nye (editors), *Governance Amid Bigger, Better Markets*, Brookings Institution Press, 2001.

[4] Andrew Blau as quoted in March 3, 2002 Mercury News article, reprinted at: http://e-ratecentral.com/archive/Bulletins2002/bulletin_203.htm

[5] From "Tradable Universal Service Obligations," Telecommunications Policy, Vol. 23, July 21, 1999, pp. 363-74. PDF, for other papers by Jon Peha, see: http://www.ece.cmu.edu/~peha/papers.html

EIGHT IMPERATIVES FOR LEADERS IN A NETWORKED WORLD

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THE HARVARD POLICY GROUP
ON NETWORK-ENABLED SERVICES AND GOVERNMENT
JOHN F. KENNEDY SCHOOL OF GOVERNMENT

CAMBRIDGE, MASSACHUSETTS

Eight Imperatives

for Leaders in a Networked World

Imperative 8:

Prepare for Digital Democracy

The Harvard Policy Group
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John F. Kennedy School of Government

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

PREFACE

As we proceed further into 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.

Until recently 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. Having worked 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 leadership imperatives for 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 leadership strategies in a networked world.

The report you are reading explores imperative #8: *Prepare for Digital Democracy.* Here we explore challenges that the growth of computer networking brings to democratic governance and how governments can respond by increasing both the breadth and depth of citizen participation in democratic processes.

The HPG was made possible through a partnership among the Kennedy School of Government, American Management Systems, EDS, IBM's Institute for Electronic Government, the MITRE Corporation, and Unisys. 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. However, 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 public and private-sector leaders and to the public at large.

THE HARVARD POLICY GROUP ON NETWORK-ENABLED SERVICES AND GOVERNMENT
CAMBRIDGE, MASSACHUSETTS
AUGUST 2002

JERRY MECHLING, JOHN F. KENNEDY SCHOOL OF GOVERNMENT
LYNDA APPLEGATE, HARVARD BUSINESS SCHOOL

As citizens, we care about how well government meets its responsibilities—about traditional concerns for effectiveness and efficiency. We are also concerned about how the government goes about deciding what its responsibilities should be. We typically care about ends even more than means, about politics more than administration. Who does government listen to? What values get priority? How should government officials be held accountable?

Of four often cited benefits of e-government, which is the most important? In an extensive Hart-Teeter poll[1], respondents said:

Government that is more accountable to its citizens	36%
Greater public access to information	23%
More efficient and cost-effective government	21%
More convenient government services	13%

Earlier papers in this series have focused on the output or implementation side of government. In contrast, this paper focuses on the input or policy side. As human interactions go electronic, how and to what extent should we redesign democratic institutions and processes?

Voting

"While voting is the central democratic act, it can also lead to flawed decision-making."

THE DIGITAL DEMOCRACY PROBLEM: PROTECTING THE PUBLIC INTEREST IN A CHANGING AND INTERDEPENDENT WORLD.

Value created through human interactivity depends on good governance—on resolving conflicts in a civilized and socially productive manner. For example, trade improves when participants trust that contracts will be fairly enforced. When trade "spills over" to uninvolved parties (as with negative spillovers from pollution or positive spillovers from police protection), we need government to stand up for otherwise unrepresented interests.

We thus need at least minimal government to protect the public interest. To this end we give government an enormous degree of power and authority—including, through the

police and the military, the authority to use physical force. Throughout history government has been essential for well-ordered, civilized life. Unfortunately, government has too often also abused its power.

Democracy has been designed to secure the benefits of government while guarding against abuse. The core idea is to make the will of the governed the source of authority. This idea is made operational through voting. In some situations, more than a majority vote is required in order to promote deliberation or protect the rights of minorities. Voting ultimately decides who wields power, and subsequent voting holds those in power accountable. As Lincoln said: democracy is "of the people, by the people, and for the people."

While voting is the central democratic act, it can also lead to flawed decision-making. Voters may not be paying enough attention to decide issues in a timely manner, or to hold their officials truly accountable. Even when paying attention, the voting public is unlikely, on many issues, to be as knowledgeable as society's best. Over the years, democracies have thus sought to improve decision-making through representative democracy (where elected officials have time to develop more skill in government problem solving), through broad-based education, and also through free speech and a free press.

Several characteristics of the Information Age make democratic governance even more challenging than it has been in the past:

1. *Rapid rates of economic and social change.* These increase the number of conflicts that need to be resolved.

2. *Growing scientific knowledge and issue complexity.* These increase the need for expertise.

3. *Cross-jurisdictional interactions and interdependencies.* These make it difficult to establish which units of government should be given authority and held accountable.

The challenges of change, complexity, and interdependency are serious – and growing. How can they best be resolved?

Depth

"We need depth as well as breadth."

WHAT TO AVOID: CITIZEN DISENGAGEMENT AND "THIN" DEMOCRACY

For democracy to succeed, the link between governance and the will of the people must not be weak or superficial.

However, as interactions grow in scale and complexity, citizens can find that governance becomes burdensome and frustrating. For many people, civic responsibilities fall low on

their personal list of priorities. We aren't as engaged in politics as we once were. While we may go bowling as many times as we did forty or fifty years ago, we don't bowl as often in organized leagues; as Robert Putnam has observed, we are "bowling alone." We have become disengaged from many activities that build trust and social capital.[2]

But if disengagement is an insidious danger, so is shallow engagement. Given modern communications, politics by plebiscite could replace the deliberative democracy that Madison and others sought in the Federalist Papers. Such a "thin" democracy would also be unlikely to lead to good governance.[3] We need depth as well as breadth.

Balanced

"... a well-balanced way to clarify and empower the 'will of the people.'"

"BALANCED" DEMOCRACY: COMBINE BREADTH AND DEPTH

For democracy to work well, it must avoid capture by either special or shallow interests. Government blind to the common interest is clearly dangerous. But so is government blind to deliberation and expertise. What we need is a well-balanced way to clarify and empower the "will of the people."

Such concerns were crucial for the Founding Fathers. They protected free speech and a free press in order to keep government from becoming tyrannical. But they also created representative rather than direct democracy in order to keep popular opinion from becoming tyrannical.

The Information Age raises anew the need to understand and balance such risks. New conflicts are emerging along with new possibilities for citizen engagement. Failing to adjust democracy will be risky, but so will many of the adjustments that might be made.

Figure 1 (see next page) plots patterns of citizen participation in two dimensions. One measures depth of participation or the degree to which decisions emerge from careful citizen deliberation and respect for expertise. The other measures breadth of participation, or the degree to which decisions emerge from broad citizen engagement in the life of the community. Note that all four categories defined in the figure can meet a technical definition of democracy, as sovereignty can be based on free elections.

The worst results—labeled "disengaged democracy"—occur when citizens are neither deeply nor broadly engaged in governance, and the government fails to attract competent and well-meaning leaders. Such a society generates little social capital. The danger of poor governance looms severe.

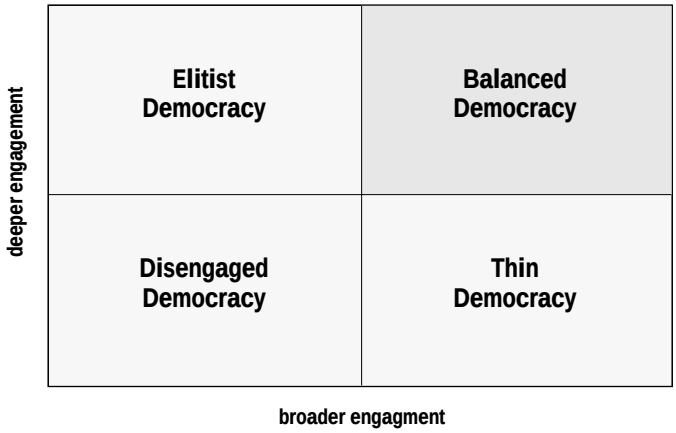

Figure 1: Citizen Participation Patterns

Somewhat better results can be produced even with narrow participation (as is often true in the U.S. today) if decisions are based on thoughtful input and competent officials. This could be called "elitist" democracy. The obvious risks are those of capture by special interests and a related low respect for government.

At the other extreme we have democracy with broad but shallow citizen engagement. While such "thin" democracy should be an improvement over disengagement, it faces severe risks from decisions based on momentary and easily manipulated concerns. Using IT for participation without deliberation would not be consistent with what the Founding Fathers had in mind.

The best hope lies in a "balanced" democracy, where citizen engagement is both broad and deep. The question, of course, is how to strike a proper balance, especially in the 21st century as commercial, social, and political interactions are increasingly specialized and conducted over computer networks.

Adapt

"...we have much yet to do to adapt democracy to a digital world."

GUIDELINES FOR BALANCED DEMOCRACY

In preparing democracy for a digital world, consider the following seven guidelines.

1. Strengthen civic education and other efforts to nurture democratic values.

The problem. Democracy depends on people willing to both define and support the "public interest." Unfortunately, in too many cases our culture seems to emphasize freedoms and personal interest to the exclusion of responsibilities and the public interest.

What to avoid. Do not continue to think of civic education as impossible, sophomoric, or otherwise off-limits.

What to do. Develop civic skills – including the ability to work well with others in resolving conflicts—on a long-term, bi-partisan basis. Encourage support for democracy at home as well as around the world.

An Example. Steven Clift and Minnesota E-Democracy. Minnesota E-Democracy is a non-partisan, citizen-based organization to improve democracy in Minnesota through information networks. Established in 1994, it created the world's first election-oriented web site. Minnesota E-Democracy's focus today is not so much elections as the use of the Internet for citizen participation in all aspects of governance. As part of this effort, the site features "Democracies Online," including the free newswire service "DO-WIRE." The site also hosts peer-to-peer public forums based on interests (e.g. Networking Neighborhoods) and geographic constituencies (e.g. Asia, London, California).

For more about Minnesota E-Democracy, visit http://www.e-democracy.org/

An Example. "e-Government: An Experiment in Interactive Legislation." This website, sponsored by U.S. Senators Joseph Lieberman and Fred Thompson, describes nearly 50 e-government proposals and offers citizens an opportunity to read and comment. Visitors to the site can read comments from other visitors. The comments are expected to be useful in creating further e-government initiatives.

For more information about the e-government website, visit http://www.senate.gov/%7Egov_affairs/egov/

2. Improve life-long e-learning for a digital world.

The problem. When it is too difficult to access government information, services, or officials, citizens become frustrated and disengaged.

What to avoid. Do not equate transparency with "shovelware"—i.e., information that has simply been "shoveled" onto the web without editing, references, or connections. High tech veneer does not solve the underlying problems.

What to do. Use technology in a concerted and broadly based effort to make information, services, and officials easy to access. This will promote transparency that leads to longer-term pressure for accountability and responsiveness.

An Example. FirstGov. In September, 2000, as a first step toward web-enabled government, the General Services Administration (GSA) launched FirstGov as a government-wide web portal for the U.S. Federal government. Designed primarily as a search engine for government information, FirstGov provides access to over 31 million federal pages. Facing reluctant buy-in from some agency CIO's, new developments are under way to expand FirstGov's utility and reach. Links to state government sites will increase total pages to over 50 million. Plans are also underway to add interactivity and highlight transactional services.

For more about FirstGov, visit http://www.firstgov.gov/

An Example. Scorecard. The Environmental Defense Fund (EDF) developed the Scorecard Project to provide the public with internet-accessible data about the impacts of toxic chemicals. Scorecard supplements raw data available through other organizations (such as the Environmental Protection Agency's Toxics Release Inventory reports). By helping interpret environmental data in terms the public can understand, Scorecard hopes to strengthen and expand the constituency for environmental protection.

For more information, visit http://www.scorecard.org

3. Explore new IT-enabled processes for e-politics and e-voting.

The problem. Politics has long been referred to as "the conversation," yet many people are too busy to talk—or even to listen. This erodes the quality of decision-making as well as the overall legitimacy of the government. Governance is not effective if not seen as responsive to the people.

What to avoid. Do not consider the political system "off limits" when designing new IT-enabled processes. And do not run another election that could possibly be decided by dimpled chads.

What to do. Explore the many options and attributes of electronic voting with their potential for providing better information and increasing voter participation. However, proceed carefully with changes to the electoral process, since public trust in elections is of the utmost importance.

An Example. Youth e-vote. Youth e-Vote was created for the 2000 election by a coalition of educators, youth groups, and technology specialists as an experiment in national registration and online voting. In addition to the student portions of the site, a portion was devoted to teachers for curriculum materials and a chat space. Online voting was conducted voluntarily

through schools and the Youth-e-Vote.net web site. The program encouraged students to learn about candidates, issues, and how elections work. Students were given a registration number and voted for President, Senate, Governor, and other key issues. Results were reported publicly before the actual election.

For more information, visit http://www.youthevote.net/main.html

An Example. Arizona Democratic Presidential Primary. In March 2000, the State of Arizona conducted the first legally binding online election in the US. In what was a shock to many, half of the total ballots were cast via a website created by election.com.[4] Voters who logged on to the Arizona Democratic Party web site were directed to an electronic letter where they verified the contents by clicking. They then filled out a number of screens using identifying information that included an individual seven digit pin number mailed to them prior to the election. After identifying themselves and voting, they received an on-screen certificate of confirmation. Despite some technical problems with servers timing out, voter turnout increased more than 600% compared to the 1996 primary. In many counties, increases in voting by minority populations increased by an even greater percentage.[5]

For more information see: http://www.election.com/uk/political/arizona/

4. Provide intelligent and committed IT support for legislatures.

The problem. Often overwhelmed by issue complexity, legislators—and entire legislative bodies—are falling prey to overload.

What to avoid. Do not merely hand out technology—e.g., laptops, email, websites, and other technology—to legislators and other officials without implementing an overall strategy for personal and institutional learning and for coping with overload.

What to do. Use IT to help legislators and staff to break through the barriers that geography and disorganized information place on their productivity. Provide them with technology to help them find what they need for better deliberations and understanding.

An Example. The National Association of Legislative Information Technology (NALIT). This group, like many associations, supports the identification and dissemination of best practices. By evaluating IT issues of particular relevance to legislative bodies, by giving out awards to leading practitioners, and by supporting conferences and seminars, NALIT has witnessed and supported a flowering of IT-based support for legislative bodies. Harnessing the indexing power of intelligent systems, legislators, staff, and even the general public can much more efficiently find research and information than was possible before. According to Joe May, Co-Chairman of the Science and Technology Committee of the Virginia House of Delegates: “Five years ago, it was 10 percent e-mail and 90 percent paper. Now, it’s 10 percent paper and 90 percent e-mail.”

For more information see: http://www.ncsl.org/programs/lis/nalit/nalithmp.htm

An Example. E-government in Estonia. Ten years ago, Estonia was just gaining independence from the Soviet Union. Today it is a model of paperless government. Cabinet ministers read, comment, and vote electronically. Although Estonia is a small Baltic nation (1.4 million) and was late in adopting technology, its growth to 214 web connections per 10,000 people now puts it ahead of Germany. The Justice Minister has proposed e-voting in the parliamentary elections set for 2003. If approved, Estonia could become the first European country to allow Internet voting in a national election.

For more, visit: http://www.riik.ee/riso/report.htm

5. Develop e-democracy programs for existing governmental institutions.

The problem. While some governments have begun mobilizing for digital democracy, many have not.

What to avoid. Do not think e-democracy will take care of itself or can be prepared for quickly. Allow for analysis, deliberation, and ongoing experimentation.

What to do. At minimum, observe what other governments have been doing—at local, state, and federal levels—and then analyze, adopt, and adapt the most promising initiatives.

An Example. E-government Act of 2001. Also known as the Lieberman/Burns bill, this legislation would create a Federal CIO within OMB to promote e-services and address issues such as privacy and security. It would also establish an interagency fund to break down barriers to interagency cooperation. While the bill is currently stalled (partly due to a reassessment of priorities after September 11, 2001), its components have support from many in government and industry.

For more, visit: http://www.senate.gov/~gov_affairs/050101_press-summary.htm

An Example. UK Online's CitizenSpace. A part of e-democracy efforts by the United Kingdom[6], this website supports participation in two parts. One provides public information such as how to make a complaint. The other is a gateway to consultation and discussion (Say So). The Say So section provides an index of all Government consultations and monitored forums. Here users can discuss views with other users, find information about elections, and contribute to policy-making through official consultations.

For more information on CitizenSpace, visit: http://www.ukonline.gov.uk/

6. Develop new approaches and tools focused on cross-jurisdictional problems.

The problem. Cross-jurisdictional interactions—e.g., financial, health, and education services; pollution flows; even criminal and terrorist activities—are becoming simultaneously more frequent and more difficult to govern.

What to avoid. Do not allow governance in your jurisdiction to focus too exclusively on internal concerns and information. External claims and forces cannot be safely ignored.

What to do. Identify cross-jurisdictional opportunities as well as threats, bringing stakeholders together to analyze and negotiate issues. Seek to develop shared sources of trust and authority.

An Example. Your Voice in Europe. Launched by the European Commission, this multi-lingual, interactive, policy-making website is designed to involve citizens and businesses in the Commission's policy-making process. The site provides access to interactive tools and elements, including a debate on the future of Europe with initial contributions from Göran Persson, President of the European Council and Prime Minister of Sweden; Guy Verhofstadt, Prime Minister of Belgium; Romano Prodi, President of the European Commission; and Michel Barnier, Commissioner responsible for Regional Policy and Reform of the Institutions. The site is available in 11 languages and has received postings from all over the EU.

For more information visit: http://europa.eu.int/yourvoice/

An Example. ICANN. The Internet Council for Assigned Names and Numbers (ICANN) is a nonprofit institution organized to govern the worldwide assignment of Internet addresses. This body has so far weathered a number of challenges to its authority as it pursues its innovative approach to providing timely and effective governance. Recently, the ICANN Board chartered an At-Large Membership Study Committee (ALSC) to "forge a consensus on the best method for representing the world's Internet users as individuals."

For information on ICANN, visit http://www.icann.org/

7. Support e-governance research and experimentation.

The problem. A networked world is developing new patterns of social, commercial, and political interactions that will challenge traditional democratic processes and institutions in fundamental ways over the long term.

What to avoid. Do not think too small. Democracy is about far more than electronic voting and plebiscites.

What to do. Support wide-ranging research and experimentation on governance issues. We need to find better ways to engage citizens, develop common ground, and resolve conflicts, much as some of the best private sector organizations have done through their customer service research and experimentation.

An Example. The Pew Internet and American Life Project. The mission of this initiative, funded by the Pew Charitable Trusts, is to "create and fund original, academic-quality research that explores the impact of the Internet on children, families, communities, the work place, schools, health care and civic/political life." Recent studies include "The Internet, Cities, and Civil Society". This research covers previously unexplored areas as well as familiar subjects at a new depth. It should provide a wealth of information for decision makers in all sectors.

For more information see: http://www.pewinternet.org/index.asp

An Example. The Democracy Online Project. Administered by the Graduate School of Political Management of George Washington University, the Democracy Online Project seeks to "promote online politics in a manner which upholds democratic values." In January 2001, the project held a series of debates on computerized voting, the results of which are published on the site along with an online campaigning primer.

For more information see: http://www.democracyonline.org

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In a heavily networked world, we need new and better ways to involve the public in governance. We need citizens to participate more broadly and deeply, with increased civic engagement leading to more effective deliberation. Faced with growing cross-jurisdictional challenges, we have much yet to do to adapt democracy to a digital world.

1. Strengthen civic education and other efforts to nurture democratic values.
2. Use IT to make government more accessible and transparent.
3. Explore new IT-enabled processes for e-politics and e-voting.
4. Provide intelligent and committed IT support for legislatures.
5. Develop e-democracy programs for existing governmental institutions.
6. Develop new approaches and tools focused on cross-jurisdictional problems.
7. Support e-governance research and experimentation.

In sum: Push for "balanced" democracy: Combine breadth *and* depth.

Figure 2: Guidelines for Digital Democracy

Next Steps

"...report to the public on progress toward e-government and digital democracy."

NEXT STEPS

Here are some ways to start applying the above guidelines:

1. *Assess how well democracy is working in your jurisdiction.* What are the shared goals that bring people together? What are the primary conflicts to be resolved? What groups do or do not participate in community life? How deep is commitment to shared values and the community? How satisfied are citizens with government?

2. *Based on your assessment, develop plans to strengthen social capital and utilize electronic channels of communication.* These plans need not require large up-front financial investments, but they will require leadership. Identifying existing sources of social capital and comparing your community with others can be extremely valuable. Work will be involved in learning to use computers to facilitate "the conversation" of politics.

3. *Continue to strengthen democratic institutions.* Civic education needs to be bolstered and recast. Alliances with non-government organizations and participation in cross-jurisdictional communities of interest will also be critical. Develop ways to report to the public on progress toward e-government and digital democracy.

Brief advice for a variety of stakeholders can be found in Figure 3 (next page).

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As more of life is conducted over computer networks, issues of governance are becoming increasingly challenging. We need to develop respected and authoritative means for resolving conflicts and protecting the public interest.

This report offers guidelines for those seeking to prepare democracy for the future. We hope that public leaders—and their overseers in the public at large—will find these guidelines useful.

This is the final report in our series of Eight Imperatives for Leaders in a Networked World. These ideas will be updated and next appear as executive education and toolkit offerings to help leaders turn ideas into action. The challenges of leadership in a networked world will continue to be enormous.

We need your best. And we wish you the best as you step forward to engage information technology issues more deeply, directly, and successfully.

The President. In a digital world, diplomacy and governance will increasingly require people-to-people action on a global basis, not just negotiation among governments. Prepare for it.

Legislators. Your role as interpreter of the will of the people may need to be rethought and recast as technology supports richer communications and a more direct democracy.

Governors. Much as the President provides a focal point nationally, governors play a similar role at the state level. Governors need to mobilize stakeholders to explore issues of social capital and community.

Local government leaders. You will have the greatest need and capacity to encourage IT-augmented community participation. Talk about it, think about it, and then act.

Judges. You will be called to help resolve many new issues where jurisdictional authority is contested. Thoughtful leadership will be required.

Budget directors. Broader and deeper public participation in financial allocations may well require setting up pricing systems to decentralize more decisions to users. Analyze your options, then get into gear.

Agency and program heads. Expand traditional customer analysis to provide citizens with an ongoing and extended governance role in service design and delivery. Use citizen boards creatively.

CIOs. If you've been successful so far, you've undoubtedly communicated well with internal line managers; but for e-government, you must also communicate well with external stakeholders.

Business community. Many businesses have learned to handle politics and governance in a multi-jurisdictional world. Help share and translate your lessons for other stakeholders.

Associations and interest groups. You are gatekeepers of "good practice" within your own communities. Identify good practice for governance as well as for operations.

The media. As always, you will need to assess how well government is working and whether the jurisdictions you reach are keeping up with reasonable expectations.

The public. A world of intelligent networks permits people to participate in politics using smaller blocks of time. Take advantage to become a more effective citizen.

Figure 3: Advice for Digital Democracy Stakeholders

Appendix A

MEMBERSHIP OF THE HARVARD POLICY GROUP ON NETWORK-ENABLED SERVICES AND GOVERNMENT

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Appendix A

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Appendix B

READINGS AND RESOURCES

Accessing Your Ontario. *The Future is Here: A Progress Report on E-Government in Ontario.* http://www.cio.gov.on.ca

Advisory Committee for the Congressional Internet Caucus http://www.netcaucus.org/

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Appendix C

GLOSSARY

Application Service Provider (ASP)—A third-party organization that provides software-based services to clients from a single location over a wide-area network. Represents an outsourcing option for governments who cannot or do not want to deliver and support enterprise applications. Also referred to as Managed Service Providers (MSP) when the software is both delivered and managed by the third-party organization.

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).

Enterprise Application—A software application that is used throughout an organization (or enterprise). For example, payroll systems or resource management systems that are used by multiple departments or an online payment processing application that is used across organizational boundaries are all enterprise applications. Such applications are important for realizing economies of scale and for ensuring information can be shared.

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.

Kaizen—Originally defined in Masaaki Imai's book *Kaizen: The Key to Japan's Competitive Success*, *kaizen* refers to a process of continuous improvement through small sustainable steps.

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.

Lifecycle Costs—The costs of developing, maintaining, operating, and eventually retiring an IT system or application. When budgeting for IT initiatives, stakeholders often focus on development costs, overlooking future costs that can represent a larger percentage of the full lifecycle costs.

Managed (or Management) Service Provider (MSP)—See: Application Service Provider (ASP).

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.

Prototype—A pre-production, functioning model of a system or application. A prototype is generally used for the evaluation of design, performance, or production potential.

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.

Scope Creep—The gradual accumulation of new or expanded requirements after a project plan (project scope) has been agreed upon by all parties. Scope creep is a significant risk to implementation success as it increases cost and extends project timelines.

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.

Share-in-Savings/Revenue—A financing strategy whereby government compensates a private-sector partner with a share of funds saved/raised as a result of the partnership. This financing strategy is commonly used when the private-sector partner agrees to cover the up-front costs of a project. It is also used to align incentives with desired outcomes.

Slow Trigger, Fast Bullet—An analogy used to describe an implementation strategy in which careful project planning and preparation (the slow trigger) is followed by swift and decisive action steps (the fast bullet) that quickly move the project to a stage that safely demonstrates value.

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] The poll is contained in a report by the council for Excellence in Government, *E-Government: The Next American Revolution.* http://www.excelgov.org/techcon/egovex/index.htm

[2] For more on social capital and community see: Robert D. Putnam, *Bowling Alone: the Collapse and Revival of American Community*, (New York: Simon and Shuster, 2000)

[3] For more on thin democracy see: Joseph S. Nye, Jr., "Information Technology and Democratic Governance," *democracy.com?: Governance in a Networked World.* Elaine Ciulla Kamarck and Joseph S. Nye, Jr. eds., p. 12, (Hollis Publishing Company, 1999)

[4] For a breakdown of voter turnout in the 2000 Arizona Democratic Primary, see http://www.azdem.org/breakdown.html

[5] For more information about voter turnout in the 2000 Arizona Democratic Primary, see http://www.election.com/uk/pressroom/pr2000/0324.htm

[6] For more information about e-government efforts in the UK, see http://www.number-10.gov.uk/news.asp?NewsId=2840&SectionId=30

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