

# 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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# 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 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  
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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.”<sup>1</sup> 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.<sup>2</sup>

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

“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.<sup>3</sup>

**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.<sup>4</sup>

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.<sup>5</sup> 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.

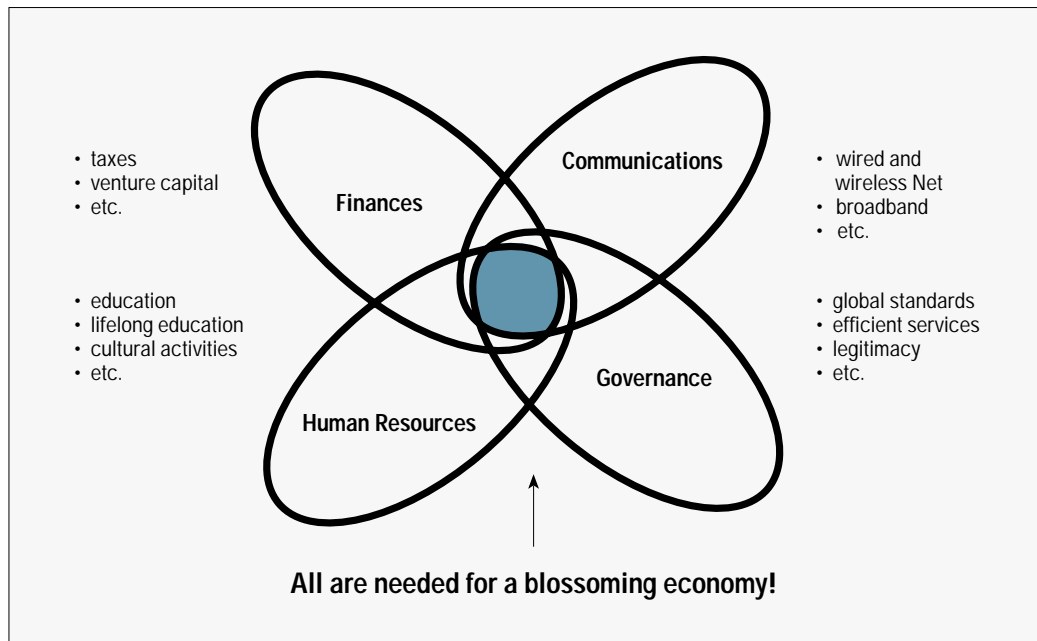


Figure 1: Public-Private Partnerships for Economic Development

# 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](http://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](http://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.<sup>6</sup>

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.<sup>7</sup>

More information about TOPAZ can be found at [gita.state.az.us/GITA/default.asp](http://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)<sup>8</sup> 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](http://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](http://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.”<sup>9</sup>

#### 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.”<sup>10</sup> 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](http://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.”<sup>11</sup>*

For information about Smart Region Hampton Roads see [www.smartregion.org](http://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.<sup>12</sup>

For information on Littleton’s “gardening,” visit [www.littletongov.org/bia/NewEcon](http://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](http://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.<sup>13</sup> 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](http://www.newmexico.org)

West Virginia’s Wild and Wonderful site is at [www.callwva.com](http://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.<sup>14</sup>

*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.”<sup>15</sup>

For information about North Adams, visit [www.bcn.net/nadams/index.html](http://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.<sup>16</sup>

To try out the translator, visit [www.state.ia.us](http://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.<sup>17</sup>

For more information about HUBS, visit [www.hubs.org](http://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](http://www.cit.org)

For more information about NASA's Mid-Atlantic TeCC, visit [www.teccenter.org](http://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 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.<sup>18</sup>

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](http://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](http://www.peoplink.org)

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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.

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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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## Appendix B

### READINGS AND RESOURCES

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## 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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- <sup>2</sup> See John Donahue and Joseph Nye, eds., *Governance amid Bigger, Better Markets*. Washington, D.C.: Brookings Institution Press, 2001.
- <sup>3</sup> For an excellent general reference see the Knowledge Economy page on “The Enterprise Development Website” <http://www.enterweb.org/know.htm>
- <sup>4</sup> For more information on the need for government support, even in an innovations driven economy, see Lewis M. Branscomb, and James Keller, eds. *Investing in Innovation: Creating a Research and Innovation Policy that Works*. Cambridge, MA: MIT Press, 1998.
- <sup>5</sup> For more information on industrial clusters, see Michael Porter, *On Competition*. Cambridge: Harvard Business School Press, 1998.
- <sup>6</sup> 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](http://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](http://fcw.com/civic/articles/2000/0821/web-city-08-22-00.asp))
- <sup>7</sup> See also, Dibya Sarkar, “TOPAZ could dazzle rural Arizona,” *Federal Computer Week*, 15 January 2001.
- <sup>8</sup> For a report on e-learning from the National Governors Association see A Vision of E-Learning for America’s Workforce, ([http://www.nga.org/center/divisions/1,1188,C\\_ISSUE BRIEF^D\\_2128,00.html](http://www.nga.org/center/divisions/1,1188,C_ISSUE BRIEF^D_2128,00.html)).
- <sup>9</sup> Quoted in Heather Hayes, “Retooling the economic engine: Cities seek to fuel growth by luring high-tech dollars,” *Federal Computer Week*, 2 May 2001.
- <sup>10</sup> See Smart Valley, Inc. Case Study. *The Joint Venture Way: Lessons for Regional Rejuvenation*. James Irvine Foundation, Fall 1995. ([http://www.jointventure.org/resources/publications/case\\_svi.html](http://www.jointventure.org/resources/publications/case_svi.html))
- <sup>11</sup> Quoted from Smart Region Hampton Road’s web site at [www.smartregion.org](http://www.smartregion.org)
- <sup>12</sup> See also, Christian Gibbons, “Littleton, Colorado: A Self Reliant Community in the Global Age,” *New Village Journal*, Spring 2000 ([www.newvillage.net/2littleton.html](http://www.newvillage.net/2littleton.html)).
- <sup>13</sup> See also, Nicholas Morehead, “Tech touch could boost tourism,” *Federal Computer Week*, 7 May 2001.
- <sup>14</sup> For more detail see Jennifer J. Salopek, “Rural Electronification: A new advanced training technology industry is putting tiny New Brunswick, Canada, on the map,” *Training and Development*, October 1999.
- <sup>15</sup> Quoted from the North Adams web site at [www.bcn.net/nadams/commerce1.html](http://www.bcn.net/nadams/commerce1.html)
- <sup>16</sup> More information can be found in Dibya Sarkar, “Iowa site speaks many languages,” *Federal Computer Week*, 23 April 2001.
- <sup>17</sup> See also William Welsh, “Lawmakers Seek to Create ‘Smart Region’ in Mid-Atlantic States,” *Washington Technology*, 3 April 2001 ([www.washingtontechnology.com/news/1\\_1/daily\\_news/16374-1.html](http://www.washingtontechnology.com/news/1_1/daily_news/16374-1.html)).
- <sup>18</sup> See Heather Hayes, “They won’t get left behind: By creating communications networks, three cities are writing themselves tickets to the 21st century,” *Federal Computer Week*, 2 April 2001.

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