

Chapter 21

SUSTAINABLE CROSS-BOUNDARY INFORMATION SHARING

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CHAPTER OVERVIEW

Information is one of the most valuable resources in government. Government managers are finding however, that information needed to plan, make decisions, and act is often held outside their own organizations, maintained in disparate formats, and used for widely different purposes. Efforts to bring this data together across boundaries have provided new understanding into just how difficult cross-boundary information sharing is. Finding ways to bring together information and integrate it for use in solving pressing public problems is fast becoming a focus of attention for digital government practitioners and researchers alike. This chapter reports on one such study¹ of cross-boundary information integration that revealed three important lessons for creating and sustaining cross-boundary information sharing: 1) interoperability is key, 2) a shift in agency culture is necessary, and 3) the role of policy-makers is central to this type of project. Four recommendations for action derived from the case studies are presented as well. Government executives and policy-makers need to ensure the creation of enterprise-wide mechanisms and capabilities such as (1) governance structures, (2) resource allocation models, (3) scalable strategies, and (4) non-crisis capacity.

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1. INTRODUCTION

Information is one of the most valuable resources in government. Anderson and Dawes characterize information as the primary input to, and product of, government activity. They identify collecting it, housing it, protecting and using it as fundamental responsibilities of the public sector (Anderson and Dawes, 1991). Information sharing is key to government's ability to work effectively across organizational boundaries. Agency heads and program managers are finding that information needed to plan, make decisions and act is often held outside their own organizations, maintained in disparate formats and used for widely different purposes. Finding ways to bring together information and integrate it for use in solving pressing public problems is fast becoming a focus of attention for digital government practitioners and researchers alike. Efforts to create resources for practitioners are underway at federal, state and local levels (See the list of related readings and online references). And information integration as a topic of study has receiving increasing attention from funding organizations in the US, such as the National Science Foundation, the Office of Homeland Security, the Department of Health and Human Services, and the Department of Justice.

Overcoming the challenges to information integration requires managers and policy-makers from multiple organizations and levels of government to come together to create new capabilities to share information across boundaries. This chapter reports on a study² of cross-boundary information integration that revealed three important lessons for creating and sustaining cross-boundary information sharing: 1) interoperability is key, 2) a shift in agency culture is necessary, and 3) the role of policy-makers is central to this type of project (Pardo and Burke, 2005). Four recommendations for action derived from the case studies are presented as well. Government executives and policy-makers need to ensure the creation of enterprise-wide mechanisms and capabilities such as (1) governance structures, (2) resource allocation models, (3) scalable strategies, and (4) non-crisis capacity.

2. INTERORGANIZATIONAL INFORMATION INTEGRATION

Information integration (1) is a critical component in the design and implementation of several advanced information technologies, such as data

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mining and visualization, (2) involves phenomena and theoretical frameworks in several disciplines, and (3) is a lynch pin in a substantial range of IT use in critical public policy areas such as public safety, environmental protection, crisis response and management, and health care. In a simple conceptualization, information integration allows managers to work at the same time, with the same information drawn from multiple disparate sources. In a more complex form, it has the potential to support the transformation of organizational structures and communication channels between and among multiple agencies working in different locations. It requires radical technical and organizational process and behavior changes for the individuals and organizations involved (Pardo, et al., 2006). Organizations must establish and maintain collaborative relationships in which knowledge sharing is critical to resolving numerous issues relating to data definitions and structures, diverse database designs, highly variable data quality, and incompatible network infrastructure. These integration processes often involve new work processes and significant organizational change. They are also embedded in larger political and institutional environments which shape their goals and circumscribe their choices (Center for Technology in Government, 2002).

While many acknowledge the importance of information integration for health care and other policy domains, the 2004 bipartisan *9/11 Commission Report* presented a sobering picture of the public sector's current ability to leverage information. It emphasized that a weak system for processing and using information impedes the U.S. government's ability to best use the vast amount of information to which it has access. It seems clear that governments could be more efficient and effective if they had the capability to integrate and use the information they already collect and store (Caffrey, 1998 and Dawes and Pardo, 2002).

Despite its numerous challenges, support for information integration transcends partisan politics and crosses multiple policy areas or enterprises. In an August 2004 op-ed in *The Washington Post*, Senators Hillary Clinton and Bill Frist called on the United States to realize the information revolution's full potential to improve the nation's health-care system. Both senators wrote that using technology to integrate information would improve care, lower costs, improve quality and empower consumers.

Integrating and sharing information across traditional government boundaries involves complex interactions among technical and organizational processes. From a technical perspective, system designers and developers must regularly overcome problems related to the existence of multiple platforms, diverse database designs and data structures, highly variable data quality, and incompatible network infrastructure (Ambite and Knoblock, 1997 and Krishnan, et al., 2001). From an organizational perspective, these

technical processes often involve new work processes, mobilization of limited resources, and evolving interorganizational relationships (Davenport, 1993 and Fountain, 2001). These necessary changes are influenced by specific types of social interaction, which take the form of group decision-making, learning, understanding, trust building, and conflict resolution, among others (Chua, 2002, Powell, et al., 1996, and Wastell, 1999).

Government executives are leading agency efforts to integrate information resources across agency boundaries, across levels of government and across governmental jurisdictions. However, while armed with the most advanced IT in the world, they are finding the task exceedingly difficult, leading to serious problems, quick disintegration, or outright failures (Fountain, 2001 and Dawes and Pardo, 2002). Moreover, the difficulty that government agencies face increases proportionally with the increases in the number of boundaries to be crossed, the number and type of information resources to be shared, and the number of technical and organizational processes to be changed or integrated.

Information integration, as well as information sharing, offers organizations a greater capacity to share information across organizational boundaries, to discover patterns and interactions, and to make better informed decisions based on more complete data (Dawes, 1996). Increased productivity, improved decision-making, reduced costs, increased revenues, and integrated services have been identified as positive results as well (Gil-Garcia and Pardo, 2005).

Understanding the type of information sharing being pursued and the challenges associated with achieving the stated objectives is important to understanding the benefits that organizations can expect to realize. The benefits realized from information integration differ from organization to organization and according to characteristics of specific projects. However, there are certain types of benefits that can be expected in almost any information integration or information sharing initiative. Dawes classifies these benefits into three categories: technical, organizational, and political (Dawes, 1996).

2.1 Technical Benefits

Technical benefits are those related to data processing and information management. For instance, information integration reduces duplicate data collection, processing, and storage, and therefore reduces data processing costs that attend every public program (Caffrey, 1998). An information integration initiative can also promote better standards and shared technical resources.

2.1.1 Organizational benefits

Organizational benefits are related to the solution of agency-wide problems or the enhancement of organizational capabilities. Improving the decision making process, broadening professional networks, improving coordination, increasing the quality of services, and reducing costs are some examples of organizational benefits (Anderson and Dawes, 1991 and Gil-Garcia and Pardo, 2005).

2.1.2 Political benefits

Political benefits might include better appreciation for government-wide policy goals, more public accountability, more comprehensive public information, integrated planning, and service delivery (Anderson and Dawes, 1991). Political benefits can also be considered as individual benefits for public officials as a result of the use of specific technology characteristics or applications.

2.2 Understanding the Complexity of Integration Initiatives

Information integration, like many other IT-related initiatives, presents organizations with tremendous challenges. These challenges result from the reality that integrating information ultimately involves large parts, if not the whole, of an enterprise or policy domain. This situation is made even more challenging by the fact that these enterprises differ greatly among states and localities. Those involved in integration initiatives must be aware of the differences and the implications of those differences as they look to their colleagues for guidance and best practices.

For instance, some initiatives focus on a specific problem while others focus on building systemic capacity. Table 21-1 shows one way to classify integration initiatives in terms of their focus and the associated level of organizational involvement. Without oversimplifying the important factors contributing to the success of an information integration initiative, there seems to be a logical progression of complexity. Specific characteristics of each initiative, such as the number of participants or the institutional framework, will influence the final result.

In general terms these dimensions help to characterize the challenges being faced by government practitioners seeking to share information across boundaries. For example, an inter-governmental initiative with a focus on building systemic capacity can be generally understood as more complex

than an intra-organizational initiative focusing on a specific need or problem. The cases presented in this chapter can be classified as D, E, or F type integration initiatives. Therefore, they are high complexity initiatives.

Table 21-1. Types of integration initiatives*

Organizational Level	Focus on meeting a specific need or problem	Focus on building a systemic capacity
Inter-Governmental	E	F
Inter-Organizational	C	D
Intra-Organizational	A	B

*Adapted from Gil-Garcia, et al., 2005

3. STUDY METHODOLOGY

This study examines cross-boundary information sharing through a case study methodology encompassing documentation analysis and semi-structured interviews. This research project concentrates on information integration activities in criminal justice and public health, since they include a full range of functions across all three levels of government. These are also areas in which significant integration initiatives are underway and available for study.

Semi-structured interviews were conducted with public managers and other actors involved in criminal justice and public health information integration initiatives at the state and local level. The public health cases focused on the immediate response to and subsequent preparation for the West Nile Virus outbreaks in Colorado, Oregon, Connecticut, and New York. The criminal justice cases included cross-boundary information integration initiatives in the states of New York, North Carolina, Colorado, and New York City. The interviews addressed three basic questions:

1. What are the critical factors and processes involved in integrating information across levels and agencies in government? In particular we are interested in analyzing how IT and social factors interact to influence the effectiveness of interorganizational information integration.
2. How do the factors and processes vary for different types and degrees of integration?
3. Can the processes be modeled in ways that improve our understanding of information system development and of interorganizational collaboration? Do these models contribute to new theoretical insights for developing and implementing advanced applications of IT?

The research team developed a coding scheme following an inductive logic and using grounded theory techniques (Glaser, 1992, Glaser and

Strauss, 1997, and Strauss and Corbin, 1998). Atlas.ti, a qualitative analysis software tool, was used to support coding and analysis activities. First, based on a sample of interview transcripts, an initial coding scheme was developed by the research team. Second, using this coding scheme, researchers carefully read and coded the rest of the transcripts, always having coordination meetings to make additions and refinements to the initial list of codes. Third, the research team looked for concepts and categories that were well represented in the data as well as the relationships among them. Fourth, a preliminary theoretical model was developed and refined through several iterations to ensure that each variable and relationship was grounded in the interview data. Finally, a high-level conceptual model was developed and the research team derived lessons and recommendations for practice.

4. INFORMATION INTEGRATION IN CRIMINAL JUSTICE AND PUBLIC HEALTH

The arguments for creating capability for sustainable information sharing programs in public health and safety are compelling. As a result, agencies in these domains tend to be early adopters of integrated information resources. In fact, public health and criminal justice are examples of domains that have recognized the value of sharing data across organizational boundaries and already boast of many successful information integration initiatives.

In the public health enterprise, for example, the Centers for Disease Control and Prevention (CDC) spent the last five years promoting information integration to provide timely, high-quality data and information at all levels of government. Information integration presents great benefits not only for daily operation activities, but also for public health emergency response. Gathering, handling and sharing information in response to a public health crisis, such as the emergence of the West Nile Virus (WNV), requires not only great interorganizational coordination and communication, but also adequate technical capacity for sharing information across organizational boundaries and among multiple levels of government.

The U.S. Department of Justice (DOJ), also an early adopter, has encouraged and supported enterprise-wide criminal justice information integration between and among federal, state and local justice agencies. Information sharing, according to Domingo Herraiz, director of the Bureau of Justice Assistance in the DOJ's Office of Justice Programs, is the "cross-cutting prevention piece" that will allow communities to reduce crime and fight terrorism. The DOJ is investing in information sharing in the justice enterprise by developing technical tools such as XML standards for justice information sharing. Information integration can provide important benefits

to this type of initiative, which have the objective of creating systemic capacity for the medium and long term. Public health and safety, as stated above, illustrate compelling benefits of information integration. The complexity of these environments, however, makes the challenges quite compelling as well. To better understand these complexities, we examined

Table 21-2. Basic Characteristics of the Cases

Case Site	Focus of Effort	Involved Parties
<i>Justice Cases</i>		
New York State	Create a portal for delivery of integrated justice services.	New York State Division of Criminal Justice Services, the Director of Criminal Justice, New York State Police, New York State Department of Corrections, and various other state agencies.
New York City District Attorney's Office	Integrate 70+ disparate databases into a single usable information repository.	Several units of the New York City District Attorney's Office
North Carolina	Develop an integrated justice information repository.	North Carolina Justice Agencies, various county and municipal agencies.
Colorado	Expand a nationally recognized information sharing model to other areas of the criminal justice enterprise.	State of Colorado Justice Agencies, Colorado Legislature
<i>Public Health Cases</i>		
New York State	Develop and implement a strategy for responding to the reemergence of WNV.	New York State Department of Health, the New York City Health Department, The Center for Disease Control, State Wildlife pathologist, various county and municipal governments as well as other state agencies.
Colorado	Develop and implement a strategy for responding to the reemergence of WNV.	Colorado Department of Health, The Center for Disease control, various county and municipal governments as well as other state and federal agencies.
Oregon	Develop and implement a strategy for responding to the reemergence of WNV.	Oregon Department of Health, State Veterinarian, various state, county, and municipal governments as well as other federal agencies.
Connecticut	Develop and implement a strategy for responding to the reemergence of WNV.	Central Connecticut Health District, Connecticut Department of Public Health, Department of Environmental Protection

eight public health and integrated justice projects. The project sites (see Table 21-2) were selected based on three criteria: complexity, integration status, and the availability of a governance body. An effort was also made to include various geographic regions of the US.

One interesting and important variation among the cases was the focus of effort. The public health cases all had the same focus – to develop and implement a strategy for responding to the reemergence of WNV. The capability of each state, however, to develop a fully integrated, sustainable information resource varied considerably. In the justice cases, both focus and capability varied considerably. The one characteristic the justice cases had in common was that none of the states were in crisis response. The public health cases were in crisis-response mode; they were all responding to an imminent threat. The similarities and differences among the cases provide a robust set of conclusions about lessons learned and recommendations for action that apply across variations in information integration project focus, the complexity of the project, the stage of integration and the form and format of current governance structures. The recommendations appear to be relevant to both crisis and non-crisis-based responses.

5. MAIN LESSONS

Government leaders and IT executives increasingly recognize cross-boundary information sharing as a critical and complex process. These executives and the agencies they lead are finding their involvement in these efforts goes much deeper than adopting new suites of IT software and hardware. They realize that successful information sharing requires a cross-agency evaluation of how individual agencies acquire and mobilize a wide range of resources, including IT. The difficulty of this task boils down to the ability of a cross-agency group to resolve conflict among organizations and make decisions and mobilize organizational resources across intergovernmental and interorganizational boundaries. Three lessons in particular stand out from the others in terms of value to practitioners as they pursue governmental reform objectives through cross-boundary information integration. These lessons are presented below, followed by specific recommendations for action.

5.1 The Key is Interoperability

Technological advances made data integration possible, but research and practical experience tell us that technology alone cannot solve information integration problems. The solution also requires management and policy

interoperability. Creating processes that span organizations — in a sense, achieving management interoperability — requires a wide range of skills and tenacity. Paul Hutcheon, health director for the Central Connecticut Health District, drew on these skills in his efforts to develop a health district among several towns in central Connecticut. Health districts in Connecticut are designed to maximize public health services by integrating scarce public health resources and attracting additional state funding. They provide an organizing framework, and in some cases, are precursors to full health information integration. Hutcheon faced significant resistance in trying to get local legislative leaders on board. “Each town council member was concerned about losing local control. It’s always the biggest initial issue, but it never turns out to be a real issue,” he said. “It’s really a fear of the unknown.”

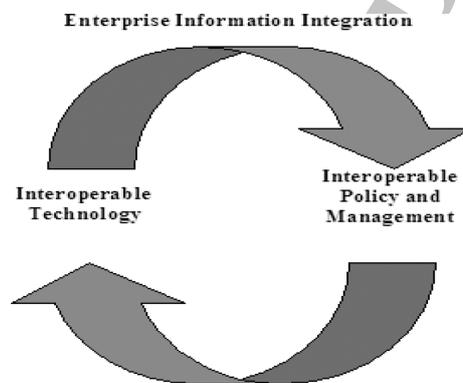


Figure 21-1. Interoperability and Information Integration

Making the argument about the return on investment for resource integration within one agency is difficult enough, but making it across many localities is daunting. Local officials had to decide whether to spend money on local efforts versus investing in an integrated approach with an unclear direct benefit. Responsible officials must ask questions, such as: Do we have to spend more money to be a part of the district? How much will it cost? What are we going to get from it? Are we going to get more than we have now?

Hutcheon mentioned that communicating directly with local officials, over a period of four years, was the only way to succeed. “Not that everybody gets sold on it,” he said, “but you get enough votes to say, OK.” For each potential integration partner, Hutcheon worked to allay local concerns. Hutcheon’s challenge was showing how investment in a health district, which required the integration of town public health resources, including information, would serve local constituencies’ needs.

5.2 Shifting Agency Culture

Changing old work models, according to Martin Cirincione, executive deputy commissioner at the New York State Division of Criminal Justice Services, is a critical step in integration processes. Agency culture presented an initial barrier to New York's enterprise-wide justice information integration initiative, eJusticeNY. "The culture within criminal justice agencies is inherently conservative. If you look at all the different functions performed by government, probably the oldest and most basic is public safety and the maintenance of order in society. Justice agencies have been around for a long time with this same mission."

It is not always easy to keep the right balance between a strong mission-driven culture and innovative uses of information technologies. "Our challenge is adopting new tools along the way that enable us to continue to achieve this mission. Realizing the full potential of information as a tool requires new ways of working and new technologies. We want one point of access that enables us to remain focused on our mission — while taking advantage of new ways to support that mission." Breaking through the conservative nature of most agencies, justice or otherwise, is what makes things work.

5.3 The Central Role of Policy-Makers

Managers can successfully face many of these challenges, but there are others that require the intervention of policy-makers. One of the most powerful lessons learned is that only legislators and government policy-makers have the power to alleviate key constraints on enterprise-wide, sustainable information integration strategies. These constraints are of particular concern as integration teams expand their efforts beyond agency-based, single problem-focused initiatives to enterprise-wide information integration. For information integration's value to be realized at the enterprise level, CIOs must work with elected officials and policy-makers to bridge the gap between what can be accomplished through project-level innovation and what is necessary for enterprise-wide change.

Past legislation and executive policies, often enacted in response to a specific set of conditions, can inadvertently create institutional constraints that make already difficult management tasks even more problematic. Since 1998, according to Theresa Brandorff, former director and CIO for the Colorado Integrated Criminal Justice Information System (CICJIS), criminal justice agencies in Colorado have worked within a legislated initiative enacted to improve the matching of criminal dispositions across local and state law enforcement, and legal organizations in Colorado. The legislation, however, tied funding and decision-making to this single issue, and did not

allow for future needs, said Brandorff. “It hampers agency efforts to expand Colorado’s nationally recognized information sharing model to other areas of the criminal justice enterprise and to other enterprises, such as homeland security.” As CIO, Brandorff played a critical role in translating the needs of public managers into action recommendations for legislators and government policy-makers. This translation resulted in a new bill that was passed by the Colorado General Assembly and signed by Governor Bill Owens.

6. TAKING ACTION

Policy-makers, with the help of CIOs, can begin to back up their calls for sustainable integrated information resources through the development of policies that eliminate environmental constraints. Four recommendations present a starting point for the policy-making.

6.1 Create Effective Cross-Boundary Governance Processes

Information integration projects often blur lines of authority and conflict with existing agency decision-making mechanisms. Cross-boundary governance structures need their own clear lines of authority and realistic membership rosters that recognize the political realities of public-sector decision-making. These should not arbitrarily replace existing lines of authority with cross-boundary governance structures that disregard how decision-making flows through agencies and branches of government. Rather, they must complement traditional mechanisms with transparent, realistic and flexible cross-boundary governance structures that, over time, can handle more and more challenging needs.

CIOs play a critical role in initiating legislative and executive policy changes — changes that will enable governance structures to adapt to changing information integration needs. Brandorff noted that CIOs played a crucial role in Colorado’s efforts to expand its successful information sharing model. “After acknowledging that the current statutes limited the CICJIS governance body in its efforts to expand operations with others as opportunities arise,” she said, “the CIOs of our justice agencies were able to work with their executive directors to craft new statutory language that would enable the executive directors to expand the CICJIS model.”

6.2 Create Enterprise-Oriented Resource Allocation Models

Many government managers are hesitant to participate in information integration projects due to demands the projects make on funds already committed to agency-based programs. Past experience tells decision-makers that new cross-boundary integration projects drain people and money from already overstretched budgets, and most existing resource allocation models do not allow for the movement of money or people across agency lines. The National Governors Association pointed out in a 2002 report that stovepiped funding mechanisms often hinder integration projects. Consequently, even when agencies recognize the value of integration efforts and are willing to commit resources, they can do so only in fits and bursts. But as projects become more complex and long term, they are stymied by the inevitable limitations of the old models. Even in situations where integration initiatives are sanctioned by key leaders, participation and commitment are severely limited by these conditions.

Many recognize that legislation must lay the foundation for resource allocation models that recognize and account for this new way of working. In the Central Connecticut Health District, Hutcheon regularly saw his efforts challenged by traditional rules. “Another challenge we’ve been facing throughout the state of Connecticut is to get the state Legislature to address the existing insufficient capacity of local health departments to provide day-to-day basic public health functions, much less during a public health emergency,” he said. Current legislation under committee review in the Connecticut General Assembly proposes a resource allocation model that would perpetuate public health “stovepipes” at the local government level by funding numerous part-time public health directors throughout Connecticut to provide specific emergency response functions.

Unfortunately emergency response is only one of 10 public health service areas mandated by the U.S. Centers for Disease Control and Prevention. Alternative legislation, also under committee review and supported by the Connecticut Association of Directors of Health, includes a different resource allocation model that would facilitate the integration of public health resources across localities so towns could draw on full-time health departments that provide the full range of public health services rather than just emergency response.

6.3 Invest in Scalable Strategies

Many information integration projects unintentionally create new information silos in the form of horizontal “islands of information.” An

island of information is a collection of information related to a single problem or issue that only a select group of agencies may access. Past legislation and executive policies have often failed to recognize that enterprises are not static or forever tied to a single issue. Enterprises and their member agencies change and will continue to change based on the needs of the government and its citizens. While policies related to information integration often stem from the need to solve a specific problem, they also present leaders with the opportunity to make policies scalable to new issues and sustainable over time.

Dr. Amy Sullivan, Epidemiologist with Oregon's Multnomah County Health Department's Disease Prevention and Control Division, described her challenges collaborating with external agencies on problem-specific and temporary or seasonal programs, such as West Nile Virus (WNV), compared to broader systemic programs, such as bio-terrorism. "In planning for a WNV outbreak, I know the specific people in the specific agencies I need to work with to get the information my health department needs to most effectively support our county leadership and public. In support of my agency's bio-terrorism mission, I'm often dealing with agencies on a much more institutional level," she said. "And honestly, the interactions with individual people in problem-specific situations are just fine, whereas the institutional interactions on larger programs, such as bio-terrorism, can be more complicated."

6.4 Reduce Barriers to Noncrisis Capacity Building

Government agencies react well to crises, in part because they loosen the institutional and organizational constraints on multiorganizational efforts, such as information integration. Crisis response is myopic, however, because resources are targeted to respond to a specific situation. Committing resources to build government's overall response readiness becomes a priority on the public agenda following a crisis, but then tends to recede as quickly as it emerged. Government leaders have the exclusive ability to sustain investments in overall response readiness by creating an environment that enables enterprise-wide integrated information to be cultivated and improved over time so they are available to help avoid and respond to future crises. Investment in readiness requires tangible resources, such as personnel, equipment and infrastructure, but less tangible resources, such as capacities for collaboration among various government agencies, can be even more critical.

Multnomah County's Dr. Sullivan has also found that for agencies to achieve information integration on a more systemic and institutional level, they must understand each other's missions and needs. To achieve this level

of understanding, she said, agencies go through several stages of collaboration. The first stage is “shake hands.” Meet and get to know the people from agencies you will be working with. The second stage is to coordinate planning and training with agencies through exercises and routine responses. Only after going through these first two stages can agencies reach the stage of true information integration. Building this collaboration capacity takes time and resources, and only through legislative and executive support can individual agencies begin to work through the first two stages and be prepared for information integration when and wherever it’s needed.

7. CONCLUSION

While government managers play their own essential roles in government information integration, legislators and government executives alone have the power to change environmental constraints that impede the ultimate success of information sharing initiatives. Public-sector executives, in particular chief information officers, can be the bridge between agency efforts to put information to work and policy-makers’ efforts to create the environment necessary for this work to succeed. Policy-makers must be made aware that the very legislation they put forward in pursuit of better government may, in fact, constrain efforts to deliver exactly the results they seek.

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QUESTIONS FOR DISCUSSION

1. Why is cross-boundary information sharing important to the work of government agencies?
2. How do new requirements for information use change our current understanding of government operations?
3. What are the critical factors and processes involved in cross-boundary information sharing?
4. How can policy makers eliminate environmental constraints on sustainable cross-boundary information sharing?
5. What role can public managers play in reducing organizational constraints on sustainable cross-boundary information sharing?
6. How can chief information officers facilitate a dialogue about cross-boundary information sharing between policy makers and public managers?
7. How do information technology and social factors interact to influence the effectiveness of cross-boundary information sharing?