



**Center for
Technology in Government**

Working Paper Series

A Multi-Dimensional Approach to Digital Government Capability Assessment

CTG Working Paper No. 05-2008

March 2008

Authors:

**Anthony M. Cresswell
Donna Canestraro
Theresa A. Pardo**

Center for Technology in Government
187 Wolf Road, Suite 301
Albany, NY 12205
Phone: (518) 442-3892
Fax: (518) 442-3886
E-mail: info@ctg.albany.edu
www.ctg.albany.edu

Note: This paper was first presented at the Fall Conference of the Association for Public Policy Analysis and Management (APPAM), November 3-5, 2005, Washington, DC, USA.

A Multi-Dimensional Approach to Digital Government Capability Assessment

Anthony M. Cresswell

Donna Canestraro

Theresa A. Pardo

Center for Technology in Government

University at Albany, SUNY

tcresswell@ctg.albany.edu

Abstract

The issue of organizational capability is central to virtually all efforts to improve government performance, particularly in the area of information technology innovation. Capability assessment can play an important role in the digital government domain in at least two ways: one is to provide a basis for judging whether agencies are ready to initiate some digital government innovation, and the other is to judge the impact of a digital government initiative in terms of improved capabilities. Data on capabilities targeted by digital government initiatives can provide both baseline measurements and evidence of subsequent improvements. As part of its research and development on several digital government projects, the Center for Technology in Government (CTG) has developed an approach to capability assessment, resulting in specific assessment toolkits for use in different types of digital government initiatives. This paper describes the approach used in developing these toolkits generally, with an example from one version intended for use in justice information integration projects. The paper includes the theoretical rationale for the design of the toolkits, methods for their use, and implications for use in practice.

Introduction

The issue of organizational capability is central to virtually all efforts to improve government performance, particularly in the area of information technology innovation. Strategic planning or planned change models typically include an assessment of capability as an initial step in projects or reform efforts (Kusunoki, Nonaka, & Nagata, 1998; Segars & Grover, 1999; U.S. Government Accountability Office, 2004; Williamson, 1999). Capability assessment can play an important role in the digital government domain in at least two ways: one is to provide a basis for judging whether agencies are ready to initiate some digital government innovation, and the other is to judge the impact of a digital government initiative in terms of improved capabilities. Data on capabilities targeted by digital government initiatives can provide both baseline measurements and evidence of subsequent improvements. As part of its research and development on several digital government projects, the Center for Technology in Government (CTG) has developed an approach to capability assessment, resulting in specific assessment toolkits for use in different types of digital government initiatives. This paper describes the approach used in developing these toolkits generally, with an example from one version intended for use in justice information integration projects. The paper includes the theoretical rationale for the design of the toolkits, methods for their use, and implications for use in practice.

The toolkits are based on a common conceptual foundation that treats capability as a multidimensional phenomenon, embedded in organizational practice. From this foundation, described in more detail below, each toolkit is tailored to a different government practice context and problem. The first toolkit was developed for analysis of capabilities and needs for developing systems for access to electronic

government information.¹ It has been used as a paper-based assessment tool and in an online interactive version.² The second, described in more detail here, is intended for information sharing and integration initiatives among government justice agencies.³ Both an online, interactive and paper version of this toolkits are under development. Work was recently completed on a third assessment toolkit for assessing the capability of state governments to plan and implement digital preservation programs for born-digital government records.⁴

The dimensions of capability in each of the separate kits are based on a combination of existing research and theory, combined with development and validation by highly qualified advisory groups from the professional and academic communities engaged in the respective fields of practice. In each case, dimensions were identified and vetted through the review of the advisory groups. For the latter two toolkits, detailed subdimensions were identified to provide detailed examination of capabilities that make up each of the overall dimensions. In the justice integration toolkit, for example, there are 16 dimensions, each with from 8 to 15 subdimensions, totaling 180 subdimensions overall.

The Need for Capability Assessment for Justice Information Sharing

Capability for successful information sharing initiatives, or other IT innovations, is particularly important in the criminal justice domain. These initiatives can involve several different levels of government, various combinations of justice agencies, and a wide range of information types and technologies. The JNET Project in Pennsylvania, for example, is a statewide effort that has developed a secure network infrastructure, web-based information sharing access, and information sharing relationships among state and local agencies. Current functionality includes a portal for access to driver license photos, mug shots, rap sheets, and court case data, advanced photo imaging for investigations, and capacity for email and pager notification of security events or arrests. The Harris County (Texas) Justice Information Management System (JIMS) over a decade in development, involves 281 public agencies in the county (including Houston), and covers most aspects of both criminal and civil justice functions. On a smaller scale, the Jacksonville (Florida) Sheriff's Department implemented a web-based portal for information sharing and coordination among the 48 law enforcement agencies providing security for the 2005 Super Bowl.

Initiatives like these are typically complex, difficult, and prone to failure. They are more likely to succeed if they are based on a comprehensive and systematic assessment of organizational and technical capabilities. The toolkit described here generates comprehensive information about those capabilities, to focus attention on strengths, weaknesses, and the strategic selection of sharing partners. The assessment results also help identify risks and risk mitigation strategies.

Origins of the Concept of Capability

A common approach to thinking about capability has informed the design of these capability assessment toolkits, namely treating capability as a multidimensional characteristic of the organizational setting. The foundation for this approach to assessment rests on both a social and technical analysis of the concept of capability. In the social sense, capability (or at times "competence") is central to a long line of organizational and economic theory. Richardson's seminal description of an organization's capability in terms of the "appropriate knowledge, experience, and skills" (Richardson, 1972, p. 888) introduced the concept in its current form, and is based in part on Penrose's earlier work (Penrose, 1959). Williamson'

¹ This work was supported in part by the U.S. National Historical Publications and Records Commission under Grant No. 98027 (<http://www.ctg.albany.edu/publications/guides/gateways>).

² (<http://www.ctg.albany.edu/publications/online/gateways/portal>)

³ This work is supported by the U.S. Department of Justice, Office of Justice Programs (<http://www.ctg.albany.edu/projects/dj2>).

⁴ This project is supported by the U.S. Library of Congress under its National Digital Information and Infrastructure Development Program.

review of capability theory (Williamson, 1999) describes the capability approach as a composite and concerned with organizational process (p. 1106). Capabilities are also linked to organizational learning and knowledge resources (Helfat & Raubitschek, 2000; Kogut & Zander, 1992, 1996; Zander & Kogut, 1995). Various dimensions of capability have also been described in research on innovations in organizations (for example, Pardo, Cresswell, Dawes, & Burke, 2004 and VandeVen & Poole, 1990). Given this foundation of process and multiple or composite conceptualization, a multidimensional method for defining and assessing in the social aspects of capability seem the most appropriate and are one basis for these toolkits.

A multidimensional approach to capability in a technical sense is common as well. The well-known Capability Maturity Model for software development is based on multiple dimensions arranged in five maturity levels (Paulk, Weber, Curtis, & Chrissis, 1994). A similar maturity model for IT investment decisions from the U.S. Government Accountability Office employs a similar design (U.S. Government Accountability Office, 2004). More general approaches to the analysis of information systems design and development also typically employ a multidimensional approach (Barki, Rivard, & Talbot, 2001; Hirschheim, Klein, & Lyytinen, 1995).

Relationship to interorganizational information sharing and integration

The capability assessment approach presented here was initially developed for use in a specific kind of IT innovation: developing systems for sharing and integrating information among criminal justice agencies. This kind of project, involving many technical and organizational issues, tends to be highly difficult and failure prone (see for example, Charette, 2005; Goldstein, 2005; Lyytinen & Robey, 1999; Walsh, 2002). Therefore assessing the organizational and technical capabilities to successfully engage in such an effort is an important part of the planning and preparation. Because of the range of issues, it seems appropriate to approach the task from a combined social and technical perspective, based on the growing body of theory and research emphasizing the importance of both kinds of influences (Boudreau & Robey, 2005; Hirschheim et al., 1995; Luna-Reyes, Jing Zhang, Gil-Garcia, & Cresswell, 2005; Lyytinen, 1999; Orlikowski, 2000; Robey, 1994).

Taking a combined social and technical perspective, however, represents a problem in its own right. The existing theory and empirical work based on this perspective uses a substantial variety of approaches to describing the social and technical elements of information system work, particularly as it applies to interorganizational relations. In order to frame a capability assessment approach that is both theoretically sound and feasible for practical use, it is necessary to simplify. Fortunately there are common elements among the various theory perspectives that provide a way to simplify the description of what we argue are important dimensions of capability. We will use a broad practice perspective as the basis for propositions on which to base the dimensions of capability.

First of all, we treat capability for interorganizational information sharing and integration as embedded in practice. In this sense, practice consists of the activities and context through which the participating persons and organizations design and develop ways of sharing and integrating information resources. The same assertion could apply to any other instance of information systems design and development, but is limited to this particular context for our purposes here. These purposes focus on efforts to integrate information across agencies in the criminal justice arena, which involves widely divergent communities of practice. The agencies have different missions and traditions, ranging from law enforcement, to corrections, to court administration, to defense and prosecuting attorneys, to victim's advocates. Their organizational sizes and internal structures and cultures vary widely as well, and often include substantially different designs and styles of IT system infrastructure, applications, development processes, and administration. The practice of interest therefore consists of solving the problems and crafting the technical and social arrangements that will yield integrated information. This is the basis for identifying and describing the dimensions of capability.

Sources of Dimensions

The capability assessment project design called for the description of capability to be grounded in both relevant theory and professional judgment. A practice perspective provides a useful framework for both, in that it is based on a considerable body of research, and also references the work situations and perspectives of criminal justice and IT professionals. Therefore the descriptions of the dimensions of capability should link to both relevant theory and reference to the nature of practice and what is required to solve these problems and craft these arrangements. The section below describes the theory sources for the basic capability dimensions followed by a description of how professional judgment was used to construct the descriptions used to construct the assessment tool.

The theoretical roots of the concept of practice have three major sources. Lave and Wenger (Lave & Wenger, 1991; Wenger, 1999) described communities of practice as informal groups engaged in shared learning and work processes, independent of formal organizational structures or management controls. The community is one in which “in which social structure and meaning are continually negotiated through participation” (Thompson, 2005, p. 152). Integrating information across organizations involves many different communities of practice in this sense, and may require the creation of new ones. This includes attention to the conditions or dispositions that are present in the physical/technical and social entities that make up the practice context. Practice capability would include alignment and compatibility of social relationships and knowledge across organizations and sub-units. The idea of technology in practice is another source of theory material, which we draw from Orlikowski’s framing of a practice perspective (Orlikowski, 2000), including concepts of structuration following Giddens (Giddens, 1984), and related work by (Levina & Vaast, 2005; Lyytinen, 1999; Schultze & Orlikowski, 2004). A similar, but dynamic view of practice learning and feedback informs the concept of capability in the process of information system development (Luna-Reyes et al., 2005). The important elements of the practice perspective in this body of work are related to the reflexive relationship between technologies and social structures. That is, neither social structures nor technology structures are treated as determining causes of practice, but rather interacting in mutual influence and restructuring. This view of practice is similar to the reflexive nature of social and technical structures in Bourdieu’s theory on the nature of practice (Bourdieu, 1980, translated 1990). In this view, the practice context, or *habitus*, is structured by the *dispositions* of the social and physical elements of the setting, and are in turn modified by the practices carried out in the setting, etc. (p. 72). In this sense practice is neither social nor technical, but action that is both influenced by and influencing the social and technical dispositions in which it is embedded.

The practice perspectives noted above raise the question of how to treat the role of human intention and agency in capability assessment. Some work has examined this question of human agency and goal-directed behavior in the information system development context. The participants in the process (individuals or organizations) can be treated as seeking to advance their own interests and acting in a goal-directed manner. Capability will therefore be influenced by divergence in individual and group interests and goals, the conflicts among them, and by the pursuit of individual and organizational strategies. These propositions follow in particular from the work of (Boudreau & Robey, 2005; Lawless & Price, 1992; Rose & Jones, 2005), and agency theory generally (Shapiro, 2005), as well as descriptions of information system development as planned behavior (Hirschheim et al., 1995).

That capability for interorganizational integration of information depends also on alignment among technical (i.e., physical) resources, social and organizational norms & cultures, and knowledge resources. By alignment we mean that the characteristics of these elements of information systems and organizations are sufficiently similar and compatible that they allow for productive interactions and interoperability. This includes the ability of the participants to overcome or resolve differences in conceptual and technical structures, and language (Ba, Stallaert, & Whinston, 2001; Lawless & Price, 1992; Pardo et al., 2004; Sabherwal, Hirschheim, & Goles, 2001; Sosa, Eppinger, & Rowles, 2004).

These theory perspectives support treating capability within this practice perspective as an overall mix of characteristics of persons, devices, and organizations that are needed to complete a complex body of work. Moving that work forward consists of meeting a mix of social and technical requirements for success. These requirements include:

- coordinating and sustaining the overall work process
- solving problems of misalignment of technical and organizational characteristics of the practice setting, which include:
 - resolving conflicts arising out of divergent interests, power, and culture, and
 - resolving conflicts arising out of incompatibilities and misalignment of technical resources.

Since these main groupings can involve different methods, knowledge bases, actors, and types of problems, they may represent different practice settings for the innovation processes. This perspective on the nature of interorganizational information sharing formed the basis for seeking professional judgment and additions to the description of dimensions.

That professional input was obtained in a series of three workshops involving over 30 professionals and experts on criminal justice information systems, and subsequent field tests of the assessment tool. The existing dimensions and their detailed descriptions were developed using the judgments and discussion obtained from the workshop participants. In the first workshop they were presented with the overall theory approach and proposed design of the assessment process and asked to identify relevant dimensions and their descriptions. These results were collected, discussed in detail, and used as the basis for the second workshop. In that setting the participants revised and refined the dimension descriptions and produced lists of questions or indicators that could be used to assess capability along those dimensions. Those results were used to draft the assessment tool, which was presented at the third workshop. There the participants reviewed and critiqued the draft and provided substantial improvements. The results are the 16 basic dimensions, each of which has between seven and 16 specific subdimensions, or indicators associated with it (an example is shown in the Appendix). Altogether the 16 dimensions and their 180 subdimensions constitute the basis for capability rating, following the assessment methods discussed below. The relationships among the basic dimensions and the theory perspectives outlined above are shown in Table 1 below.

	Coordinating & Sustaining Overall Work Processes	Resolving Organizational & Social Problems	Resolving Technical Incompatibilities & Misalignment
1. Business Model & Architecture Readiness			X
2. Collaboration Readiness		X	
3. Data Assets & Requirements			X
4. Governance	X	X	
5. Information Policies			X
6. Leaders & Champions	X		
7. Organizational Compatibility		X	
8. Performance Evaluation	X		
9. Project Management	X		
10. Resource Management	X		
11. Secure Environment		X	X
12. Stakeholder Identification & Engagement	X	X	
13. Strategic Planning	X		
14. Technology Acceptance		X	X
15. Technology Compatibility			X
16. Technology Knowledge			X

Some dimensions (4,11,12, &14) have implications for more than one problem area, and as developed include indicators and that span two columns. An argument can also be made for overlap for others that are not so marked in Table 1. Since these are complex conceptual domains and not subject to specific

discipline-based definitions, it does not seem appropriate to make too fine a distinction for these types of activity.

Collaborative Assessment Methods

To be useful in an actual information sharing initiative, the dimensions must be part of a workable assessment method. The dimensions and subdimensions (indicators), must be understandable to those involved in the assessment. The assessment activity must be organized and conducted to generate meaningful results that can be applied to planning and initiative development. And the method must be adaptable to the wide variety of settings in which justice information sharing initiatives can occur. This section describes the way the justice toolkit employs the dimensions and assessment activities to meet these requirements. Additional details on the assessment materials and activities are available in the appendix.

Assessment as a Collaborative, Knowledge Sharing Process

The toolkit assessment process is based on the assumption that a collaboration and knowledge sharing are the best ways to ensure that the results reflect the multiple understandings of capability that exists across the organizations involved in information sharing. The work of the assessment is designed to take place in a kind of knowledge and information sharing network among the various participants. That is, the directions for the assessment call for forming groups to gather and summarize assessment information based on their shared knowledge and judgments. Ultimately this information is shared within organizational structures and through interorganizational and intraorganizational network relationships.

This kind of information sharing across organizational boundaries does not require the organizations to form new institutional structures as much as form new relationships based on information needs and coordination of work processes and IT systems. These relationships are much more like network forms of organization than formal bureaucratic structures (Powell, 1990; Provan & Milward, 1995). Networks have long been associated with research on the influence and decision making aspects of the public policy process (e.g. Hecl, 1978), but the treatment of networks as instruments of public management is relatively recent (see Bardach, 1998 for example) and still developing as a research area (Rethemeyer, 2005; Zhang and Dawes, forthcoming).

The participation in network relationships as part of the assessment also provides a mechanism for identifying and resolving issues arising from diverse interests, cultures, and work practices across the participating organizations. Broad participation in the assessment provides for attention to the interests and concerns of the stakeholders before and during the development of the new IT-based initiatives (Pouloudi, 2004 & Ravichandran, 2000). As Brown argues, “[w]ith e-government, different stakeholders become critical to the survival of the project during different phases of the initiative. Adding a further dimension of complexity, e-government initiatives often require mutual and ongoing adjustment to balance competing desires across a number of interest groups” (Brown, 2003, p. 350). The ability to adopt an interorganizational information technology strategy or form a coherent joint information solution among heterogeneous organizations is also constrained by the information, technical, human, management, process, cultural, structural, strategic, and political factors in each individual organization (Heeks, 1999 & Moon, 2002). These constraints can be avoided to a degree by effective knowledge sharing and collaborative participation in the assessment.

Dimension Descriptions

In order to work with the dimensions as the basis for assessment, the assessment participants must apply a reasonably consistent understanding of the dimensions and indicators. For that purpose, the implementation materials include detailed descriptions of the dimensions themselves (Table 2 below),

and of how to interpret the higher and lower ranges of capability along each dimension (Appendix). The assessment instructions also call for training workshops for the participants to prepare them for the process and develop consistent interpretation of the dimensions and indicators.

1. Business Model & Architecture Readiness	The degree to which the initiative has developed business models and enterprise architectures that describe the service and operational components of the enterprise, how they are connected to each other, and what technologies are used to implement them. These descriptions may include detailed analyses of business processes.
2. Collaboration Readiness	The degree to which relationships among information users and other resources support collaboration; these include staff, budget, training, and technology, and prior successes or failures in collaborative activities.
3. Data Assets & Requirements	The extent of specification and identification of formal policies for data collection, use, storage, and handling, as found in documentation of databases and record systems; and in data quality standards and dictionaries. It may include procedures for and results of data requirement analyses and data models and modeling techniques.
4. Governance	The existence of mechanisms to set policy and direct and oversee the information sharing initiatives that are planned or underway.
5. Information Policies	The level of development of policies that deal with the collection, use, dissemination, and storage of information as well as with privacy, confidentiality, and security.
6. Leaders & Champions	The involvement of leaders and champions. Leaders motivate, build commitment, guide activities, encourage creativity and innovation, and mobilize resources; they see the goal clearly and craft plans to achieve it. Champions communicate a clear and persuasive vision for an initiative, provide the authority and legitimacy for action, and build support in the environment.
7. Organizational Compatibility	The degree to which the work styles and interpersonal relationships, participation in decision-making, levels of competition and collaboration, and styles of conflict resolution support information sharing. Compatibility of cultures may be gauged by the degree of centralization, degree of conformity, deference to authority, adherence to rules, and symbols of status and power.
8. Performance Evaluation	The presence of the skills, resources, and authority necessary to observe, document, and measure: (1) how well the initiative itself is developed and implemented, (2) whether information sharing goals are achieved, and (3) how the performance of the justice enterprise is improved
9. Project Management	The availability and use of methods for goal setting, scheduling development and production activities, analyzing resource needs, managing interdependencies among activities and goals, and provisions to anticipate and respond to contingencies.
10. Resource Management	The extent of effective use of financial, human, and technical resources through budgeting, strategic plans, financial analyses, and accepted financial management procedures and practices.
11. Secure Environment	The degree to which appropriate security protocols for data, systems, applications, and networks as well as systems, policies, training, and management practices are in place.
12. Stakeholder Identification & Engagement	The extent of awareness of and interaction with the persons or groups with an interest in the information sharing initiative and capacity to influence it. This dimension is based on stakeholder analyses, staff experience and knowledge, records or reports of participants in making policy and decisions, and membership of advisory or constituent groups.
13. Strategic Planning	The quality and comprehensiveness of strategic plans and strategic planning processes, including resources and integration of strategic planning with other elements of governance and management.
14. Technology Acceptance	The extent of talk and actions expressing positive or negative attitudes toward workplace changes, trust of new tools and techniques, success or failure stories that are widely shared and believed, and enthusiasm for innovations.
15. Technology Compatibility	The presence of agreed-upon standards, the extent of connectivity among the persons and organizations seeking to share information, and the experiences of staff with information sharing activities.
16. Technology Knowledge	The levels of knowledge about current and emerging technology for information sharing, including technical qualifications and experience of staff, records and documentation of technology assets, and the actions of staff in compiling, storing, and sharing such knowledge.

Critical Success Factors

The importance of collaboration and knowledge sharing is presented in the toolkit support and guidance materials for users in terms of critical success factors. The support materials instruct the users and managers of the assessment on the importance of establishing an atmosphere of commitment, learning, and trust. The material emphasized that effective use of the toolkit therefore requires careful attention to these factors:

- **Trust and Candor** - Willingness to freely share information about one's own organization and about the capabilities of sharing partners. Threats to accuracy and honesty, such as low-quality information, unconscious bias, and distortion of the status quo, can lead to invalid or badly skewed capability assessments.
- **Individual and Organizational Commitment** – Willingness and ability to gather the necessary information, make capability judgments, participate in group discussions, resolve differences, reach decisions, and implement action plans.
- **The Right Mix of Participants** – Participation by teams with the necessary knowledge of the program environment, existing systems, and possible future strategies and technologies. Participants must be able to form accurate judgments about the capacity for change in management, policy, and technology.
- **Willingness to Extend the Assessment as Needed** - Through repeated assessments emerging requirements can be taken into consideration, and new capabilities and problems can be identified.

Assessment process

Because the purpose and status of these information sharing initiatives can vary a great deal, the toolkit offers a number of options for organizing and implementing an assessment. Organizers decide how to manage the assessment ratings, who to involve in discussions and decisions using the ratings, and how to organize their efforts. Methods are chosen for how to compile and present ratings from individual units for use in interorganizational discussions. Some of the options rely on group consensus, others defer to executive decision-making. Data can be weighted in different ways and presented in qualitative or quantitative form. The implementation guide describes these options. A typical assessment would follow the process shown in Figure 1 (below). The dashed arrows indicate that this process is almost never linear; instead, it progresses through multiple iterations as information and analysis from one set of activities feed back into and modify earlier conditions and understandings.

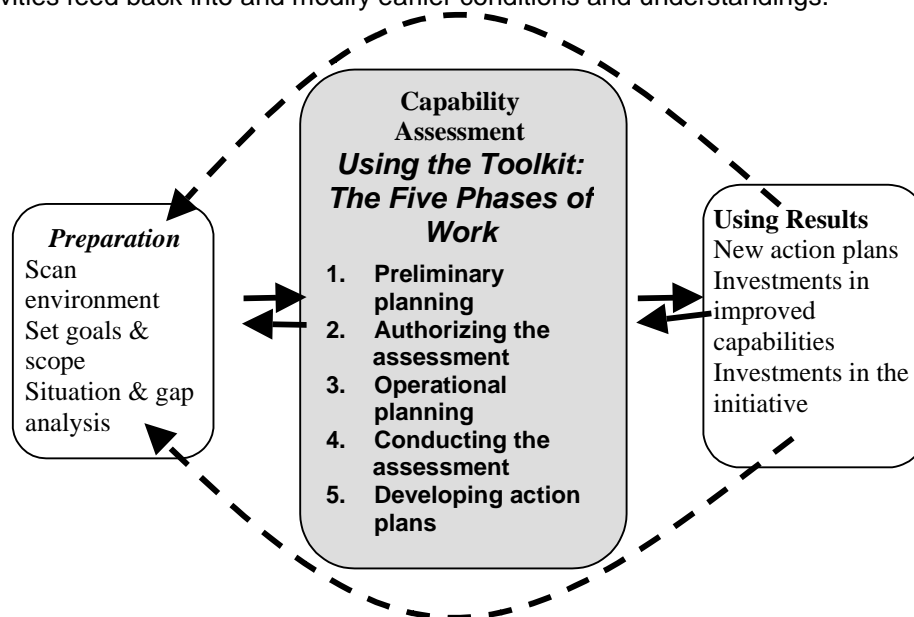


Figure 1. Cycle of Planning and Capability Assessment Activities

The most complete data come from a process that begins with the individual organizational units engaged in the initiative assessing themselves and producing unit-specific results. These are then combined into results for each agency and combined again for the entire initiative. A more detailed view of this process is shown in Figure 2, which illustrates how this might work in a setting with three agencies, each of which have two subunits involved in the initiative.

Through this process participants build knowledge about their ability to contribute to cross-boundary sharing efforts.

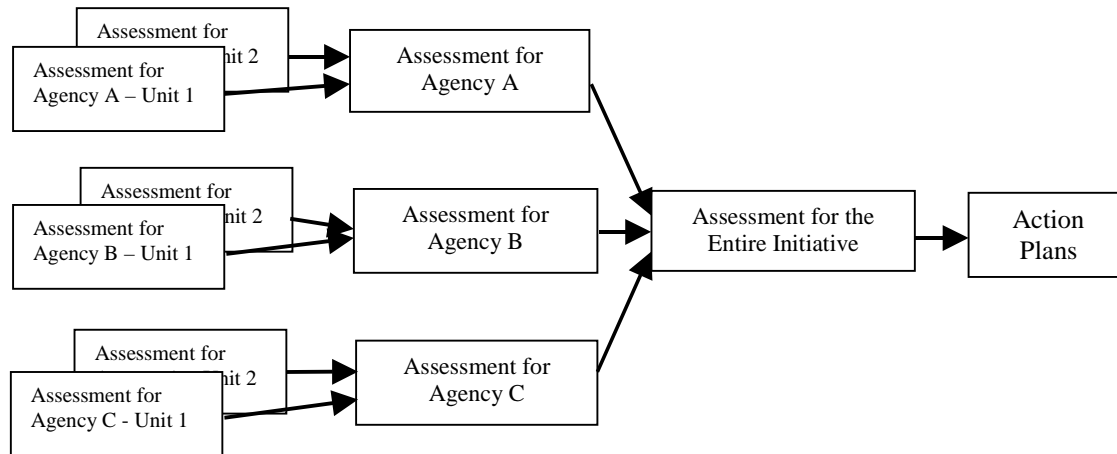


Figure 2. Example Assessment Process

Testing results

Following the review of the toolkit by the professional workshops, five field tests were conducted during the time period of July – November 2003. The field tests identified the usability of the toolkit in a variety of practical settings at the state and local level in three states (California, Colorado, and Illinois) and by a national and a state-wide panel of justice executives. The tests provided evidence of the validity of the dimensions, indicators, and procedures among the intended user population.

Two of the field tests were usability review by executives justice agencies, one chosen from a national organization, the Justice Information Sharing Practitioners (JISP), and the executive boards of a very large state integrated justice initiative: the Pennsylvania Justice Network (JNET). JISP is a professional organization made up of practitioners from the 50 states that are involved in Justice Integration initiatives. JNET is an integrated network of municipal, county, and state justice agencies in Pennsylvania. The JISP members reviewed the practicality and the use of the toolkit in each of their individual jurisdictions. The Executive Board and Executive Director of JNET organized a task force who provided a summary review of the dimensions and the toolkit and how it could be used within their enterprise. These executive review results supported the clarity and relevance of the dimensions and subdimensions from the practitioner perspective. Each of the field testers were in agreement as to the appropriate scope, content, and depth of the dimension and subdimension descriptions. There were no suggested changes to the dimensions from the field test results.

As a result of the JISP review, 3 individual jurisdictions offered to participate in an on-site administration of the toolkit by their integrated justice project team. Of these three field test sites, two were at a county integration initiative level, and one was at a state integrated justice enterprise level. The field tests consisted of a pre-workshop planning session, an assessment workshop, and a post-workshop review. The CTG team conducted the pre-workshop planning session for those who would be administering the assessment and jointly develop their field test plan. The subdimension ratings were collected in assessment workshops, which took different forms in each field test sites. CTG and field site staff

analyzed the data and provided a presentation of the results to the executive boards. The post-workshop review allowed CTG to gather additional data from the core teams from an implementation and logistical standpoint as well as assist the local teams with crafting the tactical plans resulting from the assessments.

Overall, the field tests provided strong evidence that the conceptual material and methods of the toolkit were relevant, accessible, and adaptable to a wide range of justice integration initiatives. Participants in the field tests were able to readily understand and apply the dimension and subdimension ratings to their situation. Each group was able to apply the results to strategic and tactical planning as well, focusing on those areas that were assessed as being low capability. The participants were able to easily customize the toolkit methods to their particular situation.

Implications for Theory and Practice

A number of important issues remain unresolved by the work on capability assessment described here. One is uncertainty about the effectiveness of the method to improve the success of innovation initiatives. The ready acceptance of the toolkit by practitioners suggests that it can be used as designed. At present, however, there is no direct evidence of the impact that such use would have on the progress or ultimate success of the projects where applied. When the experience with the toolkit has accumulated sufficiently, retrospective studies of possible impacts can be conducted. It seems unlikely that statistical studies for this purpose would be feasible. The types of settings in which the toolkit would be used would likely vary greatly, making sampling among equivalent units of observation very problematic. Qualitative studies of innovation processes and outcomes may be more useful, providing for comparisons across cases and new insights into how the basic capability approach can be improved.

Another practical issue is whether the cost of the assessment process represents a good investment in its own right. The assessment could involve hundreds of hours of staff time and result in substantial work disruption in some settings. The most extensive field test required hundreds of hours of the test manager's time in addition to that of the other participants. Costs can be contained by choosing the extent of participation and number of iterations of assessment carefully. But too severe restrictions on the resources used could compromise the validity of the results. Further field testing is needed to obtain more detailed cost data.

A basic theory issue remains unresolved with respect to the relative advantages of dimension-based assessment versus alternative logics, such as the maturity level approach in the ITIM (U.S. Government Accountability Office, 2004) and the Capability Maturity Model (Paulk et al., 1994). Modifications contemplated for the ITIM approach may include a dimension-based approach as an extension of the current model. Plans for the further development of the dimension-based approach described here include examining the possibility of including threshold or maturity-like components in the design. Since there is nothing logically inconsistent in a combination of the two approaches, these further developments may be helpful in advancing the overall power of these assessment tools.

References

- Agranoff, R. & McGuire, M. (2001). Big Questions in Public Network Management Research. *Journal of Public Administration Research and Theory*, 11(3): 295-396.
- Ba, S., Stallaert, J., & Whinston, A. B. (2001). Research Commentary: Introducing a Third Dimension in Information Systems Design—The Case for Incentive Alignment. *Information Systems Research*, 12(3), 225-239.
- Barki, H., Rivard, S., & Talbot, J. (2001). An Integrative Contingency Model of Software Project Risk Management. *Journal of Management Information Systems*, 17(4), 37-69.
- Boudreau, M. C., & Robey, D. (2005). Enacting Integrated Information Technology: A Human Agency Perspective. *Organization Science*, 16(1), 3-18.
- Bourdieu, P. (1980 (translated 1990)). *The Logic of Practice*. Stanford, CA: Stanford University Press.
- Brown, M. M. (2003). Technology Diffusion and the "Knowledge Barrier": The Dilemma of Stakeholder Participation. *Public Performance & Management Review*, 26(4), 345-359.
- Charette, R. N. (2005). Why Software FAILS. *IEEE Spectrum*, 42(9), 42-49.
- Cockburn, I. M., Henderson, R. M., & Stern, S. (2000). Untangling the origins of competitive advantage. *Strategic Management Journal*, 21(10-11), 1123-1145.
- Cyert, R., & March, J. G. (1963). *A Behavioral Theory of the Firm*. Englewood Cliffs, NJ.: Prentice-Hall.
- Dutta, S., Narasimhan, O., & Rajiv, S. (2005). Conceptualizing and Measuring Capabilities: Methodology and Empirical Application. *Strategic Management Journal*, 26, 277-285.
- Eisenhardt, K. M., & Martin, J. A. (2000). Dynamic capabilities: what are they? *Strategic Management Journal*, 21(10-11), 1105-1121.
- Giddens, A. (1984). *The Constitution of Society: Outline of the Theory of Structuration*. Berkeley, CA: University of California Press.
- Goldstein, H. (2005). Who Killed the Virtual Case File? *IEEE Spectrum*, 42(9).
- Granovetter, M. (1973). The strength of weak ties. *American Journal of Sociology*. 78(6): 1360–1380.
- Grant, R. M. (1996). Prospering in Dynamically-competitive Environments: Organizational Capability as Knowledge Integration. *Organization Science*, 7(4), 375-387.
- Hall, R. H. (1982). *Organizations: Structure and Process* (Third ed.). Englewood Cliffs, NJ: Prentice-Hall, Inc.
- Heeks, R., & Bhatnagar, S. (1999). Understanding Success and Failure in Information Age Reform. In R. Heeks (Ed.), *Reinventing Government in the Information Age*. London and New York: Routledge.
- Helfat, C. E. (2000). Guest editor's introduction to the special issue: The evolution of firm capabilities. *Strategic Management Journal*, 21(10-11), 955-959.
- Helfat, C. E., & Raubitschek, R. S. (2000). Product sequencing: Co-evolution of knowledge capabilities and products. *Strategic Management Journal*, 21(10-11), 961-979.

- Henderson, R., & Cockburn, I. (1994). Measuring competence? Exploring firm effects in pharmaceutical research. *Strategic Management Journal*, 15, 63-84.
- Hirschheim, R., Klein, H. K., & Lyytinen, K. (1995). *Information Systems Development and Data Modeling: Conceptual and Philosophical Approaches*. New York: Cambridge.
- Holbrook, D., Cohen, W. M., Hounshell, D. A., & Klepper, S. (2000). The nature, sources, and consequences of firm differences in the early history of the semiconductor industry. *Strategic Management Journal*, 21(10-11), 1017-1041.
- Iversen, J. H., Mathiassen, L., & Nielsen, P. A. (2004). Managing Risk in Software Process Improvement: An Action Research Approach. *MIS Quarterly*, 28(3), 395-433.
- Karim, S., & Mitchell, W. (2000). Path-dependent and path-breaking change: reconfiguring business resources following acquisitions in the U.S. medical sector, 1978-1995. *Strategic Management Journal*, 21(10-11), 1061-1081.
- Kogut, B., & Zander, U. (1992). Knowledge of the firm, combinative capabilities, and the replication of technology. *Organization Science*, 3, 383-397.
- Kogut, B., & Zander, U. (1996). What firms do? Coordination, identity, and learning. *Organization Science*, 7(7), 502-518.
- Kusunoki, K., Nonaka, I., & Nagata, A. (1998). Organizational Capabilities in Product Development of Japanese Firms: A Conceptual Framework and Empirical Findings. *Organization Science*, 9(6), 699-718.
- Langlois, R. N., & Steinmueller, W. E. (2000). Strategy and circumstance: the response of American firms to Japanese competition in semiconductors, 1980-1995. *Strategic Management Journal*, 21(10-11), 1163-1173.
- Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate Peripheral Participation*. Cambridge: Cambridge University Press.
- Lawless, M. W., & Price, L. L. (1992). An Agency Perspective on New Technology Champions. *Organization Science*, 3(3), 342-355.
- Levina, N., & Vaast, E. (2005). Competence in Practice: Implications for Implementation and Use of Information Systems. *MIS Quarterly*, 29(2), 335-363.
- Luna-Reyes, L. F., Jing Zhang, Gil-Garcia, J. R., & Cresswell, A. M. (2005). Information systems development as emergent socio-technical change: A practice approach. *European Journal of Information Systems*, 14, 93-105.
- Lyytinen, K. (1999). Empirical Research in Information Systems: On the Relevance of Practice in Thinking of IS Research. *MIS Quarterly*, 23(1), 25-27.
- Lyytinen, K., & Robey, D. (1999). Learning failure in information systems development. *Information Systems Journal*, 9(2), 85-102.
- Moon, M. J. (2002). The Evolution of E-Government among Municipalities: Rhetoric or Reality? *Public Administration Review*, 62(4), 424-433.
- Orlikowski, W. J. (2000). Using Technology and Constituting Structure: A Practice Lens for Studying Technology in Organizations. *Organization Science* 11(4), 404-428.

- Pardo, T. A. (1998). *Reducing the Risks in Innovative Uses of Information Technology in the Public Sector: A Multidisciplinary Model*. Unpublished Doctoral Dissertation, University at Albany-SUNY, Albany, NY.
- Pardo, T. A., Cresswell, A. M., Dawes, S. S., & Burke, G. B. (2004). *Modeling the Social & Technical Processes of Interorganizational Information Integration*. Paper presented at the Hawaiian International Conference on System Sciences Hawaii.
- Paulk, M. C., Weber, C. V., Curtis, B., & Chrissis, M. B. (1994). *The Capability Maturity Model: Guidelines for Improving the Software Process*. Reading, MA: Addison Wesley.
- Penrose, E. T. (1959). *The Theory of the Growth of the Firm*. New York: Oxford University Press.
- Pouloudi, A., & Whitley, E. A. (2004). Stakeholder Identification in Inter-Organizational Systems: Gaining Insights for Drug Use Management Systems. *European Journal of Information Systems*, 6(1), 1-14.
- Powell, W. W. (1990). Neither Market nor Hierarchy: Network Forms of Organization. In B. M. Staw & L. L. Cummings (Eds.), *Research in Organizational Behavior* (Vol. 12, pp. 295-336). Greenwich, CT: JAI Press Inc.
- Provan, K. G., & Milward, B. H. (1995). A preliminary theory of interorganizational network effectiveness: A comparative study of four community mental health systems. *Administrative Science Quarterly*, 40(1), 1-34.
- Raff, D. M. G. (2000). Superstores and the evolution of firm capabilities in American bookselling. *Strategic Management Journal*, 21(10-11), 1043-1059.
- Ravichandran, T., & Rai, A. (2000). Quality Management in Systems Development: An Organizational System Perspective. *MIS Quarterly*, 24(3), 381-415.
- Rethemeyer, R.K. (2005). Conceptualizing and Measuring Collaborative Networks. *Public Administration Review* (65)1: 117-121.
- Richardson, G. B. (1972). The Organization of Industry. *Economic Journal*, 82(327), 883-896.
- Robey, D. (1994). Modeling Interpersonal Processes During System Development: Further Thoughts and Suggestions. *Information Systems Research*, 5(4), 439-449.
- Rose, J., & Jones, M. (2005). The Double Dance of Agency: A Socio-Theoretic Account of How Machines and Humans Interact. *Systems, Signs & Actions*, 1(1), 19-37.
- Rosenbloom, R. S. (2000). Leadership, Capabilities, and Technological Change: The Transformation of NCR in the Electronic Era. *Strategic Management Journal*, 21(10-11), 1083-1103.
- Sabherwal, R., Hirschheim, R., & Goles, T. (2001). The Dynamics of Alignment: Insights from a Punctuated Equilibrium Model. *Organization Science*, 12(2), 179-197.
- Schultze, U., & Orlikowski, W. J. (2004). A Practice Perspective on Technology-Mediated Network Relations: The Use of Internet-Based Self-Serve Technologies. *Information Systems Research*, 15(1), 87-106.
- Segars, A. H., & Grover, V. (1999). Profiles of Strategic Information Systems Planning. *Information Systems Research*, 10(3), 199-232.
- Sosa, M. E., Eppinger, S. D., & Rowles, C. M. (2004). The Misalignment of Product Architecture and Organizational Structure in Complex Product Development. *Management Science*, 30(12), 1674-1689.

Thompson, M. (2005). Structural and Epistemic Parameters in Communities of Practice. *Organization Science*, 16(2), 151-164.

Tripsas, M., & Gavetti, G. (2000). Capabilities, cognition, and inertia: evidence from digital imaging. *Strategic Management Journal*, 21(10-11), 1147-1161.

U.S. Government Accountability Office. (2004). *Information Technology Investment Management: A Framework for Assessing and Improving Process Maturity*. Washington, DC: GAO.

Van de Ven, A. H., & Poole, M. S. (1990). Methods for studying innovation development in the Minnesota innovation research program. *Organization Science*, 1(3), 313-385.

Walsh, T. (2002). California, Oracle set to nix license deal. *Government Computer News*, 21(11).

Wenger, E. (1999). *Communities of Practice Learning, Meaning, and Identity*. New York City: Cambridge University Press.

Williamson, O. E. (1999). Strategy research: governance and competence perspectives. *Strategic Management Journal*, 20(12), 1087-1108.

Winter, S. G. (2000). The Satisficing Principle in Capability Learning. *Strategic Management Journal*, 21(10-11), 981-996.

Zander, U., & Kogut, B. (1995). Knowledge and the Speed of the Transfer and Imitation of Organizational Capabilities: An Empirical Test. *Organization Science*, 6(1), 76-92.

Appendix – Example Toolkit Dimension Worksheet

Business Model & Architecture

This dimension deals with the degree of modeling and architecture development that is already in place to support the information-sharing objectives. Planning and design of effective information sharing and interoperability depend to a significant degree on a clear and detailed analysis of the entire enterprise involved. By enterprise we mean all the organizations that participate in the services and business processes in which the information sharing takes place. That analysis typically takes the form of a description of the business model and possibly also of the enterprise architecture. Such a description identifies the service and operational components of the enterprise and describes how they are connected to each other and what technologies are used to implement them. These models may also include detailed analyses of business processes within which the information sharing takes place.⁵

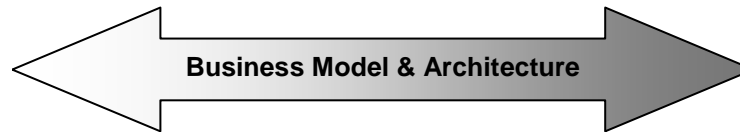
Settings with high capability on this dimension base their information-sharing strategies on detailed and comprehensive business models and an overall enterprise architecture. The strategic objectives of the information sharing are clearly described and linked to the underlying business model. The enterprise architecture guides decisions on technology design, procurements, and coordinates changes in business processes.

Settings with low capability on this dimension have neither detailed models nor an understanding of the overall business processes within which the information sharing is to occur. Project design and technology decisions are made without knowledge of interactions in the business process or within the enterprise. Staff members have only limited understanding of process analysis and modeling skills.

Please follow the instructions on the next page.

High Capability

Design and technology decisions guided by business models and enterprise perspectives



Low Capability

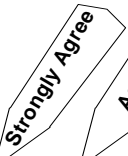

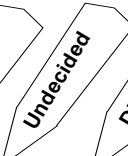


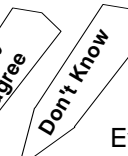
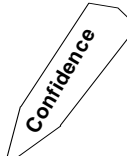
Absence of business models and enterprise thinking; ad hoc and isolated decision making

⁵ For a more detailed description of business models and architectures see the glossary in Appendix 4.

Appendix – Example Toolkit Dimension Worksheet

Step 1 – For each statement below, please circle the letters to the right that best represent how much you agree or disagree. As you think about each statement, please use the space next to that statement to describe the evidence or experience on which your response is based.

Step 2 –For an analysis of these answers it is useful to know how confident you are in your response. Please go back over each statement and mark your level of confidence in each answer, using **H** for high, **M** for medium, and **L** for low. Put the letter in the far right-hand box at the end of each row, as shown in the example below.

							Evidence	
We have a comprehensive business model of the information-sharing initiative.	SA	A	U	D	SD	DK		
We have identified the strategic objectives for each information-sharing activity.	SA	A	U	D	SD	DK		
We have identified an enterprise model or architecture for the information-sharing initiative.	SA	A	U	D	SD	DK		
We have analyzed the full range of business processes involved in information sharing.	SA	A	U	D	SD	DK		
We have identified all business process discrepancies that may interfere with information sharing.	SA	A	U	D	SD	DK		
We have eliminated all business process discrepancies that may interfere with information sharing.	SA	A	U	D	SD	DK		
Technology design and procurement decisions are guided by and referenced to an enterprise architecture.	SA	A	U	D	SD	DK		