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Using an information sharing maturity model to support national security goals

Among the many important findings in the 9/11 Commission Report, one seemed especially urgent: the need to develop guidelines for gathering and sharing information between intelligence agencies. And the problems of information sharing are not limited to the domain of the nation's intelligence services.

Information, the currency of the 21st century, flows with varying efficiency through the arteries of commerce. In this white paper, Deloitte asserts that a maturity model focused on the problems of information sharing is a critical tool organizations should use to measure effectiveness and chart road maps for improvement.

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Introduction

Among the many important findings in the 9/11 Commission Report, one seemed especially urgent: the need to develop guidelines for gathering and sharing information between intelligence agencies. The conventional wisdom prior to 9/11 was that federal, state and local agencies chartered with gathering and acting upon intelligence were exchanging intelligence information routinely.

In order to improve information sharing, an organization must focus on the process of creating and distributing information.

Sadly, as we learned in the report, the intelligence agencies, and many other government departments, weren't sharing the vast amounts of information collected efficiently or effectively. The federal government has many systems that collect enormous amounts of information, but the systems for processing and analyzing it are weak. The problem is not obtaining more information; it is using what we already have more effectively.

The 9/11 Commission exhorted Congress, the intelligence agencies and the nation: do better. The commission recommended a goal of "unifying the many participants in the counterterrorism effort and their knowledge in network-based information sharing systems that transcend the traditional government boundaries."[1] That goal remains unfulfilled today.

And the problems of information sharing are not limited to the domain of the nation's intelligence services. All organizations—whether an insurance company, a global retailer, an oil and gas company, or a media company—that deal with information face problems of varying immensity in sharing information internally or with external trading partners. Information, the currency of the 21st century, flows with varying efficiency through the arteries of commerce.

Information, because of its complicated nature, is difficult to manage from a business standpoint. More specifically, it is not the information itself that is difficult—information is largely data that, left undisturbed, just sits in silicon storage or on a piece of paper. The problems and challenges lie with the people and processes using or seeking that information.

People often collaborate to generate information; they often collaborate when they use information. Information sharing—collaboration—is at heart a business process.

So, in order to improve information sharing, an organization must focus on the process of creating and distributing information. Suffice it to say that few organizations have mastered the life cycle processes of creating, managing and sharing information. The goal of this white paper, however, is not to explore information life cycles. Instead, we wish to focus on key components of managing information sharing processes—those of measurement and subsequent process improvements.

Historically, one of the techniques businesses have used to improve complex processes is a maturity model. These models are used to measure capabilities and set organizational goals. Organizations should create the capabilities to react to information sharing needs in advance, not react in an ad hoc manner to the latest information crisis.

In this white paper, Deloitte asserts that a maturity model focused on the problems of information sharing is a critical tool organizations should use to measure effectiveness and chart road maps for improvement.

[1] The 9/11 Commission Report: Final report of the National Commission on terrorist attacks upon the United States

Maturity Models

The origins of maturity models trace back to a project in the 1980s. The U.S. Air Force funded a study at Carnegie Mellon's Software Engineering Institute (SEI) to create an abstracted model to evaluate contractors' development of Department of Defense (DoD) software. That study resulted in the Capability Maturity Model® (CMM),[2] a structured collection of practices to describe the characteristics of effective software development processes.

The SEI CMM is structured in five distinct levels of maturity within an organization, moving through initial, managed, defined, predictable and, finally, optimizing processes. At each level, an organization is assessed by third-party specialists on how it has standardized processes in software development.

More recently, maturity models have been proposed for information management and collaboration. In 2002, Doug Laney, writing for the META Group, said, "Enterprises must adopt a method for gauging their 'information maturity'—i.e., how well they capture, manage and leverage information to achieve organization goals." He suggested a traditional five-level maturity model focused on data quality and predicted that, by 2004/5, there would be a standard information maturity model (IMM) that "considers key concepts such as data quality, information architecture, information governance, information usage, metadata and information infrastructure/operations."[3]

Information maturity models are now just starting to emerge. Deloitte has recently taken META Group's proposed IMM and adapted and published our own variation.[4] The Deloitte maturity model is bundled with QuickScan, a tool that breaks information management maturity into approximately 175 capabilities that can be calculated to determine an organization's information management maturity.

Deloitte considers information sharing a subset of the larger information maturity domain.

Information sharing has been defined by some researchers as a type of collaborative or collective behavior, and it covers a wide range of collaborative concepts, ranging from "sharing accidentally encountered information to collaborative query formulation and retrieval."[5] Deloitte considers information sharing a subset of the larger information maturity domain.

Development of the information sharing maturity model

The CMM approach to developing and refining processes is well established in 20 years of industrial use. It provides a number of benefits to an organization that uses one to manage processes. Maturity models provide:

- A process framework from which to start and then prioritize actions.
- The benefit of lessons learned from either the organization or industry.
- A common language and shared vision.
- A way to define what progress and improvement mean to the model user.

A CMM both assesses the maturity of processes and capabilities over time on a topic the model is designed to describe and provides a scoring mechanism for measuring how any particular organization ranks alongside its peers.

[2] CMM and Capability Maturity Model are registered in the U.S. Patent and Trademark Office by Carnegie Mellon.

[3] Doug Laney, META Group Report, 2002.

[4] http://mike2.openmethodology.org/index.php/Information_Maturity_Model.

[5] Xiaowen Bao and France Bouthillier, 2007, *Information Sharing: As a type of Information behavior,* McGIll University, Montreal, Quebec, Canada.

Maturity models have several common features. First, they are built around the concept of maturity levels, which provide organizations with a growth path toward an ultimate goal of continuous improvement. At each level, an organization either exhibits behaviors that match the characteristics of that level or seeks to institute new efforts that let it aspire to the characteristics of the next level.

Second, maturity models use the concept of key process areas, or KPAs, that identify clusters of related activities that, when performed collectively, achieve a set of goals considered to be industry-leading practices.[6]

Enterprises use maturity models to set goals for each KPA that represent the steady state an organization must demonstrate to determine whether it is operating at a particular level of maturity. These goals, in concert with key practices that typify the activities of the process area, complete the components of the model.

In our experience working with multiple clients, we have found that effective information sharing requires a multidisciplinary approach toward assessment and implementation of the KPAs.

Deloitte's information sharing maturity model

The authors of Deloitte's information sharing maturity model (ISMM) analyzed the culture, processes and mechanics of information sharing. We harvested leading practices from the disciplines of information management, document management, knowledge management and enterprise architectures. We looked at our commercial and government clients' best practices and where their challenges and successes were. This effort resulted in the creation of 41 KPAs that we grouped into six major vectors of information sharing. Each KPA represents maturities, capabilities and leading practices in a given area. Excellence in one part of information sharing does not automatically result in overall success. Deloitte's six major vectors, as illustrated in Figure 1, are overlaid on a standard CMM to create the ISMM.

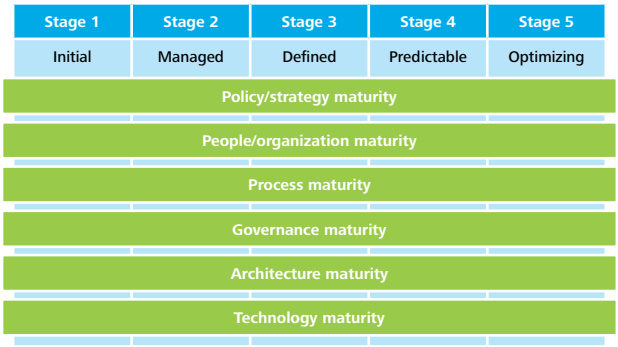

Figure 1. Information sharing maturities

Stage 1 Initial	Stage 2 Managed	Stage 3 Defined	Stage 4 Predictable	Stage 5 Optimizing
Information sharing — Policy and strategy maturity				
Information sharing policy and strategy do not exist	**Information sharing policy and strategy are partially defined and poorly understood**	**Information sharing policy and strategy are defined and communicated**	**Information sharing policy and strategy are reviewed and updated regularly**	**Information sharing policy and strategy reviewed and updated regularly**
• Information sharing policy does not exist. • Information sharing strategy does not exist. • No road map or plan for guiding the selection and implementation of information sharing initiatives. • Information sharing programs are not included in strategic plan and are not budgeted for.	• Reactive activities by individual groups to implement information sharing policies defined by the president, Congress and other departments. • Limited attempts to define information sharing policy and strategy but no follow-through during implementation.	• Information sharing policy and strategy defined and generally well understood. • Information sharing transformation strategy is in place and is being executed. • Information sharing-related activities are specifically budgeted for and funded. • Information sharing performance metrics gathered.	• Information sharing performance metrics defined. • Information sharing performance metrics used to quantitatively measure and improve information sharing policy and strategy. • Clear line of sight between information sharing policy and strategy, budget planning and performance metrics.	• Proactive planning with information sharing policy and strategy. • Information sharing policy and strategy drive key mission planning decisions (both intra- and extra-department). • Joint initiatives with other departments.

Figure 2. Information sharing characterizations and attributes

Each maturity vector detailed characteristics at each stage in the maturity model, and each stage of the vector has multiple attributes that describe the characterization (Figure 2). We have further defined those attributes in the ISMM as specific KPAs.

Policy and strategy maturity

Key to effective information sharing are the enterprise policies and strategies that describe the goals of that organization. This maturity vector contains KPAs that address:

[6] http://en.wikipedia.org/wiki/Capabilities_Maturity_Model.

- **Information sharing mandates and policies** show how clearly defined and understood they are by those who have to carry them out.
- **An Information strategy** outlines how well it is defined and communicated.
- **Information performance metrics** provide tools for measuring a performance management plan that has been defined, communicated and aligned with policies and strategies.
- **Budget and performance integration** describes the degree to which information sharing initiatives are budgeted, and how performance is linked to budgeting and outcomes.
- **An information sharing transformation strategy** defines and implements the relevant information sharing mandates and policies.
- **An information sharing implementation plan** is used to guide and control the implementation of information sharing initiatives.

People and organizational maturity

People, not machines, share information. People benefit from information exchanges more than machines do. The people and organization vector of the ISMM addresses the scope of the human component of information sharing:

- **Leadership** evaluates the focus and support of executives for information sharing initiatives.
- **Communities of interest, practice or action** are indicators of organizational activity and are used to gather user requirements, evaluate business processes and develop business vocabularies in a collaborative environment.
- **Communication** measures the frequency of and methods used to disseminate and coordinate information sharing activities within an organization and across multiple organizations.
- **Change and transformation management** evaluates the level and execution of transformational activities that promote and support information sharing activities within and across multiple organizations.
- **Human capital management** addresses the availability and qualifications of personnel to manage and execute information sharing policies and processes.
- **Training,** an often overlooked component of information sharing, measures the level of planning and execution of user training related to information sharing policies, processes and tools.
- **Skills** measure the maturity of information sharing skills within an organization.

Process maturity

Information sharing is often an ad hoc process. If it is not realized as an institutional process or critical business mission process, it should be. The ISMM process vector includes a number of activities:

After information strategies are established and people and process issues have been identified and measured, the governance of the information sharing environment must be addressed.

- **Information management** processes measure the degree to which processes are defined and used to manage information as an organizational asset.
- **Information sharing** processes look at the degree of sharing of information assets and how those are defined in a systematic manner and being improved within and between organizations.
- **Information accessibility** processes evaluate the degree to which processes are in place to make information accessible, visible, understandable and trustworthy, and to improve these characteristics continually, including the timeliness of and ease of access to information.

- **Information and data quality** examines information quality control and the processes in place to improve the consistency, accuracy and understanding of information.
- **Metadata management** processes address the degree to which metadata has been or is being captured in a systematic manner according to the defined information metamodels, taxonomies or vocabularies.
- **Process ownership and governance** identifies the acceptance of process ownership and the level of formality for managing process change.
- **Knowledge management** processes are evaluated by the extent to which processes for creating, finding, acquiring, organizing, sharing and using knowledge have been defined and implemented.

Governance maturity

After information strategies are established and people and process issues have been identified and measured, the governance of the information sharing environment must be addressed. Without an enforcement mechanism in place to clarify the operational ownership or stewardship of information, the process rapidly breaks down. The governance vector addresses a range of activities:

- **Governance of information sharing** identifies an enterprise-level owner and process for managing information sharing initiatives.
- **Prioritization and portfolio management of information sharing** determines the degree to which processes are in place to balance competing information sharing initiatives to meet policy directives and organizational goals.
- **Ownership of information** evaluates the degree to which information ownership or stewardship is clearly defined and whether those owners or stewards support information sharing activities.
- **Program governance**, both for single and multiple organizations, evaluates the maturity of program governance processes within an organization for managing information sharing projects, initiatives and programs.

Architecture maturity

Information architecture plays a key role in effective information sharing. This vector addresses architectural components that support information sharing:

Technology is a key support for information sharing and is the last major vector of the ISMM.

- **Information taxonomies and vocabularies** address the extent to which knowledge, information and data taxonomies and vocabularies are defined, agreed upon and used to support information sharing initiatives within and between organizations.
- **An information metamodel** identifies which information metamodels and metadata repositories have been defined and how they are being used to support information sharing initiatives within and between organizations.
- **Leading practices and guidelines** confirm that leading practices and guidelines for building systems to support information sharing have been defined, communicated and employed.
- **Modeling methods, techniques and tools** evaluate the extent to which modeling methods, techniques and tools are defined, communicated and employed in support of information sharing activities.
- **Standards usage and compliance** evaluates the extent to which industry-accepted open standards have been selected for enterprisewide usage and are used for sharing information.
- **Data exchange standards** evaluate the extent to which organizations have established and use agreed-upon data exchange standards.

Several early users of Deloitte's ISMM are federal agencies. The model has two optional architectural measures that address the adoption of the Federal Enterprise Architecture (FEA) Data Reference Model (DRM) and deployment of the National Information Exchange Model (NIEM), which is used by law enforcement and Department of Homeland Security (DHS) agencies. The model will be expanded over time to address other large data exchange standards efforts as needed.

Technology maturity

Technology is a key support for information sharing and is the last major vector of the ISMM. Information sharing technology has many KPA components:

- **Security** evaluates the extent to which information can be shared securely and with all authorized users and whether problems involving handling multiple security classification have been solved.
- **Information sharing services** is a large category of KPAs that measures the extent to which a complete set of services are available to allow users and systems to process information and produce information assets in support of business and mission objectives.
- **Shared services** evaluate the extent to which shared components and services support information sharing and the reuse of these components and services.[7]
- **Integration** measures the maturity of the methods used to exchange information within and between organizations.
- **Repositories** evaluate the maturity of the organization's information repositories and the processes for managing them with regard to supporting the mission or the business.
- **Accessibility** measures the extent to which the information is accessible and that authorized users and systems can access the data.
- **Visibility** measures the extent to which information is visible and that authorized users or systems can locate the data via information registries, catalogs or service registries.
- **Understandability** evaluates the extent to which authorized users or systems can understand the data (i.e., whether data dictionaries, vocabularies, taxonomies are defined, maintained and used).
- **Trustworthiness** measures the support of technology to determine the extent that authorized users and systems can determine where the data came from and assess its trustworthiness or authoritativeness (i.e., authorized users and systems can determine the data's lineage).

Within the ISMM, each vector listed above is classified according to the five levels of maturity, and then the leading-practice characteristics or behaviors of each stage are listed (Figure 3).

Information sharing maturity assessment tools

Deloitte's information sharing maturity assessment tool assesses an organization against our maturity model. The tool, based on Microsoft® Office Excel, generates both a ranking and a prescriptive road map for organizational improvement.

The assessment exercise typically consists of a series of face-to-face interviews with representatives from all levels of management within an organization. Their answers are scored by the interviewer.

The tool generates a visual representation of the current maturity of an organization's information sharing abilities, as shown in Figure 4.

The tool generates a series of radar charts in a dashboard format that allows further detailed comparisons in each major vector (Figure 5).

Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
Initial	Managed — Policies and plans to manage information sharing	Defined — Processes in place to institutionalize information sharing activities	Predictable — Management to metrics	Optimizing
No information sharing policy or strategy exists	Initial information sharing policy development and awareness	Information sharing policies developed and are executed	Compliance to policies are being measured	Policies and strategy changed to reflect metrics
Policies do not exist or are ad hoc.	Policies exist and are known. Owners of the policies are identified.	Policies are generally well understood, accepted and followed. Processes are in place to manage policy changes.	Adherence to policy may be objectively evaluated and is contained as part of a performance evaluation metric.	Policies are adaptive to reflect changes in mission or agency environment.

Figure 3. Information sharing policies maturity

[7] To avoid confusion, information sharing services deal with what services are provided and *shared services* deal with *how* the services are provided

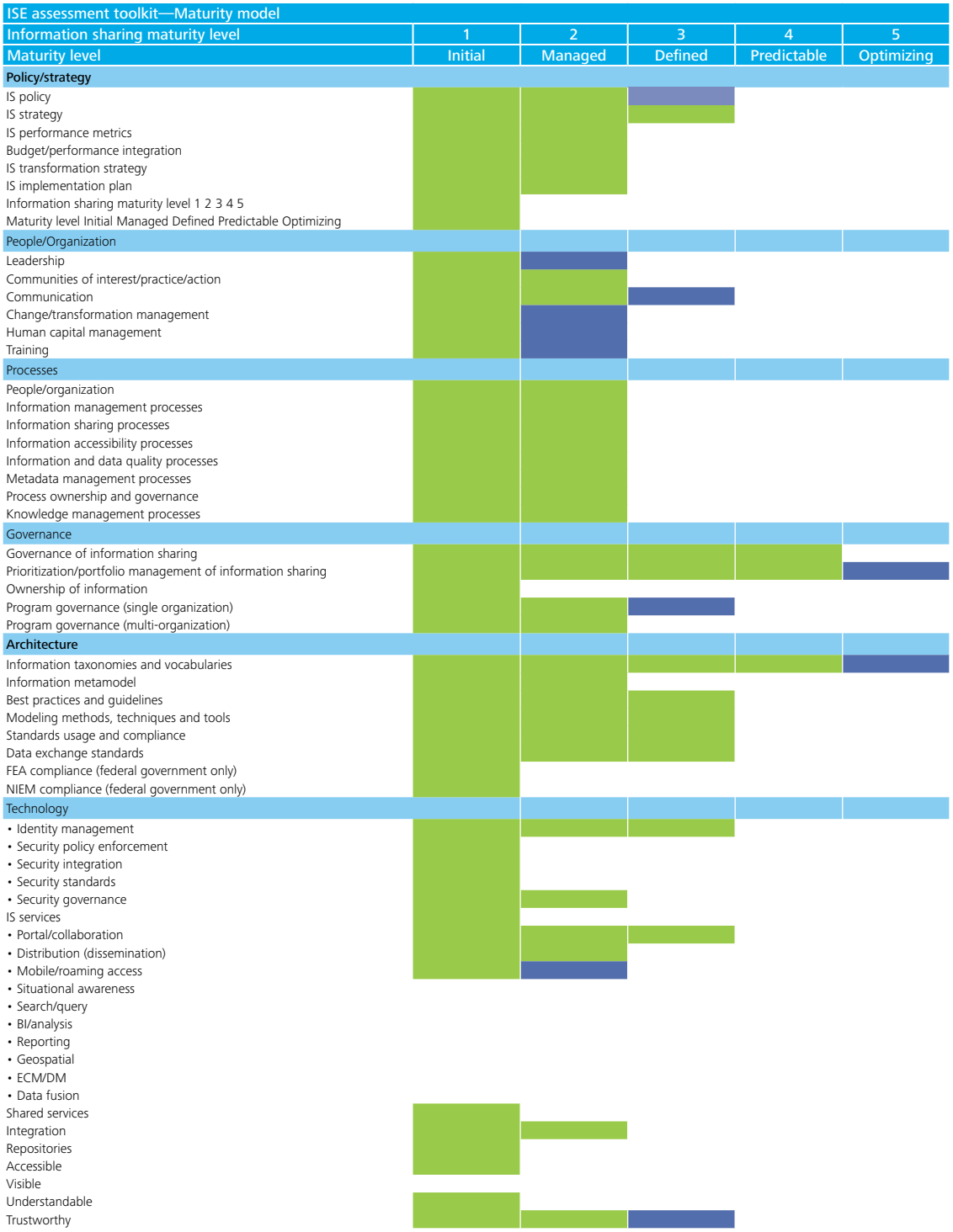

Figure 4. Example of overall maturity model scoring

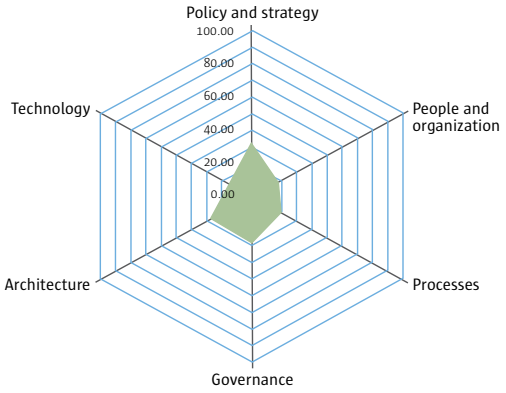

Figure 5. Example of ISMM dashboard charts—ISE strengths summary

These charts represent where an organization is more advanced in sharing maturities and areas where it can improve. Organizations can then formulate plans for specific initiatives or activities that will advance them to the next level in the ISMM.

Conclusion

While introducing the concept of the ISMM and assessment tool to clients, we have met with some resistance. A number have said, "We know we are not doing well; you don't need to evaluate our current environment, just tell us how to get better." Just as MapQuest® is used to plan the route for the family vacation, we explain that the plateaus of our maturity model can serve as the destination. To provide directions, MapQuest requires two data points: your destination and your starting point. Our ISMM is that organizational starting point as well as the step-by-step, turn-by-turn route to your destination.

Our identification of 41 KPAs as we dissected information sharing is an indicator of the complexity of the information sharing challenge. The authors of the model believe it is an important tool to help an organization develop information sharing strategies and road maps, understand the gaps in information sharing activities, and identify areas of focus. The ISMM can become the foundation for a variety of information sharing metrics to measure not only strategic progress but tactical successes, too.

About the author

Glenn Cruickshank is a specialist leader in Technology, Strategy, and Architecture in Deloitte's Federal practice, where he serves as one of the company's senior domain experts in the field of information management and enterprise architectures. He has spent 30 years working in the information field, the first 24 years working in the publishing industry as a leading news industry information management systems developer and technologist. He is responsible for a wide range of consulting assignments for the Deloitte team, covering all aspects of managing information for commercial and public sector clients. He is a co-author of the Deloitte team's information sharing maturity model with fellow specialist leader, Greg Lomow.

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