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Developments in Practice XXIV: Information Management: The Nexus of Business and IT

James D. McKeen
Queen's School of Business, Queen's University, jmckeen@business.queensu.ca

Heather A. Smith
Queen's School of Business, Queen's University, hsmith@business.queensu.ca
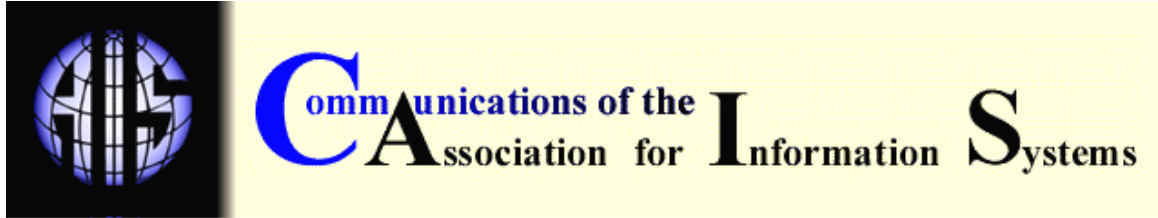
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DEVELOPMENTS IN PRACTICE XXIV: INFORMATION MANAGEMENT: THE NEXUS OF BUSINESS AND IT

Heather A. Smith
James D. McKeen
Queen's University
jmckeen@business.queensu.ca

ABSTRACT

Information management (IM) is gaining increasing attention in both IT and the business functions these days. While IT is *involved* with almost every aspect of IM, information is the heart and soul of business, and its management cannot be delegated or abdicated to IT. Thus, IM represents the true nexus of business and IT. Because of this, IM has all the hallmarks of an emerging discipline – the offspring of a committed long-term relationship between business and IT. And, it requires new skills and competencies, new frames of reference, and new processes.

IM provides the mechanisms for managing enterprise information and a foundation that can be used by both IT and knowledge management to create business value. The "IM function" is responsible for the complete information life cycle: acquisition or creation; organization; navigation; access; security; administration; storage; and retention. Because it still falls into the gray area between business and IT, many organizations find it is essential to develop an enterprise-wide framework that clarifies the policies, principles, roles, responsibilities and accountabilities, and practices for IM in both groups.

This paper reports on the findings of a focus group session of IT managers who looked at IM from the enterprise point of view, addressing the business *and* IT issues and challenges in managing information effectively. It first examines the scope and nature of IM and how it is being conceptualized in organizations. Then, it presents a framework for the comprehensive management of information and identifies the key issues currently facing organizations in implementing an effective IM program. Finally, it presents some recommendations for getting started in IM.

I. INTRODUCTION

More than ever before, we are living in an information age. Yet until very recently, "information" and its sibling, "knowledge," were given very little attention in IT organizations. Data ruled. And information proliferated quietly in various corners of the business – file cabinets, PCs, data bases, microfiche, emails, and libraries. Then along came the Internet, and the business began to understand the power and the potential of information. For the last few years, they have been clamoring for IT to deliver more and better information to them [Smith and McKeen 2005a]. As a result, information delivery has become an important part of IT's job.

As we noted in an earlier paper on information delivery, now that business recognizes the value of improved information, IT is facing huge challenges in getting it to them:

> Not only does effective information delivery require IT to implement new technologies, it also means that IT must develop new internal non-technical and analytic capabilities. Information delivery makes IT work much more visible in the organization. Developing standard data models, integrating information into work processes and forcing (encouraging) business managers to put the customer/employee/supplier first in their decision-making, involves IT practitioners in organizational and political conflicts that most would likely prefer to avoid. *Unfortunately, the days of hiding in the "glass house" are now completely over and IT managers are front and centre of an information revolution that will completely transform how organizations operate.* [Smith and McKeen 2005a].

The conclusion of this paper points out a truth that is only just beginning to sink into the organization's collective conscious. That is, while information *delivery* may be the responsibility of IT, information *management* (IM) requires a true partnership between IT and the business. While IT is *involved* with almost every aspect of IM, information is the heart and soul of business and its management cannot be delegated or abdicated to IT. Thus, IM represents the true nexus of business and IT. Because of this, IM has all the hallmarks of an emerging discipline – the offspring of a committed long-term relationship between business and IT. It requires new skills and competencies, new frames of reference, and new processes. As is often the case, IT workers are further advanced in their understanding of this new discipline, but many business leaders are also recognizing their responsibilities in this field. In some organizations, notably government, IM is now a separate organizational entity, distinct from IT.

To explore the nature and dimensions of IM and its implications for IT, the authors convened a focus group of senior IT managers from a variety of different organizations, including representatives from banking, retail, manufacturing, insurance, government, food services, telecommunications, and pharmaceuticals. In preparation for this day-long session, they were asked to consider a number of questions about IM in their organizations. These addressed IM responsibilities and how they are distributed; the different dimensions of the IM job; how IM, knowledge management and IT interrelate; and challenges that need to be overcome.

This paper reports on the findings of this session, looking at IM from the enterprise point of view. Whereas our earlier paper took a purely IT perspective, this one addresses the business *and* IT issues and challenges in managing information effectively. The first section examines the scope and nature of IM and how it is being conceptualized in organizations. The next presents a framework for the comprehensive management of information. Then, the key issues currently facing organizations in implementing an effective IM program are addressed. Finally, it presents some recommendations for getting started in IM.

II. INFORMATION MANAGEMENT: HOW DOES IT FIT?

Information management is an idea whose time has come. There are a number of reasons for this. As one focus group manager explained:

> In today's business environment, it is a given that we must know who our customer is and ensure our organization's information enables us to make the right business decisions. As well, emerging regulations are starting to shape the IM requirements of all companies. These include: privacy and security safeguards on customer data, long-term storage of historical records and stronger auditability. We are now being held legally accountable for our information.

Thus, IM has three distinct, but related drivers: compliance; operational effectiveness and efficiency; and strategy.

Information, as we are now recognizing, is a key organizational resource, along with human and financial capital. Captured and used in the right way, many believe it is a new form of capital, known as *structural capital* [Stewart 1999]. However, unlike human and financial capital, information is not finite. It cannot be used up nor can it walk out the door. Furthermore, information capabilities, that is, the ability to capture, organize, use, and maintain information, have been shown to contribute to IT effectiveness, individual effectiveness, and overall business performance [Kettinger and Marchand 2005; Marchand et al. 2000]; therefore, many companies, including those in the focus group, now believe that creating useful structural capital, is a strategic priority [Kettinger and Marchand 2005; Davenport and Prusak 1998].

Unlike information technology which provides the technology, tools, and processes with which to *manipulate data*, or knowledge management (KM) which focuses on how best to leverage the know-how and *intangible experience* of the organization's human capital, IM provides the mechanisms for managing enterprise information itself. IM represents the "meat" in the data-information-knowledge continuum and provides a foundation that can be used by both IT and KM to create business value (See Figure 1).

Knowledge Management

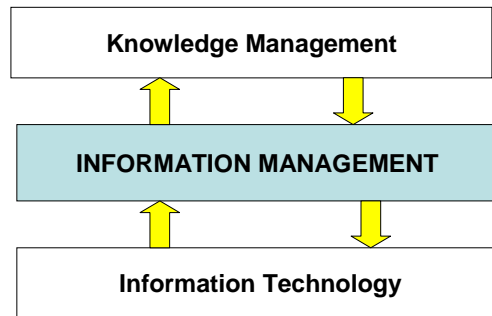**INFORMATION MANAGEMENT**

Information Technology

Figure 1. IM Is Fundamental to Organizational Success
-- Both IT Effectiveness and Individual Performance

As noted above, organizations today are beset with demands for more and better information and more controls over it. IM is the means to get above the fray and clarify how the enterprise will manage information as an integrated resource. In theory, it covers all forms of information needed and produced by the business, both structured and unstructured, including:

- Customer information

- Financial information

- Operational information

- Product information

- HR information

- Performance information

- Documents

- E-mail and instant messages

- Images and multimedia materials

- Business intelligence

- Relationship information (e.g., suppliers, partners)

In practice, some of these forms will be more thoroughly managed than others, depending on the organization involved.

IM is also responsible for the complete information life cycle: acquisition or creation; organization; navigation; access; security; administration; storage; and retention. Because IM falls into the gray area between business and IT and is not yet a separate organizational entity, many organizations are finding it is essential to develop an enterprise-wide framework that clarifies the policies, principles, roles, responsibilities and accountabilities, and practices for IM in both groups.

III. A FRAMEWORK FOR IM

Since much information use crosses traditional functional boundaries, the focus group agreed that organizations must take an enterprise perspective on IM for it to be effective. A framework for implementing IM involves several stages that move from general principles to specific applications. While these are presented as distinct activities, in practice, they will likely evolve iteratively as the organization and its management learns by doing. For example, one focus group company developed and implemented its privacy policy first and then recognized the need for an information security policy. As this was being implemented, it created a more generic IM policy that incorporated the other two in its principles.

Stage One: Develop an IM Policy. A policy outlines the terms of reference for making decisions about information. It provides the basis for corporate directives and for developing the processes, standards and guidelines needed to manage information assets well throughout the enterprise. Because information is a corporate asset, an IM policy needs to be established at a very senior management level and approved by the board of directors. This policy should provide guidance for more detailed directives on accountabilities, quality, security, privacy, risk tolerances, and prioritization of effort.

Because of the number of business functions affected by information, a draft policy should be developed by a multi-disciplinary team. At minimum, IT, the privacy office, legal, HR, corporate audit, and key lines of business should be involved. "We had lots of support for this from our audit people," said one manager. "They recognize that an IM policy will help improve the traceability of information and its transformations and this makes their jobs easier." Another recommended reviewing the draft policy with many executives and ensuring that all business partners are identified. "Ideally, the policy should also link to existing IM processes, e.g., security classifications," stated another. "It's less threatening if people are familiar with what it implies and this also helps to identify gaps in practices that need to be addressed."

Stage Two: Articulate Operational Components. These describe what needs to be in place in order to put the corporate IM policy into practice across the organization (See Figure 2). In turn, each component will have several "elements." These could vary according to what different organizations deem important. For example, the strategy component at one company has six elements: interacting with the external environment; strategic planning; information life cycle; general planning; program integration; and performance monitoring (a description of the elements identified by this firm, see appendix). Together, the operational components act as a context to describe current IM practices in the organization and reference existing best practices in each area. "This is a living document and you should expect it to be continually refined," noted a focus group manager.

The IM framework's operational components and individual elements act as a discussion document to position IM in the business and to illustrate its breadth and scope. "There's a danger of IM being perceived as a 'technology thing,'" stated a manager. At present, it is mostly IT groups that are spearheading the IM effort, but they recognize that it should not necessarily be located in IT permanently. "Ideally, we need a corporate information office, that cuts across lines of business and corporate groups, just like IT," said another manager.
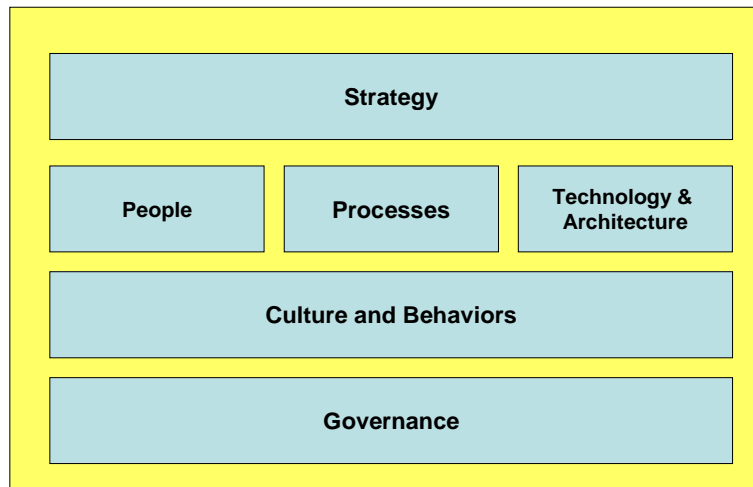
Figure 2. Operational Components of an IM Framework

Stage Three: Establish Information Stewardship. There are many roles and responsibilities associated with IM that need to be clearly articulated. These are especially important to clarify because of the boundary-spanning nature of information. Both political and practical issues arise when questions such as: Who is responsible for the quality of our customer data? Whose version of name and address do we use? Or, who must sign off on the accuracy of our financial information? Ideally, most organizations would like to have a single version of each of their key information subjects (e.g., customer, product, employees), which all lines of business and systems would use. This would enable proper protections and controls to be put in place. And this is clearly a long-term IM goal for most. However, legacy environments, political realities, and tight budgets mean that the reality is somewhat less perfect with duplicate versions of the same information and several different variants being used by parts of the business.

Information stewards should be business people. They should be responsible for determining the meaning of information "chunks" (e.g., customer name and address), and their business rules and contextual use. They should be responsible for the accuracy, timeliness, consistency, validity, completeness, and redundancy of information. Stewards also determine who may access information according to privacy and security policies and provide guidance for the retention and deletion of information in accordance with regulatory and legal requirements. In addition, they make the information's characteristics available to a broad audience through the organization's metadata.

Stewardship, like IM, is an evolving role that few understand fully. Ideally, there should be one steward for each information subject, but this is nowhere near the reality in most organizations. One focus group organization has established a working group for each of its major subjects, with representatives from all affected stakeholder groups, as well as IT. Their goals are to: reduce duplicate records; correct information; simplify processes; and close "back doors." In the longer term, these groups hope to develop standard definitions and a formal stewardship process and ultimately use these to retool IT's data infrastructure.

"We are struggling with this concept," admitted a focus group member. "This is not a simple task and no one in our business wants to take accountability as yet." Stewardship also takes time and many business units are not yet prepared to allocate resources to it. "At present, we are hitching our wagons to other projects and hoping to make some progress in this way," said another manager. "Every area is taking some steps but they're all at different levels of maturity. This can be frustrating because progress is so slow." All agreed that the role of information steward needs to be better defined and incorporated into organizational and HR models. New performance

metrics also need to be established to monitor progress against these goals in ways that link IM activities to key business objectives.

Stage Four: Build Information Standards. Standards help ensure that quality, accuracy, and control goals can be met. When all parts of the organization follow the same standards, it is relatively easy to simplify the processes and technology that use a piece of information, said the focus group. Conversely, different information standards used by different business groups will inhibit effective IM. Not all information needs to be standardized however; only that which is used by more than one business unit. When information *is* used more broadly, a standard needs to be established. This is where a metadata repository is useful. This repository stores information definitions, standards for use and change, and provides cross-references for all models, processes and programs using a particular piece of information. A metadata repository can be jointly used by business when beginning a new project and by IT when developing or modifying applications. It can be invaluable to both groups (and to the enterprise) in helping them to understand how their work will affect others, thus preventing potential problems.

> Standards require…
>
> - A unique name and definition
> - Data elements, examples and character length (e.g., name prefix)
> - Relationship rules
> - Implementation requirements
> - Spacing and order.

Typically, cross-functional working groups composed of business and IT staffs establish standards. "Metadata is really where the rubber meets the road," said one focus group manager. "It can be a very powerful tool to prevent the duplication of data in the organization." However, it is a huge undertaking and takes time to show value. "You need strong IT executive support for this," said a manager. "It is not something that those outside of IT initially understand." The focus group recommended starting with what exists currently (e.g., a data warehouse) and then growing from there. One firm initially established a procedure that any changes to production systems had to update the metadata repository first. "We weren't prepared for the demand this created," stated the manager involved. "It's much better to incorporate this step in front-end analysis than at the end of development."

Finally, education and awareness play an essential role at this stage. "We always underestimate the importance of awareness," said a manager. "We must make sure that no project starts in the organization that doesn't use standards. The only way to do this is to keep this issue continually in front of our business executives." The other group members agreed. "Standards are the cornerstone of IM," said one. "If they are followed, they will ensure we don't add further layers of complexity and new steps."

IV. ISSUES IN IM

As with anything new, those involved with IM in their organizations face a host of challenges and opportunities as they try to implement more effective processes and practices around information. Some of these can be mixed blessings in that they are both drivers of IM and complications (e.g. legislation). Others are simply new ways of looking at information and new perspectives on the way organizations work. Still others are genuinely new problems that must be addressed. When combined with the fact that IM "belongs" exclusively to neither IT nor the business, these add up to a huge organizational headache, especially for IT. "Sometimes the business people are not ready for the disciplines associated with IM," said one manager. "If they're not ready, we move on to an area that is." Another said, "Sometimes it's more trouble that it's worth to involve the business and we just do the work ourselves."

Culture and behavior. In the longer term, however, the focus group agreed that IM is something that all parts of the organization will have to better understand and participate in. One of the most comprehensive challenges is changing the culture and behavior surrounding information. Marchand et al. [2000] suggest that there are six interdependent beliefs and behaviors that are

needed by all staff to support a positive "information orientation." These have been strongly correlated to organizational performance when they are present with strong IT and IM practices:

1. **Integrity.** Integrity "defines both the boundaries beyond which people in an organization should not go in using information and the 'space' in which people can trust their colleagues to do with information what they would do themselves." Where integrity exists, people will have confidence that information will not be used inappropriately.

2. **Formality.** This is the ability to trust formal sources of information (as opposed to informal ones). Formality enables an organization to provide accurate and consistent information about the business and establish formal processes and information flows that can be used to improve performance and provide services to customers.

3. **Control.** Once formal information is trusted, it can be used to develop integrated performance criteria and measures for all levels of the company. In time, these will enable monitoring and performance improvement at the individual and work-unit levels and can be linked to compensation and rewards.

4. **Transparency.** This describes a level of trust between members of an organization that enables them to speak about errors or failures "in an open and constructive manner without fear of unfair repercussions." Transparency is necessary to identify and respond effectively to problems and for learning to take place.

5. **Sharing.** At this level, both sensitive and nonsensitive information is freely exchanged between individuals and across functional boundaries. Information exchanges are both initiated by employees and formally promoted through programs and forums.

6. **Proactiveness.** Ultimately, every member of an organization should be alert to picking up new information about business conditions and open to testing new concepts.

Information Risk Management. The increasing breadth and scope of IT, combined with greater use of outsourcing, has made information more vulnerable to both internal and external fraud and raised the level of risk associated with it. Management must therefore take proactive measures to determine an appropriate risk/return tradeoff for information security. There are costs associated with information security mechanisms and the business must be educated about them. In some cases, these mechanisms are "table stakes," i.e., they must be taken if the company wants to "be in the game." Other risks in information security include: internal and external interdependencies; implications for corporate governance; and impact on the value proposition. Risk exposures can also change over time and with outsourcing.

The focus group agreed that security is essential in the new world of IM. Today, most organizations have basic information protection, i.e., virus scanners, fire walls, and virtual private networks. Many are also working on the next level of security which includes real-time response, intrusion detection and monitoring, and vulnerability analysis. Soon, however, information security will need to include role-based identity and access management. An effective information security strategy includes several components:

- An information protection center, which does data classification and vulnerability analysis and issues alerts

- Risk management

- Identity management, including access management, digital rights management, and encryption technology

- Education and awareness

- Establishment of priorities, standards, and resource requirements
- Compliance, reviews, and audits

Many of the decisions involved must be made by the lines of business, not IT, as only they can determine access rules for content and the other controls that will facilitate identity and access management.

Information Value. At present, the economics of information have not yet been established in most organizations. It is therefore often hard to make the case for IM investments, not only because the benefits are difficult to quantify but also because of the large number of variables involved. A value proposition for IM should address its strategic, tactical, and operational value and how it will lower risk and develop new capabilities. Furthermore, an effort should be made to quantify the value of the organization's existing information assets and to recognize their importance to its products and services.

As we have noted before, "value" is a highly subjective assessment. Thus, different companies and even different executives will define it differently. Today, businesses define value broadly and loosely, not simply as a financial concept [Ginzberg 2001]. However, because there is no single agreed measure of information value, misunderstandings about its definition can easily arise. Therefore, it is essential that everyone involved in IM activities agree on what value they are trying to deliver and how they will recognize it. Furthermore, value has a time dimension. It takes time for an IM investment to pay off and become apparent. This must also be recognized by all concerned [Smith and McKeen 2005b].

Privacy. Concern for the privacy of personal information has been raised to new levels, thanks to legislation being enacted around the world. All companies need enterprise-wide privacy policies that address the highest privacy standards required in their working environment. For example, if they operate globally, policies and practices should satisfy all legislation worldwide. Privacy clearly should be part of any long-term IM initiatives, but it also affects what an organization is doing *currently*. As such, it is both an IM issue and an initiative in its own right. Both existing processes and staff behavior will be affected by privacy considerations. "Privacy is about respect for personal information and fair and ethical information practices. Training should start with all new employees and then be extended to all employees," said a focus group manager. Many countries now require organizations to have a chief privacy officer. If so, this person should be a key stakeholder in ensuring that the organization's IM practices around data quality and accuracy, retention, information stewardship, and security are also in keeping with all privacy standards and legislation.

As with other IM initiatives, it is important that senior management understand and support the changes needed to improve privacy practices over time. "Good practices take time to surface," said one manager. "It takes time and resources to ensure all our front line staff and our information collection and management processes are compliant." Accountabilities should be clearly defined as well. Ideally, IM policy and stewards set the standards in this area with privacy specialists and operational staff (in both IT and the business) responsible for implementing them. With the increase in outsourcing, particularly to offshore companies, all contracts and subcontracting arrangements must be reviewed for compliance in this area. "Our company is still liable for privacy breaches if they occur in one of our vendor firms," noted a focus group manager.

Knowledge Management. Although many organizations have been soured on knowledge management because of its "soft and fuzzy" nature [Smith and McKeen 2004a], the fact remains that IM provides a solid foundation that will enable the organization to do more with what it knows (See Figure 1). Even firms that do not have a separate KM function recognize that better IM will help them build valuable structural capital. There are many levels at which this can be done. At the most elementary, data warehouses can be built and the information in them can be analyzed for trends and patterns. One focus group company is working on identifying its "single points of knowledge" (i.e., those staff members who have specialized knowledge in an important area) and

trying to capture this knowledge in a formal way, e.g., in business processes or metadata. Many companies are making customer information management a priority so they can use this information to both serve their customers better and to learn more about them. This clearly cannot be done unless information is integrated across processes and accessible in a useable format [Davenport and Prusak 1998; Smith and McKeen 2005c]. Finally, information can be aggregated and synthesized to create new and useful knowledge. For example, Wal-Mart takes transaction level information from its sales process, aggregates and analyzes it to make it useful both to the sales process and to other areas of the business. It identifies trends and opportunities based on this analysis and enables information to be viewed in different ways, leading to new insights.

The Knowing-Doing Gap. While most organizations assume that better information will lead to better actions and decisions, research shows that this is not always (or even often) the case. All too often, companies do not utilize the information they have. One problem is that we really understand very little about how organizations and groups actually use information in their work [Pfeffer and Sutton 2000]. Some organizations do not make clear links between desired actions and the acquisition and packaging of specific information. While this may seem like common sense, focus group members agreed that the complex connections between these two are not always well understood. Effective technology, strong IM practices, and appropriate behaviors and values are *all* necessary to ensure the information-action connection is made [Smith et al. 2006].

V. GETTING STARTED IN IM

While IM is not IT, the fact remains that IT is largely driving this work in organizations these days. Whether this will be the case in the longer-term remains to be seen. Most members of the focus group would like to see the situation reversed, with the business driving the effort to establish appropriate IM policies, procedures, stewardship, and standards and IT supporting IM with software, data custodianship, security and access controls, information applications and administration, and integrated systems. In the shorter-term however, IT is working hard to get IM the attention it deserves in the business.

Focus group members had several recommendations for others wishing to get started in IM:

Start with what you have. "Doing IM is like trying to solve world hunger," said one group member. "It just gets bigger and bigger the longer you look at it." Even just listing all of the information types and locations in the organization can be a daunting task and the job will probably never be fully complete. Focus group members therefore recommended doing an inventory of what practices, processes, standards, groups, and repositories already exist in the organization and trying to grow IM from there. It is most important to get the key information needed to achieve business objectives under control first. For many companies, this may be customer information; in others, it may be product or financial information. "It's really important to prioritize in IM," said a manager. "We need to focus on the right information that's going to have the biggest return." It may help to try to quantify the value of company information in some way. While there is no accepted accounting method for doing so as yet, some members are adapting the value assessment methodologies used for other assets. "When you really look at the value of information, it's worth a staggering amount of money. This really gets senior management attention and support," noted a manager.

While a top-down approach is ideal, it may not always be practical. "It took us over a year to get an information policy in place," noted a manager. "In the meantime, there are significant savings that can be realized by taking a bottom-up approach and cleaning up some of the worst problems." Harnessing existing compliance efforts around privacy, security and Sarbanes-Oxley is also effective. As we noted in an earlier paper, at minimum, these will affect information architecture, access to data, document retention and data administration for financial and personal information. "We can take either an opportunity or a fear mindset towards regulation," said a manager. Companies that see compliance from a purely tactical perspective will likely not

see the value of increased controls. If, however, they see regulation as a chance to streamline and revamp business processes and the information they use, their compliance investments will likely pay off [Smith and McKeen 2004b]. Those interested in IM can also take advantage of the dramatically elevated attention levels of the board and executives to compliance matters.

Ensure cross-functional coordination between all stakeholders. While business involvement in IT initiatives is always desirable, it is impossible to do IM without this. "No IM effort should go ahead without fully identifying all areas that are affected," stated one manager. Typically, legal, audit, and the privacy office will have a keen interest in this area. Equally typically, many of the business units affected will not. For operational groups, IM is often seen as bureaucratic overhead and extra cost. This is why education and communication about IM is essential. "You have to allow time for these groups to get on board with this concept and come around to the necessity of taking the time to do IM right," said a manager. He noted that this effort has to be repeated at each level of the organization. "Senior management may be supportive but members of the working groups may not really understand what we're tying to accomplish."

Get the incentives right. Even with IM "socialization" (i.e., education and communication), politics is likely to become a major hurdle to the success of any IM efforts. Both giving up control and taking accountability for key pieces of information can be hard for many business managers. Therefore, it is important to ensure there are incentives in place that will motivate collaboration. Metrics are an important way to make progress (or the lack of it) highly visible in the organization. One firm developed a team scorecard for its customer information working group that reported two key measures to executives: the percentage of remaining duplicate records and the percentage of "perfect" customer records. Each of these was broken down into a number of leading indicators that helped focus the group's behavior on the overall effort rather than on individual territories. Another firm linked its process and information simplification efforts to budgets. The savings generated from eliminating duplicate or redundant information (and its associated storage and processing) were returned to the business units involved to be reinvested as they saw fit. This proved to be a huge motivator of enterprise-oriented behavior.

Establish and Model Sound Information Values. Because ultimately, front-line workers who make many decisions about information and procedures cannot cover all eventualities, all staff need to understand the fundamental reasons for key company information policies and directives. Corporate values around information guide how staff should behave even when their managers aren't around. And they provide a basis for sound decision-making about information [Stewart 2004]. Others have noted that senior IT leadership should primarily be about forming and modeling values, not managing tasks and this is especially true for IM said the focus group [Spear 2004]. Values are especially important, they noted, now that staff are more mobile and virtual and thus, more empowered. If such values are effectively articulated and modeled by leaders, they will drive the development of the appropriate culture and behaviours around information.

VI. CONCLUSION

Information management is gaining increasing attention in both IT and the business. Driven by new compliance and privacy legislation, the increasing vulnerability of corporate information, and the desire for greater integration of systems, IM is beginning to look like an emerging discipline in its own right. However, the challenges facing organizations in implementing effective IM practices are many and daunting. Not least is the need to try to conceptualize the scope and complexity of work to be done. Tackling IM is likely to be a long-term task. IT managers have a huge communications job ahead in trying to educate business leaders in their responsibilities in information stewardship, developing sound IM practices, and inculcating the culture and behaviors needed to achieve the desired results. Developing a plan for tackling the large and ever-increasing amount of information involved is only the first step. The more difficult one will be involving every member of the organization – from the Board to front-line workers – in seeing that

it is carried out effectively. While IT can lead this effort initially and provide substantial support for IM, ultimately, its success or failure will be due to how well the business does its part.

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APPENDIX: ELEMENTS OF IM OPERATIONS

A. **Strategy**

- External environment
- Strategic planning

- Information life-cycle
- Planning
- Program integration
- Performance monitoring

B. **People**

- Roles and responsibilities
- Training and support
- Subject matter experts
- Relationship management

C. **Processes**

- Project management
- Change management
- Risk management
- Business continuity
- Information life-cycle:
    - o Collect, create and capture
    - o Use and dissemination
    - o Maintenance, protection and preservation
    - o Retention and disposition

D. **Technology and Architecture**

- IM tools
- Technology integration
- Information life-cycle: organization
- Data standards

E. **Culture and Behaviors**

- Leadership
- IM awareness
- Incentives
- IM competencies
- Communities of Interest

F. **Governance**

- Principles, policies and standards

- Compliance
- IM program evaluation
- Quality of information
- Security of information
- Privacy of information.

ABOUT THE AUTHORS

Heather A. Smith (hsmith@business.queensu.ca) has been named North America's most published researcher on IT and knowledge management issues. A Senior Research Associate with Queen's University School of Business, she is the co-author of three books: the award-winning *Management Challenges in IS: Successful Strategies and Appropriate Action; Making IT Happen: Critical Issues in IT Management;* and *Information Technology* and *Organizational Transformation: Solving the Management Puzzle.* A former senior IT manager, she is currently co-director of the IT Management Forum and the CIO Brief, which facilitate interorganizational learning among senior IT executives. She is also a Senior Research Associate with the American Society for Information Management's Advanced Practices Council and a Research Associate with the Lac Carling Congress on E-Government. In addition, she consults, presents, and collaborates with organizations worldwide, including British Petroleum, TD Bank, Canada Post, Ecole des Hautes Etudes Commerciales, the OPP, Boston University, and Farm Credit Canada. Her research is published in a variety of journals and books including *MIT Sloan Management Review, MIS Quarterly Executive, Communications of the Association of Information Systems, Knowledge Management Research and Practice, Journal of Information Systems and Technology, Journal of Information Technology Management, Information and Management, Database, CIO Canada,* and the *CIO Governments Review.*

James D. McKeen (jmckeen@business.queensu.ca) is a professor of MIS at the School of Business, Queen's University at Kingston, Canada and is the founding Director of The Monieson Centre which conducts multi-university, collaborative research focused on generating value through knowledge in organizations. Jim received his Ph.D. in Business Administration from the University of Minnesota. He has been working in the field of MIS for many years as a practitioner, researcher, and consultant and is a frequent speaker at business and academic conferences. His research has been widely published in various journals including the *MIS Quarterly*, *Knowledge Management Research and Practice*, the *Journal of Information Technology Management*, the *Communications of the Association of Information Systems*, MIS Quarterly Executive, the *Journal of Systems and Software*, *the International Journal of Management Reviews, Information and Management*, *Communications of the ACM*, *Computers and Education*, *OMEGA*, *Canadian Journal of Administrative Sciences, Journal of MIS*, *KM Review*, *Journal of Information Systems Technology* and *Database*. Jim is a co-author of two books on IT management with Heather Smith – the most recent being *Making IT Happen* (Wiley, 2003). He currently serves on a number of Editorial Boards.

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