

10

Strategies for Information Management: Towards Knowledge Management

The information management strategy is one of the areas of strategy that lies behind the management of the application portfolio. Its aim is to ensure that the organization obtains the greatest possible value from its information resource and to enable its cost-effective management and protection. While the IS strategy addresses *how* the organization is going to use information and for what purpose, it is critical to ensure that the information that underpins the applications is managed effectively.

The nature of business information that requires managing has changed in the last several years from primarily numbers and text to now include images, pictures, graphics and multimedia. This shift from 'lean' to 'richer' information presents new challenges for the traditional role of information management. Information management has also become the basis for many new Internet-based business models—ebay.com, Amazon.com, Betdaq.com and Covisint are obvious examples here—highlighting just how strategic it has become.

Data are the raw material of information—the raw facts or observations—with information usually portrayed as 'data in context' or data that have been given some meaning. Yet, a key challenge for all organizations is to transform information into knowledge that can subsequently be utilized to effect action and business results. Both information and knowledge are, at the same time, related yet quite distinct. Innovation, for example, demands not only information but also the application of knowledge from a variety of sources. Information can be considered as explicit knowledge, but much knowledge is tacit and personal, rendering it particularly difficult to identify, capture, store and deploy. The increased recognition of the importance of knowledge for

competitiveness and the espoused relationship between information and knowledge has seen many chief information officers (CIOs) and IT directors being asked to either support or drive knowledge initiatives within their organizations, particularly as technologies emerge that support and enhance the management of knowledge. Yet, the nature of knowledge means that a different mindset is required in its management compared with managing information—there is an argument that knowledge *per se* cannot be managed, and that only its context can.

Information management embodies policies, organizational provisions and a comprehensive set of activities associated with developing and managing the information resource. Its effectiveness relies on implementing coherent policies that aim to provide relevant information of sufficient quality, accuracy and timeliness at an appropriate cost, together with access facilities suited to the needs of authorized users. At the same time, it must be recognized that much of the information used by employees in a business is not automated, and that while some information can be tightly managed, users will gather information from informal as well as formal sources. This informal information cannot be managed in the same regulated way. An additional necessity is for an environment within the organization that is conducive to promoting appropriate behaviours among employees regarding information.

This chapter explores information, knowledge and their management. It begins by outlining the management agenda regarding the treatment of information as an asset. It considers the acquisition, protection, utilization, accessibility and dissemination of information, as well as the promotion and management of initiatives to derive maximum benefit from the resource. It also examines the development, management and marketing of an enterprise-wide information model, and the application of the principles of Information Asset Management (IAM). The second part of this chapter is concerned with knowledge, its use and management, particularly in exploring the relationship between information and knowledge. The challenges that the nature of knowledge poses for its management are highlighted. The chapter also examines the role of technology in the management of knowledge.

INFORMATION AS AN ASSET: THE SENIOR MANAGEMENT AGENDA

The importance of information¹ as a key asset continues to grow, following a period where its production, complexity, volume and demand have rocketed, but where satisfaction of the real information needs of the organization has been limited due to many obstacles. Often, this can be

due to a lack of clarity in identifying business-driven requirements. However, the IS/IT strategy process should point to major opportunities from exploiting information. The challenge is to ensure that this information is of the highest quality possible, particularly in terms of timeliness, accuracy, completeness, confidence in source, reliability and appropriateness.

Many organizations are plagued by poor quality information. From his work with telecommunications operator AT&T, Redman² found that:

- Many managers are unaware of the quality of information they use and often mistakenly assume that because it is 'on the computer' that it is accurate.
- At an operational level, poor information leads directly to customer dissatisfaction and increased cost. Costs are increased as time and other resources are spent detecting and correcting errors.
- Poor information quality can result in subtle and indirect effects. For example, significant mistrust can ensue when the information from one part of the business, say order entry, that is used by another, perhaps customer billing, is unreliable.
- Inaccurate information makes just-in-time manufacturing and self-managed work teams infeasible. The right information needs to be at the right place at the right time. To illustrate the severity of this problem, one manufacturer was still allowing customers to purchase particular products that it was no longer making via its website.
- Poor information in financial and other management systems mean that managers cannot effectively implement business strategies. Decisions are no better than the information on which they are based.

In addition, a consequence of the Internet has been an explosion in the volume of information that is available to employees. This information is of varying quality, and one of the challenges that organizations face today is assessing this quality. Information from the Net is not subject to any review standards, policies or quality control procedures.

There is also a growing requirement for integration of information flows at individual and departmental/functional levels, and across processes and organizational boundaries, which poses a variety of complex challenges. Communications capability is expanding all the time, as local and wide area networks flourish and the number of external sources of information swell. There is also a stimulus from technology 'push', influenced by the growing availability and improvement in tools such as

middleware, advanced data dictionaries, web design tools, database technologies, and computer assisted software engineering (CASE) tools.

In most instances, effective information management is far from straightforward, and there are many obstacles to navigate:

- Information resides in multiple electronic 'libraries' and proprietary databases and on multiple technical platforms, which are not well integrated or easily accessible. These are the legacy of many years of uncoordinated, evolutionary development, and may result in poor quality and inconsistent presentation.
- Some information is computer-based and well structured, stored in centrally managed databases and applications; some is less structured, and stored in many independent and dispersed PCs or on corporate Intranets; and there is still a huge volume of unstructured and non-automated or unrecorded information.
- Information is created for different purposes by different people at different times and based on differing definitions, resulting in many conflicts and inconsistencies.
- There is both a backlog in meeting information requirements and legacy systems, requiring integration with newly developed and packaged applications.
- Complex information exchanges exist across organizational boundaries, comprising a mixture of electronic, paper-based and verbal communication.

These varying contexts create an 'information ecology'³ that, if not managed coherently, can seriously undermine organizational performance. Addressing issues relating to information and its management is not a task that can be abdicated outside managerial ranks or delegated to the IS function.

In the UK, the Hawley Committee⁴ explored the role of the Board of Directors in managing information. As its starting point, it took the view that information is a significant issue for Boards in fulfilling their responsibilities and is the heart of supervising what an organization does. Members of this Committee highlighted the difficulties they were continuing to experience at Board level in the direction and control of information and information systems. They also highlighted the fact that misuse of information and damage to the systems that hold critical information can seriously harm performance and reputations, and that the Board itself may be hampered in carrying out its duties by poor availability or poor presentation of information.

The Committee developed an agenda for Boards regarding information and its management. While the report says little that is not said

elsewhere, what is new is *who* is saying it. An outline of this agenda is presented in Box 10.1. Tools were also developed by the Committee to support Board members in managing their organization's information resources and a number of these are drawn upon in the chapter.

AN INFORMATION CULTURE

Essential for the success of any information management strategy is the existence of an appropriate 'information culture'.⁵ An information culture can be defined as the values, attitudes and behaviours that influence the way employees at all levels in the organization sense, collect, organize, process, communicate and use information. Marchand⁶ has identified four common information cultures that exist in organizations today. They are:

- *functional culture*—managers use information as a means of exercising influence or power over others;
- *sharing culture*—managers and employees trust each other to use information (especially about problems and failures) to improve their performance;
- *enquiring culture*—managers and employees search for better information to understand the future and ways of changing what they do to align themselves with future trends/directions;
- *discovery culture*—managers and employees are open to new insights about crisis and radical changes and seek ways to create competitive opportunities.

Each type of culture influences the way employees use information—their information behaviour—and reflects the importance that senior management attribute to the use of information in achieving success or avoiding failure. However, establishing an effective information culture can be a challenge. Davenport captured this point succinctly when he noted that 'effective information management must begin by thinking about how people use information—not with how people use machines'.⁷ Changing a company's information culture requires altering the basic behaviours, attitudes, values, management expectations and incentives that relate to information. 'Changing the technology only reinforces the behaviours that already exist.'

Strassmann⁸ uses the word 'politics' when considering information management, as he believes that this term, perhaps more aptly than any other, captures what it is really about. He sees information management seeking to answer the same questions as those raised in politics. He

Box 10.1 Information as an asset: the Board Agenda

The Hawley Committee proposed that all significant information in an organization, regardless of its purpose, should be properly identified, even if not in an accounting sense, for consideration as an asset of the business. It asserted that the Board of Directors should address its responsibilities for information assets in the same way as for other assets (e.g. property or plant). This implies a new approach to how information should be treated and requires a Board to make clear to management what actions it wishes to be taken and who is responsible for action and compliance.

The Board should satisfy itself that its own business is conducted so that:

1. the information it uses is necessary and sufficient for its purpose;
2. it is aware of and properly advised on the information aspects of all the subjects on its agenda;
3. its use of information, collectively and individually, complies with applicable laws, regulations and recognized ethical standards.

The Board should determine the organization's policy for information assets and identify how compliance with that policy will be measured and reviewed, including:

4. the identification of information assets and the classification into those of value and importance that merit special attention and those that do not;
5. the quality and quantity of information for effective operation, ensuring that, at every level, the information provided is necessary and sufficient, timely, reliable and consistent;
6. the proper use of information in accordance with applicable legal, regulatory, operational and ethical standards, and the roles and responsibilities for the creation, safekeeping, access, change and destruction of information;
7. the capability, suitability and training of people to safeguard and enhance information assets;
8. the protection of information from theft, loss, unauthorized access, abuse and misuse, including information that is the property of others;
9. the harnessing of information assets and their proper use for the maximum benefits of the organization, including legally protect-

ing, licensing, reusing, combining, re-presenting, publishing and destroying;

10. the strategy for information systems, including those using computers and electronic communications, and the implication of that strategy with particular reference to the costs, benefits and risks arising.

notes that information management is the process by which those who set policy guide those who follow policy. 'Where control over information changes the alignment of power, information politics appears. Whether that turns out to be constructive is something that must be resolved through information management. Who gets what data and who converts data into information? Who balances the competing interests of leaders and followers? Who benefits from the ownership of information?'⁹

Marchand *et al.*¹⁰ have developed the concept of *information orientation* to represent a measure of how effectively a company manages and uses information. Their research indicates that IT practices, information management practices and information behaviours *all* must be strong and working together, if superior business performance is to be achieved. The researchers have developed a methodology to assess information orientation, an overview of which is provided in Box 10.2.

IMPLEMENTING BUSINESS-WIDE INFORMATION MANAGEMENT

A well-managed information resource is arguably as essential as an effective IT infrastructure. Back in the late 1980s, Drucker,¹¹ in an article titled 'The coming of the new organisation', predicted that the typical organisation of the 21st century would be information based. He claimed it would be flatter, having drastically slimmed down its management size and levels, and would be populated mainly by knowledge specialists, working in fluid interdisciplinary teams. Everyone would be responsible for meeting their own information needs, and the organization as a whole would be required to have a unified vision and an information architecture, and to have abandoned former parochial views on information and its role. His predictions can now be seen to be happening.

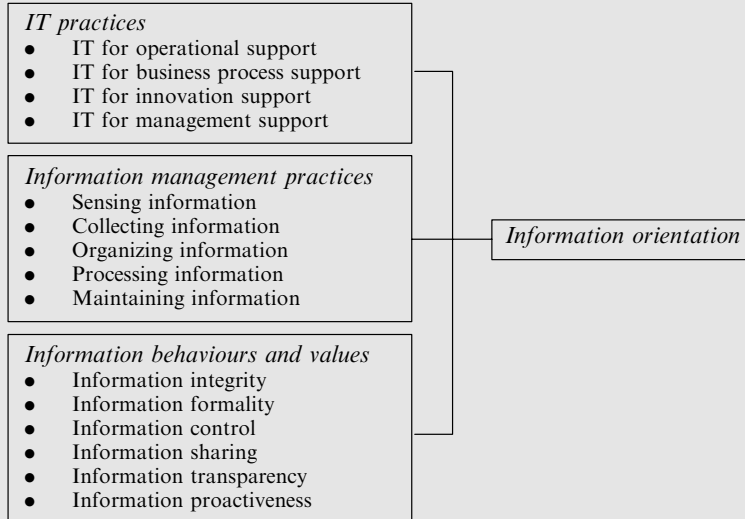
However, promoting the management of information as a corporate resource does not imply building an all-embracing corporate database,

Box 10.2 Information orientation

In their research, Marchand and colleagues* identified 15 specific competencies associated with effective information management and use. They were categorized under three headings:

- *information technology practices*—a company's capability effectively to manage information technology (IT) applications and infrastructure to support operations, business processes, innovation and managerial decision making (four competencies);
- *information management practices*—a company's capability to manage information effectively over the life cycle of information use, including sensing, collecting, organizing, processing and maintaining information (five competencies);
- *information behaviours and values*—a company's capability to instil and promote behaviours and values in its people for effective use of information (six competencies).

The information orientation (IO) of a company measures its effectiveness in managing and using information. IO is calculated by measuring performance across these three categories.



* D.A. Marchand, W. Kettinger, and J.D. Rollins, 'Information orientation: People, technology and bottom line', *Sloan Management Review*, Summer, 2000, 69–80.

Table 10.1 *Establishing the scope and purpose of information management: sample set of questions*

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- What is the extent of information that the business is interested in?
 - Why does it need the information, and what beneficial impact can be ensured?
 - How much of it resides in centrally managed computer systems, dispersed departmental or individual PCs, in paper-based forms or in people's heads?
 - How much of it is new or external information, currently not collected?
 - Which information is used by a broad cross-section of the business and needs consistent, coherent policies to avoid ambiguity and conflict?
 - What information is strategic and linked to strategic applications?
 - What high potential information is likely to become strategic?
 - When and how can it be delivered, or made accessible, where it will be most useful?
 - How can it be verified, and what other information is required to turn it into useful knowledge?
 - Which information needs to be integrated across applications, and what technical challenges does this pose?
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but does support information independence. True information independence is achieved when there is no relationship between *how* or *where* information is stored and *how* it is accessed and applied by different users. It should be possible to vary requirements without impacting the storage structure or efficiency of information access. Conversely, it should be possible to restructure databases from time to time, without interfering with access demands. This can occur when a business embarks upon a comprehensive migration from one applications environment to another. It may take years and comprise many intermediate stages. It can also occur when organization-wide information needs change, such as when a public utility becomes privatized and is required to focus on commercial dictates and customer demands; or when corporate information management policies or even basic information architectures change in line with business evolution.

From an information management perspective, there are numerous factors that need to be considered, some of which can be deduced from a list of questions outlined in Table 10.1. By answering these and other pertinent questions, a framework for implementing information management can be established. This framework will define:

- a set of objectives and policies for effective information management;
- a program for introducing information management to meet the objectives;

- the creation and maintenance of the information architecture and business or enterprise model;
- what information services should be provided, and how to organize to offer them in the most effective way;
- what implementation issues exist, and how to tackle them.

Objectives of Information Management

The main objective of information management is to satisfy the demand for information, and thus deliver value to the business. This demand is expressed in the information requirements of applications, and the information access and delivery services required by users. Value is delivered through:

- enabling the business to make the right decisions;
- improving the effectiveness of processes and their outcomes;
- providing timely and focused performance information;
- the preservation of organizational memory;
- improving the productivity and effectiveness of managers and staff.

Behind the main objective should be further objectives relating to the quality, cost, accessibility, safety and stability of the information, and others relating to the benefits that can be delivered through shared information, common definitions, an enterprise model covering information and processes, and a modelling capability. These objectives are explored in some detail in the following subsections.

Delivering Value to the Business

Delivering value to the business is the key rationale behind an information management strategy—to add value by exploiting information as a core business resource. In meeting that objective, the potential value of information, especially in the core competitive processes (the primary activities in the value chain), will be harnessed to its fullest extent. While Chapter 5 considered opportunities for gaining strategic advantage through IS/IT, in setting out to manage information, it is presumed that such opportunities have been examined and the information requirements confirmed. This will have been documented clearly in the business IS strategy, along with any other information requirements.

The Hawley Committee developed a framework to help in structuring the value of different types of information asset. Illustrated in Figure 10.1, it can be very useful in reaching agreement among senior business

Types of information asset	Value/Importance defined by		
	Price paid or potentially paid (IPR) less costs	Impact of theft, damage or loss, major errors	Potential to increase revenue or reduce costs
Market and customer information			
Product information			
Specialist knowledge			
Business process information			
Management information and plans			
Human resource information			
Supplier information			
Accountable information			

Figure 10.1 *Mapping the value of information assets* (source: Information as an Asset: The Board Agenda, KPMG/IMPACT, London, 1994)

managers as to its impact on business value as well as to the consequences of theft or damage.

Since information needs to be managed in line with its value to the business, it is helpful to ‘weight’ areas within the total information set, according to their required contribution. A similar portfolio model to that used to categorize applications can be used to rank the information portfolio (Figure 10.2).

Strategic

Information, both internal and external, that is crucial to strategic and competitive business initiatives and principally associated with business drivers, objectives or measures of success, represents the greatest potential value. Some but not all this information may exist within the available information environment in the business. Typical requirements are shown in Table 10.2. These are all business-driven needs, demanding flexible and often high-performance response.

A number of different types of response may be needed to meet strategic information requirements:

- Implementation of newly developed or purchased applications to satisfy new information requirements that cannot be met from existing applications, which provides flexible systems that can be

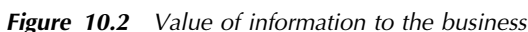


Table 10.2 Typical strategic information requirements

- Access to new information about markets, customers, competitors, suppliers or other external bodies to improve competitiveness
- Establishment of electronic links with external bodies, to speed up and improve communications and, in some cases, to lock in trading partners
- Access to external information such as market research databases or database marketing facilities to gain external intelligence
- Restructured existing information in order to meet the critical success factors of the business or its external partners
- Capability to integrate and utilize multimedia data
- Very fast access to integrated information so that visibility is provided from end to end of the key processes and information-based services can be delivered effectively throughout the processes
- Access and filtering mechanisms for unstructured information to satisfy executive information needs relating to critical business issues
- Performance measures to monitor progress on strategic factors
- Modelling data to perform 'what if' analysis on crucial business issues
- Better information about staff to enable more effective use of the human resource

adapted as business needs evolve and assists in gaining sustainable competitive advantage.

- Substantial initiatives to enable information to be shared in a controlled manner across existing, newly developed and packaged applications, and to be able to 'switch in' and 'switch out' applications with minimum disruption and risk. Examples of this are described later in the chapter.
- Short-term interim solutions, depending on providing access to 'locked-in' information. This may be through either direct or intermediate bases of easily accessible information. Appropriate tools are required to deliver information to business users, or enable them to extract it themselves. The aim is to obtain value from information in existing, but inappropriate, data structures.
- Development of an enterprise model to facilitate decision making such as:
 - top-level business decisions consistent with the 'declared' IS strategy;
 - process redesign proposals or new development proposals resulting from the IS strategy;
 - as a basis for mapping various architectures (information, application portfolio, technology, product), as described in Chapter 4 as a tool for planning IT supply, evaluation and decision making.

These responses reflect the nature of resulting initiatives' combining application, information and technology developments. For example, associated initiatives may be needed to expand the IT infrastructure, to extend communications capabilities or to deal with multimedia information.

High Potential

High potential information is generally new information, with unproven value to the business. Its sources, structures and relationships may not be fully understood, but, as potentially valuable systems are being clarified, their information requirements must be confirmed in terms of defining the best way of satisfying business needs, so that they can be included in the information management umbrella at the appropriate time. The essence of operating in this quadrant is in rapid evaluation of a prototype application or information acquisition, processing or dissemination technology:

- Single-user systems need not necessarily be subject to corporate information administration, as long as the reliance placed on their information is not greater than its integrity warrants.

- In some cases, it may be the possibility of exploiting latent information that is the driving force in exploring a high-potential opportunity; for example, historical transaction information about customers that could lead to more effective targeting of marketing activity. In others, it is the desire to improve business performance that prompts the extension of information content and usage; for example, collecting customer-specific requirements, so that customer satisfaction is based on a more personal service in meeting these requirements.
- Other high potential activity could be the trial of some new technology that relates to information management like desktop videoconferencing. This could be driven by IT 'push' from the IS function, or could reflect free market experimentation in a user area, as described in Chapter 7.

Key Operational

The largest volume of information is probably associated with the key operational systems, integral to core operational processes and essential for their effective day-to-day running. Requirements here are likely to be driven by avoidance of disadvantage and may focus on greatly enhancing value through integration across applications and processes, enabling rapid and consistent communication, especially to the external interfaces, where strategic requirements take over (e.g. production status information relating to a customer order).

There could also be opportunities to improve business productivity, and remove duplication and risk of misinformation. These opportunities must nevertheless be assessed in terms of the benefit they could deliver against the probable high cost of implementation and the likely restrictions to developing related strategic applications in the short term.

Support

Information contained only in support systems, though necessary, is not likely to contain much latent value. In some cases, it may even be a burden on the organization when it is constrained by legislation or bound by corporate instructions to supply or store information, without any business benefit being recognized. Effort expended on information management or integration should be kept to a minimum, consistent only with efficiency and necessity.

There is no assumption that, to deliver value, information must be stored and transmitted via computer and communications technology. It may be transmitted verbally as with face-to-face conversations, or in hard-copy paper form in books, journals, directories, instruction leaflets

and so on. On the other hand, emerging electronic information transfer media such as videoconferencing, groupware, Intranet and Internet may be introduced to improve the richness of the interchange.

Making the Most of Current Systems

Even if the long-term plan is to replace existing systems and databases, it is very likely that they will continue to be used for some time as they contain much of the necessary information and processing functionality. It is therefore important to consider how to obtain the maximum contribution from the information in current systems and those still under development. This must be achieved by managing the existing information contained within existing systems, which is frequently 'imprisoned' in multiple corporate files and databases, with considerable duplication, obsolescence, inconsistencies, inefficient linkages and poor exploitation. They may have been poorly designed in the first place. In addition, employees are not very well trained generally to use information. These factors can all lead to competitive disadvantage and must be rectified, if the business case warrants this. If progress is to be made toward implementing effective information management, it is essential to provide efficient access to information in these existing databases. However, if multiple versions of key subject databases such as 'customer', 'product' or 'order' exist, then it is no easy task to rationalize the various versions and harder still to integrate them with any newly defined databases, or object databases, based on the corporate information architecture. Until unique versions of subject databases, or identically maintained versions, are available, managing information globally implies managing the differences between actual database versions and consistent data dictionary definitions.

Typically, there is a huge investment in systems, and in most sizeable organizations the cost of maintaining these can be as much as 70–80% of the annual expenditure on systems and technology. Very rarely can the investment be written off—and even if it could be justified, replacements could not be found or implemented quickly. Nor can support and maintenance be abandoned. So, in planning the migration to a new system, it is important to obtain maximum value from current systems. Meanwhile, the provision of critical business information with the necessary quality attributes in an appropriate set of target databases should be the objective of any migration and must still be justified against the business need. This is likely to be a long, multi-step process of progression toward an elusive goal.

It is essential to evaluate the contribution of information in existing systems, with reference to business information needs. Sometimes,

systems will already have associated information and process models and some will be recorded in dictionary systems. Frequently, however, this is not the case, and the structure and contents of individual systems need to be identified if their value is to be assessed. The evaluation process serves several purposes:

- Documentation of the information structure and processes, and system linkages, which helps in plotting the migration path to the desired systems and information architecture, and also in any initiative that may be put in place to enable information sharing and systems integration.
- Recognition of whether current systems are able to provide information to satisfy business needs, either directly or after enhancement.
- Identification of information that can be usefully transferred to an intermediate base of consolidated information for subsequent accessing, perhaps to satisfy composite needs or unstructured enquiries.

Few tools are available for unscrambling the conceptual framework in existing systems, but some CASE tools can provide reverse engineering facilities that can backward-track and document components of existing systems, capturing data definitions, data flows and data and process models.

Provision of a Stable Integrated Information Framework

In aiming to provide a stable information base, there are strong arguments for it being integrated, at least throughout the core business processes. Prompted by many factors in the business environment, it is expected that there will continue to be a steady increase in the number of knowledge workers, and growth in the volume and complexity of internal and external information needed to meet a variety of demands. This means more people wanting more access to more information that is distributed more widely. These increased demands call for improved gathering and dissemination across a wide area such as:

- exchange of information with trading partners;
- support within decision-making processes;
- *ad hoc* end-user enquiries;
- boardroom strategy and planning systems;
- creating new knowledge by combining specialist information;
- obtaining business intelligence through the Internet and external databases.

Widespread sharing of information from a variety of sources requires considerable integration, based on a representative global information model. All users can then look at the same or consistently related models, with the same meanings and definitions and, by and large, the same or copied occurrences of information. Assuming the model is correct, some of the benefits of a well-structured, stable, integrated information resource, which can be easily and quickly adapted, are listed in Box 10.3.

For example, an organization may want to link information about the services a particular customer has used in order to contain risk (e.g. a bad debt in one area would constitute a bad risk in another), or to maximize opportunities by being able to offer the customer a complete range of services. It is for this purpose that many financial service institutions have attempted to implement channel integration strategies to provide a coherent view of the customer across all channels and products.

Opportunities exist in many other fields, including government departments. For example, the UK's Department of Social Security may wish to provide a potentially valid claimant with information and advice on a range of benefit entitlements, or alternatively to provide the authorities with a better chance of detecting false claimants. In these and most cases, the total view is needed at the business–customer interface, more so than at the centre, since the contact takes place in distributed branches.

Rapid Response to Dynamic Business Needs

Rapidly responding to changing business needs is closely related to the previous aim. Not only should the information framework be stable and integrated but it should also facilitate a swift response to an unexpected business need. The 'window' may only be open for a brief period. A completely healthy systems and information architecture that can enable a virtually instant response is a rare occurrence, but there is much that can be done.

The business models derived from top-down analysis and based on aligning business and information reflect the information-sharing requirements of the business throughout its internal value chain, and into adjacent organizations. During analysis of the value chain, and in particular in examining the information logistics of primary activities, opportunities for deriving competitive advantage by improving information flows will have been examined and built into the required architecture. The ability to satisfy unexpected needs can best be provided if consideration is given to them during the processes of information planning. Applying informed second-guessing, potential information

Box 10.3 Benefits delivered by a stable integrated information framework

- *Businesses better equipped with information to respond as necessary:* to change direction, monitor market and customer needs, competitor activity, build relationships with business partners, and so on.
- *Direct savings achieved in the long run:* even though introducing information management is costly, fragmentation is even more costly when taking into account multiple duplication of information capture, confusion caused by information inconsistencies, and the frustration and chaos in reconciling differences. It can be the cause of lost opportunities through lack of cohesive information.
- *Intraorganizational and interorganizational cooperation improved by making information available across boundaries to a broad community of authorized users:* some of these may be external users, having their own requirements for accessing information; for example, customers placing orders, suppliers enquiring into the status of manufacturing schedules to meet just-in-time delivery requirements, financial analysts collecting global economic figures. In these cases, both user and (information) supplier are beneficiaries.
- *Support for managing businesses in a more integrated way:* traditionally, many businesses have been functionally orientated and IT has supported individual business functions quite effectively. There is now a requirement toward integration along business processes in order to be more customer and market orientated, and thus more competitive. This demands taking a horizontal view across the business; for example, linking all activities relating to a customer and reorganizing information in such a way that the whole of the customer's relationship with a business is logically brought together and presented at the point of contact with the customer—face to face, on the telephone, in concurrent processing, when a written order, query or complaint arrives, or when electronic channels are used.

needs and their sources, relationships and flows can be built into the initial information architecture.

The most appropriate structure for an organization's information and systems is usually that which mirrors the organization itself. Thus, if the

organization is divisionalized and highly decentralized, then the information resources—both applications and information—are probably also best disposed in that form. Determining how best to implement the conceptual architecture is part of the IS/IT strategy process. Clearly, it is also part of the process to look toward future business needs before embarking on what could be very extensive development or redevelopment of systems and information structures. The benefits that can then be delivered are swift responses to:

- identify and exploit an opportunity;
- identify and counter an unexpected competitive action;
- build pre-emptive defence against possible competitive threats;
- supply information to assess a business risk or the probability of its occurrence.

Improved Efficiency and Effectiveness of Information Processes

Improving information processes is an aim of many organizations, and good information planning and management should play a substantial role in meeting this aim. There are a number of factors that contribute to improving efficiency:

- Initially, increased investment is required to create an appropriate integrated infrastructure of 'managed' information. Thereafter, while initial project development costs may be higher, benefits are reaped over a long period in reduced maintenance costs and greatly extended effective life and reliability of applications.
- Critical information is consistent across the business and not plagued by incompatibility problems.
- If a well-constructed data dictionary is employed, fewer information-related program errors are incurred.
- High-level languages, associated with advanced and reliable database management systems (DBMSs), reduce programming effort considerably (e.g. in generating enquiries and reports).

In defining the information architecture along with new applications, many problems can be avoided. But, in considering the current portfolio, it could be worthwhile seeking out long-standing culprits in the form of obsolete information or unmatched needs and supply:

- Archived information held longer than needed.

- Information disseminated when it is no longer needed. Where this used to apply to hard-copy reports, it may now apply to files of information distributed electronically, but never accessed by users.
- Useful information available, but not used.
- Inefficient methods of capture, manipulation, storage or distribution.
- Duplication in several activities—capture, storage, transmission.

Duplication in one or another of these forms is very common. It is usually a consequence of independent developments, and is often perpetuated out of lack of trust between system ‘owners’. It is clearly a source of potential errors when information is input more than once. It is not uncommon to find ten or even more different customer databases, some held only on PCs or personal digital assistants (PDAs), in an organization where an extensive portfolio of systems has been built over a number of years. Few, if any, of these will be identical in definition or content. Overlapping is often extensive, even where the products or customers of the enterprise differ widely from division to division and thus from database to database. The degree of overlap varies from case to case. For example, publishers of journals and magazines will have one set of customers who are subscribers and another who are advertisers. In this circumstance, there may be little overlap, nor much potential for generating business from combining the two. Where multiple copies of information exist, whether the physical information needs to be centralized or distributed more widely is an implementation and operational issue.

Multiple databases, which have grown out of independent developments, can demonstrate a number of differences. They can contain entirely different coding structures and they may also incorporate different definitions of entities, ambiguous or conflicting meanings, and different logical relationships. In the worst cases, they imply polarization, mistrust and a widespread lack of confidence in combining and sharing information. In these cases, the task is more than one of *information management*; it requires major cultural change as outlined earlier in the chapter. One of the objectives for introducing information management practices involves gaining the confidence of disaffected business users and sometimes colleagues in the IS function.

The risks associated with duplication of information input and storage can be greatly reduced by seeking to enter, update and store information once only. Duplication risks thereafter will be linked to the number of databases into which information is transferred and their distribution around the organization. In systems integration, multiple updating becomes part of the functionality of the integration.

Other factors affect the effectiveness of information processes and of the users who depend on them, but most of these are tackled within the

identification of business IS demand and the resultant information architecture. Characteristics that then determine effectiveness include the availability of required information, ease of access by end-users, timeliness, quality, integrity and consistency. These all fall within information management policies and 'service' criteria.

THE PRACTICE OF MANAGING THE INFORMATION ASSET

The practice of managing and marshalling the information asset is often called *information asset management* (IAM), although there is no universal agreement about its precise definition or constituents, its component activities, scope, organizational focus, policies and tools. It is additionally called by other names, 'information resource management' and 'corporate data management' being two favourite alternatives. It is significantly different from data administration or data management applied at system or business-function level, having a much wider significance and value. In asset-management terms, IAM seeks to build up the information assets of an organization at an acceptable cost, so that they can be employed to deliver value to the business. A definition of IAM and its constituents is given in Table 10.3.¹²

Table 10.3 *IAM and its constituents*

-
- *IAM* is a holistic approach to the management of the information assets of an organization. The emphasis is on integral, efficient and economic management of all the organization's information. It means getting the right information to the right people at the right time
 - *Data (information) administration* is the identification and classification of business information and associated requirements, development of a corporate architecture, development of procedures and guidelines for identifying and defining business data (information)
 - *Data dictionary administration* entails describing and cataloguing the information available
 - *Database administration* involves design and development of a database environment for recording and maintaining data (especially machine-readable data), development of procedures and controls to ensure correct usage and privacy of data, operational timing, monitoring and housekeeping
 - *Information-access services* ensure provision of support services and hardware and software to enable end-users to locate, access, correctly interpret and, where appropriate, manipulate the information available
-

Table 10.4 Provisions of IAM

-
- *Principles and guidelines*, which form the charter for defining IAM scope and provisions
 - *Policies and procedures* for definition, management and usage of information, including its acquisition, protection, dissemination and disposal
 - *A business encyclopaedia* of information definitions and usage
 - *An enterprise model* and other business models referencing all types of information
 - *Multimedia information* in files, databases and in an information ‘warehouse’
 - *Services, methods and tools* to enable IAM activities like information administration, appropriate for the level of information management required
 - *Services* to deliver information to users, and tools for users to access information directly
 - *Mechanisms* for enabling information sharing
 - *Skills, competencies and knowledge* in information management disciplines and the information pertinent to the business
-

In this book, IAM is assumed to include those activities and a number of further components. It contributes a major element of the information-related requirements, in pursuit of business targets. It supplies or facilitates the business in providing a range of standards, guidelines, deliverables and services, as indicated in Table 10.4.

Principles and guidelines for IAM

Principles and guidelines for IAM should be given careful consideration, both when IAM is first introduced and when it is reassessed and updated to meet changing business needs. Aspects to consider include criteria for:

- determining the cost versus value of providing information;
- defining standards of information quality, accuracy, security and timeliness;
- responsibilities and allocation of ownership;
- satisfying the individual’s need for information;
- sources and types of information to be catered for;
- what levels and forms of information should be provided (e.g. raw, unit, summary, etc.);
- how to determine the scope and methods for key practices (e.g. enterprise modelling, information sharing);
- principles relating to making the user community aware of the scope of IAM, and how to optimize their use of information;

- what constitutes an issue that needs to be resolved, and the means to do so.

Determining the Right Scope and Structure of Information to be Managed and Modelled

A key issue in IAM is deciding what is the right scope for the ‘managed’ information environment and how it should be structured. The total information environment does not stop at an organization’s boundaries; it extends into the external environment, inhabited by customers, buyers, competitors and other organizations and influences. This external environment is very volatile and can never be modelled completely, nor can its contents be captured easily and made accessible. Internally, information is often fragmented and growing ever more so, as users of personal computing have built up their own caches of information. Systems designed to meet specific business needs are unable to communicate directly with one another, and are often unable to share, exchange or combine information effectively, because of inbuilt differences in definition or usage. Figure 10.3 illustrates the various information environments associated with a typical business. A significant portion of the information may be automated, but usually only a small proportion is managed.

The target scope of the managed environment is determined by business needs and priorities. Typically, it will contain information that must be accurate and reliable such as customer order information or billing information. It is information used by a broad section of the business and often by its external partners. Everyone uses a common definition and, while there may be more than one copy of the information, it is managed by procedures that ensure consistency and integrity. Primarily, this is the information used by key operational applications.

For any business, IAM has its foundation in its business IS strategy, where information needs are defined and the information architecture for each business unit is constructed. When several business units have developed their own IS strategies, either independently or collaboratively, they may decide to compare and rationalize, and possibly combine all or part of their information architectures or application portfolios. As long as due consideration is given to likely long-term needs as well as to immediate requirements, it may make very good business, resource and economic sense to collaborate in this way. Where two businesses have entirely different technology strategies, then the collaboration can extend no further than the conceptual architecture level. More frequently, a single business unit opts to introduce IAM within its own boundaries and sometimes in even smaller subdivisions of the business.

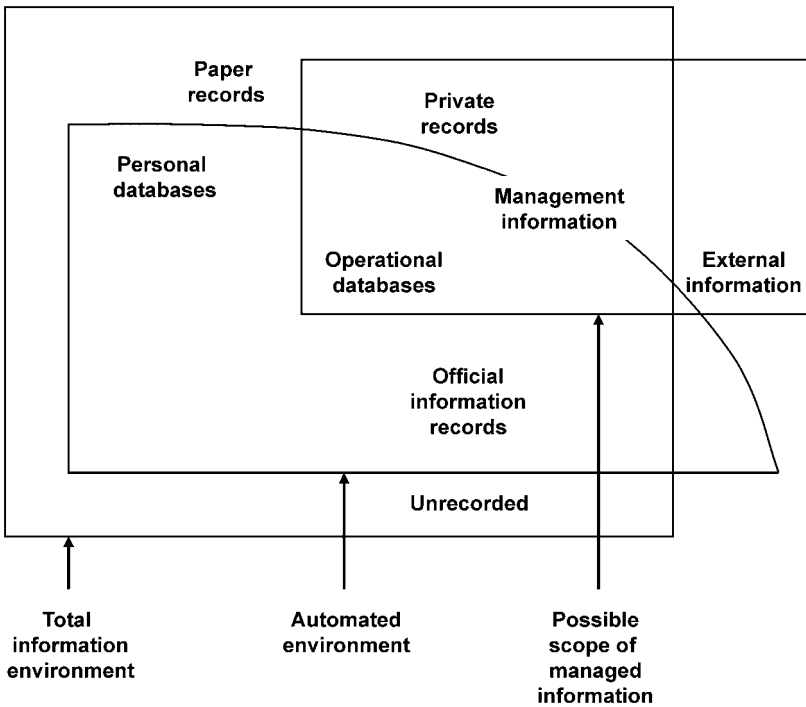


Figure 10.3 *Information environments*

Questions of centralization and decentralization of decision making, steering mechanisms, location of applications and resources, which were discussed at some length in Chapter 8, can be applied in much the same way in consideration of the ownership, location and management of information, and the location of the supporting IAM resources.

Whatever the business scope in terms of business units, the information architecture becomes the long-term implementation blueprint for IAM in that business, although it is extremely unlikely that the whole set of business information would be managed. At first, only certain parts of the architecture may be analysed beyond a global level, but piece by piece the information relevant to the business's key processes will be added until an information blueprint is complete to an appropriate level. This is likely to be a continuous process, and it will never be static, as new information is taken into the managed resource and perhaps other information is excluded as not having current significance and not warranting being managed under the IAM umbrella. Care needs to be taken to prevent this becoming a case of permanent analysis, without any value being delivered.

Remember, there is no suggestion that the information in the business environment should be stored in a single comprehensive database. Far from it—it is almost certain that there will be a number of separate databases in use. However, every attempt should be made to retain consistency of definitions across all databases and to confine the entry of information so that it is only input once. It is quite possible for there to be several copies of the same database, depending on the systems integration approach taken for linking legacy systems, new applications and packages.

Information Sharing

The ability to share information is a usual requirement when introducing IAM. Sharing can encompass interfaces within one business unit, several units, divisions or companies within the same group, and with external organizations. In its simplest form, information sharing means that only one copy of a piece of information is held and that all authorized users have access to it. In practice, this is very difficult to accomplish, because the same information is often used by several legacy applications, each with their own databases, and by installed packaged applications. Complexity increases if multiple vendors, hardware platforms, operating systems, DBMSs and network protocols are involved. In this case, it is very difficult to achieve a single source of information, and the complexity and risk increase if the situation is volatile and frequent changes to the environment and application portfolio are expected. Then a solution that incorporates consistent copies of information must be found, which enables information sharing and information management to be accomplished. This can be a very complex technical problem, well outside the scope of this book. A 'flavour' of the possibilities are considered in the next few subsections.

Single Vendor Solutions

Here a large proportion of the application portfolio is covered by one enterprise system supplied by one vendor, who also supplies the required integration. This approach has the great advantage that all functionality comes already integrated, but it is a feasible solution only if the organization is willing to lock into a single vendor, for one and possibly multiple sites, and is also willing to sacrifice the existing applications, covering this area.

This may be successful when requirements are relatively uniform and it meets information management and information-sharing requirements internally, if not externally. But it tends to have a number of drawbacks from other points of view:

- For most, except the simplest, businesses, no single vendor solution will meet all requirements, and the shortfalls have to be procured from other vendors and then integrated with the main applications. Many organizations pursue a 'best-of-breed' strategy, actively sourcing solutions from multiple vendors.
- Having to replace existing applications may produce a poor return on investment for those applications, plus the high cost of new software and training costs.
- The chosen solution may not be a good fit for all strategic business units (SBUs) if it is implemented across the whole organization.
- There is a higher risk in depending on a single vendor, who may also charge higher-than-average rates for support and development of the applications.

Point-to-Point Integration

Here tight connections are built between applications that need to share data in an integrated environment. The approach is evolutionary, and is relatively easy and low cost if only a small number of connections need to be made. However, if the numbers of applications, operating systems, DBMSs or interfaces are significant, and changes happen frequently, then it is both costly and high risk, as each interface is unique. Changing, upgrading or adding an application, or making changes to the application and network configuration, can produce risks of failure at any point in the business or technology environment.

Data Access

Data access means providing data access to users across the business regardless of the location of the users or the source of the information. This solution gives desktop tools to users for data manipulation, decision support, *ad hoc* enquiry and report generation. Its main focus is the provision of an information library or warehouse, refreshed with operational data on a regular basis, from operational systems, to perform limited integration and analysis functions. A data warehouse requires powerful servers to deliver high performance to all users.

Integration Using Middleware

Middleware is software implemented in a distributed environment that enables applications to ‘talk’ to one another and exchange information. In support of IAM, it enables information sharing in a distributed multi-vendor environment. Independent, but consistent, information is held in each application, and the middleware controls the synchronization and transmission of information between applications. There are various types of middleware that support different information integration requirements. The concept of *enterprise architecture integration* (EAI) is often encountered in relation to application integration, but is essentially similar to middleware, differing only in that it provides more sophisticated functionality.

Preparation for information sharing entails:

- determining the business needs and benefits—defined in the business IS strategy;
- defining the technical requirements and the practicalities of the provision (access mechanisms, security, risk, communications capability, centralization or decentralization, single or multiple copies of data sets);
- describing the information to be shared and the community of authorized users;
- defining the interworking requirements across the applications;
- deciding how to overcome barriers brought about by differences in management style and local values and culture within an organization;
- resolving issues of interdepartmental or company rivalry.

It is less likely that cultural factors will pose problems if the information-sharing requirement is largely restricted to a single SBU and its commercial partners in its value chain, than if the issues of shared information straddle business units in a larger corporate organization, or international boundaries, as in multinational companies. Logical arguments for sharing have to be weighed carefully against potential conflicts.

ACTIVITIES OF IAM

If IAM is being established at corporate level, then the main decisions will be made by the executive steering group, and those affecting the SBU by the business steering group (as described in Chapter 8); if it is being established at SBU level, then the business steering group for the SBU is

the decision-making body. The activities and tasks involved are described in Box 10.4.

Developing the Enterprise Model

The enterprise or business model is the highest level model that is produced during the IS strategy process or within IAM. A business model is illustrated in Figure 4.3. It may have several components, which are described in more detail in Chapter 4:

- *A global hierarchical process and activity model* that mirrors the current structure of the business. It is used to identify business activities, by decomposition from the highest level functions of the business. It can be used to confirm the content and boundaries of the primary and support business processes.
- *A global process model* that shows the primary and supporting business processes, their relationship and the principal information and material flows. It is usually possible to map this onto the value chain model.
- *A global entity model* that includes all the high-level business entities that are of crucial interest to the business.
- *The activities and entities* linked together in a matrix, which represents a conceptual information architecture, indicating the relationships between the constituents and possible application areas.

The purpose of the enterprise model is as a basis for:

- Providing a coherent picture of the business, independent of physical structures, as a communications and planning tool.
- Identifying essential changes to the business to meet business objectives.
- Identifying major streamlining opportunities to the processes, without having to consider organizational factors.
- Seeking innovative opportunities, like those described in Chapter 5, around the value chain.
- Defining the most suitable applications and information architecture that would meet the business needs and would move the business in the direction of an integrated and flexible environment.
- Defining the information entities that should be managed on behalf of the whole business.
- As a benchmarking tool in the evaluation and selection of large business software packages such as for enterprise resource planning (ERP) or customer relationship management (CRM) in terms of

Box 10.4 Tasks performed within IAM**Section 1: Data (Information) Administration Tasks**

- *Information planning*, which is a top-down task started in the strategic planning process and continued at a tactical level in IAM, in association with prioritized business initiatives.
- *Identifying business information requirements*, also undertaken in IS strategy process and business analysis.
- *Setting information definition standards and procedures*, including naming and abbreviation conventions. This also entails:
 - selecting the medium and methods for recording the definitions, usually on a data dictionary, encyclopaedia or repository;
 - defining procedures and communicating them to business and IS/IT users;
 - introducing monitoring procedures for compliance with standards;
 - measuring their effectiveness;
 - assessing the impact of changes in information definition or relationships, resulting from changes in the business.

Information administration and data dictionary administration work closely together in this area.

- *Managing the corporate information models*, determining their most appropriate form and their total scope, levels of decomposition, where separate models are relevant, and how they interface or overlap.
- *Coordinating the solving of information-related problems*. These may range from promotion and implementation of a policy to achieve a single source of information entry to internal disputes over information sharing and access rights.
- *Communicating with the business*, which includes promoting awareness of the role of information, and informing the business what information it possesses, where it is located, what its precise definition is in business terms, how it relates to other information and so on. Some of this is in conjunction with data dictionary administration.
- *Establishing and implementing process, activity and information analysis at a higher level than system level*. The task involves selecting methods, techniques and tools, and developing standards and procedures for their use throughout the information life cycle. They must integrate comfortably with systems

development methods and end-user computing. Part of the responsibility is to promote their use and to provide advice, training and assistance where necessary. There is also a quality role, to ensure conformance and consistency of analysis deliverables.

The deliverables are information models, process and information flow diagrams, activity decomposition diagrams and architecture matrices, as described in Chapter 3. The level of detail in the deliverables is determined by the type of analysis being performed, which may be strategic (enterprise level), overview (business process) and detailed analysis (application area) levels. The top level is strategic analysis, and its aim is to produce a global structured plan of the business information and processes. Models at this level are necessarily lacking in detail.

In practice, information administration takes responsibility for the enterprise models, and where contention occurs—when, for example, the scope of two overview areas overlap—then this must be resolved by data administration.

- *Establishing controls and procedures for information security and recovery, privacy (ensuring compliance under the Data Protection Act) and integrity.*

Section 2: Data Dictionary Administration Tasks

- *Providing an authoritative source of information to users and IS/IT groups on information.* It has the unique opportunity of putting information in context for the business at large, but the data dictionary must be clearly seen as a general management communication tool and not as the preserve of IT. In effect, it is the glossary and dictionary of the business.
- *Evaluating, selecting and implementing data dictionary management software.*
- *Setting up and coordinating the data dictionary contents,* the meta-models of data and functions.
- *Establishing standards and procedures* for use of the data dictionary and monitoring conformance.
- *Working with information administration* on information definition and impact analysis, and *with development and database administration* on application and database integration, development and maintenance.

Section 3: Database Administration Tasks

- *Undertaking design, development, implementation and operational tasks* associated with the business's logical and physical databases.
- *Setting technical standards, procedures and guidelines* for database activities, data input, update and access.
- *Evaluating and selecting database management software* to suit the technical infrastructure specified to support the business, implementing and maintaining the software, and implementing change control procedures.
- *Monitoring and controlling* the environment and database services to the business.
- *Protecting the integrity of the environment and investigating security problems.*
- *Undertaking periodic reorganization and restructuring, performance monitoring and tuning.*
- *Performing any necessary housekeeping tasks* such as back-up, archiving, recovery and restart.
- *Working closely with data administration and data dictionary administration* to ensure policies are followed and the impact of implementation issues is assessed.
- *Keeping abreast of database technology*, either new to the industry or as yet unused by the business.
- *Working with systems development* in ensuring that database usage is planned effectively for new applications and existing systems to give optimal user benefit, while complying with database standards and policies.
- *Working in package selection teams* to evaluate database designs to ensure that they meet defined standards of performance, structure and integration requirements.

Section 4: Information Access Tasks

- *Formulating, implementing and monitoring policies and procedures* relating to ownership, responsibility, security and access rights.
- *Promoting benefits of information management*, shared information and appreciation of the value of information.
- *Ensuring that high-quality information is available and accessible*, whether in operational databases, extracted information databases or external information.

- *Providing tools and techniques* that enable users to access information. This entails the provision of:
 - software mechanisms that integrate the environment and enable information sharing, as described earlier in this chapter;
 - delivery of information to users ‘ready for use’ or for further local manipulation;
 - tools and access to an information ‘warehouse’ of information extracted from operational files;
 - tools in the local PC, workstation or desktop environment to access local or widespread information.

their conformance to the architecture. Further investigation is needed to assess their conformance to other aspects of the principles, policies and procedures of IAM.

The enterprise model must be owned by the business, particularly at executive and business steering group levels. There are some problems and risks associated with it. It may be difficult to gain management commitment to the modelling process and to its use thereafter. This becomes a distinct possibility if the management group has had unsatisfactory experiences at some stage. Another problem is in ensuring that the level of analysis is contained at a high level, so as not to get overwhelmed by detail or to lose sight of essentials.

POLICIES AND IMPLEMENTATION ISSUES

Information planning at a strategic level demands top management involvement, without which there could be an unhealthy IT orientation to the plans. It is necessary for issues to be resolved at this level and the outcome specified in policies. The types of policy that are established at this level affect the organization as a whole. A few relate to physical issues, others to matters of central coordination, authority and responsibility, enabling access and the scope of managed information. There may also be a continuing need for marketing into the business community, to raise the level of commitment for treating information as a core business resource, and to educate the business about the inherent cost and value characteristics of information. There will be other issues that reflect the particular requirements of individual organizations.

Extent of the 'Managed' Information

As indicated earlier in this chapter, the extent of the information resource to be 'managed' must be broadly determined. Although it is unlikely that a policy will lay down the precise boundaries of managed data, guidelines are needed for information administration. However, hard-and-fast rules would be inappropriate, since the status of information changes from time to time.

At any one time, some user information will be corporate, mainly in strategic and key operational applications, some will be personal, mainly high potential and support, and thus excluded from formal information management. Over time, the personal information may move into a managed status (e.g. as it becomes more widely applicable, or as its value grows and the application moves or is redeveloped for the strategic or key operational segments). Sometimes, managed information becomes 'unmanaged' after it is extracted from the managed environment into a local environment, as when applications move from key operational to support segments, where information may be manipulated in non-standard ways. There needs to be a method for identifying what information is held by users that may have a wider usefulness. This can happen frequently in a free market environment, where user areas are innovative, and users develop their own applications and manipulate information skilfully to meet their own requirements. The challenge is clarifying the definition of each information element, ensuring that it fits consistently in the relevant models and recording the details in the data dictionary. Once the criteria for setting boundaries have been determined, the task of bringing information into a managed environment is relatively slow and needs careful coordination and control.

Clearly, there is a cost associated with managing information and this needs to be justified and then committed to, because the controls and procedures must not be irksome or inhibit business flexibility and creativity, but should be seen to be of value in themselves.

Organizational Responsibility for IAM

Responsibility for coordinating IAM activities in most instances needs to be centralized, but certain elements may be delegated to one or more business areas, responsible for client-server computing and access matters, or to local IAM units in each SBU in a decentralized business. In certain instances (e.g. where several SBUs have almost complete autonomy), a central IAM function may not be desirable, and each SBU may set up its own. However, if the corporate body has a significant say in SBU IS/IT policy, and if any attempt is made to standardize

systems and information architectures across the company, then central coordination is probably desirable.

A number of other organizational factors should be considered:

- Skilled specialists may be needed to set up and implement IAM and to train the in-house staff in the skills required.
- Other specialists may be needed to create the distributed and integrated environment.
- Because it may be a continuous process, sufficient resources must be allocated.
- There is no one organizational structure that is universally appropriate. It is possible to have a structure with all IAM activities encompassed within the IS function, and managed at the same level as IS/IT development, etc. This could represent either a corporate or SBU structure. An alternative is for information management residing outside the IS function, which retains only database administration. In this case, the structure contains corporate information management as well as information management at SBU level. This would be repeated for each SBU.

Authority and Responsibility for Information

Criteria for determining ownership and the responsibilities associated with this for acquiring, storing, maintaining and disposing must be decided. Standards for maintaining quality, privacy, consistency and integrity, and for providing the required levels of security, must also be determined, and responsibilities assigned appropriately. In addition, access rules should be laid down.

These criteria, standards and responsibilities have to be set by user management with advice from the IAM group and communicated to all users of information, along with details of what information is available and who has the responsibilities throughout the various stages of the information life cycle.

It is, of course, vital to explain the benefits of managed information to the user community and to deliver them, otherwise a natural disinclination to part with 'my' information may turn into outright lack of cooperation or even hostility. This is where top management commitment combined with well-thought-out and implemented policies are needed. Two-way trust is involved; users having faith in the integrity of the data and data administrators trusting the users not to corrupt or misuse it.

Information Security

It is necessary to protect critical information from accidental or deliberate destruction, corruption or loss. This is an issue that is growing in importance since organizations are so dependent upon their information, and its exposure to risk is so great. Computer hackers are a growing breed of criminal.

Shared databases are prevalent and the number of terminals that can gain access to information continues to expand, as does the awareness of users. The risk of damage through physical failure or human intervention is also growing and must be analysed and contained as far as possible. The Data Protection Act in the UK and similar legislation in other countries puts an onus on organizations to protect private data.

Figure 10.4 presents a template describing major categories and levels of risk against critical information assets developed by the Hawley Committee. They argued that it should be reviewed by the Board from time to time along with the method of protection.

Measures to protect information should be implemented where they are necessary and can be shown to be effective. Barriers can be designed and built into hardware and software, as can recovery procedures. These can be supplemented by audit and other security monitoring procedures.

Implementation Issues

For the introduction or extension of IAM to succeed, it must be linked to specific business goals and tied to the achievement of desired business benefits, which could be stock reduction, new product development, accelerated availability of information, staff productivity, reduction in errors or improved decision making. Effective information management targeted at a few critical items of information, especially those that straddle internal or external boundaries, will repay the effort and serve as a good example for extending the 'managed' environment. Total information management is neither practical nor cost-effective.

Naturally, there are problems associated with implementing IAM. One of the most difficult is in bridging the gap between 'top-down'-defined databases and existing databases, and the resulting need to 'manage' or reconcile the differences. There may also be difficulties in managing expectations. Some may view the process as a means of identifying application opportunities, others a systems and information architecture, others creating database designs. These expectations may all be relevant, but they need to be pulled together under the business expectations of im-

Areas of risk	Level of risk defined by:			Comments on protection
	Impact on organizational performance	Likelihood to happen	Context: who, where, when, how	
Accidental damage/ loss (e.g. corruption/ deletion from computer)				Technical procedures Back-up Education
Deliberate acts of theft, or abuse/misuse				Security procedures Infringement penalties
Loss of people				Contractual terms Registration
Inaccurate and untimely information				Validation procedures Education
External relations (e.g. customer/ supplier)				Trading security Contractual terms
IPR protection, sale and acquisition				Contractual terms Registration
Destruction of facilities				Physical security Contingency planning
Legal and accountability				Education Protection of assets

Figure 10.4 *Information assets: common areas of risk and protection* (source: Information as an Asset: The Board Agenda, KPMG/IMPACT, London, 1994)

proving business performance over a long period through optimal exploitation of IS/IT.

Other issues that were noted by Goodhue *et al.*¹³ in 1988 and are still relevant today are:

- Time and cost. If broadly-based IAM is being implemented, key people have to commit themselves. This level of commitment is difficult to obtain and to keep. Total implementation is very expensive and is a lengthy process. This level of expenditure will often be resisted if current systems are performing effectively and IAM is not being implemented on the basis of developing new strategic systems to support business objectives.
- Changes to business requirements may impact plans while information planning and implementation is under way. This must be expected and allowed for.
- Systems developed while IAM is being implemented take longer and cost more, due to the inevitable learning curve and to increased upfront analysis effort. This is a problem for line managers who want quick results and good return on investment. It is also difficult for IS managers who are resistant to allocating the extra effort.
- Removal of local autonomy when information is allocated 'managed' status. Application packages can be difficult to absorb within IAM policies, and the integration of legacy and new applications and databases is a complex issue.
- New skills are needed that are sometimes not easily acquired by existing staff.

MANAGING KNOWLEDGE RESOURCES

The investments that organizations are making in IT are generating huge volumes of information. For example, CRM systems generate vast amounts of transactional information about customers. A challenge faced is creating knowledge and insight from this information to inform business decisions. Even with effective information management strategies, most organizations are not succeeding in turning information into knowledge and results. Even those that do are doing so only temporarily or in a limited area of the business.¹⁴

One fact is without contention: knowledge is crucial for the competitive success of all commercial organizations, and, like information, if they desire to harness it to create business value, they must develop strategies to manage it effectively.¹⁵ Managing knowledge embraces not just its exploitation but the acquisition, creating, storing and sharing of this resource—all with a deep understanding of the business and strategic

context. No organization, of whatever size, is immune to the requirement for knowledge and the need to manage it effectively. Even the smallest enterprise needs to know about customers, competitors, pricing, new products, etc. Consequently, the concept of knowledge management (KM) has attracted much attention over the last decade, particularly as IT is seen as enabling the management of knowledge resources.

Davenport and Marchand¹⁶ pose the question, 'Is KM just good information management?' They argue that there is a large component of information management in KM and that much of what passes for the latter is actually the former. Nonaka *et al.*¹⁷ contend that the 'knowledge management' that academics and business people talk about often means just 'information management', although Teece¹⁸ notes that the latter can certainly assist the former. However, true KM goes well beyond information management.

The recurring questions about knowledge management are, 'How do I do it?' and 'How do I ensure that my organization exploits its knowledge?' While the concept of managing knowledge is appealing, the meaning of the term knowledge is elusive.¹⁹ Organizations are therefore faced with the task of managing something that they recognize as being vital, but yet have great difficulty in describing, particularly in a way that assists them in creating business value.

What Is Knowledge?

The concept of knowledge has been the subject of study and debate since the dawn of civilization. The creation of meaning, the role of language and symbols and the process of creating knowledge—learning—have occupied the minds of philosophers, educationalists, economists, neurologists, linguists and psychologists, to mention just a few disciplines.²⁰ What is widely accepted is that knowledge is the result of human evolution, the intelligent brain, and is a particularly human characteristic in that knowledge is inseparable from the human being. While data and information can arguably exist independently, knowledge cannot. It only exists in humans. Consequently, a distinction is often made between the object—the *known*—and the subject—the *knower*—of knowledge.

Although the terms 'information' and 'knowledge' are often used interchangeably, they are quite different.²¹ While knowledge and information can be difficult to distinguish, they both involve more human participation than the raw data on which they are partly based. Information is data that has been given structure and knowledge is information that has been given meaning.²² In essence, knowledge is information that has been interpreted by individuals and given a context. Thus, knowledge is the result of a dynamic human process, in which humans justify personal

information produced or sustain beliefs as part of an aspiration for the 'truth'²³ and can be portrayed as information combined with experience, context, interpretation and reflection.²⁴

The interpretation of information a person receives is relative to what he or she already knows.²⁵ It is suggested that man cannot grasp the meaning of information about his environment without some frame-of-value judgement. So, for knowledge to be created from information, a belief system is necessary, as is a process of converting and interpreting information to produce knowledge.

Furthermore, knowledge is not a static object, it is in constant flux and, from an individual's perspective, this is where the concept of *knowing* rather than *knowledge* is perhaps more relevant. Blacker,²⁶ in a review of the organization theory literature, contends that, '... rather than talking of knowledge, within its connotation of abstraction, progress, permanency and mentalism, it is more helpful to talk about the process of knowing ... [which] is situated, distributed and material.' In distinguishing between *knowledge* and *knowing*, Cook and Seely Brown²⁷ assert that 'knowledge is a tool of knowing, that knowing is an aspect of our interaction with the social and physical world, and that the interplay of knowledge and knowing can generate new knowledge and new ways of knowing.'²⁸ 'If only our organisation knew what knowledge it has ...' is another, more pragmatic expression of the problem!

The Concept of Knowledge Management

It is now regarded as axiomatic that the knowledge contained within an organization is one of its most precious resources.²⁹ Arguments, eloquently expressed elsewhere, and a basic tenet of resource-based theory, assert that managing an organization's knowledge may be the sole factor that keeps it competitive because all other resources are to a large extent imitable.³⁰ It therefore follows that the management of such a resource is crucial, especially creating the conditions for its beneficial deployment. Furthermore, the changing nature of the marketplace has placed even greater emphasis on knowing how to operate competitively. Being competitive in marketplaces that are increasingly global and de-regulated requires that companies be innovative (a knowledge activity itself), not just in their products and services but also how they compete in their chosen market. They therefore need to know in considerable depth what their customers and competitors are doing or are likely to do, and, furthermore, they must know how to leverage this knowledge.³¹ As more and more products and services become commoditized, the more 'know-how' about customers' needs, preferences, etc.

becomes the added-value an organization has to have in order to be a chosen supplier, rather than straightforward 'product excellence'.

There is an argument that KM is actually a contradiction in terms, being a hangover from an industrial era when control modes of thinking were dominant.³² If knowledge is information combined with experience, context, interpretation and reflection, the use of the term KM, suggesting that knowledge can be managed, is to misunderstand the nature of knowledge. There is a suggestion that only the 'context' and conditions surrounding knowledge can be managed. Some practitioners suggest that knowledge sharing is a better description, while others prefer 'learning', as a key challenge in implementing KM is sense-making and interpretation.

Notwithstanding these arguments, knowledge is key both to creating competencies—including IS competencies as discussed in Chapter 8—and in integrating them into an organizational capability.³³ Knowledge of what specific resources exist in a business is essential for the competent management of its operation. A competitive capability requires a further class of knowledge—knowledge of the market and the players in it, and knowledge of how to exploit the competencies within the organization so as to address the needs of the marketplace in a way that will distinguish it from the competition.

Consider, for instance, a team of managers and specialists meeting and working together to formulate a bid for a major international engineering contract. The bid is a complex one involving not just product specialists but also expertise in contractual law, international taxation, exporting, global supply chains, complex sourcing, costing and finance. Furthermore, the bidding activity will not be the straightforward sequential application of one expertise after another, but is more likely to be the iterative exploitation of these expertises, since a change in one expert's input could have consequences elsewhere. In a gathering of such experts, each will bring their functional competency to bear on the bid-making activity set. However, to make a successful bid will need more than the sum of the parts—what is needed is the managerial know-how necessary to integrate these into a successful bid process. An organization that develops such a competency is likely to win more business. Without institutionalizing such a competency, the organization is likely to respond to potential new business opportunities with a flurry of activity rather than deploying a coherent business process.

In these two contrasting approaches, it is worth noting the use of knowledge. In the bid-as-an-activity-set approach, knowledge belongs to each of the experts and exists as discrete packages within that expert domain (e.g. tax law). In the bidding-is-a-business-process approach, formal attempts are made to retain the knowledge that is diffused

within the working team of how to integrate the contributions of several experts in order to make a successful bid.

The DIKAR Model

A model that helps locate *packaged* knowledge³⁴ and *diffuse* knowledge within a business-related context is the DIKAR (Data, Information, Knowledge, Action, Results) model (see Figure 10.5). Introduced in Chapter 4, it illustrates the relationship between data, information, knowledge, action and results. This model has also proved useful in understanding and framing KM issues, and in helping to compare and assess the different perspectives that are being exercised by those pursuing KM.

The conventional way of interpreting and using the model is to view it from left to right as a value spectrum (i.e. to begin with basic data and progress through a series of stages, each containing more business value than the previous, culminating with the ‘right’ business results). As we progress from left to right, the business value that the stages yield potentially increases. The linkages between each of the stages are just as important as the stages themselves. They represent the activities by which the value is increased, typically including procedures, systems, processes, organizational structures, administration, skills, etc. These linkages characterize some of the organization’s competencies and will vary even between very similar organizations—due to history, culture, various constraints and, most importantly, management’s world view on how business is done. Within any company, the nature of the linkages between any two stages will also differ. Basically the further to the left

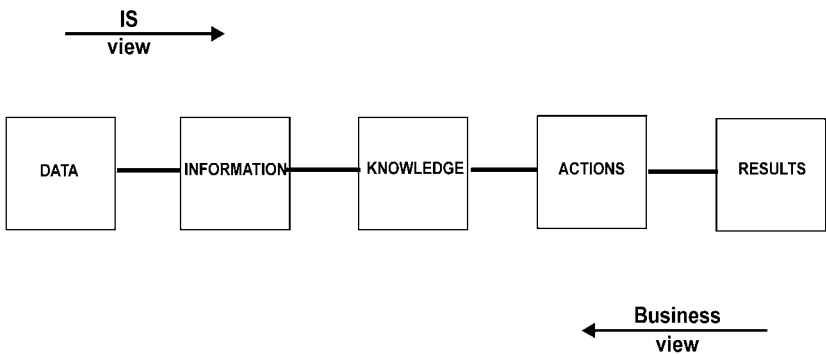


Figure 10.5 *The DIKAR model (source: after Venkatraman)*

(the data end) the more we can expect to see defined procedures and the extensive application of technology; while to the right (the results end) what occurs will depend much more on people—as individuals, as groups and as directed by management.

Using the DIKAR model in left-to-right mode is very useful in understanding (in a knowledge and information sense) how business is actually done. For an organization's core processes, senior managers should have a firm and detailed grasp on how DIKAR applies to those processes (i.e. it is in essence their business model). The application of experience, knowledge, technology and business acumen to the linkages is likely to improve the overall core process in a targeted incremental fashion. This has been the traditional approach in applying IT to business processes.

However, when the organization steps outside its day-to-day processes and instead sets itself new goals or new results targets, the left-to-right use of the model cannot explain how to achieve them. Examples of this would be how to launch a new competitive offensive, how to break into a new market, how to innovate or, indeed, to effect any radical change in the organization. In such circumstances, the data–information–knowledge–action chain does not exist. The DIKAR model, however, can still be helpful if we reverse its usage to right to left. In its RAKID direction, a number of fundamental questions are posed: Given desired results what actions are needed to achieve them? Given a set of actions what do we need to know to perform the actions? What information and data are required in order that we are in a knowledgeable position to design and affect action? Answering these questions all demand knowledge.

The linkages in the RAKID mode of the model are essentially integrative—given an end point, what resources does an organization have to bring together to get there and how does it bring them together? The necessary resources will consist not just of the obvious such as money, manpower, equipment and skills, but are likely to include processes, structures, roles and knowledge—so-called intangible resources. It is perhaps the knowledge of how to integrate such a range of resources in a new way to achieve new results that is the most potent form of KM.

Traditionally, businesses have focused more management attention on physical resources and those resources that can be measured, which usually means the intangible resources such as process, roles and knowledge might never enter return-on-investment evaluations. But, in a competitive environment, these are perhaps the most valuable since they are difficult to imitate and are also the vehicle for innovative approaches to new challenges. The effects of globalization, liberalization and deregulation on markets has been generally to make those markets harder to

survive and prosper in—there are potentially more competitors and substitute products and services competing for customers' interests. The appropriate response to this is unlikely to be to 'turn up the wick' on the existing traditional resources and their deployment. Instead, companies have to find ways of making the marketplace aware of the new capabilities that will distinguish them from existing or potential competitors. These capabilities will arise only if the management is competent in ways of integrating resources in new added-value ways. Hence, when designing processes that include the sharing and transfer of knowledge either explicitly or implicitly, the configuration of roles in the process should guide the strategy for information provision.

The role of KM in this 'new results' scenario is to marshal knowledge and experience not just of all the necessary specialisms but also of how to integrate them into a new capability that the market will place value on, such as for the complex bid example as outlined above. Once achieved, a capability should be retained and actively supported, including technology support. In practice, however, bids like that described above tend to be treated as a 'one-off' and as a task outside the experts' 'normal' day-to-day job. The experience accumulated in winning or losing bids is not retained as corporate learning—so the wheel is reinvented many times and no one is apparently alarmed by this. Losing a bid tends to be attributed to more straightforward causes such as price, lead time or what the value proposition was, rather than examining how the organization went about creating and presenting the value proposition.

The knowledge of each expert can in a sense be thought of as a knowledge 'package'—some of it even being capable of being codified. The knowledge of acting together so as to create a new capability will be much more diffuse and will reside within the bid team and will be much harder to document let alone codify. However, the outcomes of the team's activities will be capable of being documented and these can form the basis of learning. How to manage specialized 'packaged knowledge' and how to integrate it with and manage 'diffuse knowledge' such as exists in teams is one of the key goals of KM.

The Location of Knowledge and the Issues in Managing Knowledge

The past few years has seen a number of organizations introduce chief knowledge officers (CKOs) and knowledge managers as a formal step to managing their knowledge assets.³⁵ Referring to the DIKAR diagram, such a manager, who would be naturally located in the centre 'knowledge

stage', can view the organization's knowledge assets and their attendant management issues from two perspectives: 'downstream' toward data and 'upstream' toward results.

Starting from the knowledge box in the DIKAR model and looking toward data and information, the knowledge manager has a certain set of issues to contend with that are different from the 'upstream' view. Knowledge in this circumstance can be thought of as a body of information, formally written down and capable of being readily assimilated into the company's systems. The issues of KM here are identifying the knowledge, its location, validating it and verifying its value, obtaining it in a useful form, determining where it is most useful in the business and making it available there in an appropriate form, using suitable technology, and finally ensuring that the knowledge is used beneficially.

Looking 'upstream', the knowledge manager is now operating with a set of issues around the kind of knowledge that determines actions, and actions that need certain knowledge—the domain of know-how. This kind of knowledge is more diffuse and tacit, and invariably resides in peoples' heads. An example could be an organization that seeks to move into a new overseas market—it will require somebody who knows how to set up supply chains into that market quickly, knows the business scene there, the relevant legal and tax factors, the culture, etc. This is primarily experiential knowledge, although some of it can be made explicit to a certain degree (e.g. customs regulations). Someone who knows the working relationship between businesses and a country's civil servants has knowledge that is hard to codify. The knowledge manager has to operate in a much more personal domain—the motivation to share hard-won knowledge of the experiential kind is not usually high, the individual is 'giving away' their value and may be very reluctant to lose a position of influence and respect by making it available 'to everyone'. This situation and the inherent nature of knowledge can make it difficult to capture.

There is nevertheless a strong desire, almost a belief, that as technology platforms get 'more intelligent' that this know-how can be captured (e.g. with expert systems) and suppliers of 'knowledge systems' are keen to advance the point. The assumptions underpinning this view are likely to be too simplistic. While at one level it is clear that rules that have evolved over time can be encoded, some behaviours owe more to 'chaotic' factors than logical left-brain activity. The organic nature of knowledge highlights how 'mind-maps' and other such mapping techniques are more appropriate than information architecture diagrams.³⁶

A more complex variation on know-how is the 'team'. Here knowledge is distributed among a group of people, each contributing in different ways to this overall know-how. Furthermore, the team itself can create

knowledge by its own activities. Teams also represent an effective way of generating learning, of marshalling knowledge and disseminating it. Here the knowledge manager has to contend with facilitation of team activities, providing frameworks for more formal knowledge handling, and ensuring its recording so that learning can occur. Typically, companies see the gradual build-up of knowledge repositories that, if carefully constructed and subsequently used intelligently, can help in moving up learning curves, and remove duplication and reinvention.

These three ways of considering knowledge in organizations are summarized in Table 10.5. This table contrasts the nature of knowledge within each category as well as identifying both specific management issues as well as those management concerns that transcend all categories.

Communities of Practice

A central lesson emerging from research is that if KM is going to be successful, then organizations must concentrate on people. The importance of people as creators and carriers of knowledge is forcing organizations to realize that knowledge lies less in its databases than in its people.³⁷ Davenport and Prusak³⁸ note that when Ford wanted to build on the success of the Taurus, the company found that the essence of that success had been lost with the loss of the people who created it. The knowledge required was not stored in databases, nor could it be.

Research shows that people most freely share experiences in informal, self-organizing networks. Consequently, it becomes necessary for organizations to create and promote those environments. Often labelled *communities of practice* (COP), these are groups of people informally bound together by shared expertise and passion for a joint enterprise.³⁹ COPs exist to build and exchange knowledge, and, in the process, develop the capabilities of members. They differ from project teams, who are composed of employees assigned by management, in that they select themselves. The 'glue' that holds the community together is the passion, commitment and identity with the group's expertise, while for a team it's the goals and project milestones.

In a study of a COP conducted by Breu and Hemmingway⁴⁰ at a commercial utility in the UK, they found that in being prepared to accept the informal activities of its employees, the organization gained significant benefits. Their findings support motivational theories that advocate the human desire to make social contribution in the case of the COP they studied, sharing knowledge and experience with other members of this organizational community.

Table 10.5 Types of knowledge and associated KM issues

	Knowledge as body of information	Knowledge as know-how: The Individual	Knowledge as know-how: The Team
<i>Nature of knowledge</i>	<ul style="list-style-type: none"> • Explicit • Codifiable • IS/IT can play a part • Packaged 	<ul style="list-style-type: none"> • Tacit • Personal • Diffuse 	<ul style="list-style-type: none"> • Tacit • Fluid • Dependent on team dynamics • Diffuse
<i>KM issues</i>	<ul style="list-style-type: none"> • Finding it • Validation • Value assessment • Obtaining it at reasonable cost • Integration with own system • Making available to the right population in the right form • Sensible use of technology • Ensuring subsequent beneficial use 	<ul style="list-style-type: none"> • Establishing suitable processes for extraction • Tight ownership • Reluctant to impart • Motivation and reward • Experiential, thus hard to encode • Trust • Finding suitable way of passing on learning • Limited role for technology 	<ul style="list-style-type: none"> • Formal management of essentially free-form activity • Establishing suitable frameworks and processes • Members' own perception of their role • Mutual trust—need 100% buy-in • Formal learning mechanisms • Dissemination • Creating and using knowledge repositories • Technology has a background role
<i>Common KM issues</i>	<p>Knowledge about knowledge (knowing it exists and where: its context and hence its importance)</p> <p>Understanding the relevant business context</p> <p>Ownership and buy-in to KM processes</p> <p>Updating and reuse of knowledge</p> <p>Demonstrating causal link between KM activity and business benefit</p>		

The Role of IT in KM

There are two dominant and contrasting views of knowledge management that can be gleaned from the above discussion: the engineering perspective and the social process perspective (see Figure 10.6). The engineering perspective views knowledge management as a technology process. Many organizations have taken this approach in managing knowledge, believing that it is concerned with managing ‘pieces of intellectual capital’. Driving this view is the view that knowledge can be codified and stored; in essence that knowledge is explicit knowledge and therefore is little more than information.

The alternative view is that knowledge is a social process. As such, it asserts that knowledge resides in people’s heads and that it is tacit. As such, it cannot be easily codified and only revealed through its application. As tacit knowledge cannot be directly transferred from person to person, its acquisition occurs only through practice. Consequently, its transfer between people is slow, costly and uncertain. Technology, within this perspective, can only support the context of knowledge work. Indeed, Walsham argues that IT-based systems used to support KM can only be of benefit if used to support the development and communication of human meaning.⁴¹ One reason for the failure of IT in knowledge management initiatives is that the designers of the knowledge systems fail to understand the situation and work practices of the users and the complex ‘human’ processes involved in work.⁴²

While technology can be used with knowledge management initiatives, it should *never* be the first step.⁴³ KM is primarily a human and process issue. Once these two aspects have been addressed, then the created

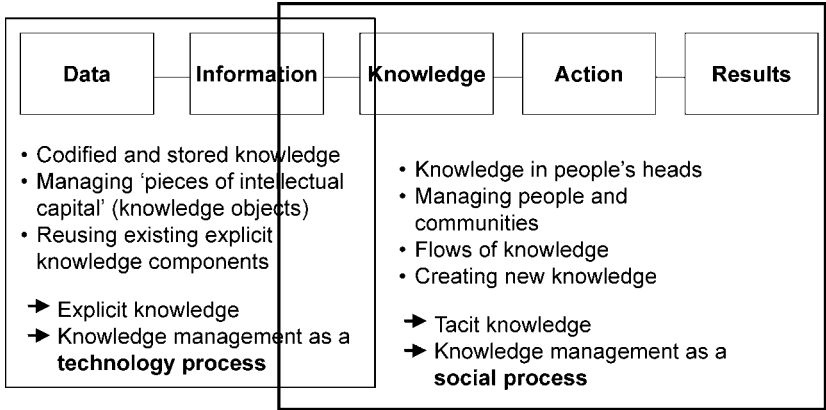


Figure 10.6 Mapping knowledge perspectives on DIKAR model (source: draws on the work of K. Breu at Cranfield School of Management)

processes are usually very amenable to being supported and enhanced by the use of technology. This is certainly the case in global companies where geographical barriers to knowledge movement and sharing are large. The degree to which information technology can directly contribute to business activity attenuates according to left-to-right progression across the DIKAR model. Around the knowledge point in the model, the nature of the IT contribution alters. To the left, IT can actually work directly on the data/information, even creating additional data/information. In significant knowledge exchange this is not the case.

Zack⁴⁴ sees IT providing a seamless 'pipeline' for the flow of *explicit* knowledge enabling:

- capturing knowledge;
- defining, storing, categorizing, indexing and linking digital objects;
- searching for ('pulling') and subscribing to ('pushing') relevant content;
- presenting content with sufficient flexibility to render meaningful and applicable across multiple contexts of use.

As indicated earlier, knowledge sharing can be complex, personal and has an organic aspect to it. The most effective way of achieving sharing is the face-to-face conversation where much more happens than the mere exchange of words. However, this can be uneconomic especially for geographically dispersed companies. The role of technology alters to being a facilitator of connectivity, and its success lies in how well it can emulate the richness of the conversation channel. Desktop videoconferencing currently comes closest to being such a channel. This is not the mere provision of a facial image on a PC screen, but extends to include its own procedural rules and is backed up by a high-bandwidth infrastructure carrying shared and concurrent access to data, images, video clips, searchable documents, etc. BP Exploration has invested heavily and successfully in this technology and claims significant cost savings in new drillings through shared learning around the globe.⁴⁵

Other technologies that are making a contribution 'on the right of DIKAR' are 'interactive' Intranets and the combination of document management and workflow management systems. The latter is especially useful in situations where large complex multi-part documents such as contracts, regulatory submissions, etc. need concurrent attention from several experts with these experts possibly residing in different countries. Seely Brown⁴⁶ argues, based on his work in Xerox, that organizations should be seen as 'communities of communities', and that new technologies such as Intranets are suited to provide support to the development of effective communication.

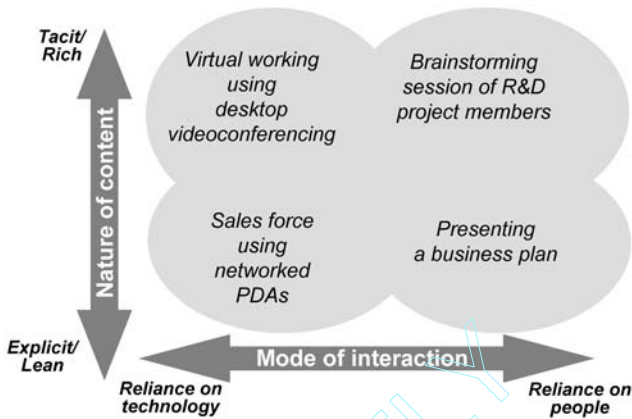


Figure 10.7 Content and interaction in knowledge management (source: K. Breu, Cranfield School of Management)

Figure 10.7 positions a number of technologies on a schematic, mapping the nature of the content against the mode of interaction. Content can be considered along a continuum from lean to rich. Mode of interaction refers to whether there is a reliance on technology or people. Some technologies like videoconferencing are suitable for exchange of rich content. Sales Force Automation (SFA) tools are suitable for communicating ‘lean’ content such as customer details and contact history.

Knowledge Has to Be Managed

There is little return in merely collecting knowledge, making it accessible and then waiting for business activities to improve purely because of the sheer abundance of knowledge. Management must intervene to leverage the benefits, and the appointments of CKOs often reflect this.

There are structural, cultural and managerial barriers to KM as well as the usual issues of lack of time and money to mount such initiatives. People are both the path and barrier to successful KM. While they are the key to success, they also have the potential to frustrate KM plans and programs. The root of this dilemma resides in the fact that knowledge sharing is not natural—there is a reluctance to divulge years of hard-won experience, especially if the divulgence is also associated with possible redundancy or reduction of status. Furthermore, experienced ‘business-winners’ such as senior consultants in a management consultancy or senior partners in a law firm, while acknowledging the value of onward transmission of their know-how to less experienced staff, will generally

still rate one hour of fee-earning work well above one hour of knowledge-sharing activity. Changing that belief is a ‘hearts and minds’ issue and not a training issue.

In such circumstances, value has to be demonstrably placed upon knowledge sharing and corporate knowledge creation and stewardship. In most organizations, this will mean leadership by example from the top. Reward structures need to be visibly in place—and these may not necessarily be financial rewards—as do formal learning loops and best-practice sharing mechanisms like communities of practice.

Additionally, there is a need to have a senior executive overview or policy on what KM is and what it means for the business and how it is linked to business drivers and plans. Unfortunately, in many organizations, KM still resides outside mainstream management activity. And, while it does, it will struggle to deliver any demonstrable tangible benefits. Mere assertions, however strongly delivered, that knowledge is a vital resource and needs to be handled as such have little chance of inducing the necessary changes for knowledge-leveraged benefits to appear.

Obstacles for Effective KM

Research conducted at the Cranfield School of Management has identified culture as top of the list of concerns among organizations regarding knowledge management.⁴⁷ Turning a ‘we don’t do it like that’ attitude into ‘who knows how to do it better?’ demands a sea change in working practices and relationships. People and cultural issues dominate as both the necessary means and the key inhibitor to sharing and exploiting knowledge. The obstacles are summarized in Table 10.6.

People are either reluctant to change or to change quickly. Working styles are often ingrained into organizations, and, in many cases, the production and sharing of knowledge—as opposed to a more tangible product—is still regarded as distracting or even career-threatening. Schutze and Boland⁴⁸ report the problems encountered in implementing a new competitor intelligence system in a large US organization where the democratization of information access and the open sharing of information that the new systems facilitated was at odds with the competitive intelligence analysts view of themselves as ‘anointed’ gatekeepers of this information. An organization’s internal structures can act as inhibitors; they are often inflexible, fragmented and separated into functional silos. In addition, the evidence suggests that there is even greater reluctance to share knowledge outside the company, among partners, suppliers and customers—a reason why strategic alliances often flounder.

Table 10.6 *Barriers to successful knowledge management*

<i>People</i>	<i>Management</i>	<i>Structure</i>	<i>Knowledge</i>
Inertia to change	The fear of giving up power	Inflexible company structures	Extracting knowledge
Too busy—no time to learn	The difficulties of passing on power	Fragmented organizations	Categorizing knowledge
No discipline to act	Challenging traditional	Functional silos	Rewarding knowledge
Lack of motivation	company style	Failure to invest in past systems	Understanding knowledge management
Constant staff turnover	Imposed constraints		Sharing between key knowledge groups
Transferring knowledge to new people	Lack of understanding about formal approaches		Making knowledge widely available
Teaching older employees new ideas			

KM is an expensive undertaking and ironically, if a business is in highly competitive markets, expensive not to do. Regarding the DIKAR model, companies who have disparate infrastructure platforms, who have not invested in information management and whose executives have never seriously debated the role of information in their business activities are unlikely to make headway in KM unless these issues are addressed. There are some basic first steps such as issues of codification of knowledge (most organizations report that this takes far longer than estimated), education and sometimes changing the organization to value knowledge sharing before any return on the investment can begin to be realized. These basic requirements absorb time, money and, crucially, senior management attention.

This means that KM initiatives must have leadership—knowledge sharing must be demonstrated and rewarded by senior managers, otherwise organizational fiefdoms will continue to prevail. Depending on how territorial and how early in the KM process an organization is, the aggregation of these costs may seem a price too high—but the evidence suggests that there are no short cuts. Conversely, many global companies who perceive their marketplace to be a highly competitive environment have concluded that it is expensive not to do KM.

SUMMARY

The introduction or extension of information management must be linked to specific business goals and tied to the achievement of business benefits. Benefits such as stock reduction or improvements in staff pro-

ductivity can be quantified easily; others are more qualitative such as accelerated information availability and improved decision making due to having pertinent information.

Effective information management targeted at a few critical items of information, especially those that straddle internal or external boundaries, will repay the effort and serve as a good example for extending the managed environment. Total information management is neither practical nor cost-effective. A sensible balance between short-term pay-offs and long-term achievement of a target information architecture is needed.

Some cultural issues must be tackled with sensitivity:

- line management preference for short-term results and positive return on investment, over building up value in the information assets;
- removal of local autonomy when information is allocated the 'managed' status;
- possible opposition from the IS function itself to IAM becoming the 'IT' focus of business attention.

Successful implementation of an information management strategy means achieving maximum contribution to the business over an extended period, at an acceptable cost and risk, and with the commitment of the business community at large. IAM is one of the principal mechanisms put in place to aim continuously for optimizing this value. This chapter has attempted to highlight the criteria that affect obtaining the right balance, and to address some practical issues associated with introducing new activities into the business, both inside and outside the IS function.

The whole of the information environment throughout an organization cannot be treated in the same way, and it is useful to categorize it in an information portfolio, related to business needs and potential. The starting point for implementing IAM may be having identified high-level information portfolios for each business unit, aligned to their respective application portfolios and their business needs. The aim then is to bring information into the managed environment according to needs and priorities, and the risks associated with not managing it. This entails:

- focusing on strategic information that must be managed;
- evaluating the key operational information in the current portfolio and determining how best to exploit its potential, at acceptable cost and risk;
- maintaining a watchful eye on high potential information that may

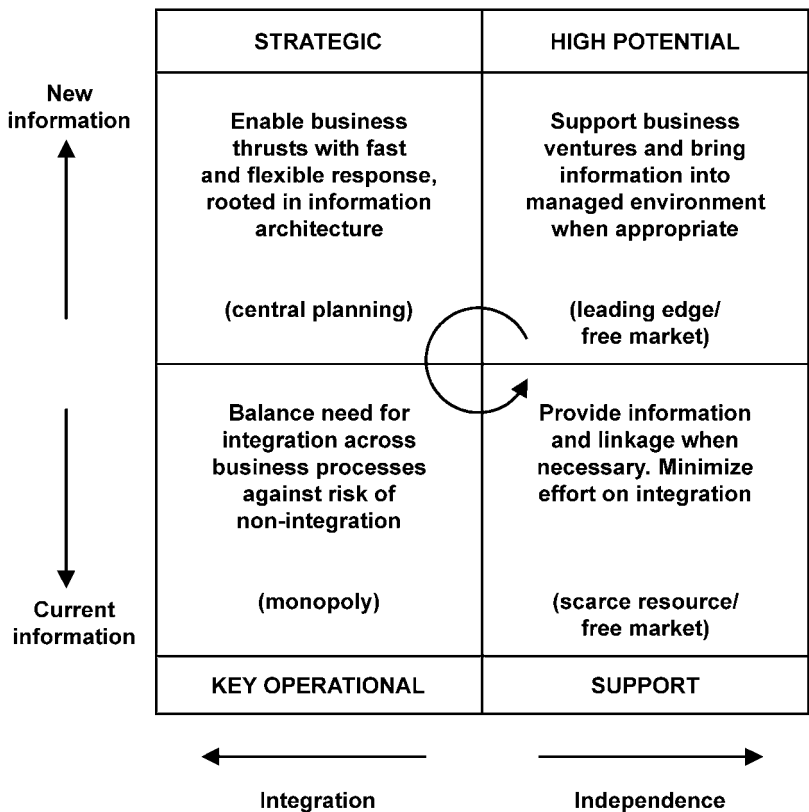


Figure 10.8 The information portfolio

- become strategic, but where structures and relationships are as yet hazy;
- perhaps choosing to ignore low-potential, support information that does not warrant a high priority for being managed.

Figure 10.8 illustrates the differing aims around the information portfolio. In managing the information portfolio over time, there is naturally an increase in the ability to integrate more information and thus to build up the information assets of the business. A sensible balance must be struck between the cost of integration, especially where old systems are retained, and the overall cost to the business of not integrating them, as well as between the freedom given to end-users to create and use information innovatively and the disciplines imposed within the managed environment.

Knowledge management is more diffuse and organic in its nature and execution than information management. This is because knowledge resides primarily within people, or groups of people, and thus has complexities not found in straightforward procedural activities. Typically, knowledge sharing has aspects of trust and politics associated with it, and requires an appropriate culture, reward system and managerial approach to be developed.

The personal nature of knowledge ownership has to be understood and accommodated before it can be managed. Where communities of practice have been constructed, success is only achieved when mutual respect for everyone's actual, rather than possible, contribution occurs; anything less and they begin to degrade as employees feel their effort is not being matched by others causing a retreat to more selfish, old behaviours. Leadership by example appears to be key in achieving a truly open knowledge environment. As an emerging topic of study within the field of IS, we have much to learn about how knowledge can be effectively 'managed' before we can understand how best to deploy IT to improve the processes involved.

ENDNOTES

1. In this chapter, the concepts of 'information' and 'data' are used interchangeably. In reality, a distinction can be made between them, but this is superfluous to the discussions in this chapter. For an elaboration of the distinction, see P. Checkland and S. Holwell, *Information, Systems and Information Systems: Making Sense of the Field*, John Wiley & Sons, Chichester, UK, 1998.
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