

# Business Technology Organization



Vincenzo Morabito

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Managing DIGITAL Information Technology  
for Value Creation - The SIGMA Approach



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# Foreword

Professor Vincenzo Morabito is a good friend and collaborator of mine. From the first time I met him I really liked his ideas for applied research and I was not surprised to find out that these ideas have been extremely useful for the business world. As Associate Professor at Bocconi University, Vincenzo Morabito has managed to turn rigorous academic research into relevant findings and valuable assets that any company would like to have. Indeed, this book is the results of the scientific activity that Vincenzo has carried out during the last 6 years. The scientific activity has used case studies, surveys and experimentations in active partnership with significant companies and corporations operating in Italy.

This book explains how to manage information technologies in creating business value and competitive advantage. The rapid changes that take place at the technological, organizational and global level have significantly affected the way that companies run their business. During the last decade those companies that have focused on their Information Technology (IT) infrastructure and combined it with innovative ideas or new business models have been successful. It is worth noting that four out of the five more profitable new organizations are worth billions of dollars (e.g. Google, Facebook). This value has been generated in less than a decade with their owners being the youngest and fastest who became billionaires in history. Google and Facebook manage the information that is produced by their information systems in a revolutionary way. They systematically invest on the information that is produced to achieve business value. Information systems' business value is associated with the impact of IT on parameters such as cost, productivity and organizational performance.

To this end, the book aims to analyze and explore the current literature on Information Technology's business value and the strategic use of information. A main goal of the book is also to provide practitioners with an academic-based framework for managing information for value creation in current business scenarios, characterized both by information growth and new dynamic digital business models. Thus, the book seeks to present a strategic tool for managing information as the core asset in the evolution of businesses toward a Business Technology Organization.

The book initially explores the linkages between strategic performance and IT business value. Then, it introduces the concept of information management and the relation between IT and information management, where information and the mechanisms for delivering it are the glue that hold together the structure of businesses. From an academic point of view, the book explores the normative literature on information management, and discusses three main approaches namely the (a) Information Operation Approach, (b) Information Orientation Approach and the (c) Information Evolution Approach:

- Information Operation Approach focuses on how information can be utilized by adding value through customers, reducing costs, minimizing risks, etc.,
- Information Orientation Approach deals with the capabilities and behaviors associated with effective and proficient use of information and
- Information Evolution Approach concentrates at different levels of potential maturity in the business use of information.

In this book, the goal of literature analysis is both at academic and managerial level and provides the theoretical foundation for an organizational *strategic information approach*. The strategic approach encompasses the three above stated approaches in a unified perspective, where IT organization absorptive capacity has a strategic role for business performance. The strategic approach is finally implemented through the Strategic Information Governance Modeling and Assessment (SIGMA) model and methodology that enables organizations to identify and take advantage of IT business value.

The book is a concrete and rigorous example of how scientific work can provide strategic tools for management and business in current digital competitive environment.

The book is structured as follow; in the first chapter there is an introduction to information technology and information technology business value. The role of IT and its importance in creating value for organizations is analyzed and issues such as performance improvements and information management are explored.

In the second chapter issues related to information management are further analyzed. Initially the role of information as an organizational resource is explained followed by a discussion on information and information management. The need for managing information is presented and issues related to performance improvements, knowledge management and knowledge management practices are explained.

The third chapter moves a step forward and introduces the Information Operation Approach. This chapter explains that information is the responsibility of every manager and presents the Strategic Information Alignment Framework. Moreover it suggests ways to add value, reduce costs and minimize risks.

The Information Orientation Approach is presented in Chap. 4. The chapter goes through the information orientation model and explains issues related to the measurement and management of information capabilities. The chapter closes by explaining practical issues of information capabilities.

In Chap. 5 the Information Evolution Approach is discussed. Initially, the challenges to the existence of organizations are analyzed followed by a detailed presentation of the Information Evolution model and its levels namely operate, consolidate, integrate, optimize and innovate. The chapter closes by explaining the transition from level 1 (operate) to 5 (innovate).

The next chapter presents the foundation for an information approach. In doing so, it clarifies how to build a foundation for strategy execution and it defines an organizational operational model. Thereafter, it analyzes the types and the dimensions of the organizational operational model and then it illustrates how to implement this model through enterprise architecture.

Chapter 7 summarizes and compares the four approaches that are explained in the Chaps. 3, 4, 5, and 6. As a result, Chap. 7 highlights the main advantages, disadvantages, the similarities and differences of these approaches.

The organizational absorptive capacity and the use of information is well described in Chap. 8. The chapter begins by analyzing the absorptive capacity and its mediation role and it highlights the importance of information systems integration and the significance of the organizational absorptive capacity. The chapter closes by identifying variables for information systems integration, absorptive capacity and business performance.

The last chapter builds on the top of the previous chapters and it introduces the Strategic Information Governance Modelling and Assessment (SIGMA) model. In this chapter, the main elements and parameters of the model are discussed and the SIGMA methodology is analyzed. Based on the SIGMA model and methodology a tool was created and presented. Through this tool organizations can identify IT business value and gain advantage.

I have watched how many of the firms and their senior IS executives have benefited from the ideas and frameworks presented in this book. I strongly believe that this book will have an impact in shaping business technology management practice. I congratulate Professor Morabito on completing this book.

Vallabh Sambamurthy  
Eli Broad Professor  
Michigan State University





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## Part I

# Chapter 1

## The IT Business Value

**Abstract** The role of this chapter is to introduce the reader to the area of Information Technology (IT) business value. IT business value refers to the impact of information technology on the organizational performance and on parameters such as cost reduction and increased productivity among others. In this chapter the role of technology as a critical source of competitive advantage is analyzed. The critical role of IT is investigated and issues related to when IT matters and when IT does not matter are presented. In addition to these, the sources and the impact of IT business value and the association between strategic performance and IT business value is explored too. The last part of the chapter introduces the concept of information management and the relation between information technology and information management. Emphasis and further analysis on Information management is taking place in the following chapters beginning from Chap. 2.

### Introduction

IT business value refers to the organizational performance impacts of information technology, including productivity enhancement, profitability improvement, cost reduction, inventory reduction and other measure of performance. Information technology may also contribute to the competitive advantage of the firm. Competitive advantage refers to a distinctive market positioning that allows the firm to obtain above-normal profits, compared to its competitors.

Competitive advantage is associated with uniqueness. When similar companies offer similar products, customers can easily switch their supplying to get the less expensive alternative available on the market as competitors have no choice than competing on price. Price competition, in turn, leads competitors' performance toward zero-profit equilibrium. On the contrary, uniqueness can shield a company against price competition, allowing the firm to get a premium price and a higher performance relative to its competitors.



Firms differ in their resource endowments as unique resources shape the firm uniqueness. The IT resources may enhance the competitive advantage of the firm, to the extent that their uniqueness is embedded into a company's offering. However, in recent years the contribution of information technology to the competitive advantage of the firm has come into doubt.

A study by Brynjolfsson and Hitt in 1996 provided little evidence of IT impact on supernormal profitability. In particular, the benefits from companies' investments in IT seemed to be seized by customers. The research concluded that "firms are making the IT investments necessary to maintain competitive parity, but are not able to gain competitive advantage" (Hitt and Brynjolfsson 1996).

In another study on 47 major U.S. retail banks was found that the spending on IT capital had neither boosted productivity nor enhanced profitability, as measured by either return on assets or return on equity. They concluded that IT investments do not provide any competitive advantage and have insignificant effect on profitability. Reasons for these surprising results could be rooted in the very nature of the information technology resource.

## The Dream Commodity

Technology is an important source of competitive advantage. Many companies along the history have conquered a dominant position on the market due to their technological innovations which served as a basis to gain extra rent.

All of these technologies share a common factor called proprietorship. Proprietary technologies are owned by a single company and are protected against imitation. As long as competitors find it difficult to replicate the new technology, the leader will be able to offer better products at higher prices, thus improving organizational performance relative to its competitors. Therefore, the fundamental characteristic of a proprietary technology is the inherent linkage between scarcity and value since the lower the number of potential users that have access to it, the higher its value.

Not all technologies are proprietary. Infrastructural technologies are technologies whose value increases with their diffusion. Their social value for the business community is so great that strong incentives lead to share them among many different actors.

Most network-based technologies are typical infrastructural technologies. During the history, the value of electricity power plant or railroad technologies increased as long as their technology became widespread among many different companies worldwide. As an example, the possibility of travelling worldwide increased the number of short distance travelling. As a consequence, the value of a localized railroad producer increased as the number of other companies, having access to the same technology, also increased worldwide.

Infrastructural technologies may originate as proprietary technologies. Its inventor has a consistent advantage in market competition. The firm owning the new

technology will benefit from superior performance over competitors, until forces leading to share it will push technology beyond the boundaries of the firm.

In the early stages of its spreading, some companies may still gain advantages from technology usage. The reason for this is that best practices and standards are not yet consolidated, and companies engage in trial-and-error experiments. Those companies that are most effective in pioneering new applications gain advantage over their competitors, and their performance will likely be above-the-average, at least until competitors will not be able to imitate the leader.

During years, an infrastructural technology is subjected to a continuous spreading over many users, losing its original proprietorship. Moreover, to facilitate its diffusion, technology experiences a process of commoditization, i.e., the original technology progressively loses its distinctiveness, and its technical characteristics conform to a universal common standard, which is recognized as the best practice by the many users on the market. Interestingly, the shared standard may not represent the optimal solution. On the contrary, it may be just a satisfying solution, since users may trade higher functionality for easier access and lower costs.

In sum, in the long run infrastructural technologies share a common fate as spreading out among operators and becoming an infrastructural, common base for competition among firms. No company will be able to gain particular, specific advantages from it.

A dilemma rests at the heart of information technology and raises questions such as:

- Is information technology an infrastructural technology?
- Is the fate of IT to become a shared technology, a common technological base allowing no more than support for operational efficiency?
- Has IT no potential to support strategic differentiation and superior performance?

The answers to these questions may be crucial to understand and foresee how IT may be used in a strategic context to strengthen the competitive advantage of the firm.

In recent years, IT developments seem to have shown a general trend towards commoditization of both hardware and software, which turns IT into an infrastructural technology. PCs were the first hardware components to suffer from commoditization. The battle among Dell Computer and Compaq Computer during the 1990 ended with the incorporation of Compaq into Hewlett-Packard and the increasing leadership of Dell Corp. Michael Capellas, at that time CEO of Compaq, well described the Dell's strategy: "Dell has made this a cost game". For his part, Michael Dell, founder and CEO of Dell Computer, had good reasons for such a choice, stating that "in the long run, all technologies tend toward low-costs standards" (Jones 2003). The Dell vision paid off in the long run.

A few key factors explain the PC commoditization. Given the high potential impact of PCs on efficiency of individual employee's ordinary activities, companies envisioned the opportunity to improve the overall firm efficiency through extensive purchase of PCs. Each employee could have one.

The huge amounts required to acquire a large number of PCs, led companies to save on investments and to target low-cost, standard products. The need to minimize costs related to PC usage, such as the training of the employees, also pushed companies to prefer easy-to-use, standard PCs, a strategy which further accelerated the move toward PCs commoditization. The need for PCs to both interact within local networks and rely on a shared operating system and microprocessor represented another incentive for companies to invest in standardized, low-cost PCs.

The server technology also followed the same pattern towards commoditization. In the early 1990s, the industry was dominated by a handful of producers, such as IBM, Sun, Hewlett-Packard, each of them offering a specialized technology. However, the opportunity to increase efficiency through standardization soon arose. Advancements in microchip technology allowed producers to standardize their offerings. Moreover, the scale economies stemming from purchasing standard solutions were huge and server buyers – once detected the opportunity – immediately changed their supply strategy, abandoning distinctive server technologies in favour of more standard solutions. As a consequence, standard, basic server solutions - using Intel chips and a version of the Windows operating system – spread over the enterprises. General Electric reported that new systems investments fell by 40% moving onto commodity hardware. Beyond GE, Amazon.com and Google represent some first movers in commoditization of server technologies. All of these companies share the same fundamental strategy by choosing cheaper Intel-based machines running Linux, instead of servers with proprietary chips and operating systems.

Storage and networking are also moving toward commoditization. In 2003 EMC and IBM disclosed their agreements to share competence, in order to improve interoperability of their equipment for production of storage products. An even stronger signal of future standardized production is offered by low-cost competitor Hitachi, which started to conquer increasing market shares offering standard technologies with open-source software. Networking technology is experiencing the same trend. In same lines with PC storage, the industry's leaders could well be on the verge of losing their proprietary grip on networking hardware. After spending years on R&D, many IT companies build instructions into networking chips that make available to any interested hardware maker. Not surprisingly, Dell Computer – the low cost competitor – is entering in all of these industries, offering the buyers low-cost standard solutions, i.e., the opportunity to get huge savings with more than acceptable IT performance.

There are three fundamental reasons leading to hardware commoditization. A first reason is technology in nature. IT value is related to the extent to which many users have access to it. Homogeneity in hardware technology facilitates higher degree of sharing among multiple different users and increases its value. Interconnectivity and interoperability become the key technological driving forces towards commoditization. At the centre of commoditization rests the common user, with his/her average knowledge in high tech. Leveraging on IT implies expanding hardware usability and standardizing technological tools. A second driving force

is related to the industry structure. Technological evolution both increases performance and reduces costs of standard products. Intel success is rooted mainly in the huge economies of scale stemming from production of large amounts of microchips. Economies of scale were so advantageous, that companies could not afford to make any different choice than acquiring standard products from external producers. The opportunity for production and sale of standard, low-cost products represents both a strong incentive for buyers to shift from distinctive technology to more standard solutions, and a threat for incumbents to be placed out by new entrants (such as Dell Computer) pursuing cost-based strategies. As a consequence, the structural characteristics of IT industry lead to progressive commoditization of hardware products.

The third determinant of hardware commoditization is related to the *Overshooting Phenomenon*. This phenomenon is defined as the process by which the performance of a technology product exceeds the need of most users, shifting buyer's preference from distinctive to cheaper solutions. In sum, technology suppliers compete on satisfying their most demanding customers, adding new sophisticated solutions to their products. However, each new generation of technological products overshoots the need of some customers. These buyers often respond by switching to cheaper versions of the same product provided by other suppliers. Eventually, as the technology continues to advance, the performance of the cheaper versions comes to satisfy the needs of most customers, and the basis for competition shifts from specifications to prices.

Differently from hardware, software reveals an almost unlimited potential for innovation. In principle, there are no limits to innovate software solutions as opportunities for distinctiveness arise continuously. However, looking at the economics of software production reveals the same trend toward commodity. Software delivery entails two different stages: (a) a design/production stage, and (b) a reproduction/distribution stage. The first stage calls for huge investments, since creating a program is very expensive in terms of skilled employees, time, planning, coordination, testing, patent protection. As it is costly to write a program, so it is cheap to reproduce and distribute it to many different users. Compared to companies producing in-house software, specialized software houses can spread out their huge initial investments on many different users, reducing the price of their products.

In recent years, companies found convenient to acquire standard software from outside producers, rather than recurring to proprietary, in-house software solutions. The once in-house made software was substituted by products realized by external producers, already in the early stages of industry life cycle. The savings from purchasing of external standard products were so huge, to outpace the benefits stemming from proprietary software.

The spreading out of PCs during the 1980s, accelerated the process towards the commoditization of software packages. The huge investments in PCs made by a single company, enhanced the pressures toward purchase of standard software solutions and saving on IT costs. Moreover, the larger number of PC users increased the need for easy-to-use, standard software packages, shifting the interest of buyers

from distinctiveness to simplicity and standardization. Finally, the need to install software that could enhance networking and communications among external PCs, further increased the recurrence to standardized software.

Commoditization involved also the more sophisticated ERP system. The launching of the first ERP package by SAP in the 1990s, illuminated the industry need for an integrated enterprise software, which could integrate all of the fragmented existing software that had been acquired during years. Through ERP systems, managers could gain a clear view of how their firm behave and perform.

Tailor-made solutions of ERP systems soon left place to more standard packages, as it became apparent that customized software was rarely worth the effort and the costs needed. As a consequence, buyers increasingly chose to acquire and use default configurations. Moreover, vendors' offerings aligned to standard best practices, determining a commoditization of the ERP systems available on the market. As a result, at the end of the 1990s, customers could not find 5 % difference among SAP, PeopleSoft and ORACLE.

Looking at the underlying forces that drive software production towards commoditization, one find out the same fundamental factors that characterize the commoditization of hardware.

Interconnectivity, interoperability and integration play a major role in software commoditization. The fundamental functionality of software packages is to interconnect many different users as its value is enhanced by widespread diffusion of standard solutions. As the example of PCs diffusion underlines, software package standardization was driven by the need to assure a common language enabling many different users to communicate to each other.

As it happened for the commoditization of hardware, the huge economies of scale of external, specialized production plays a fundamental role in software commoditization. The main source of software house performance is amortization of development costs, obtained through maximization of sales of standard products. The huge initial investments need to be spread out over the maximum number of users. Similarly, when it comes to ERP systems, the integrated enterprise solutions could only come from outside vendors able to spread their development costs over many clients.

Both in specific software packages and in ERP systems, buyers soon realized that the savings from the purchase of standard products from external vendors would significantly outweigh the losses stemming from giving up a distinctive, proprietary solution. Users progressively shifted from distinctive in-house production to external, standard and more effective software, improving both performance and cost savings.

Furthermore, software is also prone to the 'overshooting' phenomenon. Vendors usually offer upgrading solutions to stimulate their demands. However, increasing levels of sophistication and continuous advancements towards empowered functionalities may lead to overshoot actual users' expectations, to the point that these users may not willing to pay higher prices for products exceeding their needs. Overshooting opens the door to cheap, commodity versions of extant software applications. The increasing use of open-source software can be interpreted as a

consequence of the overshooting phenomenon. Open source applications tend to be rudimentary in their earlier versions. However, as their user base grows steadily, they also become more widespread and standardized. In this respect, the Internet has greatly favoured the commoditization of software packages, encouraging programmers around the world to collaborate on open-source projects.

The latest frontier of commoditization refers to Service Oriented Architecture (SOA) and cloud computing. Service Oriented Architecture and cloud computing differs from both hardware and software in that they encompass how both hardware and software are meld together. These architectures are promising for business as they seek to integrate existing software and hardware infrastructures. SOA may allow a company to easily integrate its legacy systems. In addition, a company would be able to quickly reconfigure its IT systems by automatically downloading applications from outside suppliers. Emerging trends show the increasing role of vendors on the SOA and cloud computing market. Most innovations come from vendors, and buyers are waiting for standard packages rather than developing in-house proprietary solutions. Again, the future of IT seems to leave no space for differentiated, distinctive and proprietary technological innovations.

## **When IT Does not Matter**

Information technology seems to share all the typical characteristics of infrastructural technologies. During the last decades, it has become more and more widespread and standardized. If information technology is to be considered as an infrastructural technology, then it can hardly support a sustainable competitive advantage.

As information technology matures, it loses much of its potential for competitive advantage, ending up as a standard input that all companies can easily access to on the market. Therefore, it cannot serve as a basis for differentiation among firms. On the contrary, competitors become similar as long as each of them is equipped with the same standard technological inputs and their performance converges. A typical example of this is the use of ERP systems.

In recent years, several events signal the decreasing influence of information technology on firm distinctiveness. First of all, for long time information technology has been a clear source of competitive advantage. In the earlier stages of information technology life cycle, several companies built up their differentiation by developing new IT functionalities and pioneering their alternative applications to the business. It took years for competitors to recover the gap that these pioneers had established. The wide temporal lag allowed the first mover to recover the initial huge investment in information technology and to establish a dominant position on the market. The dominant position, in turn, helped leaders to build structural barriers to competition, such as size (i.e., economies of scale) or a well known brand. Information technology had been a source of competitive advantage for these firms.

However, in recent years, the time needed for the followers to bridge these gaps in IT pioneering investments has become shorter and shorter. Time is crucial and the more time it takes followers to address competition the less power and market share they have. For that reason they focus on catching up with competition as soon as possible. In doing so, followers tend to copy a new technology (technology replication cycle) the sooner they can. The history of IT reveals that the technology replication cycle gets shorter and shorter.

Companies might choose to invest and build a competitive advantage based on IT. However, the high investments and, especially, the fast replication by competitors would make an IT-based competitive advantage to vanish quickly, leaving no time to recover the initial investment. In such a context, structural competitive forces prevent firms from building any competitive advantage on IT. First of all, external vendors realize significant specialization and economies of scale and, as a consequence, internal proprietary innovations in IT would be simply too expensive to be worth the effort. Secondly, fast replication by competitors would erase any possibility to recover the initial, huge investment.

In the IT industry, the follower position is advantageous compared to the first mover position. The first movers (i.e., the technological pioneers) support all the costs and the risks, and have low chances to build a sustainable competitive advantage and recover the initial investment. On the contrary, the followers get all the advantages and support relatively low costs, since they will benefit from the experiences and the best practices realized by the leader, minimize their investments and invest only once the new application has proved to be effective, limiting the risks related on new, uncertain investments.

In sum, the shortening of the replication life-cycle prevent companies from building their distinctiveness on information technology. All companies will naturally converge on low-cost, standard IT provided on the free market by external, specialized vendors.

An even more dramatic effect of IT commoditization is related to the homogenization of internal processes among firms, induced by IT supplying. Not only firms will converge on standardized information technology solutions, but standard solutions also lead competitors to standardize the way IT is used within the firm context, to standardize their managerial practices.

As a matter of fact, investments on information technology also induce a change in a company's internal processes, since employees behaviour need to interact with extant information technology. In recent years, competition among software houses is shifting from technical content to managerial best practices incorporated within the software package. Their objective is to incorporate the most advanced business practices within their software. This phenomenon is particularly evident for software makers producing ERP systems as their activity has progressively shifted from automating specific activity, to automate entire firm processes.

For one part, each firm is able to implement best practices consolidated in the business arena, by buying the software at a relatively low cost from external vendors. However, at the same time the software impose constraints on the process, since it determines how the process is carried out. In the past, companies investing

in information technology would first decide the business architecture, and then would choose a software package to support their proprietary process. However, in recent years, software has become the driver of internal firm architecture. The business often must be modified to fit the system.

This phenomenon further reduces the space for a company to distinguish itself from competitors on an IT basis. Companies are more and more similar as a consequence of ERP systems implementations, IT commoditization is inducing even more homogenization among competitors.

The underlying reason is the trade off between cost savings stemming from purchasing a standardized products and differentiation advantages of a customize home-made IT resource. And cost savings more often come to outweigh the differentiation advantages.

In sum in recent years we are observing a general trend from IT commoditization to a sort of competitor commoditization, a process by which managerial practices become standardized and converge upon common best practices accepted in the business arena.

## So, What

Looking at IT as an infrastructural technology reveals how it cannot serve as a basis to build a competitive advantage and gain an above-the-average performance. Moreover, the pervasive use of standard IT in firm processes is driving companies toward homogeneity. The more companies adopt similar systems the more best practices turn into universal practices.

A study documented how the adoption of an ERP package within a multinational company produced convergence of performance over many different indicators. For instance, once the ERP systems had been implemented, differences in lead times among business units located in North America, Europe and Asia suddenly disappeared, and all converged towards the same performance (between 27 and 29 days).

IT is reducing the possibility for above-the-average performance, rather than supporting companies to achieve a competitive advantage. Overall, IT and process commoditization pushes companies towards competitive parity, rather than competitive advantage.

In his paper on the Internet, Porter clearly stated how IT may challenge the opportunity for reaching superior performance: “The great paradox of the Internet is that its very benefits – making information available; reducing the difficulty of purchasing, marketing and distribution; allowing buyers and sellers to find and transact business with one another more easily – also make it more difficult for companies to capture those benefits as profits” (Porter 2001).

From this perspective, IT is becoming an even less critical resource, and prescriptions for IT managers de-emphasize investments in IT. However, in order to get a clearer picture on how IT may influence the conquering of a competitive



advantage, one needs to look more closely to business strategy and its relationship with IT.

Business strategy entails choices related to firm positioning on the competitive arena. It differs from tactical initiatives in that whereas tactical initiatives implies higher levels of efficiency/effectiveness in how specific activities or processes are carried out, strategic initiatives – in their deepest meaning – entails the set up of a completely different bundle of activities and processes. For example, IKEA reached its competitive advantage redefining completely the set of activities that a furnishing producer was supposed to provide to its customers. Its unique and distinctive offering was valuable for customers, but its offering is based on completely different value chain architecture. Companies achieving a competitive advantage all base their uniqueness on a distinctive multiple set of activities, not simply on how a specific standard process is carried out. They do not base their competitive advantage on IT basis. On the contrary, their competitive advantage is based on a broader and interrelated set of activities, processes, knowledge, culture, and on a richer set of interrelated resources.

A competitive advantage lay in a complex, tightly integrated and difficult-to-copy combination of processes and activities, and the use of a complex, integrated set of resources, including the information technology.

Homogenization of IT and processes is likely to bring to parity in operating, tactical processes. Commoditization of IT and the related standardization of key firm processes have probably limited the potential sources of competitive advantage, making more difficult for a firm to reach an IT-based superior market positioning. However, the pursuing of competitive advantage has become even more important as IT and operating processes converge to a common shared standard of best practices.

By no means have these trends toward commoditization implied the end of searching for competitive advantage. Commoditization of IT and homogenization of operating processes impose new strategic challenges for companies. In a first instance, company's flexibility and agility are becoming even more important for business success. In a competitive environment (Sambamurthy 2003), company success, and even its survival, rests on its ability to anticipate future trends and to re-define its business architecture through changes in offerings and internal processes.

Sustainable competitive advantage needs to be accompanied by a new concept called the leverageable competitive advantage. Leverageable competitive advantage is defined as a privileged market position that, provides a stepping stone to another privileged position. It can be considered as a way station and not as a destination. But like a sustainable advantage, a leverageable advantage is a manifestation of deep and disciplined strategic thinking. It can be considered as deliberate move that build on the past and prepares for the future. Apple Computer is a clear example of how a company may leverage on its original sources of sustainable advantage (e.g., design competence, integration between hardware and software, a strong and well known brand, innovation) to pursue strategic renewal.

When looking at current trends of commoditization in both IT and firm processes, one may infer that the less dynamic firms are the ones that get the most

benefits from commoditization. They easily acquire both standard technology and best practices from the external providers. Therefore, commoditization is bringing most companies to the highest levels of performance in both a critical input such as the IT and the way processes are carried out. However, such improvements are more related to operating effectiveness and efficiency, rather than to market positioning and to building of an interrelated, difficult-to-copy set of resources. Opportunities for differentiation still exist.

In sum, information technology, by itself, cannot be a source of competitive advantage, as long as standard solutions dominate the market. Moreover, homogeneity of internal processes makes it more difficult to build a competitive advantage. However, both the IT and the process trends reveal the very nature of strategy. Companies purchasing external technologies and best practices are improving their operating efficiency, not defying a sustainable competitive position. The challenge for pursuing competitive advantage is still on the desk. And information technology may still play a role as a key complementary resource.

## **The Sources and the Impacts of IT Business Value**

In order to understand how information technology may improve firm performance, one needs to get a clear picture of IT as a firm resource, and to identify how it is embedded within other firm resources (Melville et al. 2004).

The IT firm resource includes both the Technological IT Resource (TIR) and the Human IT Resource (HIR). The technological IT resource includes both hardware and software. It can be further categorized into: (a) IT infrastructure, i.e., shared technology and technology services across the organization, and (b) specific business applications that utilize the infrastructure, i.e., purchasing systems, sales analysis tool and so on. The technological IT resource refers to the physical technology of the firm. The human IT resource refers to firm's human capital and it includes both technical and managerial knowledge. Technical knowledge, in turn, includes application development, integration of multiple systems, maintenance of existing systems. Managerial knowledge refers to the ability to identify appropriate projects, marshal adequate resources, and lead and motivate development teams to complete projects according to specification and within time and budgetary constraints. It is important to note that the Human IT Resource may be associated with the entire technological infrastructure of the organization or may reside locally within business units.

Beyond the IT resource, the firm resource endowments include also complementary organizational resources. Complementary organizational resources are those resources that – together with the IT resource – jointly generate synergies and create value. Complementary organizational resources include non-IT physical resources, non-IT human resources, and other organizational resources such as organizational structure, policies and rules, workplace practices, culture and so on.

Both the IT resource and the complementary organizational resources apply to business processes. Applying IT resources and complementary organizational resources to firm processes may lead to performance improvements. Performance improvements can be measured for both single processes (business process performance) and the entire organization (organizational performance).

Two different levels of performance exist: (a) the operational performance and (b) the strategic performance. *Operational Performance* relates to efficiency or effectiveness improvements stemming from how firm processes are carried out. Operational performance is often associated to single processes improvements, and it includes quality improvements, customer satisfaction, flexibility, inventory management, time to market. Operational performance may also be associated with organizational performance, i.e., improvements for the entire organization, including productivity, efficiency and profitability. The adoption of best practice may lead to operational performance. For example, the increase of product quality or the reduction of production rejects, all represent improvements of the operational performance, which may be gained through adoption of best practices.

*Strategic Performance* is defined as superior firm performance compared to average industry performance, and it is related to the attainment of a competitive advantage. Competitive advantage may be temporary or sustainable. In both cases, the measure of performance relates to the entire organization. Moreover, it is a relative measure of performance, i.e., performance compared to competitors. Improvements in strategic performance entails changes in firm positioning on the market, and it may require dramatic changes in the firm architecture. At a minimum strategic performance may require structural changes in the way the firm uses its resources and in the way it is organized. IT business value should be valued at both the operational and the strategic firm performance.

## The IT Business Value for Operational Performance

Published studies examine how information technology may improve operational performance. It has been proved that the technological IT resource may improve business value within computerized reservation systems and ATM networks. Other studies have documented how the implementation of technological IT resources impact on cost reduction, whether in the context of production data management system in the clothing industry, in the context of supply chain management in the food industry, or within the jewelry appraisal processes. Moreover, it has been proved that the adoption of innovative IT and transaction processing systems positively influence operational performance. Human IT resources also positively influence operational performance. For example, it has been proved that enhancement of human IT resource improve operational efficiency.

All of these studies show how IT leads to improvements of operational performance. IT allows improving specific company processes, increasing their efficiency and/or effectiveness. These improvements stem from effective redesigning of

process architecture, better coordination among separate departments and offices, identification of weaknesses along the chain of activities, minimization of errors through automatic processing, early detection of errors and so on. In particular, the adoption of ERP systems allows a single company to benefit from best practices consolidated in the industry. Companies may gain significant improvements in their operational performance as investments in IT may result in cost efficiency and or better quality products, which in turn may boost the overall financial performance.

Operational performance is not a secondary objective. Even though pursuing of strategic performance, i.e., competitive advantage, remains at the top of every firm's priorities, operational performance is still worth consideration.

First of all, investments in IT may result in dramatic improvements of operational performance for those firms which are late on the path toward managerial best practices. Secondly, the achievement of operational performance may be considered as a prerequisite for conquering of superior improvements in strategic performance. Aspirations to competitive advantage are first tested in the context of operational performance as companies not able to improve operational performance, will hardly be able to realize the more radical organizational changes required to achieve a competitive advantage. Finally, given the increasing competition in many contemporary industries, operational performance is becoming a necessary condition for survival. Commoditization of ERP systems has made access to best practices easier and cheaper, leading to increasing homogeneity among firms. The spreading out of ERP systems push all the companies to invest in these systems to reach the minimum standards required to compete on the market. A company not willing to maximize operational performance may be placed out of the competitive arena in the long run. In sum, not only commoditization of ERP systems and best practices lead to increasing homogeneity among firm processes. Firms have no choice but investing in ERP systems in order to keep pace with competitors.

Pursuing operational performance is not an easy job as:

- It entails identifying key processes within the firms (i.e., those processes that significantly influence organizational outcome, or those having the higher potential for operational improvements)
- Defining the ultimate process objective and the key performance process indicators
- Redesigning the process flow
- Training employees
- Integrating IT resources within the process

Organizational inertia may characterize initiatives aimed at improving how processes are carried out within the firm. Such initiatives should be taken considering the cost – benefit trade off. Investments should be recovered in subsequent years from the expected economic benefits stemming from smooth and efficiently redesigned processes. It is important to note how industry structure may significantly impact on the possibility for a focal firm to recover its investments on operational performance. Highly competitive industries push competitors to

immediately transfer value improvements to customers, making it more difficult to gain a significant return on IT investments.

However, one should take into account not only the economic pay-off of such initiatives. On the contrary, one should incorporate also the organizational costs that such initiatives brings about and, more importantly, the competitive implications – in the long run – of not aligning the firm to the best practices spreading out within the competitive arena.

## **IT Business Value for Strategic Performance**

The linkage between IT and strategic performance is under closer scrutiny among researchers (Luftman and Kempaiah 2007). Several studies have shown how the IT resource may enhance the strategic performance of the firm (Melville et al. 2004 and Sambamurthy 2000). One approach to assess the influence of IT on strategic performance entails measuring the extent to which strategic information technology systems and firm performance are associated. An empirical study has shown that stock market reacts positively to announcements that firms are using strategic information systems. More importantly, in the years following the announcement, these firms are more productive and more profitable than their competitors. Other studies have shown that firm making investments in strategic information systems achieve competitive advantage, and that their established technology base represents an important source of sustainability.

There is also some empirical evidence that human IT resources are valuable and contribute to development of competitive advantage. Achieving competitive advantage represents the most desirable objective for a firm. It entails conquering a unique market position, based on a unique set of activities and of difficult-to-imitate resources. The general achievement of a competitive advantage needs to be disentangled into its specific components. For a manufacturing firm, the strategic performance of the firm may be disaggregated into three different strategic objectives: (a) cost reduction, (b) quality improvement and (c) revenue-growth.

Information technology may support competitive advantage for each of these strategic objectives. For example, it may support product and service differentiation or the innovation rate. In order for a company to leverage on IT and build a competitive advantage, it must identify the key processes and the business process capabilities, i.e. the key, distinctive capability that the organization needs to develop within a critical process. Business process capabilities include, as an example, innovation, efficiency, flexibility.

Information technology may support the development of business process capabilities. However, the degree to which it can enhance the business capability and support a competitive advantage, depends upon its contribution to create a unique bundle of difficult-to-imitate resources.

In order for a resource to confer a sustainable competitive advantage, it must be valuable, rare (i.e. few firms have access to it), competitors do not know what

factors lead to success and what to imitate – and there must be no readily available substitutes. In sum, the four conditions necessary for a resource to confer a sustainable competitive advantage are value, rareness, inimitability and non-substitutability.

Specific resources examined in the literature include entrepreneurship, culture, routines, invisible assets, human resources. These resources are those factors that sustain differences among competitors, and support performance gaps in the long run. Different performance among competitors ultimately rest on differences in their resource endowments. Superior performance in the long run is supported by proprietary resources which are valuable, rare, and difficult to imitate and to be substituted.

Valuable and rare resources confer only a temporary advantage, since other competitors will soon replicate the leader's set of resources. Therefore, performance gaps will be soon or later fulfilled. However, as long as the followers experience difficulties to imitate or substitute these resources, and long time is needed to complete the replication process, temporary advantages may be significant and valuable, since the firm may get significant return on the initial investments.

Notwithstanding the extant empirical research on the IT strategic business value, the causal relationships that allow the information technology to confer a competitive advantage are still unclear. Some scholars argue that only managerial IT expertise confers a competitive advantage. Since the technological IT resource and the technical-human IT resource are imitable, these latter resource may confer only a temporary advantage. However, with the increasing maturity and institutionalization of IT service markets, even these managerial and technical competence can be sourced externally. Therefore, in order to get resources difficult to imitate and to be substituted, a company should not develop technological IT resources or human IT resources by itself. Nor the technological IT resource neither the human IT resource confers a competitive advantage by itself, since each is subjected to strong imitative processes. Competitive advantage may result from a unique combination of both technological and human IT resources. Even if strong incentives do exist for a firm to completely externalize purchase of ERP systems and acquire the consolidated best practices, a possibility still exist to shape internal business processes and differentiate internal practices compared to competitors' ones.

Complementary organizational resources may further strengthen the achievement of competitive advantage. Managing teams of IT and non-IT resources together may generate greater value than they can do separately. Published studies have shown that IT resources are associated to non-IT resources. Association of IT and non-IT resources establishes a unique organizational context that allow superior performance in the long run. In particular, extensive use of IT resources is associated with team work practices, decentralization and wider breadth of job responsibilities. The association among these factors leads to higher market valuations. Culture is another resource that may lead to the achievement of a competitive advantage. In the retail industry, it has been shown that complementarities between IT and other human and business resources such as culture lead to

superior and sustainable performance. Other scholars have found that appropriate IT investments support a change in organizational thinking, and together lead to change and improvements in business processes and to competitive advantage. Other examples of how complementary organizational resources may support competitive advantage have been drawn on the travel industry, the cotton industry and the package delivery industry.

In sum, use of IT resources may have a critical organizational impact on complementary organizational resource such as structure, practices, culture and so on. Therefore, at least indirectly, IT resources may have a major role in shaping and sustain a competitive advantage.

IT investments may lead to significant changes in current organizational behaviours and thinking. Such changes are difficult to imitate, and require long time to be imitated. Moreover, IT may enable complex business processes that also take years to develop. These complex businesses are difficult to imitate and make organizations' advantage sustainable in the long run. IT may support the competitive advantage, as long as it supports the set up of a unique and complex set of business processes and induce changes in employee's behaviour and culture, which may represent insurmountable barriers for a competitor willing to imitate.

## **From Information Technology to Information Management**

Beyond complementarities with other organizational resources, the IT resource may contribute to the achievement of strategic performance and support the competitive advantage of the firm, given its inherent linkage to information. Information technology collects, transforms and disseminates information within a firm. Information is at the heart of competitive advantage since in contemporary economy, every business is an information business. In recent years we all are witnessing the emerging of a new era, the information age. Information age differs from the past industrial age in many important respects.

The once market-place, in which a company needed to find a profitable position, is going to be substituted by the market space, a locus where each firm may re-define new businesses, or different ways to do business. Hierarchies are going to be substituted by internal and external networks, as it is shown by the increasing reliance on work team, process oriented practices and the development of stable business ties with external partners. The emphasis on the once scarce physical resources is shifting towards the limitless digital resources, whereas the business is driven by knowledge and intellect workers rather than by machine/craft workers. In sum, in the information age, the information technology is going to get a more central place in business, since it is the key resource dedicated to information production.

Important recent strategic initiatives are information initiatives. Many mergers, acquisitions and alliances are driven by the need to acquire information power. Industry structure is modified with the aim to gain information power within the

industry. One of the recent trends in business strategy is to exploit opportunities for synergies created by repackaging, reuse and navigation.

Information intensive companies are playing out these new strategies as content companies try to acquire related content business or try to build alliances with communication companies and vice versa. Disney's marriage with ABC is an example. Also the Sky's bid for Manchester United can be interpreted from this perspective. More traditional companies, however, (i.e., companies historically not tied to information intensive strategies) are playing out these strategic moves. The acquisition of Diversified Pharmaceutical Services carried out by SmithKline Beecham was aimed at acquiring the data embedded in prescriptions and healthcare administration processes, which were expected to guide research development programmes and sales management.

Another example comes from Johnson & Johnson where its chairman declared that the company operates in the knowledge business. The strategic potential of information is described by the virtual value chain, which encompasses five stages toward value creation: (a) gather, (b) organize, (c) select, (d) synthesize and (e) distribute information. The virtual value chain is to be associated with the more traditional physical value chain. The implicit potential of information to create value is disseminated along each stage of the physical value chain. At each stage of the physical value chain a managers can find out how information may help to create superior performance. This information may be used to improve performance at each stage and also to coordinate the subsequent stages. However, it can also be repackaged to build content-based new products or to create new lines of business.

As an example, insurance companies are improving their expertise in analysing customers and claim information, and then are teleselling both financial and physical products. The Japan-based retail chain Seven-Eleven Japan used information technology to generate useful information and improve firm performance. Information was used to address convenience, quality, service and customer needs, by ensuring that shelves were replenished several times a day in response to orders from individual store manager. Moreover, a training program was started in order to train store operators not only to capture customer and sales information, but also to learn how to use it. The president of Seven-Eleven Japan clearly stated that their performance was based on an integrated set of resources, among which he claimed information technology and information.

Managing information as a key determinant of competitive advantage reveals the inherent strategic value of information. Among the consolidated classifications of strategic resources, the information management perspective highlights how information may be a key resource, supporting the competitive advantage of the firm. Giving its increasing relevance for business success, companies are experiencing a greater demand for information. However, most companies fall short from performing their information business, and are not able to generate the key information that may support strategic value. For one part, most companies are focused on the technological component of information technology, discarding the



more critical output of information that those systems may produce. As a matter of fact, advanced information technology does not mean good information per se.

Companies invest huge amount of money to innovate their technological systems, and pay less attention to how those systems may produce valuable information. The underlying syndrome is the mere implementation of advanced information technology should allow critical information to emerge. According to this view, information losses would depend on weaknesses in the systems. However, these managers fail to recognize that information is within people, and that the linkages between people and the system should be targeted, rather than simply increasing investments in advanced technological IT.

This emphasis on the technical IT resources may be rooted in the astonishing progress in computing and communication software that we all experienced in recent years. The aggressive strategies of IT vendors may also have played a role in boosting IT investments. Moreover, it is easier to invest in IT than to understand people. In fact, understanding how people relate to information is a psychological expertise, and most managers simply do not understand the key relationship between information and people.

The gap between technology oriented and information oriented business practices are increasing in contemporary companies. In fact, several researches have documented that senior managers are dissatisfied with the investments and practices related to IT and information use in their companies. The most commonly shared view on how information may improve firm performance is limited to the good IT practices. If IT priorities are aligned with the business, and if the IT departments work effectively with the business to deliver IT applications and infrastructure, company performance improves. Misalignments would be due to inability of IT managers to deliver the appropriate, effective technologies and application. In fact, the issue of information is an issue of the entire organization, not of the IT manager. Collecting, transforming, disseminating key information require the establishment of a new philosophy, a new organizational culture, and more attentive behaviours. The issue of information management involves the organization as a whole, and the managing director or the CEO as the top managers responsible for IT-Business integration.

The IT managers are not the only responsible ones for poor information delivery. However, they may play a key role in supporting the organizational change toward information management. Therefore, we envision a new field for how information technology may support the competitive advantage of the firm. Organizational change led by key senior managers, and supported by the IT managers, may help generating that unique, difficult-to-imitate and difficult-to-substitute resource of information, which may support more effective decision processes and superior strategic performance. Given that it entails change of the firm practices, culture and values, leader will have a great advantage over competitors, and followers will hardly reach the new competitors in the information age.

## Summary

In this chapter, a discussion on IT business value was carried out. In doing so, various interesting issues were presented and analyzed. The role of IT and the dream commodity was explored. Standardization of IT infrastructure is a key issue. During the last decades, numerous actions were taken towards this direction in terms of hardware, software and network. Organizations need to learn how to compete using standard and/or customized solutions. Information technology, by itself, cannot be a source of competitive advantage, as long as standard solutions dominate the market. Homogeneity of internal processes makes it more difficult to build a competitive advantage. Nevertheless, both the IT and the process trends reveal the very nature of strategy and companies should purchase external technologies and best practices to improve their operating efficiency, not defying a sustainable competitive position. The challenge for pursuing competitive advantage is still on the desk. And information technology may still play a role as a key complementary resource. The last parts of this chapter focus on the business value and strategic performance. The chapter closes by introducing a topic that will be further investigated in the Chap. 2 and deals with IT and information management.

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## Chapter 2

# An Information Management Approach Emphasizing on the ‘I’ in IT

**Abstract** In Chap. 1, issues related to Information Technology Business value were explored. In doing so, issues related to the impact of IT on organizational performance and competitive advantage were analyzed. Moreover, Chap. 1 introduced the relation between Information Technology and Information Management. Chapter 2 continues the discussion on information management and it pays attention to Information. Information and the mechanisms for delivering it are the glue that holds together the structure of businesses. This chapter explores also the evolution of information management as well as issues initially introduced in Chap. 1 and related to organizational performance. In an attempt to better analyze these issues, Chapter 2 reports three different approaches namely: (a) IT-centered approach, (b) Information-centered approach and (c) People-centered approach. In addition to these, Chapter 2 introduces Knowledge Management and knowledge management practices.

## Introduction

Imagine the Information Technology (IT) industry passionate about delivering the right IT solutions to their clients. In this industry, hundreds or thousands of magazines, books, web sites, and even television channels, covering and celebrating the latest technological innovations in the IT industry. Conversations dominated by the issues of whether ‘X’ company technological solution is more effective and efficient than ‘Y’ company. IT companies invest millions, billions and even trillions to connect all their technological devices and to ensure that their network reaches every desktop, every home office or possibly even every car. Perhaps among others one particularly significant issue is overlooked in the IT industry – Information.

Is this information consistent and transparent – or can it be considered as good information? Due to technological advancements and the wide dissemination of information, many companies suffer from information overload. Thus, they need to

apply Information Management (IM) to deal with this information chaos in the digital world. Most of the time, this information is stored in computer hardware in an unorganized way, spread in databases, rendering access to relevant knowledge difficult, and compromising employees' productivity on their daily activities.

Consequently, many several business enterprises lack a global view of their own data and information – thus, it can be said that information technology outshines information itself in the real world and or good information is rarely synonymous with advanced IT. As a result, it is time to focus on the 'I' rather than the 'T' in the world of business IT.

The indications of the obsession with technology are everywhere. Companies and consumers spent several billion dollars a year on IT. About half of the capital expenditures in the US go to IT. Information Systems (IS) departments in corporations focus very nearly exclusively on acquiring, connecting and maintaining computer hardware, software and communication networks.

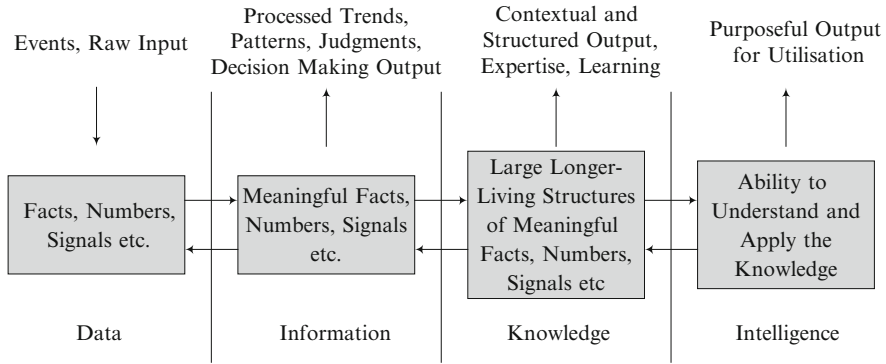
What is the aftermath of this obsession? The return on their investment is depressingly unsatisfactory. Even the most rigorous economists have difficulties in finding correlations between IT spending and yield, profits, growth, revenues or any other measure of financial benefit. Surveys of several managers suggest that they feel the information they get today is no better and consistent than it ever was.

Since companies have many technological solutions, they tend to drift towards the form of information that is most easily addressed with it – that is highly structured transaction data. Companies gather automated data on almost every aspect of their operational activities and new enterprise systems are particularly effective at processing and gathering structured transaction data. However, this structure data cannot be considered as information and or is rarely transformed into information and knowledge.

The transformation of data into something much constructive requires substantial human consideration with concentration and intelligence but most companies view the issue only in technological provisions. Terminologies such as data, information, knowledge and intelligence also often generate legitimate scepticism. For example, these terminologies are recurrently used loosely and as though they are interchangeable. Figure 2.1 illustrates the possible association between data, information, knowledge and intelligence.

Whatever the detailed explanations, they represent a spectrum ranging from single facts, numbers, signals about human events and activities, through more organized and meaningful concepts. These concepts contain facts, relevance and purpose or human interpretation and contextualisation of data in a given context (information), to concepts that comprise real reasoning. This reasoning allows new information to be generated. It can only reside in one's mind and is the result of human experience and reflection. The reasoning is based on a set of beliefs that are at the same time individual and collective (knowledge) and lastly, intelligence as a more active component than data, information, or knowledge.

It is the application of knowledge expressed in principles to arrive at prudent, sagacious decisions about conflicting situations or in simple terms as the ability to understand and to apply knowledge. In the subsequent section, this chapter does not



**Fig. 2.1** The links between data, information, knowledge and intelligence

focus on illustrating the differences between different terminologies but seeks to review the information management literature and its approaches in emphasizing the importance of ‘I’ – information in the business IT world. In addition, reviewing the knowledge management literature and identifying different variables through which the knowledge management practices can be analysed. The chapter commences the debate by focusing on the role of information as an organizational resource to defining and explaining information management and its approaches to define and analyze Knowledge Management (KM) practices through different variables.

## Role of Information as an Organizational Resource

The word ‘information’ is often used to signify what is processed and provided by the computers and other electronic devices and in turn provides a certain meaning in some context for its receiver. That is, when information is entered into and stored in a computer, it is generally referred to as data. After processing (e.g. formatting, editing and printing), output data can again be alleged as information.

It can be said that information as a concept bears a diversity of meanings, from everyday usage to technical settings. The concept of information is closely related to the notions of constraint, communication, control, data, form, instruction, knowledge, meaning, mental stimulus, and pattern. The aforesaid observations illustrate that information is a resource on its own that can be managed, as well as an asset to others.

On the other hand, the role of information as an organizational strategic resource can be considered in three areas: (a) to make an impression of change in an organizational environment, (b) to generate contemporary knowledge for transformation, and (c) to make decisions about the courses of action. These seemingly manifest processes are in fact corresponding pieces of an outsized canvas, and the

information behaviours analysed in each approach interleave into a richer rationalisation of information use in organizations.

For example, taking into consideration information as a strategic resource for an organization, can be compared with capital – a relatively equivalent ingredient of success (to information) and as another significant resource for an organization. Like capital, information is received or acquired and transmitted or utilised in and out of the organization.

Organizations can be 'information affluent' or 'information deprived' and organizations have set rules that constraint as to how information can be manipulated. Conversely, there are also discrepancies between information and capital resources. There is a general conformity as to what constitutes capital amount for an organization. With capital, there are constraints, such as when organizational associates are given a certain amount of budget of a clearly defined size.

Organizational accounting information systems and budget holders can keep track of each financial transactions. If for say, the chief executive officer or the finance director are the budget holders, they can keep track of the amount of capital spent and the residual. They can estimate how much will be needed for planned disbursements and or identify what amount of capital they 'own' and distinguish their capital from 'owned' by others. By contrast, what constitutes information can comprise almost whatever thing.

For example, a packaging assistant notices that an invoice is not attached to the completed order and informs his/her senior warehouse manager, a shop assistant while receiving their weekly product deliveries finds out some missing items in the delivery but highlighted in the invoice and tells the delivery driver for missing items – this can be termed as to have and provide *information*.

Anderton (1991) also gives some useful examples which illustrate that there are subtleties associated with the idea of information and its communication with others. For example, a motorist is travelling at 30 km/h. The speedometer indicates 30 km/h. Does the motorist have information about his/her speed? Apparently, yes. But actually the mechanism is stuck and although the indication happens to be correct, *the driver receives no information*.

Another instructive example is that – a traveller plans to fly to another country but can do so only if s/he is free from smallpox. S/he has some medical tests in the afternoon and arranges with her doctor that if the results are positive the airport desk will be called before 5 p.m. At 5 p.m. s/he checks with the desk and finds that no message has been received. S/he thus receives the information that s/he is free of smallpox. Yet *no physical event has occurred*, nothing, apparently, has carried the information.

These examples illustrate different types of information, much of it there for anyone to collect. The aforementioned conceptions illustrate that information can be regarded as formal (and or informal), compressible (and or expandable), substitutable, textual (and or pictorial), transportable (and or storable), diffusive, shareable, quantitative (and or qualitative), verbal (paper based and or electronic) and individual (and or aggregate).

The list of information dimensions although may be comprehensive, but it also suggests that an effective approach to information management must be sufficiently broad and flexible to cater for all these different dimensions of information. Information management is too all pervasive and diffusive to be subject to normal management practice. But information can be effectively and efficiently managed.

## From Information to Information Management

Information is a fundamental constituent of nearly every activity in an organization, so much so that its function has become translucent. Without a firm grasp of how it creates, transforms and uses information, an organization would lack the coherent vision to manage and integrate its information processes. While it is also factual that most of the organizations rely on several different information technologies to support their information processes, managers may be aware that there is also a large amount of information and knowledge that is not captured by or represented for example in computer-based information systems.

In this regard, managers in particular should make decisions and choices about their potential future operations appropriately. Recurrently, the decisions made by the managers are based on imperfect information and this is due to the unavailability of complete information in due course. *What may be considered necessary here?* – In such situations managers must use their accumulated knowledge and expertise to evaluate and deduce imperfect information in choosing the best course of action in the light of their organizational objectives. In most of the organizations such decisions made by the managers will be supported by information of varying degrees of accuracy and usefulness gleaned from the organization's information systems. However, all such systems have fundamental limitations (e.g. lack of seamless interoperability of systems and not able to provide consistent information).

It is conceivably, thus, that the majority of information that managers draw upon is not embedded in computer systems – rather, it is principally in the minds of the employees. This is particularly the high-level information that is knowledge about the information that resides within the organization. Examples of high-level information (i.e. knowledge) might include knowing:

- Where to find the required internal data,
- Who may be responsible for a specific information (does the responsible person have the ability to comprehend the information?)
- Where to source external information in order to prepare a financial report
- Who in the organization last tackled a similar problem that you are asked to solve.

It has long been recognised that the majority of managers acquire most of their information by having conversations with people, either face-to-face, or exchanging informative views through communication devices i.e. on the telephone.

This reflects the fact that, although managers do deal with some relatively well-defined and structured issues (e.g. planning budgets and other financial matters), many of the issues that they deal with are poorly structured. It has also been noted that most managers have little understanding of: (a) how people relate to information and (b) what type of information people do need. Even those managers that understand the human side of the information do not necessarily act upon their knowledge.

As US consultant and author Tom Peters once noted, success in managing information is 5 % technology and 95 % psychology – but most companies do not even spend 1 % of their information management time and expense budgets on psychological or human issues. Perhaps, the reason why organizations do not really manage information is that there is lack of appropriate managerial skills and awareness of what life would be like if they did. Managers do not know what approaches to take or what benefits would result.

They have possibly never seen examples of focusing on information rather than technology. In other words a manager's life is mainly about shades of grey rather than black and white. Such gradation is typically lost when information is put into writing or stored in a computer. But people are highly skilled in conveying such information, not only with the words they use but also by their tone of voice, their facial expressions and even their bodily gestures they adopt. Because it is difficult to express and communicate to others, and practically impossible to express in any code, implicit knowledge is difficult to represent in computer systems. Information that is not captured in computer-based information systems is especially relied upon decision-making processes. Information is also fundamental for business strategy, not only in industries based on information, but more broadly in every industry.

Organizations and other administrative bodies have looked for ways to process and manage information in an organized way, just as they processed and managed raw materials to produce goods, as from this interpretation it can be said that the ultimate goal of information management is to ensure that information is stored and retrievable.

## **Information Management Evolution**

The concept of data mining or extracting specific data from huge fields of information is usually used along with information management. This allegory highlights the beginning of the industrial revolution in Europe. Industrial economic growth expanded and companies increased in complexity. One of their first issues was to record and transmit ever-larger and increasing amounts of information. Given the simplicity of technology availability at that time, solutions tended to be manual. In retrospect of this view, since the end of the nineteenth century, information management has tried some conceptual and practical changes.

Until the 1980s, information management passed through seven different stages. In the first period, the dilemma was the physical control of information containers



that, after the turn of the century i.e. earlier in the twentieth century, tended to mechanisation, simplification, and replication of these information containers, originating the first efforts to control the proliferation of information containers, essentially on paper. The 1920s and 1930s saw the third stage of records management, focusing on information containers management in a more organized and wider perspective.

With the advent of the computers in the late 1930s and early 1940s e.g. the well known examples are the Electronic Numerical Integrator and Calculator (ENIAC) built by John Mauchly and J. Presper Eckert at the University of Pennsylvania in 1943–1946, Eniac weighing 30 t and eventually developing the first commercial computer – Univac in 1951, began the fourth stage, represented by the management of automated information technologies. The fifth phase was characterised by information explosion and use of computers and other technologies such as microfilms, microfiches, punch cards, and optical devices. At the end of the 1960s, the idea of management information systems evolved and constituted the sixth stage of information management.

Dias (2001) referred information management as a transformation process of data into information used by the decision hierarchy of an enterprise. Management Information Systems (MIS) is able to supply more consistent information to decision-making, providing a contextual view of the present and the past, and allowing top managers to elaborate more realistic prognostics.

MIS can improve productivity and quality, reduce operational costs, decentralise decision-making process and facilitate information access, among other benefits. In the 1970s, information management was often termed as information resources management, an innovative strategy for managing relevant and necessary information in an organization. Most of the modern companies are experiencing this seventh stage of information management, although a new concept has already appeared recently – knowledge management – the eighth stage of information management.

In classifying information management, academics, intellectuals and scholars have traditionally defined information management as the process by which relevant information is provided to decision makers in a timely manner. It has become an important tool that helps build organizational competitive advantage in today's globalised and turbulent environments.

Information management can also be seen as the conscious process by which information is gathered and used to assist in decision making at all levels of the organization. This definition illustrates several points of interest. First, true information management is a conscious process. Information management just does not transpire. It has to be envisaged or thought about.

This implies that it has to be planned, systematic and structured. A second point is that the purpose of information management is to assist in decision-making. Information is not gathered for its own sake (although that sometimes it seems to be the case), but it is gathered to be used. Information management therefore works best when the conscious planning process not with information but with the decisions those have to be made. However, although information assists

decision-making, it should not determine totally what decisions are made. The scope for professional expertise, intuition and discretion remains.

The third point is that information management is for the benefit of all levels of an organization. In many organizations, information management is often perceived as being a control mechanism for the benefit of senior managers or shareholders. Information management should be as much about aiding decision making across and between all levels of the organization as it is for senior planners and decision makers. A final point is that information management is as much about paper-based systems, or even human voice-based systems, as it is about technology-based systems.

It is a popular misconception that information management is only concerned with information technology management. Over the last 4 decades, the rapid expansion in the use of IT has created a raft of management concerns with respect to the use of this new technology. While it is true that some of these concerns form part of the information management agenda, there is a plethora of wider issues concerned with managing broader information resources which transcend the narrow focus on simple technology management. Table 2.1 highlights some of the definitions with some different perspectives on information management in the normative literature.

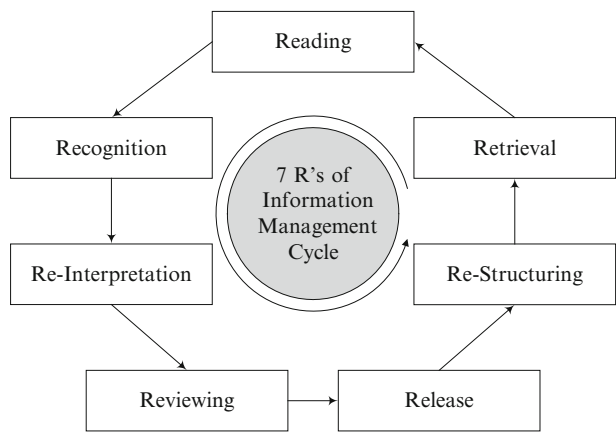
Based on the definition of Rowley (1988), Butcher and Rowley (1998) proposed the '7 R's model of Information Management'. In this model, the 7R's represent the information cycle, from information reading to recognition, reinterpretation, reviewing, release, restructuring, and finally, retrieval as depicted in Fig. 2.2. This cycle may be observed in any information environment, including digital world. The corporate portal, in its wider conception, is considered a tool that satisfies the whole information management cycle, because it incorporates technologies, which are able to implement, individually, each one of the functions mentioned, from information reading to information retrieval.

The *first phase* of the information management cycle occurs when a person reads and acquires relevant data recorded electronically in documents, e-mails, web pages, reports. Such data is presented by the corporate portal web interface on the computer screen. Once read, this data becomes information and is absorbed into the cognitive framework of each person. Information is then converted into subjective knowledge, when the contents of the document read match the user's concepts during the cognitive process (*Recognition phase*). The next phase entitled *Reinterpretation* occurs when subjective knowledge is transcribed to another document, becoming public. This transcription, in the digital world, can be facilitated by word processors, spreadsheets, presentation software, etc., which are stored in or retrieved by the collaborative processing component of the portal.

The following phase, *the Reviewing*, is the validation or evaluation of what was transcribed by an individual, and may be supported through office automation and groupware software. Groupware users are able to suggest changes, correct mistakes, cite other authors, establish links to other documents that deal with the same subject, etc. Once validated by the group, knowledge reaches public domain during the *Release Phase*, that is, it becomes widely available to any person of that

**Table 2.1** Information management definitions

Definitions	References
IM relies on codified knowledge (symbols, standards, and algorithms) to represent information entities that allow process automation, decision-making, information retrieval, etc.	Cronin and Davenport (1991)
IM is able to identify, coordinate and exploit information entities in an organization, using the characteristics of these entities to add value to existing information and to gain competitive advantage over competitors	Taylor and Farrell (1992)
IM is used as a synonym for information systems, information technology, data management, systems engineering, among other expressions. In fact, information management is more than that. Modern information management uses information technology, cybernetics, systems engineering, concepts of information and computer sciences, management information systems, engineering, office automation, business and management principles, to plan, manage and control one of the most important resources for survival of an enterprise on the current market Information	Dias (2001)
IM a discipline that includes organization-wide information policy planning, development and maintenance of integrated systems and services, optimization of information flows, and harnessing of leading edge technologies to end-users requirements, regardless of their status or role in the organization	Rowley (1988)



**Fig. 2.2** Information management cycle (Adapted: Butcher and Rowley 1998)

community. This knowledge release or distribution, inside the enterprise, may be conducted through its internal communication network or Intranet, e-mails, virtual journals, electronic news bulletins, etc. When using a corporate portal, the *Release phase* takes place via its personalised web interface available through the Intranet.

The enterprise that maintains this knowledge domain certainly needs to manage this set of resources, selecting, collecting and providing access to the information considered relevant for its business goals. In a medium-size or large enterprise,

besides textual documents, it is usual to generate and store the daily information manipulated by enterprise personnel in operational databases, using different kinds of systems, applications and transactions. For business decision making, however, the information considered relevant and strategically is extracted from these operational databases and loaded into the decision processing system, that is, it is reorganized or restructured, by extraction, transformation and load tools into the data warehouse.

The data warehouse is a great repository of data, whose purpose is to support the strategic decision-making process in the enterprise. Precursors of this technology the data warehouse is a subject-oriented, integrated, time-variant, and nonvolatile collection of summary and detailed data used to support management decisions. Its main goal is to satisfy the users' needs, storing useful and relevant information for business management.

Finally, the *Retrieval* of relevant knowledge to each user, available on this collection or repository, may be carried out by ordinary retrieval tools such as:

- Customised tools, focusing the real needs of the users
- Tools that use metadata and eXtensible Markup Language (XML)
- Business intelligence (e.g. intelligent systems that help companies in their strategic planning process)
- Analytical tools that compose the portal decision processing system, capable of generating reports and analyses to be distributed to users through corporate network, e-mail or portal web interface.

## Improving Company Performance

Many senior executives have a decidedly negative opinion of the relationship between IT and business performance. They are dissatisfied with the investments and practices related to IT and information used in their companies. Ironically, this stream of dissatisfaction runs alongside widely held expectations that IT has the potential to transform economies, industries and businesses. Over the past several years, many surveys in Western Europe and North America have shown that the main concern of Chief Information Officers (CIO) – the senior managers responsible for IT in their companies – has been the alignment of IT investments with corporate strategies.

At the same time, senior executives have been concerned with getting business results from their investments in IT. Neither group seems to have found what it is looking for. Economist attempt to explain this gap as the “IT productivity paradox” – companies spent billions on IT worldwide with no clear link to improved macro-economic productivity or business performance. Marchand et al. (2000) have uncovered three different approaches of how IT and information use may be linked to business performance such as the: (a) IT centered approach, (b) information-centered approach and (c) people-centered approach. These approaches are explained in the following sub sections.

### ***The IT-Centered Approach***

Ironically, the most widely held view is that IT practices will increase business performance if IT priorities are properly aligned with the business and if the IT function works effectively with the business to deliver IT applications and infrastructure. Senior managers expect IT to improve business performance in four key ways:

**First**, IT should improve the efficiency of business operations. Most manufacturing companies are busily upgrading their software and systems in finance, manufacturing and distribution. This is being done not only for the sake of Y2K and Euro compliance but also to increase operational control, speed, and flexibility with the customers.

**Second**, IT should improve communications in support of smoothly functioning business processes. For example, companies such as ABB and General Electric are using collaborative software and networks to improve networking and information sharing among employees in diverse locations. They are also using advanced technologies to link their business processes with suppliers, distributors and customers.

**Third**, IT should facilitate managerial decision making by providing appropriate information for market forecasting, managing business risks, spotting new customer trends or simply helping people to locate and share knowledge. While the history of executive information systems and decision support systems has been mixed, many senior managers continue to feel that using IT in support of these applications will improve decision-making and business results.

**Finally**, IT should support innovation in new product and service development and facilitate growth and new initiatives.

### ***The Information-Centered Approach***

Senior managers who subscribe to this view contend that good IT practices are necessary but not sufficient to improve business performance. They hold that careful attention to the ways in which information is sensed, collected, organized, processed and maintained is also essential to improving both IT and business performance. According to this view, the way that people turn data into information that can be used to improve customer relations, product innovation, sales, marketing, operations and financial control is critical to improved performance.

In case this view is correct, managers need to examine more carefully their information practices. At the center of this view is the perception that a company's information practices are critical for turning data into information knowledge to improve performance. Many managers who are interested in knowledge management are supporting efforts to accelerate the use of information, knowledge and expertise in their companies to obtain business results.

## ***The People-Centered Approach***

For this approach, executives believe that the main reasons why IT has not lived up to its many promises or why information and knowledge are not share, come down to the way employees behave and to the company's cultural values. If the company is becoming more dependent on sharing and using information and knowledge, then senior managers should pay careful attention to the cultural values and behaviors associated with information and IT use in their company. When it comes to information management, companies try to increase their information endowments using three different mechanisms such as: (a) data mining, (b) signaling and (c) screening. These mechanisms are explained in the following paragraphs.

### ***Data Mining***

Contemporary organizations are inundated with data. However, they have little information, even less knowledge, and perhaps no wisdom. Several companies simply hold data in record or archive format, thus, potentially. Valuable information hidden within these databases remains untapped. The absolute volume of data held in corporate databases, in particular, is already too great for manual analysis and understanding, and as the information within them grow, the problems are similarly compounded. Previously, organizations failed to solve business problems due to the deficit of available data, however, to date the problem has been reversed, as there is a plethora of obtainable data in many of modern organizations.

Manufacturing environments are extremely costly and time-critical locations in general, as a result of the difficulties in maintaining process control and identifying parameters responsible for variance. Similarly, a vast amount of data, information and knowledge is collected on each individual manufacturing operation, generating a complex information management situation within the scenario. Accordingly, the challenge is to find ways of distilling and managing these large volumes of data and transforming them into valuable information and additionally exploring the use of techniques to improve information and process management to maximise manufacturing benefit.

Data mining mechanisms possess the potential to enhance process improvement, information management and communication within the manufacturing environment of this case study, on a global basis. For example data mining, finding meaningful patterns in a torrent of data, already plays a crucial role in the algorithms behind the Google search engine.

Improving process control to enhance performance, ameliorate product quality and increase productivity is an important consideration within any manufacturing industry. Accordingly, it is critical to find efficient methods of both performing and achieving this insight. For example, in a case study by Gibbons et al. (2000), the fabrication and production of components carried out within the manufacturing

facility required a vast number of complex and meticulous processes. Such extensive manufacturing operations are often carried out in clean-room environments and employ continuous quality and precision controls. A major difficulty with process control in the manufacturing industries in general is the extensive quantity and complexity of data and procedures involved within the fabrication process.

Often, process data is collected from more than one database. Hence, problems analysis and decomposition are laborious tasks. The complexity and magnitude of operations performed in the fabrication process, inevitably impacts information management and process control, making them cumbersome procedures. Current methods of process management employed within the manufacturing consortium, such as the Statistical Process Control (SPC) and feedback control models, have proved to be inefficient in providing adequate information management and process control improvement. This has caused a reduction in product quality and productivity within the individual plants in this case study, as engineers are unable to exercise controlled changes due to the limited real-time framework involved. As a result, temporal and monetary detriments have increased in this high cost, time critical environment. The current situation within this domain area highlights the need for new process improvement and information management methods. Thus, it can be said that data mining entails looking for patterns in detailed data that may be correlated with customer profitability or with changes in profitability.

## *Signaling*

Signaling actions are performed by potential customers to indicate their profitability or desirability. For example, a couple who have a small child and who want to rent a furnished home might volunteer to pay a double – or even triple – sized security deposit to signal their confidence that they are unlikely to damage the house or its contents. In another illustration, Akerlof (1970) showed in his classic lemons example that in a situation where buyers could not ascertain the quality of products (e.g., certain used cars markets), markets would collapse because of buyers' eventual reluctance to buy.

Spence (1974) demonstrated that in such markets, reestablishment of effective exchange could be achieved if 'above-average' quality product sellers could engage in some costly effort to signal their quality to the market. Such signals are important because of their information content. They reveal information about unobservable characteristics to an uninformed agent. Thus, Spence considers signals as those "activities or attributes of individuals in a market which by design or accident, alter the beliefs of, or convey information to, other individuals in the market" (Spence 1974, p. 1). For these signals to be effective, they have to provide information about the quality of the unobservable attribute(s).

## Screening

Screening mechanisms are in many ways similar to signaling, except that they are designed by the seller. If the screening mechanism is properly designed then the buyer's selection of a particular action or package of options will correctly indicate his or her profitability to the seller, and will permit accurate pricing. The normative literature highlights a classic example of screening mechanism is differential pricing of insurance coverage on the basis of policy exclusions and the size of deductibles. The idea is that a customer willing to accept a high deductible of £400 or more is signaling a sincere belief that he or she is unlikely to be involved in a traffic accident. Screening provides an incentive for customers to reveal their desirability to the company accurately through their selection among product and service offerings. Ideally, the bundle of offering should be designed so that all customers would be profitable under the terms of the offerings they selected.

## From Information Management to Knowledge Management

Moving from information management to knowledge management is far from being well-articulated in the normative literature and this is compounded by the confusion around the concepts of information and knowledge. According to Koenig (1997), there is no consensus regarding the claim that knowledge management is a new field with its own research base, since much of the terminology and techniques used, such as knowledge mapping, seem to have been borrowed from the area of information management and librarianship. Knowledge management is considered by some as the business salvation.

On the one hand, Gourlay (2000) presents knowledge management as an emerging discipline from information management. The knowledge management expression was created in 1986 by Dr. Karl Wiig in his book on, *Knowledge Management Foundations*. On the other hand, other authors, claim that companies and information professionals have been practicing for years on knowledge management related activities.

Streatfield and Wilson (1999) argue that the concept of knowledge is oversimplified in the knowledge management literature, and they seriously question the attempt to manage what people have in their minds. Nevertheless, there is a real interest and enthusiasm in moving from information management to knowledge management as revealed by the increasing number of publications relating to the topic since 1995.

Looking at the business community, there is also a strong interest for knowledge management. A survey conducted in 1997 related to 200 large US companies revealed that 80 % had knowledge initiatives (KPMG Consulting 2000). Technological innovation has been cited as a major reason for the current interest in knowledge management. In the high-tech sector, as well as consulting firms, the



stakes are particularly high because knowledge is considered as perhaps the only meaningful economic resource.

Private sector organizations are not the only ones embracing knowledge management. The systematic sharing of knowledge is assuming a larger role in all kinds of organizations around the world. Some of the recent knowledge management initiatives in the United Kingdom (UK) include the creation of the post of knowledge officer at the British Council and the appointment of a Chief Knowledge Officer (CKO) at Natwest Markets. Claims of the potential benefits of knowledge management abound and range from improving productivity, decision making, customer service and innovation.

Davenport and Prusak (1998) report that although many knowledge management programs are acknowledged in the business literature, what is actually entailed in these programs remains indistinct and ambiguous as there are several interpretations of knowledge management. Recently, the lack of a clear distinction between information management and knowledge management has been recognised as a major issue in the knowledge management literature.

Gourlay (2000) suggests that knowledge management practices focus mainly on knowledge representations not on knowledge per se, making the distinction between information management and knowledge management even more blurred. There is indeed a fine line between information management and knowledge management at both the conceptual and practical levels.

## **Defining Knowledge Management: A Good Information Management or Another to Information Management**

In the Post-Industrial economy, sometimes termed the knowledge economy, the concept of knowledge management has become an emerging discipline that has gained enormous popularity among academics, consultants and practitioners. It has been argued that it is no longer the traditional industrial technologies or craft skills that drive competitive performance but instead knowledge that has become the key asset to drive organizational survival and success.

To the uninitiated reader, the multitude of offerings on knowledge management in books, journals and magazines can appear rather daunting and confusing at first. The fact is that it is a relatively young discipline trying to find its ways and reorganizing that it has roots in a number of different disciplines. The normative literature on knowledge management is heavily information systems oriented, giving the impression that it is little more than information management.

Other literature looks more at the people's dimension of knowledge creation and sharing, making the subject more akin to human resource management. These are the two most common dimensions and there is often little cross over between them. Each world fails to comprehend the other as the language and assumptions of each

**Table 2.2** Knowledge management definitions (Source: Jashapara 2004)

Definitions	References
Knowledge management draws from existing resources that your organization may already have in place – good information systems management, organizational change management, and human resource management practices	Davenport and Prusak (1998)
... any process or practice of creating acquiring, capturing, sharing and using knowledge, wherever it resides, to enhance learning and performance in organizations	Swan et al. (1999)
The explicit and systematic management of vital knowledge and its associated processes of creating, gathering, organizing, diffusion, use and exploitation, in pursuit of organizational objectives	Skyrme (1999)
... all method, instruments and tools that in a holistic approach contribution to the promotion of core knowledge processes	Mertin et al. (2000)
The achievement of the organization's goals by making the factor knowledge productive	Beijerse (2000)
... improving the ways in which firms facing highly turbulent environment can mobilise their knowledge base (or leverage their knowledge "assets") in order to ensure continuous innovation	Newell et al. (2002)
... the effective learning processes associated with exploration, exploitation and sharing of human knowledge (tacit and explicit) that use appropriate technology and cultural environment to enhance and organization's intellectual capital and performance	Jashapara (2004)

discipline very significantly. However, it is precisely these inter-disciplinary linkages that provide the most rewarding advances in this field.

Jashapara (2004) highlights that given the inter-disciplinary nature of this emerging field, conventional academic demarcations in traditional subject areas do not help. For example, it is relatively rare for computer or information science graduates to gain sufficient grounding in human resource management and vice versa with traditional business management students. This impasse is often based on fear on both sides about the nature and relative merits of their respective skills and expertise. Beyond these two dominant dimensions, there are some additional prospective within the knowledge management literature. It is not surprising there is little coherency between these offerings as many authors orientate the subject area to their singular discipline prospective. Given the multidisciplinary nature of knowledge management, it is not surprising that the variety of definitions comes from a number of different perspectives, as illustrated in Table 2.2. some come from information systems perspective while others suggest a human resource perspective. Few definitions adopt a more strategic management perspective, recognising the importance of knowledge management practices for gaining competitive advantage.

From the definitions of knowledge management in Table 2.2, it is clear that any advancements in this field need to adopt an integrated, interdisciplinary and strategic perspective. The strategic purpose of knowledge management activities is to increase intellectual capital and enhance organizational performance. There is a human dimension of developing knowledge in individuals, teams and organizations

and this fundamentally occurs through different learning processes. Once knowledge is created, the sharing of knowledge remains one of the fundamental challenges in this field. As human beings, we need support to help us explore and exploit knowledge (tacit – knowhow – and explicit – knowwhat) more fully. There is a wide variety of tools, technologies and systems that can fulfil these functions, such as the continuous cycle of knowledge creation, capture, organization, evaluation, storage and sharing. Knowledge management tools and organizational processes are insufficient in themselves to achieve success.

## Knowledge Management Practices

Despres and Chauvel (2000) illustrate that knowledge management practices can be analysed taking into account four different variables: (a) the process of cognition, (b) the type of knowledge (tacit or explicit), (c) the level of activity (individual, group or organizational) and (d) the context in which the knowledge is applied. These variables define a map on which company's activities can be plotted. Moreover, companies can use the map to understand their position and identify future developments.

### *Process*

Though does not spring into existence out of nothing, it is the result of a series of factors that come together over time. Of course, cognition is a highly interconnected, multi-causal process but it can be simplified to extract the issues relevant to knowledge management. Despres and Chauvel (2000) report that various strands of the cognitive sciences have untangled the complexities of their subject by outlining a process of cognition that is, the critical steps and elements that lead to the accomplishment of some act. In extracting a synthetic process appropriate to the concerns of knowledge management, it is possible to specify an event chain that – from a linear and structural perspective. While this representation greatly simplifies the interconnected and multiply-causal nature of cognition, it appears to fit many of the issues addressed in this field. Despres and Chauvel (2000) defined six key events in the process of cognition as below:

*Mapping:* Individuals and organizations function within information environments of their own making. Most agree with the truism that we scan for information but fewer acknowledge that (a) these environments are actively constructed and (b) they are multiple – not singular. This has important implications. If a formalised business intelligence system monitors Environment X, for example, the weak signals in Environments Y and Z are likely to be absent from the radar screen. Recent history suggests that this can be disastrous. There is a

balance to be struck between divergence (which can be costly) and convergence, which focuses attention on a delimited field.

*Acquire/Capture/Create:* From these information environments, information is corrected or combining the elements that are judged valuable. This has feedback and feed forward loops with the *mapping* phase since much of what people search for at Time 1 is what they expected to find at Time 2. A large part of the creativity literature is centered on developing new inputs during this phase by opening horizons in the former. A significant body of research that investigates the filtering and distortion of information, which is pertinent to this phase, is also finding its way into knowledge management.

*Package (or bundle):* At a mundane level this involves the media that bundles information such as paper, electronic, voice, multimedia and so on. There is obviously much to be said for the effective packaging of information at this level. More important, however, is the matter of codification and representation. Before information can be transmitted it must be codified by the author (who seeks to infuse it with meaning) and once this is accomplished, a representation is launched into a public space. Characters on a page, numbers, maps and balance sheets are all representations. The critical issue, of course, is the meaning that one extracts from them and this is anything but a given. This phase is founded in the semantics and semiotics of communication.

*Store:* Store individuals and organizations stockpile information in memory systems of various kinds. These range from the mysterious chemistry of synaptic response in the brain, to recipe cards, hard disks, filing cabinets, libraries and data warehouses. The identification and retrieval protocols associated with stored information are equally important: little benefit is derived from information that exists but cannot be accessed. Some of the origins of applied knowledge management are located in this phase (data warehouses, search engines) and the foci of work appear to remain technology-dominated.

*Apply/Share/Transfer:* Implicitly, the field of knowledge management recognises that information is inherently social. There is, in fact, no way of recognizing a stimulus as information or knowledge outside a social (not a psychological) process of some kind. This means that knowledge must be communicated and the many forms and functions of this basic fact abound in the literature like knowledge cafes, groupware, virtual teams, communities of practice, and so on. The field is also beginning to validate the notion that the value of knowledge is known only through action.

*Innovate/Evolve/Transform:* Finally, knowledge must evolve in step with changes in the environment, else it risks losing its value. This implicates product development programs that build on experiences in the marketplace, R&D processes that adapt basic science to a products' needs, creativity processes that broaden intellectual horizons and so on. In the language of systems theory the issue is change – the extent to which an individual or organization is satisfied to remain in stasis.

## *Type*

The field of knowledge management struggles with the fact that knowledge is not a simple, stable quantity. Different schools of philosophy and sociology give different accounts. Currently, the importance of tacit and explicit knowledge is recognised by managers and is a subject of considerable work within knowledge management.

Tacit knowledge seems to be the primary concern of knowledge management writers and has been a great deal of discussion in the literature about its nature. Tacit knowledge is defined as action-based, entrained in practice, and therefore cannot be easily explained or described, but is considered to be the fundamental type of knowledge on which organizational knowledge is built. Although most knowledge management writers cite Polanyi (1962), who drew a distinction between tacit and explicit knowledge, they often overlook a part of his writings emphasizing the personal character of knowledge and knowing.

For Polanyi (1962), tacit knowledge cannot be expressed because (we know more than we can tell). Thus, it cannot be articulated what we know with words because we are not fully conscious of all the knowledge we possess. It resides and remains in the human mind. Polanyi (1962) illustrates this with the example of a medical student learning how to read X-ray pictures by listening to experts reading them. Exposure to empirical material and specialized language combined with the learning of medical knowledge will enable the student to become an expert, but tacit knowledge remains tacit. For Nonaka and Takeuchi (1995), tacit knowledge can be transmitted through social interactions or socialization, and made explicit through externalisation-although they agree with the idea that tacit knowledge is somewhat hidden.

Explicit knowledge, unlike tacit knowledge, is defined as knowledge that can be codified and therefore more easily communicated and shared. Knowledge management writers view explicit knowledge as structured and conscious and therefore it can be stored in information technology (Martensson 2000). This type of knowledge is often equated with information, providing the argument that knowledge management is simply another terminology for information management. The concept of information however, is far from clear-cut. "Information is a vague and elusive concept susceptible of being understood in a variety of ways" (Gourlay 2000, p. 3).

Considering that the concepts of both information and knowledge are unsatisfactorily defined and that the notion that tacit knowledge can be transformed into explicit knowledge is troublesome, some authors have suggested that the expression "knowledge management" is perhaps misleading. Gourlay (2000), for instance, argues that knowledge itself cannot be managed and it is "knowledge representations" that are the actually focus of knowledge management. Given the complexity of knowledge, the depiction of types of knowledge, such as tacit and explicit, as mutually exclusive categories might be also misleading and prevent researchers to see the interrelated dimensions involved in the process of knowing.

## *Level*

The idea that companies have three levels of social aggregation – individuals, groups and organizations – is familiar in management studies. Individuals are the fundamental building blocks, particularly in knowledge – intensive systems, but most individuals accomplish their work in groups, using resources provided by the organization. Business management has adopted this thinking since its inception. Individuals are the fundamental reality of organization and this is particularly true in knowledge-intensive systems that draw their primary resource from the individual. Individuals accomplish work with and through others: groups confer an identity, physical and psychological resources, organizational power, and a sensemaking ground and so on.

Organizations are complex systems in which individuals and groups are the foundational elements. Even a quick review of the knowledge management literature reveals that all three levels are the object of programs and problematics. Some knowledge management applications seek to relate each of the levels while others work exclusively within only one. Separating matters at the level of individuals, groups and organizations provides greater clarity and disentangles the various approaches to applied knowledge management.

Context people and groups work within a company context. It is true that humans think and act within a context but also that (a) their thinking and action create that context, and (b) the identity boundaries we fix around legal entities are social fictions—contextually speaking—given the wide-ranging work interactions we all have. This is a complex and subtle matter. The importance of an organization's culture, for example, is increasingly cited in the knowledge management literature relative to the expectations that lie therein and the systems and structures it animates.

A deeper importance lies in the seldom acknowledged reality that nothing has any meaning outside of a context. That is to say, black has no meaning absent white, neither has any meaning apart from a color scheme, color schemes are inherently culture-bound and so on. The relevance for knowledge management is that a datum may or may not be meaningful as a consequence of its context. The implication, which has anecdotal support in the knowledge management literature, is that initiatives should begin by specifying their meaning-making context(s) and build from there. Among others, Carayannis (1999) goes a step beyond to explicitly include the stakeholders outside an organization's boundaries (industry/interorganizational context), the importance of which has clearly been demonstrated by institutional theory and elsewhere. In the discussions that ensue, several authors also recognise that the cornerstone of knowledge management is the individual, and that the organization-level knowledge is a fiction.

## *Context*

The importance of organization's context – which influences its systems, structures and expectations – is increasingly sited in the knowledge management literature. More fundamentally, nothing has any meaning outside our context – hence,

whether a piece of information is meaningful or not depends on its context. Knowledge management efforts should begin by simplifying their meaning – making context(s) and build from there.

To introduce a broader view of the idea of context, consider Pierre Teilhard de Chadrin who at the beginning of the previous century conceptualised a web of determinate human knowledge he termed the *nöosphere* and announced that it enveloped human consciousness on Earth (1947). He beleived that this knowledge web gave substance to physical and social phenomena and that without it we were senseless as to the phenomena of gravity, rainfall, or the displacement of matter that constitute achitecture. Business is to knowledge managementbt what the *nöosphere* was to de Chadrin's concept of life on this planet. Several authors recognise that a business context anchors their knowledge management devices, but they do so differently, varying from the firm's strategy to human interaction, group dynamics and technological infrastructure.

While some clearly set the boundaries of a context, others are more elusive. That said, all make reference to the context of knowledge management in some way or the other, but because of the lack definitional agreement, it is viewed as a secondary structuring device.

## Summary

This chapter focuses on issues related to the first word of the term '*Information Management*'. The word '*Information*' is used to signify what is processed and/or provided by computers and it is the result of data processing. In the first part of the chapter, issues related to information management were introduced followed by a discussion on the role of information as an organizational resource. The evolution of information management and the transition from information to information management are then presented. In doing so, the 7R's information management cycle is analyzed in detail. The 7R's refer to the phases Reading, Recognition, Re-interpretation, Reviewing, Release, Restructuring and Retrieval. The chapter also investigates the linkage between information management and knowledge management and at its last sections it reviews knowledge management practices and examines variables such as process, type, level and context.

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## Chapter 3

# The Information Operation Approach

**Abstract** The previous chapter paid attention to the first word of the term ‘Information Technology’ and explained the role of information as a resource. Moreover, it emphasized on the importance of information management and explained information management cycle and knowledge management and IT practices among others. It also explored relevant approaches such as the IT-centered approach, the Information-centered approach and the People-centered approach. The basic intent of Chap. 3 is to facilitate managers to understand how to use, manage and align information effectively. In doing so, improving business performance and achieving business results. As a result Chap. 3, moves a step forward and presents the *Information Operation Approach* and it commences the debate by focusing on why information is the responsibility of every manager and creating business value through information. In this regard, the Strategic Information Alignment Framework is presented and analyzed. Thereafter, contemplating on how information can be utilized by (a) adding value through customers, (b) creating new reality, (c) reducing costs, and (d) minimizing risks.

### Introduction

Businesses are increasingly dependent on information. This is because, people in businesses express, represent, communicate and share their knowledge with others through information, to accomplish their activities and achieve shared objectives. Considering some examples such as Wikipedia, Encyclopedia Britannica, Compton’s Encyclopedia, Encarta, Funk & Wagnalls, World Book and Grolier – are all information businesses, but that does not make them distinctive.

Every business is an information business and it is through information about (e.g. markets, customers, competitors, internal operations and the mix of products and services offered by the company) that managers and employees create business value and improve business performance. However, in several businesses not

widely considered as information businesses, information plays a surprisingly critical role.

For example, about one-third of the cost of health care in the United States (about \$350 billion) consists of the cost of capturing, storing, processing, retrieving information (these steps can also be termed as generic framework for information management activity) such as patient records, cost accounting, and insurance claims. It is quite apparent that by this measure, health care seems to be a larger information industry than the “information” industry itself.

Similarly, the physical world of manufacturing automobiles is shaped by information. For example, a high-end Mercedes automobile contains as much computing power as a midrange personal computer. This illustrates that information dominates processes as well as products. It is hard to imagine how even low-tech manufacturers could compete without such information-intensive functions as market research, logistics, and advertising. It is also highlighted that inventory and work-in-process are purely physical things, but if information were accurate and timely, factories could operate with a fraction of their current inventory. Inventory is merely the physical correlate of deficient information. More fundamentally, information and the mechanisms for delivering it are the glue that holds together the structure of businesses. A company’s success depends on the quality of its strategy and on its ability to use the corresponding appropriate information. This chapter commences by exploring these issues.

## **Why Information Is the Responsibility of Every Manager**

Information was once a functional discipline but now it is becoming the focal point of strategy. This is true for all businesses, not just so-called *Information Businesses*. Information is shifting the vector of economic forces that defines competitive advantage and many companies need therefore to rethink – almost from first principles – their strategic focus. Information is the way people in businesses express, represent, communicate and share their knowledge with others to accomplish their activities and achieved shared objectives. It is through information about e.g. markets, customers, competitors, internal operations and the mix of products and services offered by the company that managers and employees create business value and improve business performance.

Drucker (1999) has called information “data endowed with relevance and purpose”. Data exists all around us in the form of signals, events and situations, which people can choose to, interpret as potentially relevant or not relevant depending on their purposes. This over-abundance of data challenges people to manage their time and attention carefully since both of these resources are in scarce supply. Managers and employees of business organizations should focus on relevant information to execute appropriate activities and tasks to implement their strategies and achieve results. Companies compete with information to the extent that managers and employees seek, collect, organize, process and use the relevant

information in decision-making and actions that lead to superior business performance in markets. Effective use of information is critical to how executives manage their companies and how businesses create value in their market.

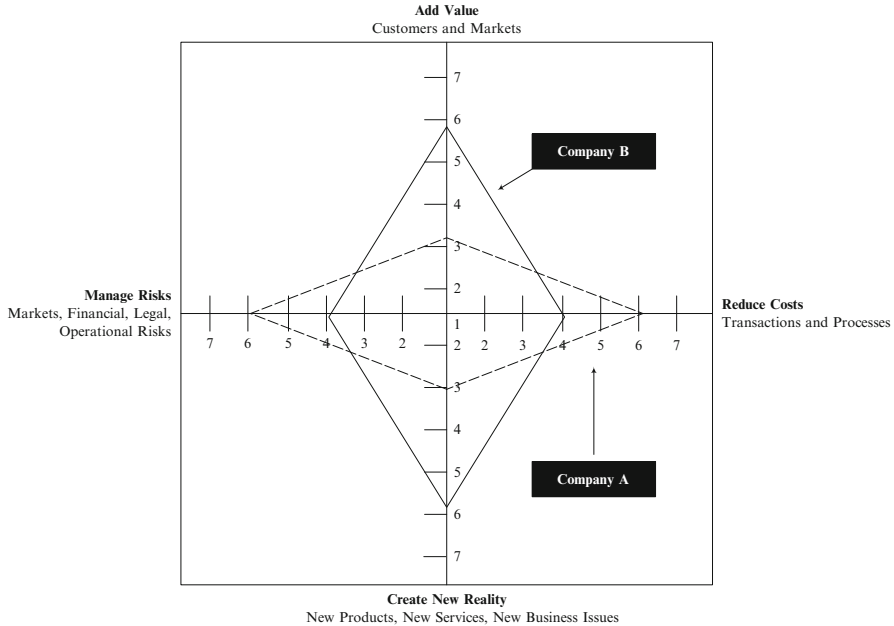
The basic intent of this chapter is to facilitate managers to understand how to use, manage and align information effectively in companies and businesses. In doing so, improving business performance and achieving business results for three reasons:

- **First**, senior management is responsible for developing a holistic and integrated view of how to manage people, information and IT in a business to implement strategy and achieve results (i.e. aligning people, information and IT). While IT and information specialists play vital roles in supporting how a company effectively uses information, it is the top management who must understand how to integrate business processes, organizational structures, behaviours and values as well as the appropriate information uses and IT resources to achieve the company's or business unit's strategies. In essence, top management is accountable for their business results and the way they achieve it.
- **Second**, senior management is necessarily generalists rather than specialists who must approach information management with a holistic perspective. They are not IT literate. While IT specialists may have a solution for every problem, managers decide where and when IT can be deployed for its appropriate use. Managers must balance the opportunities, risks and their IT investments with their people's capabilities to effectively use information for enhanced performance.
- **Third**, while senior management may not be expected to be information specialists in their business, rather create conditions in a business for effective use of information. Thus, in a business information management is the responsibility senior management.

On the one hand, senior management is expected to know and understand what information they need and use to make decisions and interact with people inside and outside of the company. This expectation is called *information responsibility*. On the other hand, managers must have the ability to comprehend how their business is performing well and achieving business results.

This component of information responsibility extends to the company or business unit and its competence in sensing, collecting, organizing and deploying the right information for other operational activities. Within each unit, it is responsibility of general managers to comprehend how well information facilitates their company to achieve higher performance and compete in the future. This indicates that the answerability for managing information lies at each business division in the organizations and their individual managers.

The role of manager is perhaps to understand how information is used and how it assists its business in creating business value. This twofold roles create a vital opportunity for managers to walk the talk among people about the use of information in decision making and creating value in the business. In the next section, the Strategic Information Alignment (SIA) framework that assists in creating business value with information is introduced.



**Fig. 3.1** How information creates business value (Source: Marchand 2000)

## Strategic Information Alignment Framework

This chapter utilises a business framework of strategic information alignment that is designed around four fundamental ways of using information to create business value (see Fig. 3.1). Not all companies are equally able to manage information along each axis, which accounts for variations in how companies use information to compete. Marchand (2000) highlighted that this framework is useful for four reasons:

- **First:** the SIA framework provides a holistic analysis of information use and how to align information use to strategic priorities in a business.
- **Second:** the SIA framework focuses on the essentials of how to view business strategy and organizational capabilities to use information, IT and people to improve performance.
- **Third:** the SIA framework can assist managers in developing a shared language around how they use information.
- **Finally,** the SIA framework provides a road map for addressing the managerial responses of:
  - Why is information vital to compete?
  - What are the appropriate priorities for information use and management?
  - How should managers implement their strategic priorities and achieve improved business performance through people, information and IT?

In light of this framework, the four fundamental ways of using information are explained in detail.

## Adding Value with Customers

The first way of creating business value with information focuses on adding value to customers and markets. Here, the focus of information management is on knowing about, and sharing information with, customers, partners, suppliers and employees to improve customer satisfaction and relationships before, during and after sales. Stock (1990) supports that information sharing makes a firm more responsive to customer requests and builds greater customer loyalty and better customer-firm relations.

An examination of firms that have achieved competitive advantage through “individualised, but cost effective response programs”, emphasized the critical role of information sharing. After gradually adopting the production, sales and marketing philosophies, several leading companies are now faced with the challenges of a new orientation that might be termed a customer-centric one. At the core of this orientation there exists the necessity for developing and establishing long-term relationships with customers aimed at improving customer service and satisfaction with the support of available information.

The normative literature states that applying information to serve each individual customer effectively provides a major source of competitive opportunity. Current competitive challenges induced by globalisation and advances in information technology have forced companies to focus on managing customer relationships, and in particular customer satisfaction.

The interest for the company's- or businesses-customers relationships has evolved from the concept that there is a continuum of customer relationships, ranging from transactional to relational orientations. Through this relational orientation a company or business seeks to create overall or cumulative customer satisfaction as opposed to transaction-specific customer satisfaction.

Customer satisfaction and the level of customer service are particularly regarded significant in building trustworthy relationships with customers and retaining the competitive advantage. Sophisticated organizations worldwide rely on specialised customer relationship management systems to accumulate and analyse customer-focused information.

In the last two decades, industries have moved from serving markets to serving customers, to serving each individual customer needs (Horovitz 2000). Due to this increase in focus, the nature of information needed for decision-making has shifted dramatically. In the past, information needs focused on issues such as market size, market volume, market growth etc. At present, information focus has shifted towards knowing customers, their needs and expectations, their satisfaction and repeat purchase behaviour.

In the future, information will focus on each customer's individual needs, expectations, satisfaction, loyalty, behaviour and response to particular marketing stimuli. This sharpening in focus has already started, in part as a result of the opportunities afforded by technological advances i.e. improving company relationships with customers by employing information technology, but also driven

by the quest for greater efficiency, effectiveness and competitive advantage. Horovitz (2000) states that “customer bonding not only enables businesses to compete more effectively, it also provides valuable source of growth during times of intense competition” Horovitz (2000, p. 37).

In this regard, IT can facilitate and enhance customer relationships in various ways, but mainly enables companies and businesses to attain customisation, the essence of the customer-centric orientation, through the deployment of sophisticated customer relationship management systems.

Managing customer relationships is about knowing customers better and effectively using that information to own their total experience with business and to drive revenue growth and profitability. Developing and managing relationships with customers can also be described as the management approach that involves identifying, attracting, developing and maintaining successful customer relationships over time to increase retention of profitable customers. Companies have come to realise that in order to develop successful, long-term, relationships with customers they should focus on the “economically valuable” customers, while keeping away and eliminating the “economically invaluable” ones.

Several industries face the predicament of where to find new sources of growth, as markets mature and competition intensifies. Companies need to balance the costs of acquiring new customers against the costs of keeping current ones. In most sectors customer retention – or bonding – is vital to success as it is cheaper to keep customers than to acquire new ones; available new customers might be limited, and the costs of attracting and retaining those new customer might be extravagant – especially for that part of the market that are named as bargain hunters. Serving each customer and focusing on existing ones at the same time – then the need for information and its role in building a profitable customer base is expanding.

In this section, we explain how to use information to enhance customer bonding, creating solid bonds at each step of the relationship with customers – the three stage process for customer bonding. Customer bonding – the ability to attract and keep customers for a long time – is a step-by-step process that successful companies and businesses complete in the right sequence i.e. by following three acts: (a) using information for successful conquest, (b) using information to ensure that customers are satisfied and (c) loyalty building and the need for even more information. Customer bonding happens when all these three acts are accomplished well, and this qualitative element is central to the success of the entire process. Satisfying the customers well does not merely mean performing well relative to competitors, it means meeting customers’ expectations as completely as possible and where feasible exceeding them.

**Stage 1: Using Information for Successful Conquest** – conquest is about capturing and gaining customers. It means delivering the appropriate product or service to the right customer at the right moment. At the conquest stage, two pieces of information are vital, as they help to understand and know the customer: information for *targeting* and information for *customisation*. Information for targeting enables to identify those customers that have the best fit with

the offer, as well as helping to communicate and attract them, whereas, information for customisation accentuates the differences in their needs, allowing the offer to be adapted or customised to ensure successful of each clearly-defined market segment.

**Stage 2: Using Information to Ensure that Customers are Satisfied:** as the selling process is concluded, it is the need to create satisfaction that will bring continued success. Satisfaction means ensuring that what was pledged gets delivered i.e. solving problems, future needs anticipated, customer expectations exceeded and customers are delighted. At this stage, four types of information are key to achieving customer satisfaction:

- Information that enables to adapt service delivery to specific customer satisfaction e.g. customers do not want to be served in the same way, perhaps this is what has made the Ritz Carlton Hotel chain, for example, world-renowned for its attention to customer satisfaction.
- Information that provides feedback from unsatisfied customers, highlighting areas of improvement, using the information for future relationships as well as solving problems (i.e. off course, knowing what makes a customer satisfied or dissatisfied – and the relative importance of each factor in the customer's current or future buying behaviour – will assist to improve satisfaction).
- Specific information that assists to delight each customer (e.g. delight occurs when the customer experiences a pleasant, unexpected surprise. Delight may also happen when the customer achieves an important target set together with their supplier or partner) and
- Information verifying that service delivery corresponds to the required standards (i.e. quality is often defined as a level of excellence based on the needs and expectations of target customers. However, quality level has two aspects – as the customer perceives it and as it is in reality).

**Stage 3: Loyalty Building and the Need for even more Information:** Several surveys indicate that satisfaction is sometimes simply not enough to retain customers. This is because some customers may want to: (a) compare, (b) get lured by cheaper prices and (c) multiple sources of supply to minimise their risks. Strengthening of satisfaction through loyalty building instruments can be managed e.g. through rewards, recognition, customer involvement and individual relationships.

Several companies and businesses think about the type and amount of information that is needed to make better business decisions, and then these companies build information systems and processes according to their needs. Information is a vital tool for selling and can be employed to enhance customer's knowledge, understanding and overall loyalty.

Some of the key applications of information for selling include using information to: (a) *information to aid customer decision-making* e.g. customers concerns such as 'Can I select effortlessly and can I be assisted to come to a decision?' are resolved with the use of information, (b) *information for customers to compare*

*offers* i.e. customers can collect information on what the competitor is offering in terms of features, benefits, price and other important issues; (c) *support transparency of pricing* i.e. transparency of pricing is at the heart of the comparison of competitors' offers. Not many companies or businesses may be eager to do that as among the worst are the professional services companies such as the consultants or the accountants, which provide a total amount, and (d) finally, as far as helping customers to buy is concerned, information on *availability* is a key concern as well as a potential source of competitive advantage.

For example, Hewlett Packard devised a system available on computer to all its account managers selling to large distributors in Europe, so that they could immediately tell their customers how long their order would take to deliver, as well as tracking orders that had been received.

Information technology also offers a range of other potential advantages that can be exploited in order to delight customers. Most vital among these is the ability to open up new relationships with customers. Knowing what customer wants has been a precondition of a successful enterprise since commerce began. Early vendors won a customer's support by forming a relationship with them, knowing their likes and dislikes and thereby making transactions easier.

Not only the customers benefit from the potential attention, but the vendor could improve profits by charging different prices based on their knowledge of a customer's ability or willingness to pay. In today's world, technology is helping companies and businesses rediscover the level of service and customer intimacy of long ago. The application of IT to store, supports decision-making and introduces new opportunities for improving relationships with customers.

Information technology is also helping companies to profit from the available knowledge. Many examples are available with some of them including the following:

- In pharmaceuticals distribution, McKesson provides its pharmacists with computer terminals that allow them to enter orders directly, simultaneously improving customer service and increasing switching costs. Federal Express drivers use hand-held computers and a sophisticated data management system that improve service and reduce costs, making overnight delivery services profitable and affordable to customers.
- Merrill Lynch introduced the Cash Management Account (CMA), based on an information system that combined customers' checking, savings, credit card, and securities accounts into a single statement, automatically investing unused funds in interest-bearing money market funds. Xerox provides master production schedules online to suppliers to facilitate just-in-time deliveries, reduced inventory costs, and improved supplier relationships.
- Large retailers like Toys R Us and Wal-Mart use sophisticated inventory management technologies, including electronic data interchange with suppliers, to increase operational efficiencies and improve services. In addition, advanced statistical tools are computing the impact on profitability of customer loyalty programs, where lower prices reward frequent purchasing.



Information about customers' preferences and behaviours are being captured as businesses utilise technology in their day-to-day business activity. Retail stores, having introduced scanner technology to make transactions much quicker and more reliable, have found themselves with enormous databases of transactions that have proven very useful in decision-making. As many transactions migrate to the World Wide Web it is possible to capture not only purchase data, but also the information that the customer requested prior to making a choice. As companies and businesses accumulate this data, successful firms will differentiate themselves from less successful ones by understanding and utilising the data to make a more profitable enterprise.

The applications of information technology for understanding, serving and delighting customers are not only many and varied, but are also constantly evolving with new developments in technological capability. The trend, however, is clear: customers in many markets now seek products and services that not only offer quality, but also provide precisely what they want at lower or no additional cost. This section focused on using information to add value with customers, in the following section, there is a discussion on using information to create new reality i.e. new businesses, innovation and sources of competitive advantage.

## **Creating New Reality**

The second way of using information and creating business value is for firms to use information to innovate or create new realities – draw the attention of new customers, formulate and invent new products, provide different services and use emerging technologies. Historically, this use of information evolved in marketing department, which were responsible for 'hearing the voice of the market' and introducing new products, or in Research and Development (R&D) department, which were involved in sensing new technological, social and economic trends and coming up with new products.

Each of these departments relied on information professionals – especially librarians – to seek out or contract for market, competitor or technological intelligence and to pass this information along to the appropriate marketing R&D units for their use. At its best, information use and management in these departments was focused on sensing the outside world and discovering distinctive trends and ideas that might lead to commercially viable products and services.

In the 1990s, this use of information to create business value has led to use of Internet technologies to share external intelligence across all the departments and functions in the firm, and not just within specific department such as R&D or marketing. For example, Amazon.com uses the information latent within their business to innovate, providing a different way of book selling that has a global market and is found to be both convenient and enjoyable by millions of customers.

Retailing as a whole will improve as a result of the activities of online traders. Retailers will need to improve their service levels and the value that they provide to

customers in order to succeed and those who will not be able to survive. What matters is not simply what information exists, but how that information is used to build competitive advantage.

Other companies such as Intel and Microsoft are now learning to operate in a 'continuous discovery mode', inventing new products in shorter time frames and using market intelligence throughout the company to retain competitive edge. Within these companies, investment in information management focuses on mobilising people and collaborative work processes to share information and promote discovery and experimentation company-wide.

Companies that focus on using information to create a new reality and add value with customers on the vertical axis contrast sharply with company's horizontal axis, where minimising risks and reducing costs are key drivers of information use and management. To compete with information today means that companies must increasingly focus on differentiating their uses and management of information from their competitors and find ways of using structures, processes and people, as well as IS and IT, to satisfy customers and promote growth.

Using information to create new business realities (such as products, new services and new businesses) require that management rethink not only how they learn and use information to develop innovative business solutions. Marchand (2000) highlights that the management must also understand what forms of organization best support creative knowledge work and how information about the external world can be continuously sensed and deployed for new product innovation.

Increases in the global competition, customer requirements, and environmental and governmental regulations suggest that dramatic transformation and innovation is required by many companies for future success and economic survival. Numerous examples are reported in the literature in which well-known companies failed to keep up with the technological innovation progress in their industries just because they were too narrowly focused on their key customers and, thus, assessed new opportunities wrongly. Their inertia led them to miss new trends.

On the other hand, innovativeness is associated with uncertainty and the risk of failure. Thus, while innovation increases the risk of failure in the short run, it enhances the growth of firms in the long run. These effects led to the *Innovator's Dilemma*.

In the information demanding competitive environment, companies that persistent in repetition, merely compete on costs, ultimately lack behind their competitors. On the other hand, innovators, keep setting the pace, reconfiguring the business system of their industry sector before it is obvious to anyone else that it has to be done. This is because these innovators constantly renew themselves.

Some companies seem to be more agile than others at renewing themselves. Among other examples of this is Logitech (a Swiss mouse producer), which started with word-processing in mind. Dell Computer, whose initial activity consisted of disk optimisation. Microsoft, which did not even have an operating system of its own when its first one; and the Virgin Group, which started as a student magazine.

These companies renewed themselves several times during their early life, driven as they were by an urge to learn fast to survive.

Similar examples of corporate renewal can be observed in companies undergoing a life-saving turnaround, when very fast learning is simply a matter of survival, as was the case with Nokia. But interestingly, when their success is confirmed, companies seem to provide no more signs of renewal, often preferring to optimising the same routines through repeated rationalisation, and using their market power to mitigate any urge to reinvent themselves. Few organizations understand why they have been successful and what is required to remain successful and innovate; in fact, many companies tend to attribute their past success to the wrong reasons.

Dechamps (2000) reports that information for innovation is more externally focused and forward looking than information for operations, and it can be viewed as a clear business process with a top-down and bottom-up dimension. The need to foster greater internal growth is inducing an increasing number of companies to look proactively for innovation. Nestlé's entry into functional foods and Daimler-Chrysler's commitment to fuel cells, exemplify a type of innovation. It is driven by the ambition of management to create a business territory and it is fuelled by a compelling vision of new opportunities. For this reason, it is referred to as top-down innovation. Unlike bottom-up innovation, which proceeds in a somewhat erratic fashion, top-down innovation generally results from an organized but a non-linear, process.

Innovation – whether be top-down or bottom-up – is a business process, and like all business processes, it is highly dependent on information. But the information needed to feed and support innovation is of a very different nature from that required running and optimising operational processes. Indeed, innovation is more driven by intelligence, foresights, insight and market after-thoughts, than by hard facts and data.

These soft and creative types of information are needed in order to: (a) scan the market, competitive and technological environment for opportunities, sensing potential leads, (b) generate ideas and evaluate alternative methods for implementing the most promising of these leads, (c) identify the new competencies that need to be developed to exploit these opportunities, and (d) manage the technical and commercial development process and the risks kinked with building and innovating.

To simplify, information is an important element of bottom-up innovation, but it is not its main driver. The idea or insight generally comes first often by chance, and information is searched mostly to validate, challenge or enrich the initial idea. In top-down innovation, on the other hand, information is at the root of the process. Thus, the importance of information for top-down innovation can be viewed as – when management decides to innovate, a business territory it is generally in reaction to streams of information which all point to an opportunity.

The pursuit of these opportunities generally involves starting a series of interlocking activities and projects i.e. processes – geared to satisfy two main objectives: (a) generating, validating and selecting the best possible ideas to address

those unfulfilled or unarticulated customer problems, needs or desires, which managers sense lie at the root of the opportunity and (b) developing, launching, marketing and exploiting the best possible solutions to these customer problems, needs or wants, in terms of attractive and economical new products or services.

The numerous and diverse activities agreed to meet the first objective can be called the upstream processes in innovation. They established the context and prepare for the actual development and launch of the new product or service, which are the down-stream processes. The type of information required for each of these two types of processes will generally be quite different. Whereas, the type of information that will derive innovation is quite different from which managers generate and use to run operations. It is broader in scope, softer in content, and exploratory in its acquisition process.

The bad news is that most of the management mechanisms that have been put in place to generate information in support of the business – like the marketing research departments – are ill-prepared to generate innovation-relevant information. This is because they tend to focus on the past and present to predict the future. They focus on facts, whereas, innovation requires insights and foresights. However, most of the information management needed to drive innovation probably lies somewhere in the organization or can be obtained if managers search for it with an exploratory mindset.

## Reducing Costs

The third way of using information to create business value is by reducing costs. The information revolution is sweeping through different economies in the contemporary and none can escape its consequences. Reductions in the cost of obtaining, processing, and transmitting information are changing the way we do business. Here the focus has been on improving business processes and transactions so that information used in processes, as well as to monitor processes, is an efficient and economical as possible to achieve the outputs required.

Historically, this way of thinking about deploying information began with Frederick Taylor's 'time and motion' studies in the 1930s and 1940s and has led through the scientific management movement of the 1940s and 1950s to total quality improvement in the 1970s and 1980s and the evolution of reengineering and process improvement in the 1990s. The common elements of these movements has been a focus on first eliminating unnecessary and wasteful steps and activities, including paperwork and information movement, and then simplifying – and if possible – automating the remaining processes and transactions to reduce costs.

The search for continuous improvement embedded in total quality improvement and radical reengineering as represented by Michael Hammer, the acknowledged guru of reengineering, both focus on the need to eliminate and simplify information used in processes and transactions to reduce costs and improve productivity. During

the past 10 years, several companies have focused on using information to reduce costs and minimise risks at the same time

For example, by using the advantages of information, Amazon.com is able to carry a massive list of titles – nearly five times as many as a conventional large book retailer. Yet they can do this at a reduced cost by using technology to significantly influence the way that they manage their inventory and suppliers. Thus, their efforts to improve information management have advanced along both sides of the horizontal axis, often with mixed results as the high failure rates for radical reengineering projects suggests. Nonetheless, general managers in many commodity-based industries, or those threatened by increased commoditisation of their products and services, have focused their business strategies and change management initiatives on improving business results on both sides of the axis at the same time.

Information is an intrinsic component of nearly every activity in the organization, so much so that its function has become transparent. Without a firm grasp of how it creates, transforms and uses information, an organization would lack the coherent vision to manage and integrate its information processes, information resources, information technologies and eventually lead to cost reductions. While cost reduction and productivity improvements have been in the minds of the top management for several years, using information to reduce costs involves more than just better cost accounting or reducing ‘head counts’ and expenses.

On the one side, it involves using information so precisely that a company wastes less money, time, energy or materials on meeting customer’s precise needs; increasingly matching customers’ individual needs and wants with use over time; directly including customer in value creation and creating sales opportunities that are genuinely valued by the customer. This business capability is reported as the co-configuration or efficient personalisation. Co-configuration is not just an ability to provide new value to customer. It is a new way of working by continuously linking the customer, the product and the company to achieve maximum customer value and cost efficiencies at the same time.

The second vital aspect of using information to reduce costs on adopting systematic techniques for achieving meaningful cost-reductions across a company without diluting the capabilities of the company to compete. Thus, Howell (2000) suggests that strategic cost reduction can actually create economic value as a business activity rather than dilute it. For example, over the 1990s, companies such as Toyota have placed cost reduction at the heart of their improvement efforts and strategic positioning in their industries. To do this companies have had to develop management approaches and information to enable strategic cost-reduction programmes.

Thus, one of the main challenges facing companies is to drive success by providing personalised products and services whilst simultaneously reducing cost. As the need to drive competitive advantage narrows the distinctions between companies offering similar personalised products, companies need to innovate and challenge the accepted norms in order to emerge as the industry leader.

Baynton and Victor (2000) report that increasingly it is no longer enough to offer one-off, limited customisation.

Leveraging all the information, expertise and new technology available, companies must tailor products that adapt to a customer's changing requirements or that evolve in line with the latest technological advances. It is predicted that the more a company was able to deliver customised goods on a mass basis, relative to their competition, the greater would be their competitive advantage, a view supported by many authors. Pine et al. (1993) describe the synergy of customisation and continuous improvement as a "new" competitive strategy to challenge "old" strategies such as mass production. Hart and Taylor (1996) report that operationally, mass customisation is the use of flexible processes and organizational structures to produce varied and often individually customised products and services at the price of standardised, mass-produced alternatives.

Products that are tailored to individual preferences and that are also capable of adapting continuously to changing needs may seem the stuff of science fiction but. As the development of digital hearing aids by a Danish company *Oticon* (*a leading provider of high-quality hearing instruments established in 1904*), revolutionised the industry's approach to customisation and showed that they are a powerful source of competitive advantage. What value would a customer place on such potential for example a car that is capable of upgrading its level of comfort and performance without the need for visiting a garage or perhaps a radio alarm clock that learns which music you enjoy?

These products customise themselves in response to the needs and preferences as they change. This is termed as customer intelligent value – that has moved considerably beyond the precision customer value of mass customisation. Whereas precision customisation meets the needs of a customer at a given time, customer intelligence enhances greatly the value of the product by customising continuously over time. Adding customer-intelligent value to products and service will be a major new source of competitive advantage in the twenty-first century. Thus, the product is neatly and intelligently responsive to the customer's changing needs. Clearly this is no small order; to achieve such efficient personalisation, companies need to build the potential to respond to changing needs and new technologies into the product or service.

The work of co-configuration involves building and sustaining a fully integrated system that can sense, respond and adapt to the individual experience of the customer. When a company or a business does co-configuration work, it creates a product that can learn and adapt, but it also builds an ongoing relationship between customer-product paring and the company. Following mass customisation requires designing a product at least once for each customer.

This design process requires the company to sense and respond to individual customer's needs. Adding to the relationship, co-configuration brings the value of an intelligent and adapting product. By doing work of mass customisation, the company or business generates new type of understanding a new kind of knowledge by-product. That knowledge is how the product or service, in its essential elements or modules, must vary as the customer's needs and wants vary – this is termed as

configuring knowledge. Having this configuration knowledge as a by-product of mass customisation is not sufficient if the destination is co-configuration.

However, to leverage configuration knowledge, companies have to go beyond mass customisation and transform work to achieve co-configuration. This illustrates that the emphasis on cost reduction is the need for companies to use information so precisely that customers are satisfied in a way that wastes little money and other resources.

Literature also focuses on systematic techniques for achieving cost reductions in a way that can actually create business value, rather than reducing the company's competitiveness. Strategic cost reduction to create economic value is a relatively new business activity, not performed well by several companies and businesses, and is dependent in many respects on the availability of useful information. Cost reduction efforts have taken place for years. Most companies utilise standard cost accounting systems and responsibility-centre accounting budget product and organizational costs, measuring actual costs against the budgets and analysing thoroughly the variances.

There have been a number of broad conceptual ideas and specific practices aimed at reducing costs over the years. However, in an industry where all of the participants are relatively cost-inefficient, that participants who are most efficient, (as a result higher volume or real cost advantage), will have the lowest cost position, even though this cost position might not be as low as it could be. One only has to consider the US steel and automotive industries over the past 50 years to see the point. If budgets are set loosely, performing better than budget may not represent good cost performance. The time and motion study of detailed labour operations may reduce costs at this very specific cost-element level. Whether it has a positive impact on total costs or is the most vital place to put emphasis is questionable, given the shift in cost structures such that productive labour is a relatively small element of cost.

Until the last 10 years, a real urgency to significantly reduce costs was not present in a number of businesses and industries. If costs increased due to increasing input costs, inefficiencies, or poor decisions, the normal reaction was to raise prices to sustain profit margins, rather than address the rising costs. As the competitive landscape has changed dramatically, the ability to raise prices as costs rise has been altered. No longer is it automatic. If prices cannot be raised in the context of rising costs, a company or business finds itself in a price cost squeeze. When the profit margin erosion becomes severe, many companies and businesses have reacted by initiating across-the-board cost reduction initiatives.

If prices continue to drop and costs continue to rise, the cycle repeats itself – in this way another cost reduction initiative is introduced. For several years, information to enable good cost and other decisions was not readily available due to the limitations in IT. However, over the years competitive forces have heightened product and market changes as well as increased emphasis on quality, speed and cost. Fortunately, IT and management constructs and applications have developed as well. But even today there are a number of cost reduction practices that many companies have failed to develop.

## Minimizing Risks

Finally, firms can use information to minimize risks. The first written statements on “managing risks” or “risk management” can be traced back to Henry Fayol who, in an article dated 1916, listed six basic functions that should be included in management. At that stage he called it “security”, but as time went by, a new concept would take root, which is more commonly referred to today as “the risk management discipline”.

According to Snider (1991), the first major international company to recognise and implement the concept of risk management was Massey-Ferguson. The first known policy statement on risk management was published by Massey-Ferguson early in 1966, and because of the fact that Massey-Ferguson operated internationally, managers and insurance brokers abroad became familiar with the concept. This was a significant factor in introducing risk management worldwide.

Risk is the fundamental element that influences financial behaviour in any business whereas, to be effective and meaningful, risk managing practices must be an integral part of the overall management of a business. Managing risks in business is perhaps the foremost way to create a business value. The evolution of risk management in business has provided the stimulus for the growth of function such as finance, accounting and auditing, which manage information, to account for orders and goods, finance future investments, hedge against the unforeseeable, budget over predictable periods such as quarters and years, and audit the books to protect against fraud and errors in counting. In addition, financial devices to control risk, such as bonds, stocks and options, have evolved as trading and capitalism developed in the industrial age of the nineteenth and twentieth centuries.

In examining the operations of the modern corporation today, it is easy to forget or overlook how much of the company’s ways of using information are shaped or influenced by the controls needed to manage commercial, operational and financial risks. In fact, it is only when risk management controls breakdown or are violated, as in the case of Barings Bank and the derivative trading activities of Nick Lesson, that it can be appreciated how much of the success of a company is dependent on a daily basis on the monitoring and control of risks.

In another example, Amazon.com business analyses information from their millions of customers to see i.e. how they purchase, when they buy and what route they take through the website to reach their decision. This degree of understanding and control enables the company to minimise the level of risk in the business and put systems in place to monitor transactions and to provide management of information. Although risk management has risen in prominence in recent years, it is not a new phenomenon.

It is, however, more common in risk intensive industries such as the petrochemical and financial services industries. The risk management activities in these industries are typically confined to specific high-risk areas or risks that are inherent in the relevant industry, such as safety, health and environment risk in the petrochemical industry, and credit and market risk in the financial services industry



(Barlow 1993). The recent years have seen an exceptional number of high profile financial disasters such as the South Sea Bubble, Barings Bank in London, Tulipomania and John Law's Louisiana are a few examples.

These disasters illustrate that the lessons to be learned are not only relevant to the finance sector but are generally applicable to any business. The key lessons for the financial sector of recent years are general management issues relating to the use of business information in minimising risk – they are therefore highly relevant to all firms.

Hamilton (2000) also reports that like any other component of business practice, risk has to be managed e.g. there are four key elements to a top-class risk management process: (a) risk has to be accorded a high priority within the organization, (b) availability of well-documented risk management policies and procedures, reviewed and monitored regularly, (c) an integrated risk management framework needs to be in place and (d) there must be effective communication of these policies and procedures throughout the organization.

Risk management requires accurate, timely information in order to work effectively. Yet information systems related to risk management themselves can be subject to dislocating events, heightening the risk and potential for damage. It is therefore vital to ensure that the management information system is aligned to the risk characteristics of the business and that the control system takes account and minimizes the likely impact of identified risk.

## Summary

This chapter focuses on the issues of how information can be used to support business strategy, create value and improve business performance. The kind of information used and the way it is changed, depending on the specific strategy the company intends to pursue i.e. *each way of using information requires a different kind of information*. There are four fundamental strategic choices and, respectively, four different ways of information that are studied in this chapter: (a) manage risks, (b) reduce cost, (c) add value and (d) create new reality. The Strategic Information Alignment Model was also examined in this chapter. According to this model, a company must make choice among the aforementioned four strategic directions. Some companies focus on adding value and innovation. Others might focus on managing risk and reducing costs. Generally, it is difficult for a single company to be outstanding in each of the four dimensions of information use. The differences among companies and their abilities to use information accounts for distinct competitive advantage and performance. In the next chapter we will explain the information orientation approach.

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## Chapter 4

# The Information Orientation Approach

**Abstract** In the previous chapter, the *Information Operation Approach* and the *Strategic Information Alignment (SIA) Framework* was presented. The SIA framework deals with issues of information use to add value, manage risks, reduce costs, and create new reality. As a result, SIA supports the business strategy of an organization. This chapter is about perceiving information in an innovative way but with a different approach i.e. in a way that can assist in measuring the use of information and managing it to enhance the business performance – through the *Information Orientation (IO) Approach*. *Information Orientation Approach* refers to the capabilities and behaviours associated with effective and proficient use of information. It measures the extent to which senior managers perceive that their organizations possess the capabilities correlated with effective information use to improve business performance. This chapter analyses the establishment of orientation towards the effective use of information within a business by itself the: (a) information i.e. information management practices, (b) technology i.e. Information Technology (IT) practices, and (c) people i.e. promoting information behaviours and values in people.

### Introduction

In today's information age, it is evident that technology is transforming almost every industry, as well as creating new industries. Within such vibrant environment, how can businesses achieve improved performance, and for how long can they sustain an edge over their competitors through effective use of information. It is indeed with information that the people in businesses articulate and communicate their market knowledge, analyse, verbalise and compare their competitor's achievement trends with theirs, investigate and assess their customer relationships and their retention, and result in augmenting their products and services.

It is evident that information or more precisely “data” is almost everywhere e.g. in the form of events occurring in our daily life, signals about human activities to performing trivial accounting proceedings.

Yet there have been few examples that managers perceive the importance of information in enhancing business performance. This scenario among the managers can be alleged as twofold, for example, information overload i.e. managers are bombarded with information or scarcity (i.e. when needed either little or no meaningful information is accessible). This illustrates that if information is so significant in the way companies perform today, then why company’s managers do not manage information in a better way.

Literature exemplifies that several companies have learned to use information effectively and efficiently to achieve superior performance for example, the European Regional Bank, Hilti Corporation, Banco Bilbo Vizcaya Argentaria, Ford Motor Company, Daimler-Chrysler, Amerada Hess – a company from the oil and natural gas industry.

These companies illustrate that their management understands how to leverage information, IT and people to meticulously strengthen their business performance. In addition, a new state of mind is emerging at the top management level. This mindset represents a possibility in providing a way to reconcile the IT productivity paradox, as well as to straighten out the conflicting expectations of the senior management.

Over the past four decades, the growth of IT in the business world and enormous transformation in the IT industry have tended to outshine the role of information practices, behaviours and values in contributing to the business success. Researchers suggest that determining the degree to which a company possesses competence and synergy is across three vital capabilities – that differentiate high performing companies. These are referred to as information capabilities i.e. information management practices, IT practices and information behaviour and values.

Thus, it is apparent that these information capabilities are not only indispensable for executing business strategies with momentum, quickness and receptiveness, but they can also be employed to augment, surrogate or lessen the use of people, organizational structures or business processes.

Companies that progress advanced levels of information capabilities in the ways they incorporate their information practices, IT and people can be more profitable and innovative as compared to their competitors. The aforesaid conceptions enforce an inquisition that is the use of information to enhance business processes and company performance by utilizing information technology.

Literature answers this inquest, as it is evident that managers have primarily utilised information technology rather than managing information. They have been concerned with the ‘T’ in IT, to the disadvantage of the ‘I’, which seemed to diminish away as business managers learned to use IT to perform organizational transactions e.g. transact orders, issue payments.

Just as the company managers have learned more and more about different contemporary IT solutions, it seems that they have taken for granted that ‘I’ is also a very vital part of an organizing business. This is also because, senior

executives are constantly being told that information technology is the key to the success of the business. Such focus on IT has also de-emphasized another critical component while utilising information – it is the people involved in processing and transmitting the information.

It seems that while senior management has worked on learning how to manage technology and information, they have not been able to develop an understanding of how people's behaviours affect information use within their companies. Retrospectively i.e. in the last four decades, the use of IT in business, with the rapid evolution of Internet and e-Business and considerable attention towards IT by the senior executives, one conclusion is undeniable: the Internet and IT have become competitive necessities in industry worldwide.

Thus, to differentiate themselves from their competitors, managers need to focus on the ways people use information. A research showed that: senior managers believe that the competitive advantage goes to the companies that create superior business results by synchronising the management of their people with information and IT. Keen's (1993) 'fusion' perspective supports the argument as aforesaid, which finds IT success based on an amalgamation of people, business, and technological resources available to the organization.

In the following sections, this chapter commences the debate by focusing on how information, IT and people assist in improving business performance i.e. the information orientation model and the thoughts on measuring and managing information capabilities. Then, the strategic and competition perspective to information capabilities are presented. Lastly, the outcome of putting the information capabilities into practice is analyzed.

## **The Information Orientation (IO) Model: Measuring and Managing Information Capabilities**

Regarding the debate on the contribution of information, IT and people at both the macro-economic level and within the companies, management officials have developed a distinguishing attitude about:

- How they interpret it to the related events in their business
- What other people (including the company's customers and employees) do,
- How they should think about and influence events, people and their business to achieve the desired results.

To this end, two different schools of thoughts are explored. The first one focuses on the *IT productivity paradox*. During the 1980s, a discussion began in the business media and press and among the private and public domain over the perceived IT productivity paradox and the inquest to seek 'why was the estimated unprecedented \$ trillion invested in IT by the American business community in the 1980s epoch not resulting in commensurate increase in economic productivity?'

To measure whether investments in any technology deliver value and result in higher productivity, it must be assumed that technology is being adopted and used. Furthermore, evidences demonstrate that few organizations derive full value from their IT investments, either because people have not learned how to use technology well enough or because managers have not yet learned how to realise and manage its benefits. At a large-scale in the USA, national productivity statistics illustrated little substantiation to support contentions that IT was transforming different businesses and creating a productivity boom.

Furthermore, it is reported that the annual rate of productivity for much of the 1980s and early 1990s in the USA showed little increase, while IT spending by the 1990s reached over two-fifth of the total investments. It is also argued that in addition to little evidence of national productivity benefits, at the micro-economic level several senior managers complained that limited output efficiency gains as a result of their expensive IT investments within their own companies were not seen.

This also indicates that senior managers need to gather the courage to face the reality that they will not have access to the information they need to complete managerial tasks unless they use IT. Moreover, senior managers' mind-set toward information and IT are still seen as the barometer of the company's information culture. Senior managers do not have to be IT-literate but IT-oriented and be familiar and comfortable with IT.

Their mind-set, behaviors, and practices regarding IT can lead to increased credibility among staff. In addition to investing in and deploying IT, senior managers must also encourage employees to embrace the right behaviors and values for working with information. The behavior of senior executives sends strong messages to the rest of the organization and creates the culture of what constitutes acceptable behavior, whether dealing with either IT or other areas.

The latter few conceptions are related to the other school of thought i.e. the practitioners and academicians discuss about the potential of information, information technology and people to provide companies with a competitive advantage and improve business performance. Their interest is reflected in the large number of studies that have examined the strategic value of information, IT and people and their impact on the business performance. Literature indicates several directions leading towards elevating the role of information age to the centre of market and organizational behavior.

For example, the first direction signifies the growth of the global information and communication infrastructure, including the Internet, has made information that was once inadequate, omnipresent. In the information age, several stakeholders share a common yet higher enormity of data from several channels. This information ubiquity leads the business community to gain competitive advantage. The second direction focuses on organizing human activity so that information is used most effectively in organizational decision making. The third direction leads to the centrality of information in modern business life is reflected in the rise of information technology. These three directions illustrate three different information capabilities and senior managers recognise that moving a company to effective information use requires actively measuring and managing these information capabilities.

## Measuring Information Capabilities

The measuring practices in a company – measuring what it may be and through at all different means it may be, both influence the mindsets of the managers and behaviour of the people working in the company. The preminent measuring practices together with business performance are correlated with business strategies and the business capabilities of a company. Managers advocate IT as a facilitator for enhancing dynamic capabilities through some motivating management concepts such as the knowledge management. Yet still fall short in measuring the association between their company's functional activities and the outcomes to be achieved.

This calls for a clear focus on comprehensible definitions and measures. Literature indicates the development a business metric that is directly tied with the business performance that would assist the managers in measuring their organizational information capabilities. As a primary measuring source of its sort i.e. business metrics, information orientation measures the extent to which senior managers perceive that their organization possesses the practices and behaviours associated with effective use of information to enhance business performance.

Companies, managers and functional professionals in the past have not explicitly managed their information capabilities in a holistic manner, due to this. Information capabilities have not been cohesive with business performance. Instead, when managed explicitly, each information capability was considered separate from each other in terms of measuring these capabilities and their correlation to business performance. While companies have invested several millions of Euro in IT without configuring and measuring the comparable increases in performance, they have fallen short to invest in more formal ways of understanding and enhancing the effective and efficient use of information.

In the past the available measurement approaches in the companies were scarcely focused, not articulated explicitly or not linked to the broader criteria business performance such as profitability or growth in market share. It is apparent that having the knowledge on what to measure may not be passable. Company managers must have a way of envisaging their information orientation that illustrates how good it is at each of the information capabilities and how these capabilities are related to the business performance.

The association between business performance and information orientation can assist the managers to understand the prominence of their company i.e. using the benchmarking process allocating the companies in a matrix of four quadrants such as:

- *Self-aware winner*: This demonstrates those companies that understand how to systematically manage their information capabilities to improve their information orientation and to achieve superior business performance. Nevertheless, these companies are also concerned about keeping their primary standing through information orientation at some point.
- *Winner at risk*: This illustrates those companies that have achieved significant business accomplishments at present but lack the information capabilities to enhance their information orientation in the prospect.

- *Information-oriented laggard*: These are those companies that know how to enhance their information capabilities to further improve their information orientation. However, these companies lack the confidence in implementing business changes effectively.
- *Blind and confuse*: Those companies that have not improved their information capabilities and have suffered poor performance formerly and in the contemporary. Thus, requiring significant business changes to transform their information capabilities and business performance. Senior managers in these companies perceive IT as a cost to be cut and view information management in traditional bureaucratic and hierarchical terms.

## Managing Information Capabilities

The focus of this section is to explore on how senior management manage changes to their information capabilities to best accomplish higher information orientation in their companies. It is notable that establishing a resilient foundation for and itself – the information capabilities is time consuming. To be a high performing company, senior management and their staff needs to focus on the slow and steady approach in building their information capabilities and with the help of this, strive with the information in their industry. Companies with higher information orientation are good at managing all the three information capabilities, e.g.

**Information Management Practices (IMP):** It is the capability of a company to manage information effectively over its lifecycle, which includes:

- *Sensing*: During this phase people in the organizations need to constantly identify different events, trends and changes in the business conditions and make sense out the them, in doing so, defining their information needs prior to collecting appropriate information, developing new strategies, or making decisions.
- *Collecting*: During this phase relevant information is collected when organizational members have sensed changes in the business conditions, or in customer, competitor, partner or supplier behaviours, have began to describe prospective information requirement.
- *Organizing*: This phase focuses on indexing, classifying and connecting information and databases to provide access within and across business units and functions.
- *Processing*: In this phase two steps are followed – initially, people in the organization must be able to approach to relevant information sources and databases prior to making any decision and secondly, people must actively engage in analysing information sources to derive useful knowledge as inputs to decisions.
- *Maintaining information*: This is the last phase and includes reusing and updating of existing information to avoid redundancy and inconsistencies.



Senior managers perceive these interrelated phases as representing a comprehensive measure in realising how well their organization manages information. Good information management practices should constantly focus on the decision contexts of managers and organizational members.

To sum up the analysis of an example story of the European Regional Bank illustrates the ability to manage information across all branches in a consistent and timely way while ensuring that the information is accurate and of high quality. In another example, an organization that has mature practices in this area would have effective processes in place to gather information about markets, customers, suppliers, and competitors, and would be able to effectively process this information to make decisions.

**Information Technology Practices (ITP):** It is the capability of a company to effectively manage appropriate IT applications and infrastructure to support operational, decision-making and communication processes e.g. the Bank can deploy IT systems to support operational and management levels of decision-making as well as to innovate with new products. In this area *IT Management* topics typically fall, including not only the technical issues surrounding architectures and application deployment, but also strategic IS planning and project management. IT practices must support the need for control and innovation in the business. Senior managers perceive four distinct dimensions of IT support:

- *IT for operational support* such as the software, hardware, telecommunication networks, and technical expertise to control business operations, to ensure that lower-skilled workers perform their responsibilities consistently with high quality and to improve efficiency of operations.
- *IT for business process support:* This support focuses on the deployment of software, hardware, networks, and technical expertise to facilitate the management of business processes and people across functions within the company and externally with suppliers and customers.
- *IT for innovation support:* This is used to support business decisions is to facilitate the creativity and exploration of new ideas among professionals by improving the uses of knowledge and information internal and external to the company.
- *IT for management support:* For example supporting executive and functional managers in decision making.

It is highlighted that such support must also facilitate the development of a company's evolving strategy to encourage originality and investigation of novel ideas and targeting of new product and services for future business growth. However, senior managers concede that successful companies recognise that to be good at IT practices alone will not be sufficient to achieve superior business performance.

**Information Behaviour and Values (IBV):** It is the capability of a company to instill and promote behaviours and values in its staff for the effective use of information and IT e.g. the Bank has the ability to inculcate in its employees and managers the right information behaviours and values, which affect how information is used for customer interactions and internal management. Some additional

behavior and value dimensions have a direct and indirect impact on creating proactive information use. These dimensions draw from both human resources and management control literature streams include:

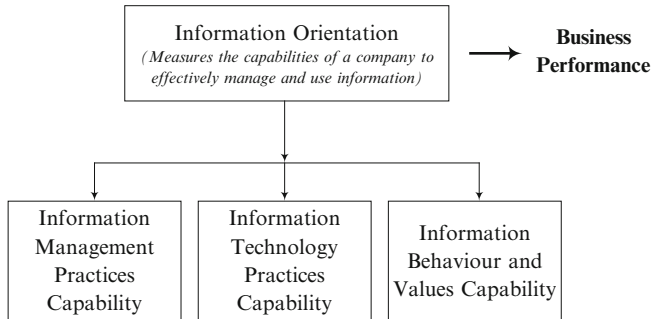
- *Information integrity*: Integrity as an individual or organizational value represents a vital component in the effective use of information in business organizations.
- *Information formality*: It is concerned with the relationship between formal and informal use of information in the business organization.
- *Information control*: It is related to information depiction on business performance to all employees to influence and direct individual and, company performance.
- *Information transparency*: For instance, transparency of information is associated with four characteristics – free from bias, basic fairness e.g. honest and impartial in making decisions, sharing, and openness.
- *Information sharing*: It is perceived as a vital value that can be influenced by the senior management as well as a set of behaviours correlated with what people do with information internally and externally.

These dimensions represent an integrated theoretically derives measure of how well senior managers believe organizations react in the use of information. Figure 4.1 illustrates the Information Orientation Model.

As seen by the senior managers, the combination of these three information capabilities determines an organization's information orientation "maturity." Research indicates that the more mature an organization's information orientation, the superior that organization performs. However, the IO model is built on the principle that these three capabilities must all be working in concert to achieve high business performance. Weakness in one area cannot be compensated for by strength in the other areas. In this regard, literature indicates that there is no causal link between any one of the information capabilities and business performance.

Being good at one of the information capabilities does not lead to improved business performance. Thus, three practical implications arise from the practical perspective: (a) each of the information capability is unique and valid concept – companies good in managing each of the capabilities achieve superior interactive effects – this higher IO leads to better business performance, (b) there is a definite measure of effective information use and managers can use IO to analyse and benchmark the degree to which their company possesses high or low levels of effective information use, and (c) if the company invests too little in any of the three capabilities, business performance will suffer – focusing on one capability at the expense of others, will not lead to higher business performance.

The normative literature reports that an organization's IO maturity is assessed by administering a proprietary survey to a cross section of business managers in the organization. For example, they put forward a questionnaire that asks the managers about their opinions of three information capabilities. Initially the managers are asked how acceptably their organization accumulates information about their



**Fig. 4.1** Higher information orientation predicts higher business performance (Adapted from Marchand et al. 2002)

customer requirements and the organization's capability to identify employees' information needs.

Secondly, in the area of IBV, managers for example are asked how well organizational members share information and if information about failures and mistakes is used constructively to improve performance. Lastly, in the area of ITP, managers are asked such things as how good is the organization in using IT to support information sharing and to enhance the efficiency of business operations.

One of the valuable characteristics of the IO model is that it provides business managers with a better understanding of why their investments in IT so often fall short of expectations. When the organization focuses primarily on IT practices, it ignores the equally important issues surrounding information behaviors and values and information management practices. By explicitly expanding their perspective, the IO model helps business managers recognise that they, too, have a role in the effective use of information and information technology, and therefore, on business performance. The IO model also includes prescriptions for improving an organization's maturity in each area.

## Putting the Information Capabilities into Practice

Several skepticisms related to the enhancements in information orientation maturity and information capabilities need to be answered. For example, what is your personal information orientation maturity in leading people, what can be done to improve information capabilities? Being a manager is sometimes subsisting in an arduous position as developing an information orientation maturity commences with the managers mind-set, their behaviours and practices that are related to effective use of information in their business. The way managers focus on human energy with information and IT, this has a direct influence on the business.

Managers do not fall short while they are intelligent or motivated, they fail whilst they lack the confidence to face the reality i.e. reality about the events,

products or people. Thus, for a manager to lead, it is important to know how to effectively utilise information. There are fundamental differences between senior management operational activities in companies where information capabilities lead to superior business performance and in those where their information capabilities do not effectively and efficiently contribute to the business performance of a company.

In companies with *higher information orientation*, senior management leads by knowing how and which information creates value for them, their people and their business – facing the reality with full confidence, whereas, in companies with *lower information orientation*, the senior management does talk about good behaviours and values as well as information management and IT practices. But here the management focuses on managing by controlling the different entities.

In this section, seven vital and essential principles were highlighted that managers can follow to augment their information capabilities and information orientation maturity of their business. Manager's behavioural patterns on information usage to achieve better business performance, either builds or diminishes information capabilities. These principles act as a platform for managers in helping and leading their company and businesses higher information orientation and enhanced business performance. For example *managers*:

- *Personally set the standard for information behaviours and values in their company*: Managers must lead by example, in the absence of such traits in them, their subordinates will not have enough trust and confidence that their managers will use information and behave consistently.
- *Need to know and understand the role of IT in their company, in turn communicate this with its staff*. For instance, if not an IT literate then there is possibility to end up in overrating or undervaluing IT significance.
- *Be information usage savvy, not simply relying on company's expertise* (i.e. not promoting the information paradox),
- *Create the right expectations for their people in changing business strategies and the mix of business capabilities*. There can be two perspective to this principle – firstly, understanding the people's needs and share information and secondly, act before they comprehend people's needs – this deals with engaging in explicit acts of persuasion.
- *Managers must not simply be advocates of good information capabilities, but they must also understand the conditions for implementing information capabilities in their business* (i.e. not just to have wishful thoughts about information capabilities but also have a resilient grasp for their implementation),
- *Need to have the courage and foresight to disrupt a successful business model in order to capitalise on future potential – they cannot wait to see what the future holds*. This relates to making the decision to grow by exploiting new opportunities and fulfilling customer needs, however, this requires high level future anticipation from the senior management.
- *Who lead their company towards high information orientation are in best position to implement the e-company in the new e-business economy*. In order to do this, companies will continuously need to reinvent their products and services to create business value for their existing and future customers.

## Summary

The previous chapters examined issues related to: (a) IT business value, (b) Information management and information management lifecycle, (c) knowledge management and knowledge management practices, (d) the information orientation approach and the strategic information alignment framework. Chapter 4 continues this discussion by examining the information orientation approach. Information orientation refers to the capabilities associated with effective use of information and it measures the extent to which senior managers recognize that their organizations have the capabilities for effective information use in order to improve business performance. For this reason, Chapter 4 investigated issues related to the measurement and management of information capabilities. In this context, Information Management Practices (IMP), Information Technology Practices (ITP) and Information Behavior and Values (IBV) were analyzed in full detail. The last part of the chapter emphasized on putting information capabilities into practice. The next chapter studies the same area from a different point of view using the information evolution approach.

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## Chapter 5

# The Information Evolution Approach

**Abstract** This chapter moves our discussion a step forward by introducing a new approach entitled ‘Information Evolution Approach’. This approach is based on the information evolution model which separates information capabilities at five levels. The first one is called Operational level and it is characterized by individual data ownership and control. The second level, the Consolidation level, has an individual level perspective. The next level is called Integration level and it expands level 2 into an enterprise-wide view. The Optimisation level is the fourth in the row. During this level organizations are closely aligned with their markets and gain market leadership by applying predictive insights about customers, suppliers and business partners. The last level is entitled Innovation level and it focuses on sustainable growth and revenue potential by continuing creativity and renewal. The analysis at each level of the model is based on four parameters. These are presented and investigated in the following sections.

### Introduction

Since the high-technology transformation of the 1990s; computers, Internet, and associated Information Technologies (IT) have revolutionised the industries. Today, the emphasis is on information management i.e. information gathering, processing, storing and or distribution. As it is predicted twenty-first century is dominated by IT and its correlated technologies. Debate on the perspectives of, then the methodology of, and now the onslaught of, the information revolution and its related information industries, have been part of many industries for several years. For example, Tadeo Umesao predicted the coming of an information industry in 1963. In late 1980s and 1990s many researchers suggested that modern telecommunication and information technologies would be the front-runners of the information era.

Drucker (1988), whose ideas predisposed several large corporations, conjectured that by the year 2000 information-related work would be the primary task of at least

one-third of the US workforce. At present, it would be somewhat difficult to predict another future revolution that might replace the current information revolution. However, according to Makridakis (1995) due to the increasing power and decreasing costs of IT-related technologies, by 2015 the information revolution will be at about the same stage of development as the industrial revolution is at present. As the recent developments in the businesses, computer and communication technologies have revolutionised the industrial sectors, on one side, their progression is making a significant contribution to the dramatic increase in the economic resources while also simultaneously increasing the proportion of their contribution in comparison to other industries.

On the other hand, these trends require companies to realise major changes in their approach to information management. As a general concern, the actual business environment is more and more competitive and firms are facing challenge for survival. Compared to the information orientation approach (as studied in the previous chapter), the information evolution approach emphasizes the strong environmental pressures that force companies to continuously improve their approach toward information and information management. This is because the first observation that leaps out at even an unceremonious observer of the contemporaneous ambience is the amount of information that has to be managed.

Information management is not only substantially influencing the transaction processing part of the enterprises. It also facilitates extra-enterprise collaboration that is now a critical differentiator product design as well (e.g. Nike.com). The information evolution approach introduces the longitudinal perspectives in information management. Companies achieving superior performance are not only those having stronger information orientation at one point in time, but those that are able to achieve superior information evolution levels faster than competitors.

Enterprises are confronted with significant pressures to proficiently and cost-effectively manage their information resources in a business environment that rebukes the incompetent, unproductive and the lethargic. The information management is no longer an appendage espouse structure. It is an indispensable underpinning for enhanced business performance. Issues such as how information is obtained, validated, stored, accessed and distributed are central to organizational continued existence, effectiveness and profitability.

The key factors determining a company's success in managing its information assets at each of the evolutionary levels are a function of:

- *Infrastructure*: The hardware, the software and networking tools and technologies
- *Knowledge process*: Policies, best practices, standards – these processes define how information is generated, validated and used, as performance measures
- *Human capital*: The employees and their competence
- *Culture*: Organizational and human influence on information flow, i.e. the moral, social and behavioural norms of corporate culture – and all these functions functioning in concert.

A company's maturity on these dimensions can be fairly represented in a five-level evolutionary path: **Stage 1** – *Operational level*, **Stage 2** – *Consolidation level*, **Stage 3** – *Integration level*, **Stage 4** – *Optimization level*, and **Stage 5** – *Innovation level*.

Each of the above/mentioned levels has its own importance over the imminent levels. However, each subsequently higher level takes account of and exceeds all preceding levels. Initially, this chapter exemplifies several realities i.e. the challenges that endanger the continued existence of businesses. Thereafter, it explicates the characteristics of each one evolutionary level along the four dimensions as aforesaid: (a) infrastructure, (b) process, (c) people, and (d) culture – and presents a high-level road map for evolving to the highest level an organization can attain.

## Challenges to the Existence of Businesses

Driving the businesses forward successfully requires aligning IT investments with organizational strategies. In addition, executives and top management need to consider constant monitoring of several areas of their businesses. For instance, among others: (a) their current relationship with their customers and future increase in value of their relationship with them, (b) among all their IT investment projects, which are the ones that will offer higher return on their investments. Despite several technological advancements during the preceding decades, some 70 % of organizations have not achieved level 3 status and are either on level 2 or below. But the winners in the future would be those organizations reaching the fifth levels at the foremost. This is because level 5 is the key to sustainable growth in an environment where even the ever-best notions may be quickly imitated or commoditised. At each stage a company has a different and peculiar way to face competitive challenges and, at higher levels, is in a stronger position to win and gain superior performance in the long run.

However, the dilemma for the huge percentage of organizations still operating at a fairly basic level of information management, is that the new business realities (i.e. the practical environment challenges, is giving rise to more criticalities in managing information more effectively and efficiently). For example, realities such as:

- Diminishing business cycles sighting several serious and time-consuming organizations into daunting positions. This is because the pathways effectively and productively followed in the past and do not inevitably lead to future triumph. It is highlighted that continuous endurance, profitability and effectiveness stipulates organizations for unremitting innovation entailing multidimensional vision.
- Several organizations have invested significant time and capital in implementing Enterprise Resource Planning systems, in order to optimise their operational processes and produce huge cost savings, thus leading to competitive advantage.



Although ERP systems have addressed several organizational problems, they only provide a partial solution.

- The changing business rules. For instance the winner is not the one with the most resources, but the one who is the first to innovate, thus organizations need to respond more quickly to the changing business environments, constantly changing market demands, higher quality products, all these accomplished with less workforce, waste and cost.
- Unpredictable markets crush the companies that possess meagre business models, whereas, at the same time volatile markets recompense a company's intelligence, responsiveness and readiness to evolve. However, to achieve this, companies need more than rear-view based planning in an industry where future trends are not reliably derived from the past outcomes. They need to exploit the change rather than react to it and focus on what will create the value for their organization in the future – all at the Internet speed.
- Globalisation requires organizations to change accordingly as where it turns the smallest organizations into global entities, it also transforms largest organizations into local entities with virtual teams and processes that span the globe.
- Organizational top management and executives need to be aware of their financial reporting controls and procedures, follow the ethical business conducts and impartially and precisely present their organization's financial position to their investors and the public entities involved.
- The outcome of the aforesaid business realities is that organizations need to act more rapidly and be savvier than ever, more innovative, flexible and compliant – that is to achieve more growth with lesser resources.

The underpinning requisite to achieve all these attributes is *information*. Executives and top management that are involved in the decision making process must have to-date access to the intelligence relating to all the issues that may influence their decision making process. The aforesaid discussions also illustrate that the prevailing business milieu is even more reproving to those organizations that are sluggish and unproductive. Sustainable organizational development is no longer a panacea, rather an underlying characteristic in an organizations' existence. Organizations need to innovate by re-evaluating their information management strategy. For example their former ways of using and managing information and recurrently endeavour for a methodical and systematic evolution to more competitive information management models. Information is no longer a transactional derivative of business. It is the means of support of the business itself. In a permanent volatile world – information is the critical success factor that enables organizations to respond to constant external changes and constant renewal and innovation. The literature also exemplifies here that in principal, an organization's information management strategy can be either its convincing resource or even its main restrictive underperformance.

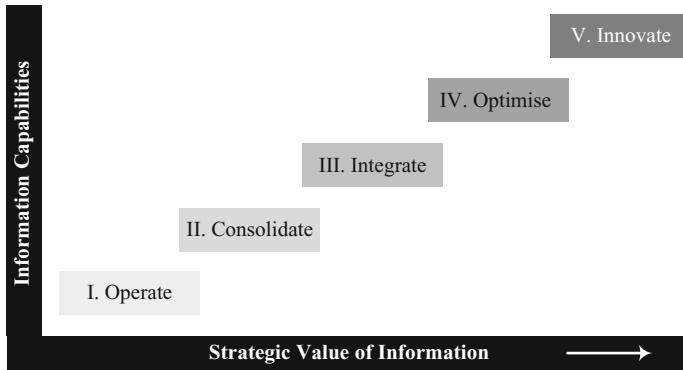


Fig. 5.1 Information evolution model (Source: Davis et al. 2006)

## Information Evolution (IE) Model

The five levels as reported earlier maximise the value of information, whereas, an organization's accomplishment in managing information as a strategic resource is a function of the dimensions such as infrastructure, process, people and culture. An organization's maturity level on these dimensions can be represented in an Information Evolution Model. Figure 5.1 illustrates the IE model.

As illustrated in the IE model, there are five levels or evolutionary stages such as:

- **Stage 1 – Operational level:** it is characterised by individual data “ownership and control”. At this stage, organizations deal with everyday functional and operational problems.
- **Stage 2 – Consolidation level:** individual level perspective is replaced by departmental or functional level standards, metrics and perspectives.
- **Stage 3 – Integration level:** expands level 2 into an enterprise-wide view (a broader view of the organizational activities).
- **Stage 4 – Optimisation level:** the organization is closely aligned with its markets and gains market leadership by applying predictive insights about customers, suppliers and business partners.
- **Stage 5 – Innovation level:** sustainable growth and revenue potential is fuelled by continuing creativity and renewal.

The implementation process for Information Evolution Model varies across different organizations and even in industries, whereas, the characteristics at each evolutionary stage come within four wide-ranging dimensions as aforesaid. IE is a unique as it comprehends the multifaceted affiliation among the dimensions. Like no single integration technology can solve all the integration problems in an organization – for this to happen – there needs to be a set of related integration technologies to solve the integration problems.

Similarly, these dimensions will not benefit the organization individually – all the four dimensions must evolve in unanimity along the logical maturity path for

the organization to benefit from their investments. The IE model is an effective framework for organizations to determine their existing evolutionary level, in turn also identifying the constraints and advantages at each level. In doing so, let us discuss in advance in the five levels:

**Level 1 – Operational Organization:** Any organization whether it be from multinational to Small and Medium Enterprises (SMEs) to a company from a different sector – all have been through Level 1 enterprise stage. However, so much different these organizations be, they share similar features on four key dimensions such as:

- *Level 1 infrastructure* – this represents individuality and exclusivity within the organization and across different departments. All possible resources (e.g. technological platforms, analytical tools) are available to the organizations at this level. Nevertheless, organizations tend to act as client based rather than server based.
- *Level 1 knowledge process* – this epitomises individuality at a personal degree. Employees in such organizations work discretely with their own procedures of getting hold of and evaluating information. This type of organizational employees' characteristics can also be termed as individual silos. Based on this view, such organizational employees focus on short term targets rather than long term plans.
- *Level 1 people (human capital)* – this corresponds to functioning independently in an amorphous milieu and taking into consideration transformation as intimidation to the status quo.
- *Level 1 culture* – signifies everyone-for-himself information philosophy. This dimension also results in internal competition and deficient in consistent assessing and performance standard.

The limitations at *level 1* largely emerge from self-centeredness of information individualists (i.e. promoting silo mentality). However, organizations at level 1 are at times triumphant due to visionary idiosyncratic supervisors, whereas, these organizations generally function and take their decisions in an unintentional and anarchic ambiance. Information cost can be significantly high due to redundant and inconsistent processes, replication of data repositories and inconsistent data collection processes.

**Level 2 – Consolidated Organizations:** This level illustrates that organizations progress gradually with relatively stable stance. These organizations strengthen their information management practices across their somewhat well-designed functional areas. Coalescing with different departments and putting into practice solution that merely comply with the needs of the individual departments. The overall functioning of such organizations demonstrates less significance and consideration to the organizational plans and priorities at large.

- *Level 2 infrastructure* – this implies the departmental-level hardware, software, networking and other infrastructure resources. Sophisticated tools such

as data stores, data modeling and mining are designed, developed and supported to serve departmental needs, however, these tools are not consistent, nor are they frequently used across the organization. Departmental information governance does exist to some extent, nonetheless, it is inconsistent. Likewise, contradictory and inconsistent definitions for similar data elements persists (i.e. each existing application has its own meaning of different objects and each application has data that intersects data in other applications). This partial redundancy generates significant data integrity problems – thus duplication of effort is in spite of everything, a predicament.

- *Level 2 knowledge process* – this dimension at level 2 reinforces the data available to the organization, this in turn also facilitates the decision making process at the departmental level. Employees and other staff members work in concert following the department formalised procedures using analogous processes and systems that are coherent across the department.
- *Level 2 people* – these persons focus on departmental plan of actions. However, these people are challenged when asked to perform cooperatively and understandingly with other departments;
- *Level 2 culture* – this philosophy focuses on pursuing departmental vested interests and employees are recompensed while achieving the departmental set aims and objectives.

The limitations at level 2 largely become apparent due to the department's shortsightedness – the confined functional concentration that initiates incompatible and contradictory results. At this level, departments take of lot of labor-intensive consolidation and conciliation to develop an enterprise view of performance, so the information cost, while far better than at level 1, is yet still soaring. Although level 2 illustrates the departmental view as beneficial for merely the departments but this prejudiced focus is not as great for the organization as a whole. This is because the departments perform autonomously and their aims and objectives are not aligned with the organization's strategic course.

***Level 3 – Integrated Organizations:*** This level exemplifies that organizations understand the tactical and competitive significance of information. In addition, the organizations at this level delineate an information management framework to comply with the organizational level aims and objectives. Rather than focusing on individual and or departmental levels as reported earlier, technological solutions augment the organization's capacity to create value for all its stakeholders including their customers. This level also indicates that organizations start understanding the value creation process – exactly how the organization creates profitable value for customers.

- *Level 3 infrastructure* – centralisation of IT resources is vital at this level, as organizations at this level formalise their information management processes under a centralised point of management. Organizations IT capability eliminates redundancy and facilitates a single view of resources.

- *Level 3 knowledge* – this dimension at level 3 signifies the diversion of organizational focus from conventional operational activities to a relatively vigorous approach toward analytical systems that not only answer the questions such as *what was?* but also *what if* and *what will be* questions. Level 2 also may possess such potential but at the departmental level, however, in level 3, this competence is perceived at the organizational wide level.
- *Level 3 people* – such employees focus on a holistic view of their organization and pool resources together internally as well as externally, nevertheless, with much attention towards the betterment of their organization.
- *Level 3 culture* – focuses on the organizational-wide performance results and value of information, in fact, this information is considered as a corporate resource.

The limitations of level 3 are in excess of outweighed by the recompenses of accomplishing this level i.e. by prompt decision-making based on precise, up to date, organizational-wide intelligence. The organizations at this level foresee higher returns on their stakeholder relationships and more rapidly time to market their products and services, however, cross-functional association is notwithstanding inadequate, and superior alertness is in spite of everything attainable.

**Level 4 – Optimized Organizations:** This level insinuates that organizations are much flexible, adaptable, and optimised for effectiveness and persistently moving in parallel with the rapidly change market environment. Simply saying, when market conditions change (i.e. grow or regulating, organizations at this level also follow the similar stream of transformation).

- *Level 4 infrastructure* – instead of developing new frameworks, this dimension represents an enhanced extension to the level 3 organizational infrastructure IT capabilities. Organizational business information systems and other applications are integrated with the back-office applications and data repositories, in turn facilitating seamless communication, information sharing, and permanence across other functional and service areas of the organization.
- *Level 4 knowledge process* – this dimension focuses on augmenting the operational activities and increased enhancements in timely availability of quality information. Much attention is given to realise and understand the importance of their stakeholder's integrated information, as this information is assessed to identify stakeholder's different behavioral patterns and their needs – and this all is done to enhance stakeholder relationships in the future.
- *Level 4 people* – these people are adaptable and risks inclined and possess distinctive rational expertise and utilise their capabilities to enhance their organizational effectiveness.
- *Level 4 culture* – organizations with such dimension at level 4 provide extensive access to internal as well external information to their employees

and this capability endorses the individuals to continuously bring improvements in their organization.

The limitations of level 4 represents that organizations at this level heavily rely on their available information repositories and its flow internally and externally. This can be attributed to the fact that information can on one side be a competitive advantage, whereas, on the other hand it can also be a susceptible resource. Additionally, organizations at this level while sharing information internally and externally also need to highly focus on the information security and privacy, their network infrastructure vigor and data reliability procedures.

**Level 5 – Innovative Organizations:** The organizations that have reached this level have transformed from an organizational-wide conventional operational body to a more proactive entity by persistently maintaining a stable growth and rapidly developing new sources of value.

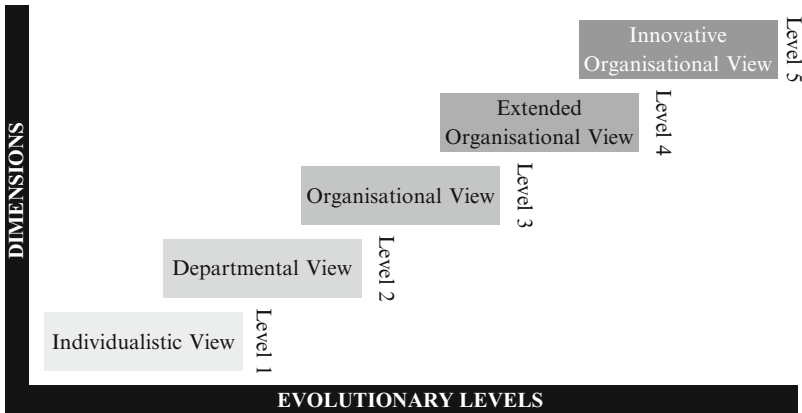
- *Level 5 infrastructure* – organizations at this level possess a sophisticated IT infrastructure. Such infrastructure is flexible, adaptable, and extensible to any integration issues an organization encounters. Information can be accessed from several internal and external resources, in structured as well unstructured formats through such flexible infrastructure.
- *Level 5 knowledge process* – organizations with this dimension in level 5 utilise extensive systematic and diagnostic logics to formulate their potential future while reducing the risks and constantly innovating.
- *Level 5 people* – such people possess innovative thoughts with superior responsibilities in the organization. These people always focus on enhancing their organizational performance and do not consider unimportant tasks as malfunction but learn from them for future opportunities.
- *Level 5 culture* – organizations at this level are proactive, consider revolutionary culture as a standard, sense and contemplate the outside the box world (i.e. focus on generating a significant amount of its development with innovative thoughts).

The aforementioned detailed description on the evolutionary levels illustrates that each level represents a different viewpoint correlating to individuals, organizational departments or extended organizational view as illustrated in Fig. 5.2.

## Dimensions Without Alignment

The latter section rationalizes that organizations differ from each other. Even departments within the same organization may operate distinctively.

- *What does this signify?* It can also be said that a single organization may represent discrete maturity levels on different dimensions as studied earlier.



**Fig. 5.2** Different views on the information evolution levels

For example, an organization might be at level 2 in its infrastructure but still at level 1 in culture.

- *What does this imply?* This view suggests that the organizations have the required IT infrastructure capabilities to promote and support the operational activities of the organizational in alliance with others, but the organization recompenses the individuals at the cost of the departmental targets. Similarly, the organization might be at level 3 in process but mired at level 2 on the people (human capital) dimension.
- *What does this illustrate?* This view indicates that organizational processes and IT solutions support cross-functional assessment and facilitates decision making processes but the people in the organization yet still have well-established “us-versus-them” mindset. Circumstances of this sort may raise questions such as:
- *What happens when dimensions are out of alignment?* Such misalignment of the evolutionary progress generates the dimension apprehension and consequences that are out of the ordinary. This oddity also results in inevitably dragging down the dimensions that are at much mature junctures.

## Advancing in Levels: Transition from Level 1 to Level 5

It certainly does matter what is the up-to-date standing of an organization on the IE model, however, even much more important is that there are several endurance improvements and value added recompenses to be achieved by moving up the ladder (i.e. stepping up to the subsequently level). With this, however, other questions need to be answered for example:

- How does an organization transit from one level to the next?
- Are there guides for this?

- How do you get the whole organization to evolve in a proportional synchronisation?

Organizations must achieve the required standards for a given level the organization is on each of the four dimensions: infrastructure, process, people and culture – before the organization is considered qualified to advance up to the next higher level.

***Making the transition from level 1 to level 2*** – in progressing from level 1 (i.e. an operational approach based on the individualistic view), to level 2 (i.e. a consolidated vision that is focused on departmental view), the organization will conduct the following activities:

- Inculcate in the minds of information individualists about the benefits of evolution for moving up to the next level, as without their approval organizations will not accomplish their targets
- Recognize the work of these information individualists and earn their support
- Develop department level data repositories and applications with the tools that are used across the organization
- Generate an information infrastructure that can be used throughout the organization as a standard
- Encourage the analysis process
- Develop departmental-level metrics and incentives and lastly
- Follow a critical mass approach and learn from others.

Transiting along the way from level 1 level 2, where organizations will gain vivid gains, they may also encounter several challenges such as: (a) lack of support from the top management, (b) organization may lack sufficient budgets at the right time, (c) deficient in coming to a consensus for taking the ownership of standardised tools and processes and (d) inadequate IT capability. These issues do not seem overwhelming that organizations cannot overcome them. However, they need their top management support to achieve them. In doing so, the organizations can maximise the success of its transition to the next level. Moving to level 2 does not signify that redundancy and inconsistency of information silos is surmounted, it merely denotes that these and other issues of level 1 should now be declined, easier to manage and control or occur between departments rather than the individuals as in level 1.

***Making the transition from level 2 to level 3*** – organizations tend not to persist in at level 2. For example once these organizations become aware of their achievements in strengthening their individual infrastructure silos into departmental beneficial resources, it is thus, straightforward to anticipate extraordinary enhancements that could be gained by accompanying that consolidation to next level that promotes integration. The transition from level 2 (i.e. departmental view) to level 3 (i.e. organizational wide view) is firmly related to aligning organizational information management strategies with organizational wide requirements not just the single departments needs. To make this transition, organizations will gain the following activities such as:



- Top management must beyond doubt accept the transformation from level 2 to level 3 and also at times act as champions to lead in the new level
- Restore the departmental silos mentality with organizational-wide performance improvement approach
- Implement infrastructure i.e. set standards that strictly focus on organizational-wide performance enhancement
- Consolidate the departmental data to align with the organizational-wide view
- Describe organizational-wide data standards
- Seek support from the departmental silos mentality data keepers
- Align business tools with organizational-wide aims and objectives
- Generate organizational-wide metrics and incentives
- Develop a governing body that will formulate standards and implement and maintain integration information environment.

Transition from level 2 to level 3 is at times difficult for organizations to achieve, thus several organizations fail in overcoming some common predicaments such as: (a) resistance and confrontation from departmental silos mentality data keepers, (b) inadequacy of IT capabilities, (c) substantially heterogeneous IT infrastructure, (d) deficiency of funds and lack of preplanning, and (e) inadequate as well as unsatisfactory top management commitment towards an integrated view of information. Moving from level 3 to level 4 requires some level of business process reengineering, as this is the commencement of optimisation, which in turn leads to level 4.

***Making the transition from level 3 to level 4*** – organizations can exit at level 3. But when the challenge gets arduous, customers demand more in less time, market asks for abrupt response, then *what do organizations need?* They need more. In moving from level 3 (i.e. an organizational-wide view) to level 4 (i.e. extended organizational-wide view) that focuses on alignment and optimization, organizations carry on with the following activities:

- Extend their organizational-wide business models and include more stakeholders
- Implement IT applications that support in collecting and analyzing market data
- Implement a process enhancement methodology such as the Total Quality Management (TQM)
- Develop such IT applications that capture implicit as well as explicit information
- Establish decisive organizational-wide metrics that assist in quantifying process efficiency
- Planning for the provision of incentives for developing alliances.

Some of the challenges faced during the transition from level 3 to level 4 may seem similar as organizations also encounter analogous challenges while transiting from level 2 to level 3 such as: (a) lack of sufficient support from the top management as they are not convinced to invest more at this level, especially when they have already experienced significant gains while at level 3, (b) lack of communication between the stakeholders within and external to the organization,

and (c) data security and privacy concerns at the organizational-wide level. Organizations at level 4 drive the multitude of inefficiencies and ineffectiveness out of the system to speedup in the market, however, as soon as the market turns to commoditisation and merely fought on price, even the successful organizations must evolve to level 5 to innovate and renew itself.

***Making the transition from level 4 to level 5*** – while staying long at level organizations foresee contraction returns on their optimisation efforts and IT investments. Organizations may produce infallible products or services, always it is likelihood that it can imitated at perhaps equal or lower cost. To secure themselves, organizations need to provide more than just lower cost. Here is where organizations need to innovative and this can be accomplished with a level 5 information management model.

In moving from level 4 (i.e. extended market alignment and optimization) to level 5 (i.e. an atmosphere of continuous innovation), organizations can extend their level 4 information management framework in the following ways:

- Incorporate external market condition's input in systems and process
- Implementation of an IT infrastructure that is capable of handling high volumes of data
- Search and retain highly creative and skill workforce
- Develop an organizational-wide culture that encourages and supports creative thinking promote and expand the risk management practices organizational-wide
- Proactively facilitate and manage the creative process of innovation.

All these activities illustrate that organizations at level 5 need to identify and comprehend their core capabilities and apply them to novel areas of opportunities. However, even at level 5, organizations encounter potential challenges along the way such as: (a) organizations with candidness can be at risk, thus they need to keep a balance between openness and its security, (b) utilising existing funding for creativity and innovative projects of e.g. empirical research, (c) automated information sharing among the stakeholders, and (d) an environment of continuous innovation can at times prove to be an atmosphere unsettling impermanence.

Making transition from level 1 to level 5, it is apparent that organizations with a proactive information management strategy can keep a strategic edge over their much reactive opponents. With the Information Evolution Model studied in this chapter as a guide, organizations can evaluate their standing in the evolutionary continuum and plan a systematic evolution path – before the competition does.

## Summary

Compared to the Information Orientation Approach (presented in Chap. 4), the Information Evolution Approach emphasizes the strong environmental pressures that force companies to continuously improve their approach towards information

and information management. This is because the first observation that leaps out is the amount of information that has to be managed. The information evolution approach introduces the longitudinal perspectives in information management. According to this approach, companies that achieve greater performance are not only those having stronger information orientation at one point in time, but those that are able to achieve better information evolution levels faster than their competitors. The Information Evolution Approach consists of the *Operational level*, *Consolidation level*, *Integration level*, *Optimization level*, and *Innovation level*. Each level of this model is analysed based on four different functions namely: (a) *infrastructure*, (b) *knowledge process*, (c) *human capital* and (d) *culture*.

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## Chapter 6

# The Foundation for an Information Approach

**Abstract** The previous chapters presented and analyzed various approaches on Information Management, Information Operation, Information Orientation and Information Evolution. This chapter discusses the foundation for an information approach. In doing so, Chap. 6 presents an approach for building a foundation for execution. This means an IT infrastructure with automated business processes that synchronize a company's fundamental operational and technological capabilities. The chapter explains how to build a foundation for strategy execution and defines an organizational operating model. Thereafter, it goes through the types and dimensions of the operating model and explains how to implement an organizational operating model through enterprise architecture.

### Introduction

In the previous chapters, it was made clear that the mere adoption of IT is not adequate for organizations. Companies also need to align their IT with their business processes. An analysis of the various sectors of the economy demonstrates that several companies are not just active and surviving but also flourishing within the tough global competition such as the software and laptop giants Microsoft and Dell, the building materials supplier CEMEX, the banking giant ING DIRECT, grocery retailer such as Wal-mart and others are constantly developing, expanding and making profits. These companies have more productive and efficient workforce, get greater returns on their investments and achieve better output from their strategic initiatives. To this end, the questions that must be answered are the following:

- What makes these companies more successful than others? or
- What different operations these companies perform that distinguishes them from others?

The difference is that these companies execute better and have a better foundation for execution. These companies have aligned and embedded their

technological solutions with their business processes and are efficiently and effectively executing their foremost fundamental organizational operations. The decision makers in these companies have taken some tough decisions regarding executing the core operations. On the other hand, these companies have also implemented relevant technological solutions that have facilitated in digitising their core operations. This indicates that IT is more than a liability (i.e. considered as an asset in developing a foundation for business dynamism).

There is a significant amount of difference between how human beings perform a variety of daily tasks and a company. Companies cannot match or be equivalent to human thinking and in performing daily operational activities. Very basic organizational operational activities such as sending an invoice, taking an order, or despatching the order – these activities seems too trivial, yet still can easily be inconsistently performed. These are simple tasks and what about those processes that are considered as a core such as providing new products and services to the customers and looking for and responding to new business opportunities accordingly. For these tasks the management needs to focus and limit their time for other routine activities (for the routine tasks management must automate them so that they are carried out without any deviation from main tasks).

For example, Dell Company while providing product sales and services, requires clear and precise information on their customers orders for assembling their customised laptops or PCs, their final products despatched, invoices attached and other related transaction data. An error in any of these transactions can have a negative impact on Dell's performance in the eyes of its customers. This is perhaps where a foundation for execution takes place. Having a robust foundation for execution in place digitises these daily routine tasks and business processes. This in turn provides reliability of business processes that are required to be in moving towards the right direction. According to Ross et al. (2006) the best of all companies (e.g. the 7–11 Japan [see also Chap. 1]) lead beyond routine processes and digitise capabilities that distinguish them from others with significant competitive advantage.

In essence, building a foundation for execution means an IT infrastructure with digitised business processes synchronising and automating a company's fundamental operational and technological capabilities. Foundation for execution typically develops commencing with some straightforward infrastructure services (e.g. human resource related), then encompassing essential transaction processes (e.g. the sales, accounts related), and finally, incorporating distinguished business capabilities. Building a foundation for execution does not mean to merely focus on the distinguished business capabilities but also to digitise the daily monotonous operational activities in order for the company to stay persistent in the business. This is because every single process in a company is important to some degree or the other and having these processes digitised provides better information and innovative ideas – thus foundation for execution provides a platform for innovation.

## Building Foundation for Strategy Execution

There are few questions that need to be answered regarding foundation for execution such as: *(a) does a company possess a good foundation for execution? (b) how to build a foundation for execution? (c) why is foundation for execution important? and (d) how does foundation for execution create business value?* In analysing question (a) several indications identified during their empirical surveys in various companies emerge such as:

- Inconsistency in providing answers to the same customer query from different departments
- Businesses lack agility
- IT is constantly an impasse
- Different business processes completing the same operational activity, each with a different system and platform
- Lack of knowledge and awareness on positive return on investment on IT

These indicators signify that there is no alignment between company's business processes and its IT investment. In addition, it also illustrates that a company without a robust foundation for execution has significantly less competitive advantage compared to others. Thus, an effective and operational foundation for execution depends on resilient alignment between business processes, objectives and IT infrastructure capabilities.

In examining question (b), foundation for execution results from circumspectly opting the required business processes and IT systems for standardising and integrating. These processes require in-depth focus and concentration – this leads to automating routine operational activities. The foundation for execution takes a company to another layer where the top management has a much clear idea about their existence and it is able to focus more on the potential prospects. However, to achieve such a vision, a company is required to develop themselves as unsurpassed on three crucial disciplines such as:

- Operating model: An important level of business process integration and standardisation for delivery of goods and services to customers. Integration of business processes facilitates seamless access integrated information and forces a common understanding across the company, whereas, regarding the standardisation of business processes, company management needs to decide to take appropriate levels (i.e. the degree to which a company will be consistent in performing the same business processes again).
- Enterprise architecture: It is the organizing logic for company's business processes and IT infrastructure that reflects the integration and standardisation requirements of its operating model. In learning how to adapt to the enterprise architecture approach, companies pass through four phases: (a) business silos, (b) standardised technology, (c) optimised core and (d) business modularity. These four phases lead a company to greater than before strategic importance.

- **IT engagement model:** This model is the system of governance mechanisms that ensure business and IT projects achieve both departmental and organizational-wide objectives. This model also provides an alignment between the IT and business objectives of projects and facilitates coordination of IT and business process decisions taken at the organizational-wide level.

The next question (c) deals with the importance of foundation of execution and demonstrates that companies with strong foundation for execution have shown higher profitability, more competitive edge over their competitors and reaching the market more rapidly, and reduced IT infrastructure costs. However, there are other areas that highlight the importance of foundation for execution, as companies that lack a substantial and sound foundation are confronted with several risks like:

- Growing complexity and inflexibility in companies' IT systems have resulted in non-integrated IT infrastructures that create rigidity and excessive costs.
- Business agility: a strategic necessity increasingly depends on a foundation for execution.
- Legislation requires businesses to follow certain laws and regulations in order to demonstrate discipline, and
- Building a foundation for execution is less expensive than the alternative (i.e. it can be implemented based on one project at a time).

In examining question (d) (creating business value through foundation for execution), the example of a case study of UPS is used. UPS is well known for its use of IT in business processes. Its top management decided to change its operational activities to introduce an enterprise architecture that would reflect their organizational goals. The architecture focused on the development of a single package database rather than a multi-package database to avoid data integrity. This allowed UPS to develop a global telecommunications capability to get its package data accessed and captured anywhere.

On the other hand, the business process side, management defined core processes and UPS standardised the tasks within these processes as appropriate so that new initiatives could leverage existing technological capabilities. Later on, UPS expanded its services to allow its customers get notification regarding incoming packages and to track the packages that are still on the way. This whole process indicates that UPS transformed from a package delivery company to a global commerce company. The strategic use of IT and its return on investment indicates what foundation for execution has done for UPS in creating business value through IT.

## **Defining an Organizational Operating Model**

Managing and maintaining a thriving business is certainly a tough responsibility, especially in the increasing global competition. There are increasing pressures to meet the challenges of satisfying the customers and their conflicting requirements.

Such intensifying pressures have also reflected on the increase in competition and impulsive transformation and this also means that business leaders are no longer able to maintain a balanced administration in such demanding market conditions. This indicates lack of robust business strategies that help the business leaders sail through rough seas and facilitate to confront the unexpected along the way.

However, it is noted that there are very few business leaders that are contented in leading their companies without a vigorous strategy in place. Business strategy is about deciding what to do, providing the directions for action. It requires more than best-practice benchmarking, cost reduction initiatives and one-off process re-engineering. A business strategy describes how a company will compete, what its goals will be, and what policies it will support to achieve those goals.

All this signifies that developing and updating a company's business strategy is one of the major responsibilities of the business leaders. Most of the companies consider that relying on their strategies lead and direct them towards IT investments. In accordance with the intention of relying of strategies, business leaders and IT executives work to align their IT infrastructure and IT-enabled business processes based on their defined business strategy.

However, strategically aligning IT with business processes can be a hard to define process. IT-business alignment has been an issue as it was first documented in the 1970s and reported by the Society of Information Management. They explain that three important reasons why achieving IT-business strategic alignment has been insubstantial such as:

- Defining alignment is frequently focused only on how IT is aligned with the business. Nevertheless, alignment must also address how the business is aligned with IT.
- Organizations have often looked for a silver bullet. Originally, some business leaders thought the right IT infrastructure and its applications is what is wanted. While important, it is not enough. Likewise, improved communications between IT and the business help but are not enough. Clearly, mature IT-business alignment cannot be attained without effective and efficient execution and demonstration of value, but this alone is insufficient.
- The reason IT-business strategic alignment has been elusive is that there has not been an effective tool to gauge the maturity of IT-business alignment – a tool that can provide both a descriptive assessment and a prescriptive roadmap on how to improve.

Other reasons reported are that business strategies are many-sided and complicated, covering decisions as to which markets to compete in, how to maintain a steady stance of a company in different distinct markets with different competitors, and most importantly the required capabilities for development. Having a brief overview of IT-business strategic alignment, it may be right to say that strategy rarely offers a clear definition for the advancement of a steady IT infrastructure and business process capabilities.

In this case, to best support a company's strategy to overcome the abovementioned, companies can define their own operating model. Ross et al.



(2006, p. 25) describe, “*the operating model is the necessary level of business process integration and standardisation for delivery goods and services to customers*”. An operating model facilitates the business leaders in directing and making them aware of how their company can thrive and grow. In contrast to the company’s strategy, the operating model is in a better position to provide a more established and actionable view of the company and facilitates in driving the design of the foundation for execution.

Taking the decision on selecting the right operating model for one’s company can be a tough one for the business leaders. This is because it is the fundamental step in planning to build a foundation for execution and in enabling speedy implementation of strategic initiatives. As there exist different types of operating models, having no clear notion on the operating model can result in companies having no automation and low-cost capabilities to a new strategic quest.

## Types and Dimensions of the Operating Model

There are four different types of operating models: (a) diversification, (b) coordination, (c) unification and (d) replication, whereas, there are two dimensions to these operating models: standardization and integration. Initially, the dimensions of the operating model are explained. Business process standardisation and integration may appear to be directly correlated with each other. However, they are both different and enforce distinct requirements. Despite these conceptions, many authors argue that standardisation and integration are similar to the objective of supporting corporate growth that was cited as a motivation.

Standardisation of business processes and related IT infrastructure systems signifies defining exactly how a process will be executed not considering who is performing, how it is performed, when it is performed and where it is completed. Business process standardisation can provide efficiency in company’s operational activities. Ross and Vitale (2000) also highlights an example of several firms’ management that was more generally concerned with the business process standardisation to ensure the quality and predictability of global business processes. Through business process standardisation, these firms anticipated reduced cycle times from order to delivery for customer responses.

Another example of using standardised processes for marketing and selling Dell laptops or purchasing their office supplies allows the activities of different business units within Dell to be measured, compared and enhanced. Reduction in the variability is the result of standardisation of business processes, as it also augments the throughput and effectiveness. Where standardisation has a positive impact on the organizations operational activities, there are negative sides to it as well such as increased standardisation may result in increased cost. As a negative impact on the IT infrastructure, increased standardisation requires companies to replace their vital systems and processes with new standards.

On the other side, there is plethora of references discussing on the integration area. In spite of this, such references cover integration in different perspectives. In general, integration signifies a state of readiness or the effort to reach this state to provide services (e.g. information, transactions, which are possible through successful incorporation of informational or functional elements, which had been isolated before).

However, in this chapter, a discussion on integration is carried out with respect to the operating model. Integration results in interconnecting organizational units through integrated shared data. Such data sharing can be considered in two different perspectives such as: (a) data sharing between business processes to facilitate continuous transaction processing, and (b) or across the business processes to allow the company to illustrate a unified view to their customers.

The exceedingly aggressive and competitive nature of the present business environment has created enormous pressure for plethora of global company operations. To survive and thrive in such a tensed and competitive environment, it is indispensable for a company to understand the promptly changing business conditions.

It is highlighted that globally, organizations are striving for agility and flexibility to deal with the rapid changes in the internal and external environments. To rapidly act in response to a fast transforming environment, companies must integrate their business processes into a single system proficiently utilising their technological resources, and share data across the different units internally and externally.

For example, a car manufacturer may decide to integrate its business processes so that when their sales figures are recorded, a specific car model is reserved from among other models currently in the production line for a customer. *What does this indicate?* By facilitating seamless data sharing between different relevant unit's (i.e. sales and production department) business processes, the car manufacturer can enhance its internal integration and consequently improve its customer services.

There is plethora of integration benefits such as increased data integrity, improved systems productivity and efficiency, streamlining data flows, enhanced coordination, transparency, interoperability, agility etc. By integrating business processes, companies can improve their customer service delivery, provide support to the management in their decision-making process, and an integrated coordination that facilitate the changes made in one division to alert other divisions to take their actions accordingly.

Integrating IT infrastructures and other related disciplines can speed up the overall flow of information and transactions within the company. In spite of this, there is one major challenge that needs more consideration. Seamless end-to-end integration requires companies to develop standard definitions and data formats that will be shared across all the departments within the company.

To facilitate customer information sharing, all the departments must agree on the data formats developed as a standard. Similarly, the departments must also share a common definition for different terms such as sales, production etc., which can be said to occur when contract is signed, when money is paid, or when product is delivered. It may be time consuming and difficult for each department to take

**Table 6.1** Characteristics of four operating models (Source: Ross et al. 2006)

Business Process Integration	High	<b>Coordination</b> <ul style="list-style-type: none"><li>• Shared customers, products, or suppliers</li><li>• Impact on other business unit transactions</li><li>• Operationally unique business units or functions</li><li>• Autonomous business management</li><li>• Business unit control over business process design</li><li>• Shared customer / supplier / product data</li><li>• Consensus processes for designing IT infrastructure services; IT application decisions made in business units</li></ul>	<b>Unification</b> <ul style="list-style-type: none"><li>• Customers and suppliers may be local or global</li><li>• Globally integrated business processes often with support of enterprise</li><li>• Business units with similar or overlapping operations</li><li>• Centralised management often applying functional/processes/business unit matrices</li><li>• High-level process owners design standardisation processes</li><li>• Centrally mandated databases/ IT decisions</li></ul>
	Low	<b>Diversification</b> <ul style="list-style-type: none"><li>• Few, if any, shared customers or suppliers</li><li>• Independent transactions</li><li>• Operationally unique business units</li><li>• Autonomous business management</li><li>• Business unit control over business process design</li><li>• Few data standards across business units</li><li>• Most IT decisions made within the business units</li></ul>	<b>Replication</b> <ul style="list-style-type: none"><li>• Few, if any, shared customers</li><li>• Individual transactions aggregated at high level</li><li>• Operationally similar business units</li><li>• Autonomous business unit leaders with limited discretion over processes</li><li>• Centralised/federal control on process design</li><li>• Standardised data definitions but data locally owned with some aggregation at corporate</li><li>• Centrally mandated IT services</li></ul>

Low      **Business Process Standardisation**      High

decisions regarding agreeing on similar formats, as this may require them to transform their operational activities and possibly some relevant business processes. The types of operating models are:

- Diversification with low standardisation and low integration (e.g. JM Family Enterprises possess this operating model)
- Coordination with low standardisation and high integration (e.g. Merrill Lynch Global Private Client provide an example of this operating model),
- Replication with high standardisation and low integration (e.g. TD Banknorth, one of the largest commercial banking companies in US provides an example of this model), and
- Unification with high standardisation and high integration (e.g. Dow Chemical adopted this model for its principal chemical manufacturing business).

Ross et al. (2006) developed a two-dimensional framework with four quadrants (Table 6.1). These quadrants represent distinct combinations of the levels of business process integration and standardisation. To simplify how a company intends to deliver its products and services, every company should position themselves in one of the quadrants.

Companies may adopt a specific operating model at the organization-wide level and for each divisional or business unit level in the company there may be other distinct operating models. For companies to comprehend in which quadrant they belong to, the decision makers need to ask themselves two questions as the first question is related to integration and the second to standardisation requirements.

For example, initially companies need to confirm as to what degree is the successful termination of one divisional or business unit’s transactions reliant on

the accessibility, precision and appropriateness on other divisional or business unit's data? Thereafter, inquiring as to what scales the company gets advantage of having all its divisions or business units running their operational activities following standardised procedures. The discussion thus so far, highlights that no matter what operating model a company opts; the model will have an impact on the design decisions around the independence of business unit management and role of technology.

Operating model signifies a broad vision that indicates companies facilitating and carrying out their business strategies. Having four types of operating models with each displaying different characteristics (Table 6.1) represents different opportunities and challenges for company growth. Taking the example of Coordination and Unification operating models, in these models the need to integrate company business processes makes possession – a challenging task, as the new company must bring together disparate data definitions.

Conversely, the process integration related to the Coordination and Unification operating models facilitates company growth due to development into new markets by extending the current product range. In the case of Unification and Replication operating models, the business process standardisation facilitates the growth through a rip-and-replace approach to acquisitions, whereas, the Diversification model enforces less limitations on the development of individual business units within the company with limited challenges in an acquisition.

As there are different operating models, companies can identify business processes appropriate to every operating model. In addition, companies need to select a single operating model suitable for them to direct their management thoughts and system implementations. Management can then organize the responsibilities for business units and IT based on the principles about how company will execute its operational activities – a possibility for companies that act in response to contradictory requirements – adopt a different operating model for each distinct organizational level in the company.

An operating model also facilitates companies in defining the range of strategic initiatives that the companies can promptly engage in. If a company finds out that they are not benefiting from their existing operating model or their operating model is not well suited to its market realities, the company may want to move to a new operating model. This is a transformational process. Nonetheless, a transformation process may disrupt a company by compelling to bring new behavioral changes. But while companies may not intend to frequently initiate new operating models, such changes are sometimes necessary.

A company's focus on the operating models rather than on the individual business strategies offers them with improved assistance for developing IT and business process capabilities. Such steady underpinning facilitates IT to become a proactive rather than reactive force and further support in identifying future business strategic proposals.

Therefore, it is highly recommended for top management to have regular discussions on their operating model within their company. This discussion compels the top management to clearly express a vision for how a company's

operational activities are performed and how those activities differentiate the company in the marketplace. This is because, once these queries are resolved and the company vision is elucidated, it signifies the top management's provision of significant direction for building a foundation for execution.

## Implementing the Organizational Operating Model Through Enterprise Architecture

The strategic importance of enterprise architecture is recognised by an increasing number of global companies around the world. To avoid the intermingling of enterprise architecture and IT architecture terms, it is important to clarify their differences. The term enterprise architecture can be muddled with IT architecture because in some companies IT units refer to one of these architectures – or the set of four architectures – as the enterprise architectures.

The use of this term in this section refers to the high-level logic for business processes and IT infrastructure capabilities. Companies that intend to build a strong foundation for execution need to focus on more details rather than merely focusing on what the operating model provides. *So what is needed here for the companies to follow?* This indicates that companies need strong enterprise architecture to guide their efforts.

As aforementioned, the operating models simply outline the prospects for integration and standardisation across company business units. Whereas, the enterprise architecture demarcates the key business processes, IT systems and data composing the core of a company's operational activities. In a more direct explanation, enterprise architecture guides the digitisation of the foundation for execution.

Johnson et al. (2004) highlights here that, as a company's Chief Information Officer (CIO) is responsible for the management and evolution of the enterprise information system, thus, enterprise architecture is an approach suggested to facilitate CIO's decision-making process. Enterprise architecture can be thought of as a "blueprint" that facilitates in the design of an enterprise. With growing importance of architectural considerations as a key issue of information management in recent years, enterprise architecture has a wide-spread acceptance as a vital mechanism for guaranteeing the promptness and steadiness, acquiescence, and effectiveness in the company.

The aforesaid conceptions illustrate that enterprise architecture is the organizing logic for business processes and IT infrastructure reflecting the integration and standardisation requirements of the company's operating model. Enterprise architecture is critical for building a foundation for execution as it maps important business processes, data, and IT infrastructure technologies enabling desired levels of standardisation and integration. While implementing enterprise architectures, companies achieve a number of benefits such as:

- Reduced IT costs (i.e. IT operational unit costs and application maintenance costs)
- Increased IT responsiveness
- Improved risk management (i.e. reduced business risks, increased disaster tolerance, and reduced security breaches)
- Increased management satisfaction (i.e. top management)
- Enhanced strategic business outcomes (i.e. better operational excellence, more customer intimacy, greater product leadership, and more strategic agility).

To achieve such benefits, companies carry out various exercises in sketching their enterprise architecture and analysing their existing and future IT infrastructure capabilities. However, most of these efforts are not focused on the core aspects. In order to have effective and efficient enterprise architecture, companies need to identify their business processes, data, technologies, and customer interfaces that assist the companies in taking their operating model from merely a visualisation to pragmatism.

The core essentials of enterprise architecture are different for each of the four operating models. For instance taking into consideration the examples of four multinational companies:

- For JM Family Enterprises, which runs its business units individually; their enterprise architecture's core characteristics are its shared technology environment.
- For Merrill Lynch's Global Private Client, working towards meeting financial needs of customers, the core essentials of their enterprise architecture are their customer's data and the customised interface that captures and accesses that data.
- For Dow Chemical, which prides itself in the cost-effectiveness and safety of its manufacturing and distribution processes, the core constituent of their enterprise architecture is the set of standardised business processes and shared data within their individual Enterprise Resource Planning (ERP) systems.
- For TD Banknorth's success depends on implementation of a shared technology and business process environment.

All these companies have legacy systems and business processes that are not compatible with their existing IT infrastructures and business goals. However, these companies understand their operating models, and they capture the critical components of their operating model in their enterprise architecture. Thus, these companies use their architecture to persistently enhance their foundation for execution.

While discussing on encapsulating the enterprise architecture in a core diagram, it is reported that as a builder captures the architecture for a new building in a sketching format, similarly, the enterprise architecture corresponds to principles, policies, and technological choices for their IT infrastructure. This sort of illustration may be complicated for managers to comprehend. Thus, a more straightforward depiction that can be referred to as the "core diagram" may assist the

managers in having in-depth discussions and ultimately be able to understand their company's enterprise architecture.

This uncomplicated representation is a high-level view of the business processes, data, and IT infrastructure technologies constituting the desired foundation for execution. The core diagram provides a meeting point for the management responsible for building and utilising the enterprise architecture. In addition, to the aforesaid elements, it also has implications for the design of organizational roles and structures. Even though the structural requirements are not generally captured in the core diagram, roles and reporting relationships also need to be aligned within the enterprise architecture.

Companies have deep-rooted legacy applications that are the collection of years of IT-enabled business projects. There was rarely a single approach for developing such legacy applications, as companies developed their applications without a common architectural planning. Here the core diagram assists in facilitating the discussions between business and IT managers to simplify company's needs for foundation for execution to ease the communicating their vision to others within the company.

It is obvious that each company is different in terms of their operational activities, business processes, IT infrastructure capabilities, thus also take different approaches to develop their core diagram. However, all the companies emphasize four essential variables of their foundation for execution. Designing the enterprise architecture i.e. making choice of these four variables is a business issues (not just an IT issue or information or an information management issue). The four common variables that senior managers use in enterprise architecture core diagram are:

- *Core business processes* describe a set of established company-wide capabilities or procedures that a company requires to implement its operating model and take necessary actions for thriving and capturing the market opportunities.
- *Shared data driving core processes* is referred to as the data that corresponds to customer records shared across the products lines of a full-service financial services institution and item data shared across the business units.
- *Key linking and automation technologies* is referred to as a middleware technology that enables application integration and seamless access to data, ERP systems, portals providing standardised access to systems and data or a customer interface distinguishing a company from its competitors.
- *Key customers* are those major customer groups e.g. channels or segments that are served by the foundation for execution.

The key elements highlighted in a core diagram are specific to that company's operating model. There may also be similarities between the core diagrams of companies adopting the same operating model. To describe architecture for each operating model, examples reported in literature are summarized:

- ***Enterprise Architecture for a Unification Operating Model:*** In this model both integration and standardisation of business processes are required to serve distinct essential customer types. IT is used to incorporate and mechanise the

business processes. The IT infrastructure at Delta Air Lines was constructed in response to their unsuccessful outsourcing efforts. Later, each division built its own IT capability. There was lack of right information at the appropriate time that resulted in dissatisfied customers and displeased employees. The top management debated on the core diagram and came to a common understanding to develop future strategies. To clarify the company vision, the top management defined core processes. After agreeing to the core processes, thereafter, the company identified several data types critical to process execution. In 2001, top management noted technology and business processes enhancements resulting from enterprise architecture efforts. These efforts transformed Delta Air Lines from low performing company to top three with on-time performance, resolving customer lost baggage issues, and settling customer complaints. However, it was also observed that enterprise architecture was not a final solution for them to thrive. They also needed to have a viable and practicable marketing strategy.

- ***Enterprise Architecture for a Diversification Operating Model:*** As reported earlier the Diversification operating model is different to the Unification model that involves low integration and low standardisation. Using this operating model, operational activities in companies are autonomous, however, there can also be opportunities for shared services. Taking the example of Carlson Companies, they comprise different businesses related to marketing, hospitality and travel business – are based on the Diversification operating model. Carlson's enterprise architecture core diagram emphasises technologies illustrating their management's philosophy that technical infrastructure services should be shared, whereas, the business units retain control over their local business processes and IT applications. An extreme instance of a Diversification may be a total lack of an enterprise architecture i.e. a company anticipating to possess no synergies across its businesses. However, such companies also establish economies of scale by means of shared IT infrastructure platforms.
- ***Enterprise Architecture for a Coordination Operating Model:*** These operating models provide integrated service delivery to individual but essential group of customers. This type of integration results by sharing data within the business divisions to present a unified view to customers. Taking the example of MetLife – a large insurance and financial service institution, follows the Coordination operating model. Their enterprise architecture core diagram signifies the importance of integrated data by focusing on integration. While designing the Coordination model core diagrams, companies need to identify their essential customers along with company data to be shared across the business divisions to serve these customers. Thereafter, identify the technological solution to understand the importance of data integration. Lastly, considering business process elements depends on the company's willingness.
- ***Enterprise Architecture for a Coordination Replication Model:*** These models are successful when their essential business processes are standardised across the company and supported by automating their technological infrastructure. As demonstrated by the example company ING DIRECT, their Replication model



facilitates rapid expansion and scalability of business. The Replications models emphasises standardised business processes. Following this model, ING DIRECT's several businesses operate individually, however, they have something in common i.e. these businesses share a set of widespread standardised business solutions and standardised technical infrastructure components.

While designing a Replication model core diagram, companies need to identify the essential business processes that need to be standardised and replicated across the business divisions. In addition, identify the vital technological solutions to automate these business processes. Thereafter, considering the linking technological solutions that can be shared across the business divisions. In this model, it is not required to follow the characteristics of this model, as the business divisions can take their own decisions locally.

It is vital that the enterprise architecture process must commence with top management discussing on the operating model. In doing so, management must take the decision regarding the core capabilities for their company. Selecting an operating model enforces a decision on a general vision. Identifying the essential customer types, core processes, shared data, and technologies to be standardised and integrated requires a commitment from the top management to a specific course of action. It can be said that once the core is in place, it is not easy to change the operational activities of the companies. Thus, a company must not only redesign and implement its technological capabilities; its personnel needs to relearn the business processes.

Several companies top management consider core diagrams an essential tool in developing a shared understanding regarding how a company will function and communicate their shared vision at organization-wide. By considerately developing an enterprise architecture core diagram, top management commits itself to IT and IT-enabled business processes that construct and influence a foundation for execution.

## Summary

The first six chapters of this book focused on introducing and analyzing issues related to IT and information. In this regard, Chap. 1 investigated issues associated with IT business value, where Chap. 2 paid attention on information and presented the Information Management approach. Chapter 3 introduced the Information Operation approach where Chap. 4 the Information Orientation approach. The previous chapter explored the Information Evolution approach and Chap. 6 the Foundation for an Information approach. The next chapter will attempt to compare all these different approaches in order to support the reader in better understanding the characteristics, the advantages and disadvantages of all the aforementioned approaches.

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## Part II

## Chapter 7

# A Comparison of the Four Approaches

**Abstract** In this chapter a concentrated view and analysis of the four different approaches presented in the previous chapters is provided. Starting with the first section, a quick view of the approaches under question is given. The second section presents characteristic advantages and disadvantages of each of the approaches and analyzes them. Thereafter, the third section analyses the similarities and differences among these approaches, with the fourth section presenting a quick reference to the main characteristics of the four approaches. Finally, section “Example of Business Scenario” is an exemplar scenario that summarizes all four approaches.

### Synopsis of the Four Approaches

#### *The Information Operation Approach*

Information and the mechanisms for delivering it are strongly associated with businesses. In a company either the core of its business is information handling, or it uses it as part of a function (market research, logistics and advertising). As it is reported in the previous chapters information plays a vital role for a company's performance. The Information Operation Approach focuses on the way that information can be used to support business strategy, create value and improve business performance and it has four essential strategic choices namely: (a) create new reality, (b) reduce cost, (c) add value and (d) manage risks. The competitive advantage and performance of a company comes from its ability to excel in every one of the four dimensions of information use. Its purpose is to illustrate how to use, manage and align information.

A company should be able to change strategy and use information to grasp new market opportunities at any point. At that point the dynamic nature of the strategic alignment model comes in play, as it comprises the alignment between strategy and information management. A clear view of the relationship between information use and strategy follows divided in two sections: (a) the first one explains why

information is the responsibility of every manager and (b) the second presents the strategic information alignment framework.

**Why Information is the Responsibility of Every Manager:** One of companies' main assets is information since companies compete for the collection, acquisition and use of valuable information. Organizations use information, after organizing and processing it, to make decisions that will enhance their performance and help them gaining competitive advantage. Effective use of information is critical as it helps executives managing their companies and creates value in their market. The basic intent of this approach is to facilitate managers to understand how to effectively use, manage and align information in their businesses.

**Strategic Information Alignment (SIA) Framework:** The Information Operation Approach is based on the Strategic Information Alignment Framework presented with detail in Fig. 3.1. Here a summary of the four main issues related to explain the importance of the SIA framework is presented:

- SIA provides an analysis of information use and clarifies how to align information use to strategic priorities in a business.
- It focuses on the fundamentals of how to perceive business strategy and organizational potentials to use information, IT and people to enhance performance.
- SIA assists managers to communicate in common terms on how they use information.
- It provides the steps towards the advanced management, addressing and implementing strategic priorities and achieving improved business performance through people, information and IT.

As reported earlier on and illustrated in Fig. 3.1 the information operation approach consists of four fundamental ways of using information namely: (a) adding value with customers, (b) creating new reality, (c) reducing costs and (d) minimizing risks.

**Adding Value with Customers:** Business value is a function of adding value to customers and markets as information should target customers' individual needs, expectations, satisfaction, loyalty and behavior. It is necessary to develop and establish long-term relationships with customers aiming at improving customer service and satisfaction with the support of available information. The technological advances occurring day by day provide solid ground to improve company relationships with customers by employing information technology, but also driven by the quest for greater efficiency, effectiveness and competitive advantage. IT facilitates and enhances customer relationships in various ways, but mainly enables companies and businesses to attain customization, (the essence of the customer-centric orientation), through the deployment of sophisticated customer relationship management systems.

**Creating New Reality:** A company should use information to innovate in order to create business value. In more detail, organizations need to focus on new customers, engineer new products, add more services and apply new technologies. A company will thrive when it will step from the mere knowledge that information exists, to how that information is used to build competitive advantage. Differentiation is a key issue between competitors and Information Systems and Information Technology can play a crucial role to satisfy customers and promote growth. This way, new business realities such as: products, new services and new businesses can be created but management needs to evolve. The management has to understand what forms of organization best support creative knowledge work and how information about the external world can be continuously sensed and deployed for new product innovation.

**Reducing Costs:** In this perspective the essential ingredient that improves the business performance reflects to the efficient way that companies utilize information. Companies in order to improve business process need to use information in a minimal and limited amount but without weakening their capabilities to compete. Thus, a series of actions as reductions in the cost of obtaining, processing, and transmitting information should be put into practice. On the other hand, a new aspect such as the personalization of products and services emerges. Under this aspect a company should sense and respond to individual customer's needs. Mass customization, produces new types of understanding of the product/service. That understanding relates on how the product or service, in its essential elements or modules, must vary as the customer's needs and beliefs vary (configuring knowledge). Nevertheless, this shows that cost reduction is associated with the precise way that companies or businesses use information to satisfy customers and in parallel waste little money and other resources.

**Minimizing Risks:** For a company to be effective and meaningful, risk managing practices may be an integral part of the overall management of a business. Risk management is of high importance and it is a parallel action with adding business value. The evolution of risk management in business has provided the stimulus for the growth of functions such as finance, accounting and auditing, which manage information, to account for orders and goods, finance future investments, hedge against the unforeseeable, budget over predictable periods such as quarters and years, and audit the books to protect against fraud and errors in counting. There are four key elements during a risk management process: (a) risk has to be accorded a high priority within the organization, (b) availability of well-documented risk management policies and procedures, reviewed and monitored regularly, (c) an integrated risk management framework needs to be in place and (d) there should be effective communication of these policies and procedures throughout the organization.

## ***The Information Orientation Approach***

The Information Orientation Approach focuses on an effective use of information within a business by augmenting attention to: (a) information (information management practices), (b) technology (Information Technology practices) and (c) people (promoting information behaviors and values in people). This approach presents an innovative way that can assist in measuring the use of information and managing it to enhance the business performance. Following this perspective a model that illustrates the measurement and management of information capabilities is presented, alongside with an analysis of three information capabilities: (a) Information Management Practices (IMP), (b) Information Technology Practices (ITP) and (c) Information Behavior and Values (IBV). Finally a practical roadmap for managers to follow so as to handle information capabilities is presented.

**The Information Orientation (IO) Model:** Information Orientation (IO) approach refers to the capabilities and behaviors associated with effective and proficient use of information. The Information capabilities (information management practices, IT practices and information behavior and values) have numerous advantages, from substituting the use of people and organizational structures, to supplement business processes. Thus, it is apparent that these information capabilities are (a) indispensable for executing business strategies in today's environment with momentum, quickness and receptiveness, and (b) they can be employed to supplement, substitute or lessen the use of people, organizational structures or business processes.

**Measuring Information Capabilities:** Due to lack of holistic management method information capabilities have not been interrelated with business performance, leading companies to invest several million euro's in IT without proper ways of understanding and enhancing the effective and efficient use of information. The method of associating business performance to information orientation can assist the managers to understand the magnitude of their company. The companies are being allocated in a matrix of four quadrants such as: (a) *self-aware winner*, (b) *winner at risk*, (c) *information-oriented laggard*, and (d) *blind and confuse*.

**Managing Information Capabilities:** Companies with higher information orientation are good at managing all three information capabilities:

- ***Information Management Practices (IMP):*** it is the capability of a company to manage information effectively over its lifecycle by sensing, *collecting*, *organizing*, *processing*, and *maintaining* information.
- ***Information Technology Practices (ITP):*** it is the capability of a company to effectively manage appropriate IT applications and infrastructure to support operational, decision-making and communication processes. Four dimensions of IT support exist namely: (a) *IT for operational support*, (b) *IT for business process support*, (c) *IT for innovation support*, and (d) *IT for management support*. Also it's important for top management to comprehend the influence among these dimensions as they are interrelated. Hence

managing only one or two levels well will perhaps lead to lower business performance.

- **Information Behavior and Values (IBV):** it is the capability of a company to instill and promote behaviors and values in its staff for the effective use of information and IT. These dimensions draw from both human resources and management control literature streams include: (a) *information integrity*, (b) *information formality*, (c) *information control*, (d) *information transparency*, and (e) *information sharing*.

For a more detailed analysis of companies with high information orientation Fig. 4.1 illustrates the information orientation model. Utilizing these three information capabilities establishes an organization's information orientation "maturity" and the enhancement of that maturity level in its area. Emphasis should be given to the parameter that these three capabilities may all be flourishing in order to achieve high business performance.

**Putting the Information Capabilities into Practice:** Seven principles are highlighted, that middle – senior managers can follow to expand their information capabilities and information orientation maturity of their business, managers should:

- Personally set the standard for information behaviors and values in their company,
- Need to know and understand the role of IT in their company, in turn communicate this with its staff,
- Be information usage savvy, not simply relying on company's expertise,
- Create the right expectations for their people in changing business strategies and the mix of business capabilities,
- Not simply be advocates of good information capabilities, but they must also understand the conditions for implementing information capabilities in their business,
- Need to have the courage and foresight to disrupt a successful business model in order to capitalize on future potential – they cannot wait to see what the future holds, and
- Lead their company towards high information orientation are in best position to implement the e-company in the new e-business economy.

### ***The Information Evolution Approach***

The information evolution approach follows a different perspective in information management. This approach points out that companies achieving superior performance are not only those having stronger information orientation at one point in time, but those that are able to achieve superior information evolution levels faster than competitors. Moreover, the parameters decisive for a company's success in



managing its information assets at each of the evolutionary levels are a function of: (a) *infrastructure*, (b) *knowledge process*, (c) *human capital*, and (d) *culture*. The information evolution approach explains how to achieve superior Information evolution faster than competitor.

Organizational strategies and IT investments should go hand-in-hand for a company to thrive in the marathon of business success. A company needs to forget traditional ways and focus on new visions, accomplish parity with their competitors, innovate, exploit the change rather than react to it and focus on what will create the value for their organization in the future. Also, grasp the essence of globalisation but with a view on how to respect the local entities, be aware of their financial reporting controls and procedures and finally respond more quickly and attain more growth with fewer resources.

In that respect, the faster a company reaches higher information evolution levels the faster it accomplishes better performance against its competitors. The information evolution approach is based on a model that consists of four dimensions and five-level evolutionary path: **Stage 1 – Operational level**, **Stage 2 – Consolidation level**, **Stage 3 – Integration level**, **Stage 4 – Optimization level**, and **Stage 5 – Innovation level**.

**Information Evolution (IE) Model:** An organization's success in managing information as a strategic resource is a function of infrastructure, process, people and culture. An organization's maturity level on these dimensions can be represented in an Information Evolution Model. Figure 5.1 illustrates the IE model, where, there are five levels or evolutionary stages such as:

- **Stage 1 – Operational level:** it is characterized by individual data “ownership and control”. At this stage, organizations deal with everyday functional and operational problems.
- **Stage 2 – Consolidation level:** individual level perspective is replaced by departmental or functional level standards, metrics and perspectives.
- **Stage 3 – Integration level:** expands level 2 into an enterprise-wide view i.e. a broader view of the organizational activities.
- **Stage 4 – Optimization level:** the organization is closely aligned with its markets and gains market leadership by applying predictive insights about customers, suppliers and business partners.
- **Stage 5 – Innovation level:** sustainable growth and revenue potential is fuelled by continuing creativity and renewal.

The characteristics at each evolutionary stage come within four wide-ranging dimensions as mentioned. The IE model is an effective framework for organizations to determine their existing evolutionary level and identifying the constraints and advantages at each level. An analysis of the five levels follows in Table 7.1.

At this point it should be mentioned that all the four dimensions may evolve along the logical maturity path for the organization to benefit from their investments. The way that an organization can proceed from Level 1 to Level 5 with practical guidelines can be seen below in Fig. 7.1.

Table 7.1 The four dimensions correlated to the five levels of maturity

	Level 1	Level 2	Level 3	Level 4	Level 5
General	Any organization have been through Level 1 enterprise stage	Organizations progress gradually with relatively stable stance putting into practice solution that merely complies with the needs of the individual departments	Organizations understand the tactical and competitive significance of information, use information management framework to comply with the organizational level aims/objectives	Organizations that are flexible, adaptable, and optimized for effectiveness and persistently moving in parallel with the rapidly change market environment	The organizations that have reached this level have transformed from an organizational-wide conventional operational body to a more proactive entity
Infrastructure	Individuality and exclusivity within the organization and across different departments. The organizations tend to act as client based rather than server based	Sophisticated tools are designed, developed and supported to serve departmental needs, however, these tools are not consistent, nor are they frequently used across the organization	Centralization of IT resources is vital at this level, as organizations at this level formalize their information management processes under a centralized point of management	Organizational business IS are integrated with the back-office applications and data repositories, in turn facilitating seamless communication, information sharing, and permanence across other functional and service areas of the organization	Organizations have a sophisticated IT infrastructure (flexible, adaptable, extensible). Information can be accessed from several internal and external resources, in structured or not formats through such flexible infrastructure
Knowledge process	Individuality at a personal degree. Individual silos	It reinforces the data available to the organization, also facilitates the decision making process at the departmental level	Signifies the diversion of organizational focus from conventional operational activities to a relatively vigorous approach toward analytical systems	Augments the operational activities and increased enhancements in availability/quality information. Great understanding stakeholder's integrated information, as this information is assessed	Organizations with this dimension in level 5 utilize extensive systematic and diagnostic logics to formulate their potential future while reducing the risks and constantly innovating

(continued)

Table 7.1 (continued)

	Level 1	Level 2	Level 3	Level 4	Level 5
People	This correspond to functioning independently in an amorphous milieu and taking into consideration transformation as intimidation to the status quo	These persons focus on departmental plan of actions. However, these people are challenged when asked to perform cooperatively and understandingly with other departments	Such employees focus on a holistic view of their organization and pool resources together internally as well as externally, nevertheless, with much attention towards the betterment of their organization	These people are adaptable and risks inclined and possess distinctive rational expertise and utilize their capabilities to enhance their organizational effectiveness	Such people possess innovative thoughts with superior responsibilities in the organization. These people always focus on enhancing their organizational performance and do not consider unimportant tasks as malfunction but learn from them for future opportunities
Culture	Signifies everyone-for-himself information philosophy	This philosophy focuses on pursuing departmental vested interests and employees are recompensed while achieving the departmental set aims and objectives	Focuses on the organizational-wide performance results and value of information, in fact, this information is considered as a corporate resource	Organizations with such dimension at level 4 provide extensive access to internal as well as external information to their employees and this capability endorses the individuals to continuously bring improvements in their organization	Organizations at this level are proactive, consider revolutionary culture as a standard, sense and contemplate the outside the box world i.e. focus on generating a significant amount of its development with innovative thoughts

Limitation	Largely emerge from self-centeredness of information individualists i.e. promoting silo mentality. Information cost can be significantly high due to redundant and inconsistent processes, replication of data repositories and inconsistent data collection processes	Department's shortsightedness – the confined functional concentration that initiates incompatible and contradictory results	The organizations at this level foresee higher returns on their stakeholder relationships and more rapidly time to market their products and services, however, cross-functional association is notwithstanding inadequate, and superior alertness is in spite of everything attainable	Organizations at this level heavily rely on their available information repositories and its flow internally and externally. This can be attributed to the fact that information on one side may be a competitive advantage, whereas, on the other hand it can also be a susceptible resource. Also, they need to focus on the information security/privacy, their network infrastructure vigor and data reliability procedures
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Fig. 7.1 Transition guidelines

*The Foundation for an Information Approach*

The foundation for execution indicates an IT infrastructure with automated business processes. The foundation for execution begins with basic infrastructure services, then moving to necessary transaction processes, and finally, including distinguished business capabilities. This approach provides a platform for innovation and its goal is to present how to align and embed technological solutions with business processes. The foundation for an information approach attempts to answer questions in the form of:

- Does a company possess a good foundation for execution?
- How does an organization build a foundation for execution?
- Why is foundation for execution important? and
- How does foundation for execution create business value?

The main aspects of this approach are summarized in the following four sections. The first section answers basic questions raised before, the second defines the organizational operating model, the third illustrates the types and dimensions of the model and the fourth explains how the operating model can be implemented through enterprise architecture.

**Building Foundation for Strategy Execution:** Firstly, a company needs to answer the question: *Does a company possess a good foundation for execution?* There is no alignment between company’s business processes and its IT investment and discovered several indicators identifying this: (a) inconsistency in providing answers to the same customer query from different departments, (b) businesses lack agility, (c) IT is constantly an impasse, (d) different business processes completing the same operational activity, each with a different system and platform and (e) lack of knowledge and awareness on positive return on

investment on IT. Therefore, in order a company to have an effective and operational foundation for execution it needs to align its business processes, objectives and IT infrastructure capabilities. The second question: *How to build a foundation for execution?* Standardization and integration of both business processes and IT systems is the answer and it leads to automating routine operational activities. A company needs to focus on three disciplines: (a) operating model, (b) enterprise architecture, and (c) IT engagement model. The third question: *Why is foundation for execution important?* Companies with well-built foundation for execution report rising levels of profitability, advantages over their competitors, reach the market faster, and minimize IT infrastructure costs. On the other hand, companies that do not share a sound foundation are confronted with several risks such as: (a) growing complexity and inflexibility, (b) business agility, (c) legislation, and finally (d) focusing on a foundation for execution is less expensive than the alternative. And the fourth question: *How does foundation for execution create business value?* The strategic use of IT, by adding the ability to cooperate in a global perspective by limiting the boundaries and its return on investment it indicates that this approach is creating business value through IT (as explained in Chap. 6).

**Defining an Organizational Operating Model:** An operating model assists top managers towards a clearer view of how their company can succeed in the marathon of modern business. The operating model excels from the company's strategy, by providing a more coherent and actionable view of the company and also assists in driving the design of the foundation for execution. Selecting the right operating model can be a tough choice for a company, due to the lack of existence of different types of operating models. At this point it should be mentioned that having a blur view of the operating model can result in companies having low level of automation and cheap capabilities.

**Types and Dimensions of the operating Model:** As seen in Table 6.1 there are four different types of operating models: (a) diversification, (b) coordination, (c) unification and (d) replication, whereas, there are two dimensions to these operating model: (a) standardization and (b) integration. Two basic aspects must be identified for a company to identify which quadrant they belong to, related to integration and standardization requirements respectively. A company may focus on a single model and push all its activities towards the principles related to that. The opportunity to change the operating model, in the process is valid but not favored, as it will disrupt a company by compelling to bring new behavioral changes.

**Implementing the Organizational Operating Model through Enterprise Architecture:** The operating model highlights the vision of integrated and standardized business units across a company's platform. On the other hand, enterprise architecture distinguishes the key business processes, IT systems and data as basic elements of a company's operational activities. In other words, guiding the digitization of the foundation for execution. Enterprise architecture is an approach suggested to facilitate CIO decision-making process. In more detail, it is the organizing logic for business processes and IT

infrastructure reflecting the integration and standardization requirements of the company's operating model. Enterprise architecture is critical for building a foundation for execution as it maps important business processes, data, and IT infrastructure technologies enabling desired levels of standardization and integration. Employing enterprise architectures can be beneficial for a company as it reduced IT costs, increases IT reaction time, enhances risk management, elevates management, and improves strategic business results. But it should be mentioned that the core essentials of enterprise architecture are different for each of the four operating models. Each company is different in terms of its operational activities, business processes, IT infrastructure capabilities, thus also takes different approaches to develop its core diagram. Nevertheless, four essential variables of their foundation for execution exist: (a) *core business processes*, (b) *shared data driving core processes*, (c) *key linking and automation technologies* and (d) *key customers*. The key elements highlighted in a core diagram are specific to that company's operating model. There may also be similarities between the core diagrams of companies adopting the same operating model. The characteristics of the enterprise architecture for the four operating models mentioned before are summarized below

- *Enterprise Architecture for a Unification Operating Model:* In this model both integration and standardization of business processes are required to serve distinct essential customer types. IT is used to incorporate and mechanize the business processes.
- *Enterprise Architecture for a Diversification Operating Model:* Using this operating model, operational activities in companies are autonomous, however, there can also be opportunities for share services.
- *Enterprise Architecture for a Coordination Operating Model:* These operating models provide integrated service delivery to individual but essential group of customers. This type of integration results by sharing data within the business divisions to present a unified view to customers.
- *Enterprise Architecture for a Coordination Replication Model:* These models are successful when their essential business processes are standardized across the company and supported by automating their technological infrastructure.

It is essential that the enterprise architecture process initiates with top management conveying on the operating model. Thus, conclude on the decision considering the core capabilities for their company, and its vision. Top management considers core diagrams as an essential tool in developing a shared understanding regarding how a company will function and communicate their shared vision at organization-wide.

## Advantages and Disadvantages of the Related Approaches

### *Advantages*

Taking under consideration the view presented in the previous section, the main benefits related to the approaches were identified and presented. It appears that five main categories of advantages exist: (a) adding value with customers, (b) enhance information capabilities, (c) business performance improvement and (d) reducing costs, as seen in Table 7.2.

**Adding Value with Customers:** IT can facilitate and enhance customer relationships in many ways. Specifically, it enables companies and businesses to attain customization, the essence of the customer-centric orientation, through the deployment of sophisticated customer relationship management systems. Organizations develop successful, long-term, relationships with customers by focusing on adding value in the customer – company relationship. Thus, better customer service through improved responsiveness and understanding helps in building customer loyalty and decreases customer agitation. Also, enhances customer bonding – the ability to attract and keep customers for a long time and thus helps them to gain a better understanding of customers and anticipate their purchases.

**Enhance Information Capabilities:** information capabilities (i.e. information management practices), IT practices and information behavior and values can be employed to augment, surrogate or lessen the use of people, organizational structures or business processes. The association between business performance and information orientation, managing the capabilities can assist the managers to understand the prominence of their company. The combination of these information capabilities determines an organization's information orientation "maturity." Research indicates that the more mature an organization's information orientation, the superior that organization performs.

**Business Performance Improvement:** improve business performance (e.g. improving the financial results), company reputation, market share growth and product and service innovation. Superior business performance in markets between companies who compete with information is a result of the extent that managers and employees seek, collect, organize, process and use the relevant information in decision-making and actions.

**Reducing Costs:** Improving business processes and transactions so that information used in processes, as well as to monitor processes, is an efficient and economical as possible to achieve the outputs required. Reducing costs can be achieved by adopting systematic techniques for achieving meaningful cost-reductions across a company without diluting the capabilities of the company to compete. This illustrates that the emphasis on cost reduction is the need for companies or businesses to use information so precisely that customers are satisfied in a way that wastes little money and other resources.



**Table 7.2** Advantages of the four approaches

			APPROACHES			
			(1) The In-formation Operation	(2) The Infor-mation Orienta-tion	(3) The Infor-mation Evolution	(4) The Foun-dation For An Infor-mation
ADVANTAGES	Adding Value With Customers	Bond	✓			
		Build Loyalty	✓			
		Improve Customers Knowledge	✓			
	Enhance Information Capabilities	Management	✓	✓	✓	✓
		Technology		✓	✓	
		Behavior & Values		✓	✓	✓
		Minimizing Risks	✓			
	Business Performance Improvement		✓	✓	✓	✓
	Reduce Costs		✓	✓	✓	✓

**Minimizing Risks:** Risk is a fundamental element that influences financial behavior in any business whereas, to be effective and meaningful, risk managing practices must be an integral part of the overall management of a business. Managing risks in business is perhaps the foremost way to create a business value. The evolution of risk management in business has provided the stimulus

for the growth of functions such as finance, accounting and auditing, which manage information, to account for orders and goods, finance future investments, hedge against the unforeseeable, budget over predictable periods such as quarters and years, and audit the books to protect against fraud and errors in counting.

The advantages mentioned and interrelated with each of the four approached not only represent characteristic parameters of the approach, but also give a view of the area that the company applying them desires to focus on. Moreover, even if all approaches enhance performance and reduce costs the process they follow to achieve that, it's a parameter of the advances they possess. Thus, the information operation does not support the technology and behavioral enhancements the other support, as the information orientation, the information evolution and the foundation of information do not support as a core element the adding value to customer's parameter.

## *Disadvantages*

This section concentrates on the disadvantages of the aforementioned approaches. The following three main categories of disadvantages exist: (a) uncertainty, (b) need for all principles to work simultaneously and (c) need for great understanding, as seen in Table 7.3.

**Uncertainty:** Using information to create new business realities (such as products, new services and new businesses) requires management to rethink not only how they learn and use information to develop innovative business solutions but also understand what forms of organization best support creative knowledge work and how information about the external world can be continuously sensed and deployed for new product innovation. On the other hand innovativeness is associated with uncertainty and the risk of failure. Thus, resulting to uncertainty and the risk of failure.

**All Principles Work Efficient at the Same Time:** Models are built on the principle that the capabilities must all be working to achieve high business performance. Weakness in one area cannot be compensated for by strength in the other areas. In this regard, literature indicates that there is no causal link between any one of the information capabilities and business performance. Being good at one of the information capabilities does not lead to improved business performance.

**Needs Great Understanding:** A high level of understanding is needed, usually from top management of the people's needs and the structure of the company regarding the value of information in its various departments. They need to identify their business processes, data, technologies, and customer interfaces that assist the companies in taking their operating model from merely a visualization to pragmatism.

**Table 7.3** Disadvantages of the four approaches

		APPROACHES			
		(1) The Infor- mation Operation	(2) The Infor- mation Ori- entation	(3) The Infor- mation Evolution	(4) The Foun- dation For An Infor- mation
DISADVANTAGES	Uncertainty	✓			
	All Principles Work Effi- cient At The Same Time		✓	✓	
	Needs Great Understand- ing	✓			✓

At this point, it is worth noticing that the disadvantages of each process if narrowed and their minimization applied as strategic guideline the company moves towards business performance enhancement. Moreover, the information orientation and the information evolution require all of their principles to work efficiently at the same time as to succeed. On the other hand the information Operation should better be an equation of innovativeness towards known, understood and measured risks, rather uncertainty that leads to danger. The foundation of information requires great analysis and inspective views as to enhance the company’s business performance.

**Similarities and Differences Between the Approaches**

***Similarities Between Approaches***

The main similarities between the approaches are that all four have as a core element the management of information and as a sub sequential result the reduction of cost that is delivered through different ways.

In more detail, *the Information operation Approach* suggests that business organizations should aid their staff to recognize the appropriate information. Managers and employees should focus on the relevant information to execute appropriate activities and tasks to implement their strategies. Thus, achieve results and effectively use information to manage their companies and create value in their market. In doing so, it reveals three reasons on how senior management can manage information, as well as four reasons why use the *business framework of strategic information alignment*. Moreover presents a subsection on Cost Reduction and it concludes that the way of using information to create business value is by reducing costs.

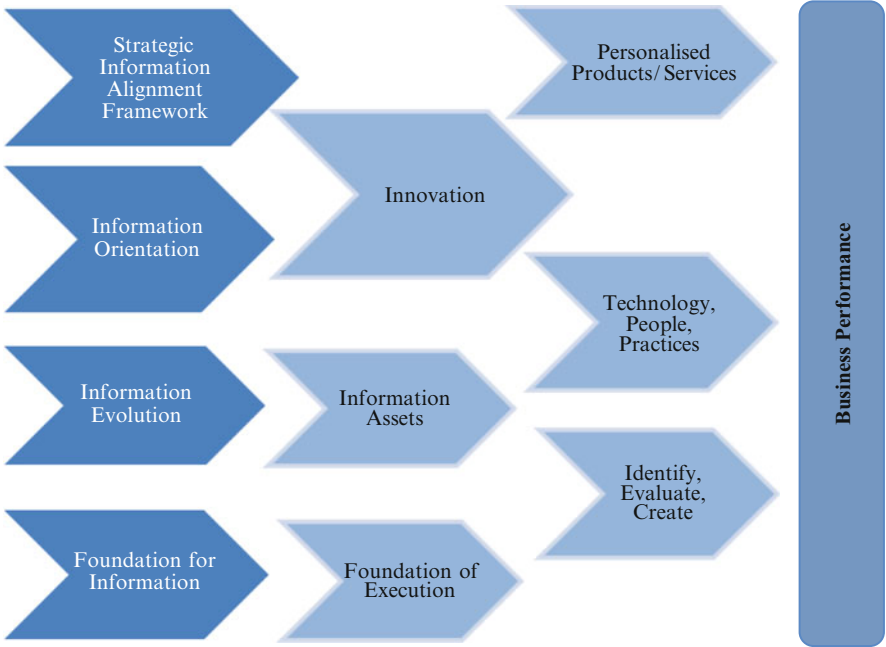
*The Information Orientation Approach* refers to the capabilities and behaviors associated with effective utilization of information. Moreover, it analyses the foundations of the approach, the orientation, with the information i.e. information management practices. Also, focuses on these information capabilities which can be employed to augment, surrogate or lessen the use of people, organizational structures or business processes and thus reduce cost.

*The Information Evolution Approach* suggests that Information management is not only substantially influencing the transaction processing part of the enterprises but also facilitates extra-enterprise collaboration that is now a critical differentiator for product design as well. Furthermore, enterprises are confronted with significant pressures to proficiently and cost-effectively manage their information resources in a business environment that rebukes the incompetent, unproductive and the lethargic. The information management is no longer an appendage espouse structure. It is an indispensable underpinning for enhanced business performance. Issues such as how information is obtained, validated, stored, accessed and distributed are central to organizational continued existence, effectiveness and profitability.

*The Foundation for an Information Approach*, refers to information management that is needed to facilitate customer information sharing, that all the departments should agree on the data formats developed as a standard. The departments should share a common definition for different terms such as sales, production etc., which can be said to occur when contract is signed, when money is paid, or when product is delivered. In addition, the approach analyses how an Enterprise architecture is critical for building a foundation for execution as it maps important business processes, data, and IT infrastructure technologies enabling desired levels of standardization and integration. Thus, concludes that while implementing enterprise architectures, companies achieve a number of benefits such as reduced IT costs (i.e. IT operational unit costs and application maintenance costs).

## ***Differences Between Approaches***

In a glance, as seen in Fig. 7.2, the main differences of the four approaches correspond to the way they use information. The first uses information towards



**Fig. 7.2** Analysis of the four approaches

the customer and the products, the second uses information towards its own perceptions, the third uses information towards a fast plan of assets enhancement, and finally the fourth uses information towards operation activities.

The first approach, the Strategic Information Alignment Framework, focuses on how to use information and from this knowledge innovate and engineer personalized products and/or services. It also differs from the other approaches in the induction of the risk management as a parameter in the equation of business enhancement.

The second approach, the Information Orientation approach, focuses on how a company can use information in an innovative way. Main characteristic of such a company should be to alternate the established way that it uses information in correlation with technology, people and practices.

The third approach, the Information Evolution approach, focuses on time and how a company can achieve an advantage using information faster than its competitors by using its information assets in a function with infrastructure, knowledge, human capital and culture.

The fourth approach, the Foundation for Information focuses on the company itself and how a company can identify, evaluate, create a foundation of execution and interrelate it with business value.

## Summary

This section is a summary of this chapter. It represents a quick reference section and is divided in two tables. Table 7.4 part A where a summarized view of the main issues and goals of each approach is presented and Table 7.4 part B where the advantages and disadvantages are illustrated. At the end of this section an example of a business scenario is given.

### *Example of Business Scenario*

**Company X** reflects on the reality that businesses are not going well. After several meetings, and numerous hours of brainstorming the CIO decides to appoint the responsibility of enhancing the business performance to four senior managers, under the condition that each will produce his own way of dealing with the situation.

**Manager A** suggests using the **Strategic Information Alignment Framework** approach and unfolds his plan. First, he explains the company should target each customer separately, reflecting on individual needs thus building a strong relationship that will provide competitive advantage over the competitors. This differentiation and customization will produce new realities for the company, as new services, products and business will be revealed from the process. On the other hand, the same process will reconfigure the entire system not only by developing a new billing system, but also by taking advantage of the emerging opportunities. Finally, all the suggestions presented will be under the umbrella of a risk management plan that will monitor and review all the parameters associated with potential danger.

**Manager B** is a fan of the **Information Orientation approach**. His plan involves the orientation towards the effective use of information in an effective and proficient way. He thinks that information in company X must be perceived in a new way and its capabilities analyzed and enhanced as to achieve higher business performance. First, before investing in new projects an association of business performance to information orientation should be made, thus measuring the information capabilities. Secondly, emphasis may be given to the management of those capabilities by sensing, collecting, organizing and maintaining the information. This will be feasible by acquiring the appropriate technology practices. Also, he suggests that human aspects may be a part of the process, by promoting behaviors and values in its staff for the effective use of the information. Finally, he introduced seven principles that middle – senior management must be follow for his plan to work.

**Manager C** suggests using the **Information Evolution approach**, according to which they should use information as a vehicle for faster evolution against its competitors. The model he suggested first deal with everyday functional and

Table 7.4 Quick reference – Part A

		APPROACHES			
		(1) The Information Operation	(2) The Information Orientation	(3) The Information Evolution	(4) The Foundation For An Inform- ation
GENERAL	Main Focus	This approach focuses on the issues of how information can be used to support business strategy, create value and improve business performance. This approach presented four essential strategic choices: (a) create new reality, (b) reduce cost, (c) add value and (d) manage risks. The competitive advantage and therefore performance of a company comes from its ability to excel in every one of the four dimensions of information use.	The Information Orientation Approach analyses the approach of orientation towards the effective use of information within a business by focusing on: (a) information (information management practices), (b) technology (Information Technology (IT) practices), and (c) people (promoting information behaviors and values in people).	Introduces the longitudinal perspectives in information management: companies achieving superior performance are not only those having stronger information orientation at one point in time, but those that are able to achieve superior information evolution levels faster than competitors. The key factors determining a company's success in managing its information assets at each of the evolutionary levels are a function of: (a) <i>infrastructure</i> , (b) <i>knowledge process</i> , (c) <i>human capital</i> , and (d) <i>culture</i>	The Foundation for an Information Approach attempts to answer questions in the form of: (a) <i>Does a company possess a good foundation for execution?</i> (b) <i>How does an organization build a foundation for execution?</i> (c) <i>Why is foundation for execution important?</i> and (d) <i>How does foundation for execution create business value?</i>
	Goal	How to use, manage and align information.	Perceive Information in an innovative a way that can assist in measuring the use of information and managing it to enhance the business performance.	To achieve superior Information evolution faster than competitor.	Align and embed technological solutions with business processes.

operational problems, the departments may set standards and new perspectives that comply with their needs. Moving on, the organization should set a management framework to comply with its aim and objective with the parameter that this will focus on creating value for the customers and not just representing the departmental logic. Finally, flexible, adaptable, and extensible infrastructure could be deployed to sustain growth, creativity and renewal. Manager C also explained that the above must all mature gradually for the company to achieve the performance enhancement that it seeks.

**Manager D** suggests using the **Foundation for an Information approach**, and emphasizes the digitization of the business process contacted in the company and especially the synchronization and automation of the fundamental operations

**Table 7.4** Quick reference – Part B

			APPROACHES			
			(1)	(2)	(3)	(4)
ADVANTAGES	Adding Value With Customers	Bond	✓			
		Build Loyalty	✓			
		Improve Customers Knowledge	✓			
	Enhance Information Capabilities	Management	✓	✓	✓	✓
		Technology		✓	✓	
		Behavior & Values		✓	✓	✓
		Minimizing Risks	✓			
	Business Performance Improvement		✓	✓	✓	✓
	Reduce Costs		✓	✓	✓	✓
DISADVANTAGES	Uncertainty		✓			
	All Principles Work Efficient At The Same Time			✓	✓	
	Needs Great Understanding		✓			✓

and technological capabilities. First, the plan focuses on the alignment between business process objectives and IT infrastructure capabilities. Then the company may identify itself by its characteristics and present its operating model, which will



strengthen and follow. Finally Manager D proposes to engineer an enterprise architecture that distinguishes the key business processes, IT systems and data. Thus, guiding the digitization of the foundation for execution.

**Analysis:** All four managers appreciate the value of information and focus their approach in the right direction. They believe that the way that information is perceived and managed is the solution that will enhance the business performance of the company. The potential results of all the plans are valuable, either it is cost reduction or new product development, and can benefit the company. On the other hand, the company should invest in analyzing the way it perceives information and strengthen the mechanisms (infrastructure – human) that adds value to the information, and hence its business performance. A difficulty of change in the employee's behavior usually exists, and it should be dealt with as to have a better consistency in the use of IT. The plan that the CIO of the company must use should be a result of unedifying if the company corresponds to the maturity level of the different aspects that each plan requires, as well as the responsiveness against the competitors its company wants to succeed. In the end, the company must gain the ability to recognize, incorporate and utilize external knowledge and use it to enhance its products and services.

## Chapter 8

# Organizational Absorptive Capacity and the Use of Information

**Abstract** A discussion that focuses on two key questions is carried out in this chapter. Questions like: (a) how does investment in Information Technology contribute towards enhanced business performance? (b) how can we relate IT and business performance with organizational absorptive capacity? In this chapter, the effect of IS integration on business performance through absorptive capacity is explored by theorising that absorptive capacity also has a mediation role between IS integration and business performance. The chapter proposes IS integration as a construct that measures a simultaneous change in IT and non-IT resources. The IS integration construct is considered as a general measure of a simultaneous change in IT and complementary organizational resources, leading to the first causal relationship of the integrated model.

## Introduction

IT can be associated with higher performance if accompanied by organizational change. The identification of the variables describing organizational change is still an on-going work. A review of the literature reveals that studies examining the association between IT and business performance are divergent in how they conceptualise key constructs and their interrelationships.

Empirical findings suggest that IT investments have started to exemplify their outcomes in proving that they can make a positive contribution to organizational output. Various measures of IT investment do not appear to have a positive association within administrative productivity, demonstrating inconsistency in their business performance. While IT is likely to improve organizational efficiency and effectiveness, its effect on administrative productivity and business performance might depend on other factors as the quality of an organization's management processes and IT strategy links, which can vary significantly across organizations.

Several other exploratory questions on the association between IT and business performance have been studied extensively since the initial application of computers in business. Until the early 1990s, this area of research offers conflicting findings with evidence to both confirm and disconfirm IT's performance benefits. Some authors suggest a positive relationship between IT and productivity, while others propose a negative contribution from greater investments in information technology.

Another issue that it is explored in this chapter deals with the relation of IT and business performance with absorptive capacity. Absorptive capacity is defined "as a firm's ability to identify, assimilate and exploit external knowledge to commercial ends" (Cohen and Levinthal 1990). Absorptive capacity is high if companies can learn how to make use of new knowledge within their processes and implement a change that increases their competitiveness. With respect to the focal firm perspective, absorptive capacity embeds both business process and process performance.

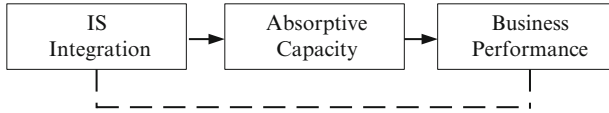
According to this approach, the organizational absorptive capacity is critical for IT business value, since complex IT systems induce a significant learning process within the organization. This learning process requires employees to make continuous effort and integrate data and applications. In order for learning process (i.e., Information Systems [IS] integration) to improve company performance, the organization should have the ability to identify, assimilate and exploit the existing knowledge and transform this knowledge into business initiatives and profit. The absorptive capacity of an organization depends on absorptive capacity at an individual level.

However, the absorptive capacity of an organization is not merely the sum of the absorptive capacities of its employees. It is the cooperation among individuals that enables the exploitation of new external knowledge and, hence, successful change.

Isolated individuals may change, but cannot innovate without cooperation. This model points out how individual or functional learning processes may lead to superior IS integration. However, higher IS integration generates higher level of profitability to the extent that a company develops its own absorptive capacity. This chapter focuses on organizational absorptive capacity and analyses its effects on the relationship between IT and business performance in organizations. This chapter also emphasizes the mediation role of absorptive capacity between IT investments and information from one part, and strategic choices from another part (see also Francalanci and Morabito 2008).

## **Absorptive Capacity and its Mediation Role**

Absorptive capacity measures the ability of an organization to complete a learning process. A significant learning effort is typically associated with IT, as it represents a complex information technology. To cope with IT's complexity, implementation is typically incremental and is accompanied by a continuous integration effort of data and applications. The degree of integration of a company's information



**Fig. 8.1** Absorptive capacity as a mediation variable (adapted from: Francalanci and Morabito 2008)

system, called IS integration, is a proxy of IT maturity and quality. It can be said that IS integration leads to greater business performance through absorptive capacity, i.e. that absorptive capacity has a *mediation role* as shown in Fig. 8.1.

In this chapter, the effect of IS integration on business performance through absorptive capacity is explored by theorising that absorptive capacity also has a *mediation role* between IS integration and business performance. It has been noted that the previous research studies on IT and business performance presuppose a direct causal relationship between higher IT investments and productivity improvements. Evidence supporting this causal model is appealing to establish IT as a critical determinant of productivity, but is also subject to theoretical criticism. As far back as Robey (1977), authors discussed how technology alone is an insufficient predictor of variance in productivity.

The exclusion of other variables in productivity models may distort the measurable influence of technology, thus providing results with lower explanatory value. Other authors refer to the direct causal relationship between IT investments and productivity as the technological imperative and contrast it against the organizational imperative, which views productivity gains as a result of a deliberate alignment between managerial and technological choices.

The technological imperative is supported in different streams of literature. The contingency perspective points to classes of variables – organizational, human, and technological, that companies have to combine in order to compete successfully in different industries. Compared to the external competitive environment, firm-specific integration of different resources, such as technology, skills, and organizational culture, underlies corporate performance.

The strategy literature has welcomed these considerations and formulated the strategic necessity hypothesis asserting that IT, although a necessary factor, cannot in and of itself generate sustainable performance advantages. Performance variance across companies originates in a management difference and not simply a technology difference.

From the mid-1990s, a number of studies have taken the organizational imperative's perspective. This second wave of literature on the relationship between IT investments and business performance has been recently reviewed. Two research approaches are distinguished, referred to as: (a) IT-Enabled Efficiency and (b) Focal Firm Change. The first approach focuses on specific organizational processes and measures the impact of a single class of IT applications on process efficiency. The second approach searches for critical areas of organizational change that, combined with IT, led to greater business performance.

Within the first category of studies, Clemons and Row (1998) document widespread IT-enabled efficiencies at McKesson and its customers. The latter benefiting

substantially from rationalising operations in preparation for the new order entry and distribution system adopted by McKesson. Another study describes how at First American Bank a data-warehouse application, adopted as a consequence of a shift in corporate strategy and a radical organizational transformation, has led to improved business processes and competitive advantage.

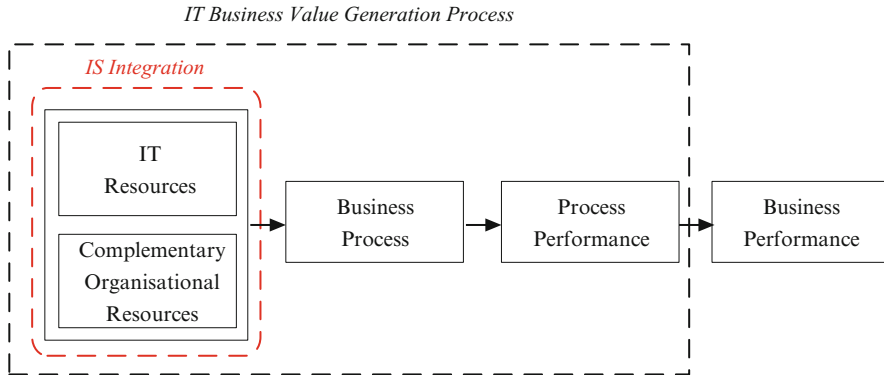
At the focal firm level, IT business value is generated by the deployment of IT resources (including both technology IT resources and human IT resources) through a process that involves the deployment of complementary organizational resources. A number of studies assess the degree to which complementary organizational resources moderate or mediate IT's performance impact. Brynjolfsson and Hitt (2000) indicate that firms must not only customise, deploy and maintain IT, but also must manage IT together with non-IT resources, including organizational practices and structures.

Empirically, the decentralisation of decision authority is found to be greater in companies with higher levels of IT investment. It is also found that IT business value, as measured by productivity, differs according to worker composition: firms with higher IT investment that have also decreased their clerical and professional ranks show higher productivity. In the retail industry, complementarities leading to sustainable performance advantages exist between IT and organizational culture.

However, the co-introduction of IT and complementary organizational changes may not result in immediate success. IT resources generate business value when they are *absorbed*, becoming a routinised element of a company's value-chain. In a study of the introduction of computer integrated manufacturing at a medical products manufacturer, it is illustrated that in spite of an extensive set of organizational change initiatives, improved flexibility and responsiveness were not immediately attained.

At the core of the problem lies a difficulty in changing the behaviour of employees when new technologies and practices appear to contradict their tacit knowledge accumulated over the years. Similarly, in a study of the impact of the use of computers, TQM, profit sharing, and employee participation on labour productivity, Black and Lynch (2001) report synergies among various workplace practices, but no consistent evidence of synergies with the use of computers.

To explain the contextual ability of companies to translate change into performance, the literature has developed the theory of *absorptive capacity*. Absorptive capacity has been initially defined as a firm's ability to identify, assimilate and exploit knowledge from external sources. This encompasses the ability to imitate other firms' products or processes, as well as the ability to exploit less commercially focused knowledge such as basic scientific research or new IT solutions. Absorptive capacity is recognised to be a strategically valuable capability as it is embedded in processes, knowledge, culture and people.



**Fig. 8.2** IS integration from a local firm perspective (adapted from: Francalanci and Morabito 2008)

## IS Integration

The chain of causal relationships leading from IT resources to organizational performance according to the focal firm approach is shown in Fig. 8.2.

The model shows that IT resources are always associated with complementary organizational resources. A combination of IT and non-IT or complementary resources can exert an impact on business processes.

According to the resource-based view of organizations, complementary resources represent any organizational resource that must change in combination with IT in order for companies to complete the IT business value generation process successfully. In general, the resource-based view assumes that differentiation is obtained by means of a combination of resources. If these resources are difficult to imitate, they can provide a sustainable competitive advantage.

This chapter proposes *IS integration* as a construct that measures a simultaneous change in IT and non-IT resources. IS integration is defined as the “outcome of initiatives leading to greater technical standardisation and broader user access to a common set of technical resources, infrastructure, data or software applications” (Hasselbring 2000).

From a technical perspective, IS integration encompasses both technical and human IT resources, since it typically accompanies a growth in IT awareness and quality, which cannot be obtained without IT management skills. It is also tightly bounded to organizational change.

A fundamental reason why organizations integrate their information systems is to enable greater inter-functional cooperation and reach a higher degree of process orientation. An integration project is typically implemented in conjunction with a corresponding change in the organizational variables that enact process orientation, such as greater delegation, greater inter-functional communication, and a lower degree of individual specialisation.

In this chapter, the IS integration construct is considered as a general measure of a simultaneous change in IT and complementary organizational resources, leading to the first causal relationship of the integrated model.

## Organizational Absorptive Capacity

Initially, the concept of absorptive capacity was introduced to the field of strategy in early 1990s. This concept was extracted from the economic theories (e.g. primarily Schumpeterian) that examined the role of Research and Development (R&D) in economic performance. In the early twentieth century, economic development is entrenched in technological innovation. Later in the twentieth century this argument came up with some convincing substantiation that R&D had a considerable effect on the economic growth.

The perception of absorptive capacity evolved from preceding research on organizational learning. Organizational learning has been defined as the growing insights and successful restructuring of organizational problems, the process of recuperating the actions through improved comprehension and understanding and the capability of the organization to evaluate and act upon internal and external stimulus in a collective, interactive and focused manner.

Whereas Cohen and Levinthal (1990) describe that absorptive capacity is a firm's ability to identify, assimilate and exploit external knowledge to commercial ends, this focus on external knowledge dates back to March and Simon (1958) who noted that most innovation results from borrowing rather than invention. An open view of organizations is particularly appropriate for IT, which is mostly provisioned, rather than developed internally. The majority of software applications are customised to a company's needs, but rarely developed ad hoc.

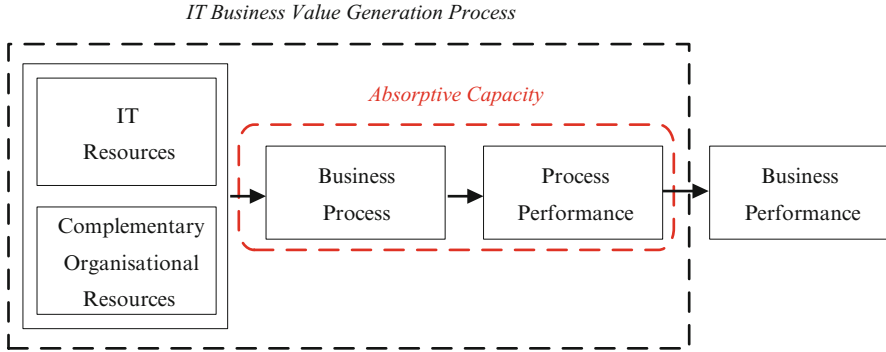
Other IT resources, such as hardware and communication equipment, are purchased and most often managed in outsourcing. Organizations' recourse to outsourcing is extensive, both in terms of percentage of companies depending on external IT operations and of variety of services procured from IT suppliers. There exists a tight relationship between organizational absorptive capacity and the innovation ability of a company, (i.e. a company's ability to perform successful change).

There is a noticeable similarity between the definitions of organizational learning and the definition of absorptive capacity. However, the distinguishing feature of the "absorptive capacity" of an organization is that it is a function of the level of a firm's prior related knowledge.

Absorptive capacity is qualitatively different from technology development. Absorptive capacity involves learning and acting on the scientific discoveries and technical activities occurring outside the boundaries of the firm. The information gathered from outside the firm is then used to redirect scientific discovery and technology development activities.

Absorptive capacity is high if companies can learn how to make use of new knowledge within their processes and implement a change that increases their competitiveness. With respect to the focal firm perspective, absorptive capacity embeds both business process and process performance as shown in Fig. 8.3.

Absorptive capacity has been described within the innovation literature, to model a company's ability to innovate. Since, by definition, innovation requires



**Fig. 8.3** Absorptive capacity from a local firm perspective (adapted from: Francalanci and Morabito 2008)

the successful implementation of a change, a company's innovation ability necessarily embeds the causal relationship between business process and process performance.

Absorptive capacity represents a dynamic construct, which is appropriate to model the effect of knowledge resources that involve a learning effort. A significant learning effort is typically associated with IT, as it represents a complex technology. The complexity of IT as a business tool is particularly challenging for Small and Medium Enterprises (SMEs), where access to scale economies is more difficult, IT literacy is often lower and management attitude is rarely IT oriented. As a result, the impact of absorptive capacity is higher and is recognised as a fundamental driver of competitiveness to offset a smaller size with flexibility. According to the resource-based view of organizations, absorptive capacity represents the ability of a company to translate a change in a combination of input resources into organizational performance. Absorptive capacity's mediation effect between input resources and organizational performance is found to be particularly critical in the R&D context. It is noted that R&D can act as a bottleneck and prevent innovation if companies fail to develop their learning abilities.

In line with the above, the literature under the resource-based view considers absorptive capacity as a strategically valuable capability since it is a path-dependent, firm-specific, and socially-embedded means to use other firms' knowledge to create competitive advantage. In other words, absorptive capacity has a strategic value since it is embedded in the business processes and culture of organizations as well as in the skills of employees.

A major empirical finding is that learning abilities are largely a function of a firm's level of prior related knowledge. It was also noted by them that it is prior knowledge that confers an ability to recognise the value of new information. Given that a lack of investment early on an area of expertise can foreclose the future development of technical capabilities, absorptive capacity cannot be achieved unless a company's knowledge of a given resource is continuously improved.

As discussed earlier, IS integration measures the quality of the IT resource, involving both technical and complementary organizational resources. The degree



of integration of a company's information system is the outcome of a continuous improvement of the IT resource, starting from isolated automation initiatives and progressively integrating infrastructures, data, and applications along organizational processes to reach a higher degree of process orientation and overall organizational flexibility.

Note that absorptive capacity is a characteristic of individuals, who develop context-specific innovation abilities. It has been demonstrated how continuity is critical at an individual level, due to the obsolescence of knowledge, contextual change and an individual need for frequent testing of his/her skills.

IS integration constitutes a fundamental lever of process orientation and, therefore, represents an enabler of inter-functional communication that facilitates the process of absorption and transformation of knowledge into action and help employees perform their work. This reinforces the relationship between IS integration and absorptive capacity. IS integration is conjectured to be one of the determinants of organizational absorptive capacity, which, in turn, is theorised to affect business performance.

## **Defining the Variables of IS Integration, Absorptive Capacity and Business Performance**

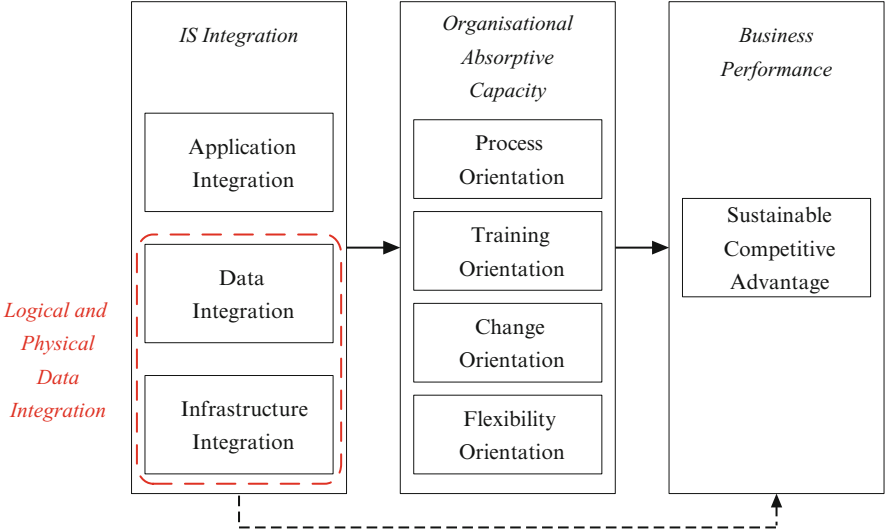
This section discusses the variables related to IS integration, absorptive capacity and business performance.

### **IS Integration Variables**

Information systems in an organization are composed of multiple vertical components corresponding to different organizational units. Each component is typically structured in three architectural layers, application, data, and infrastructure. The application architecture defines the software modules and the main information exchanges among them. The data architecture defines the databases and their content, called *schema*.

The infrastructure defines the hardware and network components of the system. The vertical components of the information systems are not independent of each other, since they support a common set of business processes. This requires the cross-functional integration of all architectural layers. This section defines IS integration as the combination of application, data and infrastructure integration as shown in Fig. 8.4.

Two applications are integrated if they can exchange data and recall each other's functionalities. The application layer of a company's information system is totally integrated if all vertical components are integrated. It is only partly integrated if



**Fig. 8.4** Defining the variables (adapted from: Francalanci and Morabito 2008)

only subsets of vertical components are integrated. Typical subsets are sales and procurement, warehouse and accounting, accounting and reporting. Different degrees of application integration are achieved if integration is implemented within one or multiple subsets of vertical components.

Data can be either logically or physically integrated. They are logically integrated if they are accessed through one logical schema (such as a data warehouse schema). In this case, data can be stored in separate databases, on different machines and in distinct organizations, but they are reconciled in real time or through periodical alignment operations. They are physically integrated, if all applications access the same databases and data are not duplicated. We refer to this latter case as infrastructure integration. If data are duplicated, the customers' or products' databases are not unique.

**Organizational Absorptive Capacity Variables**

Absorptive capacity has been widely studied by organizational and innovation researchers. Most research focuses on the identification of the determinants of absorptive capacity for different types of knowledge. However, the literature does not provide a study addressing IT-related knowledge. Zahra and George (2002) provide a general model that conceptualises absorptive capacity as a dynamic construct with four underlying organizational capabilities, acquisition, assimilation, transformation, and exploitation.

Acquisition represents the ability to identify new knowledge and realise its potential benefits. Assimilation is the process of internalisation that allows

employees to reach a deep understanding of new knowledge. Transformation represents the individual ability to accept the change in one's own job necessary to make use of new knowledge. Exploitation represents the result of enacting change and reaping benefits at an organizational level.

We complement Zahra and George's (2002) model of absorptive capacity from an IT perspective and derive the four organizational capabilities that influence the absorptive capacity of new IT-related knowledge. We conjecture that process, training, change and flexibility orientation correspond to the general capabilities of Zahra and George's (2002) model from an IT perspective.

*Process Orientation:* Process orientation was first introduced by Porter (1985), who has thoroughly discussed its relationship with improved cross-functional interaction. A number of researchers have studied process orientation thereafter. Keen's (1993) model strongly emphasizes the integration between IT and business processes and Boar (1994) suggests that IT solutions must be aligned with business process redesign.

This tight relationship between IT and business processes has been broadly studied by the vast literature on business process reengineering. They suggest that implementing new ITs within traditional functionally-driven structures is equivalent to "paving the cow paths". Process reengineering supporters argue that traditional functional structures camouflage value-creating processes and that managers should accompany the implementation of IT with greater process orientation.

According to Hammer and Champy (1993), "technology is an essential enabler . . . merely throwing computer at an existing business problem does not cause it to be reengineered. In fact, the misuse of technology can block reengineering altogether by reinforcing old ways of thinking and old behaviour patterns". A business process orientated culture is cross-functional, customer-oriented and IT-enabled.

The literature provides evidence supporting the relationship between process orientation and the ability to exploit IT towards greater performance. In particular, process-oriented organizations have the ability to identify the benefits of inter-functional information exchanges to enhance management processes. The greater the integration of a company's information system, the faster the overall planning and control cycles.

In contrast, a traditional hierarchical structure (equipped with legacy systems) cannot make use of cross-functional information, due to its inability to understand the benefits of inter-functional cooperation in terms of process performance.

*Training Orientation:* Training activities increase pre-existing know-how and skills and represent an enabler of the assimilation of new knowledge. There exist different types of training, ranging from lecturing or formal training, to on-the-job learning. IT researchers advocate that formal training is a necessary complement to on-the-job learning to increase computer literacy and is especially required as part of the deployment of new software applications. Cohen and Levinthal (1990) argue that a firm's absorptive capacity is a function of its level of prior related knowledge. Acquiring knowledge related to a new IT domain by investing in training can help evaluate future opportunities that may be offered by technological development over time.

*Change Orientation:* The organizational literature defines change orientation as the extent to which managers and employees favour change and oppose organizational inertia. This definition is close to Zahra and George's (2002) definition of transformation as the individual ability to accept the change. A change-oriented enterprise fosters an organizational culture that supports the exploration, assimilation, and application of new technologies and related business solutions. On the other hand, organizations may develop a resistance to learning if the management has a clearly negative attitude towards change. Change orientation is also found to be an enabler of pro-activity, which, in turn, improves scouting and discovery of new external knowledge.

A positive attitude towards change is also found to influence the outcome of investment decisions. For example, it can affect the allocation of resources in research and development, which is critical in developing the organizational ability to innovate. Change orientation can encourage individuals to engage in activities that contribute to the transformation of their jobs by means of new knowledge. These activities include environmental scanning to acquire new knowledge and trends as well as regular dialogue across functional and hierarchical boundaries to ease knowledge sharing and integration. Through these mechanisms, the knowledge base of organizational members can be extended and, eventually, transformed into new information processing tasks.

*Flexibility Orientation:* The literature defines flexibility orientation as "the ability to adapt or change . . . organizational processes and products with relatively little time or cost penalties" (Swink et al. 2005). Researchers have conceptually argued and empirically demonstrated that two types of flexibility can be distinguished such as: (a) process flexibility and (b) new product flexibility.

This chapter's operationalisation of flexibility accommodates this distinction with a two-item scale addressing both types of flexibility. Flexibility enables a constant organizational change, consistent with Zahra and George's (2002) definition of exploitation. As an organizational technology, IT is found to be a fundamental driver of flexibility and to deliver benefits by either reducing the cost of flexibility or enabling higher degrees of flexibility.

IT enables the process of organizational adaptation, resulting in organizational experience and learning and thereby creating, acquiring, and transferring organizational knowledge. Besides, the level of organizational adaptation depends on the maturity of IT.

## **Business Performance and Sustainable Competitive Advantage**

The idea of sustainable competitive advantage surfaced in 1984, when Day (1984) discussed the types of strategies that may help to sustain the competitive advantage. The actual term sustainable competitive advantage emerged in 1985, when Porter has discussed low-cost and differentiation as the basic types of competitive strategies.

Barney (1991) has provided a formal definition of sustainable competitive advantage: “A firm is said to have a sustainable competitive advantage when it is implementing a value-creating strategy not simultaneously being implemented by any current or potential competitor and when these other firms are unable to duplicate the benefits of this strategy” (Barney 1991).

Zahra and George (2002) conceptualise absorptive capacity as a dynamic capability pertaining to knowledge creation and utilisation that enhances a firm’s ability to gain and sustain competitive advantage. Since IS integration is a management as well as a technological approach, a *common knowledge base* or *prior knowledge* requires a learning process and a corresponding organizational change. This learning process is firm-specific and difficult to imitate among organizations.

## Discussion

As discussed in the earlier sections, previous research works in the IT-performance literature concur that IT per se does not have a positive impact on business performance. Recent research contributions assert that firms cannot gain a performance advantage unless they deploy IT resources together with complementary organizational resources.

Furthermore, the co-introduction of IT and complementary organizational resources generate business value only if they are *absorbed*, becoming a routinised element of a company’s value-chain. To explain this contextual ability of companies to translate change into performance, the literature has developed the theory of *absorptive capacity*. This chapter attempts to measure the mediation effect of absorptive capacity between IT and business performance.

The authors noted the earlier sections that how the evolution of the IT resources of an organization can be seen as a sequence of changes aimed at reaching a higher degree of integration, which has been defined as as the outcome of initiatives leading to greater technical standardisation and broader user access to a common set of technical resources, infrastructure, data or software applications.

The concept of IS integration is broadly studied, either as the outcome of Application Integration initiatives or as a consequence of the adoption of packaged solutions increasing the degree of standardisation and sharing of IT resources.

IS integration is found to have a direct positive impact on sustainable competitive advantage. In and of itself, this finding supports the relevance of the IS integration construct as a driver of business performance. Previous literature has found that data integration is advantageous in organization-wide coordination and decision making.

However, the impact of IS integration on sustainable competitive advantage is mediated by organizational absorptive capacity. In fact, IS integration projects are usually coupled with reengineering, change and training projects for facilitating the use of integrated information system for supporting operating and strategic decision making.

Thus, an IS integration project is conducted typically by implementing a corresponding change in the organizational variables that enact organizational absorptive capacity. The definition of organizational absorptive capacity is based on Zahra and George's (2002) model that identifies four underlying organizational capabilities that drive absorptive capacity, acquisition, assimilation, transformation, and exploitation. We have provided four corresponding IT-related capabilities, namely, process, training, change and flexibility orientation.

We have conjectured that IS integration is associated with greater absorptive capacity. This hypothesis is verified, suggesting that a higher degree of IS integration is associated with a greater process, training, change and flexibility orientation. The relationship between IT and a process view of organizations is among the most broadly studied within the Management Information Systems (MIS) literature.

The positive association between IT and flexibility represents the assumption underlying the vast literature on business process reengineering. This chapter's contribution is to support the validity of Zahra and George's (2002) model by showing the mutual correlation between process, training, change and flexibility orientation. This indicates that these variables should not be studied in isolation but constitute different aspects of a more general construct, namely organizational absorptive capacity.

The positive association between IS integration and this chapter's operationalisation of absorptive capacity suggests that the integration of a company's information system increases together with firms' ability to take advantage of a higher-quality IT in terms of greater process orientation and flexibility. Furthermore, absorptive capacity mediates the impact of IS integration on competitiveness. This confirms the role of absorptive capacity as a necessary organizational capability enabling the measure of IT performance benefits.

## Summary

The main focus of Chap. 8 is to study the area of IS integration, Absorptive capacity and Business Performance. The contribution of this chapter is to provide evidence to support the mediation role of absorptive capacity. In addition this chapter's contribution is to support the validity of Zahra and George's (2002) model by showing the mutual correlation between process, training, change and flexibility orientation. This indicates that these variables should not be studied in isolation but constitute different aspects of a more general construct, namely organizational absorptive capacity.

The organizational literature emphasizes the relevance of absorptive capacity as a construct involving several organizational variables that concur towards the ability to innovate. However, few studies have studied absorptive capacity from an IT perspective. Future research could benefit from the positive associations uncovered by this study and provide additional evidence of absorptive capacity's mediation role.

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## Chapter 9

# Strategic Information Governance Modeling and Assessment

**Abstract** In this chapter an analysis of the Strategic Information Governance Modeling and Assessment (SIGMA) model is provided. The chapter consists of three sections. Section “The Sigma Model” portrays the Sigma model, the factors affecting firm performance, the main elements of the model and proceeds explaining the concept of information governance and its parameters. Section “The Main Elements of the Model” analyzes the model’s check-up tool by clarifying concepts relating to the evaluation of: (a) performance, (b) capabilities and (c) business process of a firm, as well as analyzing the TO-BE state of a firm. The last Section refers to the SIMBA methodology which was used to develop the SIGMA model.

### The Sigma Model

In highly competitive business environments, companies should be able to understand and adapt to rapidly changing business circumstances. As reported in the previous chapters, organizations usually follow specific patterns or models to quickly respond to the changing business environment. The adoption of an appropriate model will help organizations to identify and take advantage of IT Business Value and its related opportunities. In this section the author presents such a framework entitled Strategic Information Governance Modeling and Assessment (SIGMA). Firstly the key role that the agility parameter plays in the model is explained. Then, factors affecting the performance of a firm are analyzed.

### *Agility and Its Role*

Agility is vital to the innovation and competitive performance of firms in contemporary business environments (Sambamurthy 2003). Firms are increasingly relying on information technologies as the Internet or Web-services. One definition for agility is provided by the Advanced Research Programs Agency (ARPA) and the Agility Forum where “agility is the ability to thrive in an environment of continuous



and often unanticipated change” (Sarkis 2001). Agility is also reported as the ability to detect and seize market opportunities with speed and surprise, and it is considered to be an imperative for business success. Companies that use agility as a competitive tool can grasp on opportunities for competitive action in their product-market spaces and assemble the necessary knowledge and assets for seizing those opportunities. With agility a company can continually improve the processes of creation, capture, and competitiveness through innovations in products, services, channels, and market segmentation. Moreover, at this point it is important to identify the factors affecting the performance of a firm.

### ***Factors Affecting Firm Performance***

Different mechanisms cause different impacts of the information systems on corporate performance. In particular, the synergy (given by complementary organizational resources) impacts both the business processes and the overall performance of a company. As it is illustrated in Fig. 9.1, the general environment that a company belongs includes characteristics which are unique for each country and the competitive environment in which a company does business.

The competitive environment gives ground to the characteristics of the business sector and the partners’ resources and processes to interact with the information core of the company, its information systems. Information Systems can be used as a tool that reinforces business processes and enhances corporate performance.

Information Systems integrate both IT resources, such as technology or human, as well as complementary organizational resources and form a distinctive mechanism that enhance business processes and on their performance. In addition, the role of information is more focused in the business process itself, the business process performance and therefore reflects on the corporate performance.

Information and Information Systems can be of great value for the company but this is limited to a company that grasps the full potential of its information. Thus, special emphasis should be given on management in order to understand how information can be used and result in competitive advantage.

### ***Information Governance***

According to the Webster dictionary (*Webster’s Dictionary* 1913) the word “**Governance**” corresponds to: “*exercise of authority; control; government; arrangement*”. In a more modern version of the term, and in correlation to organizations, governance can be seen as the act of affecting government and monitoring (through policy) the long-term strategy and direction of an organization. In general, governance comprises the traditions, institutions and processes that determine:

- How is power exercised?
- How are citizens given a voice? and
- How are decisions made on issues of public concern?

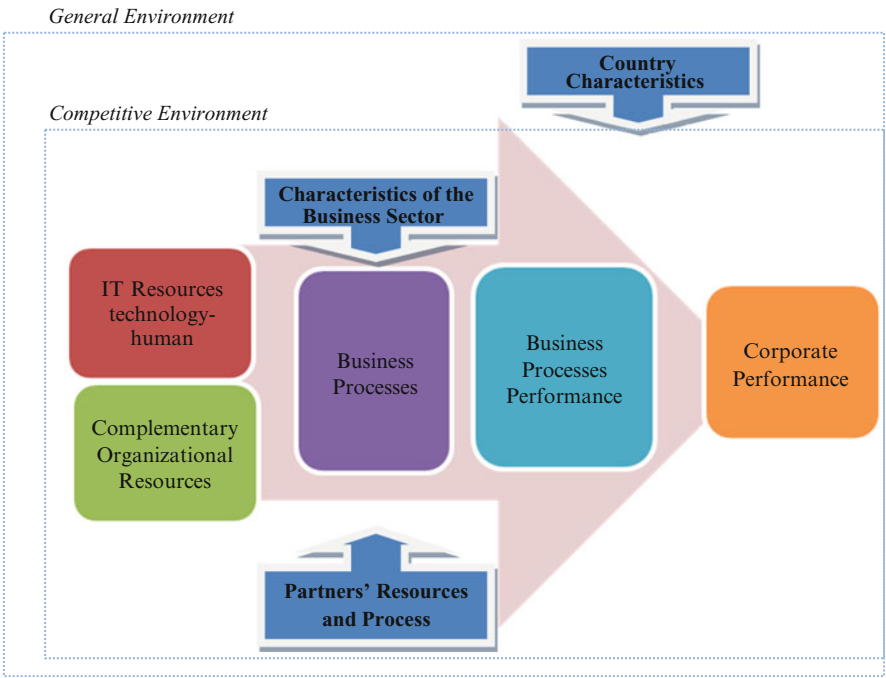


Fig. 9.1 A model for IT business value

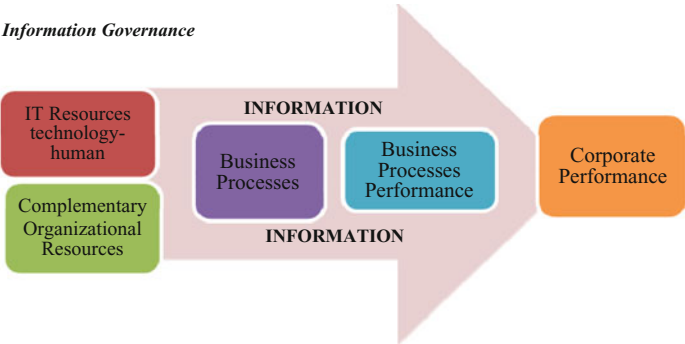


Fig. 9.2 Information governance

The ability to govern the information flow (or information governance) plays a key role to corporate performance. In respect to the model of IT business value presented before, IT Governance focuses on the part of information (business process, business process performance, corporate performance) (see Fig. 9.2).

That is also the basis of a company's ability to adjust the structure of its processes. As its process towards orientation to information governance consists of automation, rationalization and reengineering is a subject of different degrees of risk and profitability accordingly (see Fig. 9.3).

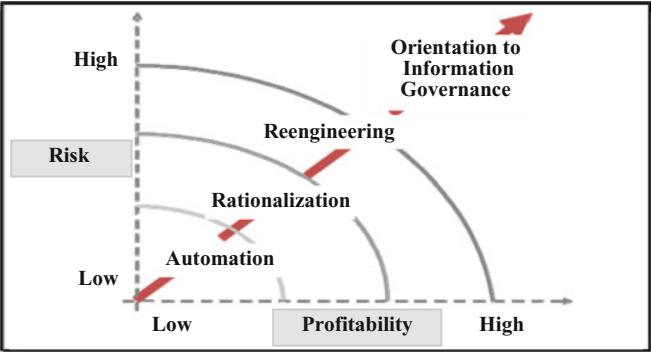


Fig. 9.3 Orientation towards governance

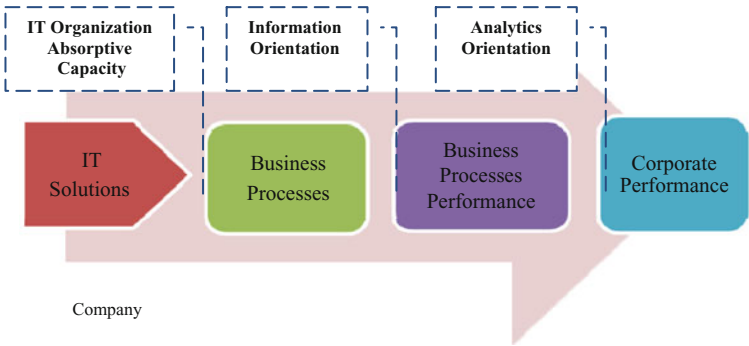


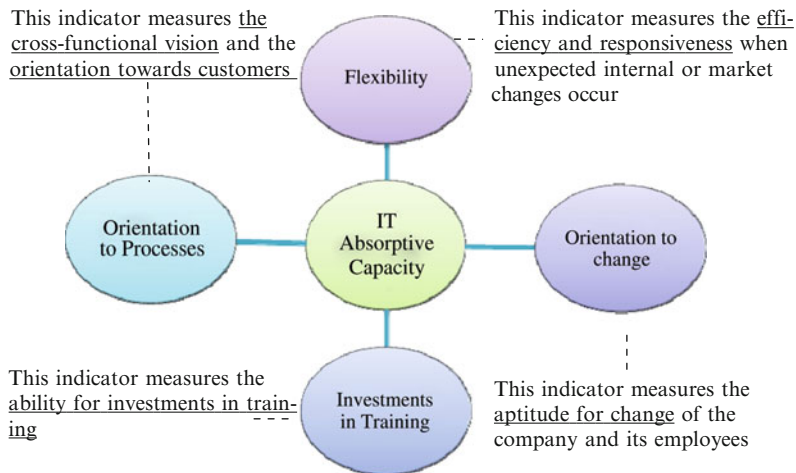
Fig. 9.4 Information governance variables

In the following subsection an analysis of the Strategic Information Governance Modeling and Assessment (SIGMA) model is provided. In doing so, the main elements of the model re presented and explained in detail.

The Main Elements of the Model

IT solutions can enhance corporate performance through the appropriate use of information, but specific variables as *IT organization absorptive capacity*, *Information orientation* and *analytics orientation* interfere this path. These variables address the concept of “Information Governance” and are depicted in Fig. 9.4.

In more detail and moving towards an understanding of the model by *IT Absorptive Capacity* we mean the ability of a company to identify and take advantage of IT Business Value and its related opportunities.



**Fig. 9.5** IT absorptive capacity

This has four indicators affecting it as presented in Fig. 9.5:

- **Orientation to process** which measures the cross functional vision and the orientation towards customers,
- **Flexibility** which measures the efficiency and responsiveness when unexpected internal or market changes occur,
- **Investments in training** which measures the amplitude for investments in training and
- **Orientation to change** which measures the amplitude for change of the company and its employees.

IT absorptive Capacity requests a strong Information Aptitude, which we define as *the ability of a company to use all information available in different business units and departments and can be measured by the information orientation variable*. Focusing on *information orientation*, we consider also four distinct indicators, as it is illustrated in Fig. 9.6:

- **Management aptitude towards information** which measures the level of information aptitude,
- **Management use of information** which measures the information management process (gathering elaborating, publication, sharing),
- **Business use of IT**, which measures the different complexity and
- **Data quality** which measures both the qualitative and quantitative dimensions of data involved in decision making process.

In order to gain great corporate-level results from business processes performance, a company needs strong “Analytics” Orientation, both at strategic and operational levels (in the following, *strategic business analytics* and *operational business analytics*). These analytics address specific questions as it is shown in

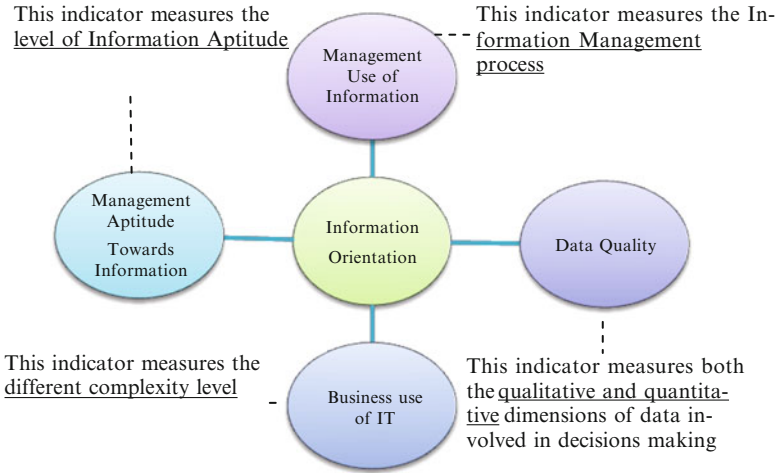


Fig. 9.6 Information orientation

Table 9.1 Business analytics

Strategic impact	Strategic Business Analytics	Optimize and simulate	What is the best event possible if...?	Analysis
		Forecasting models	What may happen in the future..?	
		Forecast and analysis	What may happen if trends are confirmed?	
		Statistics and analysis	Why did this event happen?	
	Operational Business Analytics	Alerts	What should we do?	Access and reporting
		Questions/ insights	Where is the problem exactly?	
		Ad-hoc reports	When, how often, how?	
		Standards reports	What's happening right now?	

Table 9.1, and are divided in different groups of process handling. The elements of Strategic Business Analytics are divided into: (a) Strategic Business Analytics and (b) Operational Business Analytics. These are described after the presentation of Table 9.1.

As reported above, the elements of Strategic Business Analytics are classified into the following two categories:

**Strategic Business Analytics** can be characterized as advanced technologies and tools supporting strategic decision-making processes and corporate agility, thus permitting innovation and competitive differentiation:

- It is based upon relevant information for companies and markets;
- It requires homogeneity and identity of corporate data;

- It makes possible to aim information towards decision-making processes, thus pulling out relevant trends, market opportunities and penetration strategies;
- It enables the chance to anticipate competitors' strategies or to answer respond timely to their initiatives;
- These opportunities can be seized through continuous knowledge sharing and pervasive use of relevant information.

*Operational Business Analytics* deal with urgent operational needs. Typically, the need for information is detailed and specific and information is required to be accurate. By using these analytics, employees may instantly “enable” the required knowledge. Practically, the Operating Business Technology enables direct knowledge about:

- Which customer orders are late, comparing the average duration of the ordering process, or the number of goods?
- Who are the best sellers, comparing their mark-up to the other sales force?
- Customer behavior models, comparing the duration of the relationship and the types of orders
- Any changes in the mix client/product or company/product
- Insights on characteristics of main events for a company, for example very large commercial orders
- Profitability of individuals

## The Sigma Model Tool

The proposed SIGMA model is based on various elements discussed in the previous sections or chapters. It mainly focuses on:

- (a) IT absorptive Capacity
- (b) Information Systems Integration Aptitude which is related to application integration and data
- (c) Analytics Orientation
- (d) Information Aptitude
- (e) Business Capability
- (f) Competitive Actions Portfolio
- (g) Strategic Information Governance and
- (h) Competitiveness Performance.

In SIGMA model the Strategic Information Governance can be defined as the result of the components A-D namely: (a) IT absorptive Capacity, (b) Information Systems Integration Aptitude, (c) Analytics Orientation and (d) Information Aptitude. Business Capability is affected by the values of the Strategic Information Governance and the former has an impact to the Competitive Actions Portfolio. The latter interacts and affects the Competitiveness Performance.

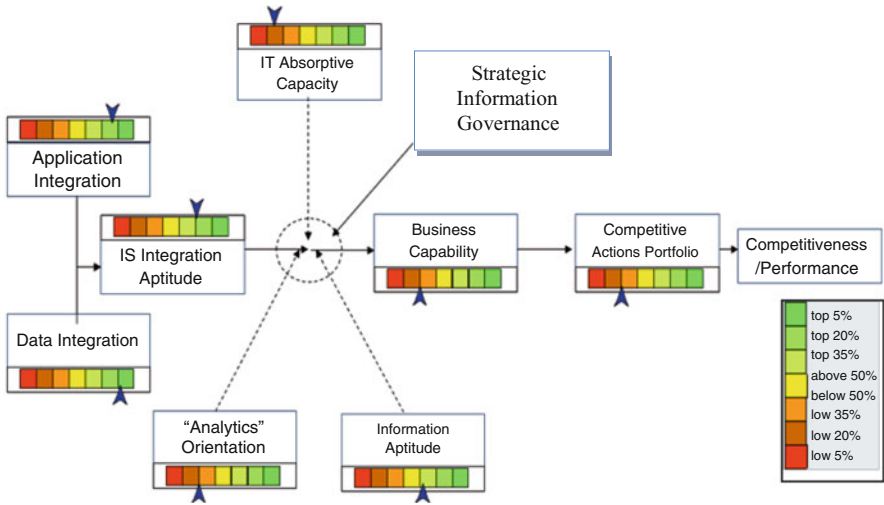


Fig. 9.7 The strategic information governance modeling and assessment (SIGMA) model

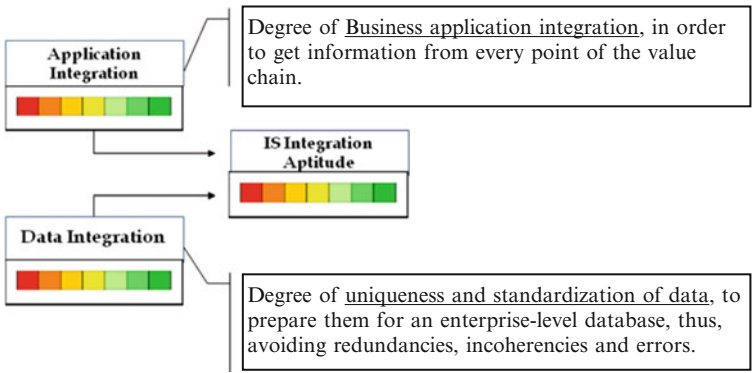


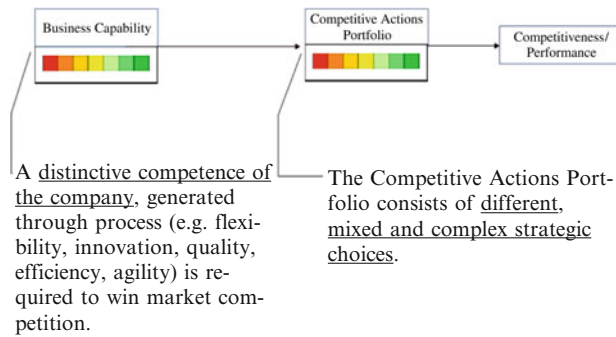
Fig. 9.8 The IS integration aptitude

### Check-up Tool

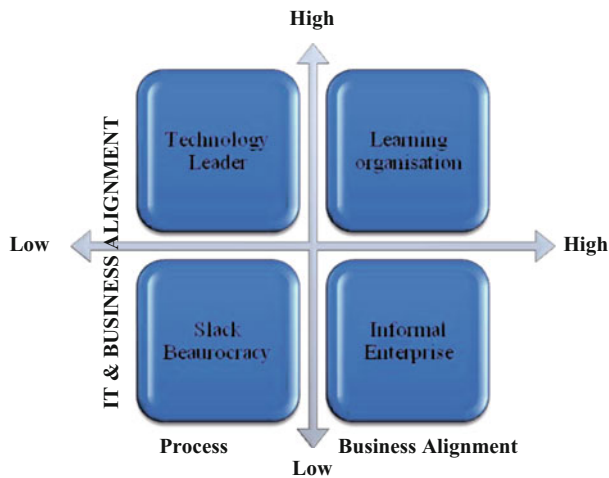
The proposed SIGMA model addresses the issues of how IT can be used to support business strategy and create value. Based on the SIGMA Model, the author developed a Check-up tool which is presented below. This is shown in Fig. 9.7.

The IT variable can be defined as “Information Systems Integration”. It results from two “second level”, variables application and data integration, which, as seen in Fig. 9.8, are a degree of business application integration and uniqueness and standardization of data respectively.

The processes analysis is driven by two dimensions: organizational and informative. Three variables are considered: (a) IT absorptive capacity, (b) data potential and (c) information aptitude.



**Fig. 9.9** Towards competitiveness/performance



**Fig. 9.10** Placement matrix

Moreover, business capabilities are achieved through corporate processes, and thus it can be stated that:

- The business capability represents the necessary alignment between processes output and strategic needs. To succeed for a company depends on its ability to transform key corporate processes to create distinctive skills.
- A business process is a logical sequence of related activities, aiming to a specific goal or scope. A company should develop and improve its business processes, to achieve business capabilities.

In more detail the reference model can be seen as a tool that using business capacity and competitive actions portfolio, conclude to competitiveness-performance, as seen in Fig. 9.9.

Analyzing the answers gathered using the SIGMA model, we can allocate four different types of companies into a Placement Matrix, presented in Fig. 9.10.



The details of the organizational issues identified on the axis of the matrix and the “Technology Leader” group, are presented:

- IT-business alignment: IT is integrated and supports business. In case of a low IT-business alignment, IT is not integrated and supports only technical requirements, not business ones.
- Process-Business alignment: this is the organizational perspective. If processes are aligned to business (e.g. everybody understood the process goal, which is functional to value generation for the whole enterprise); in case the alignment is low, the company is too atomistic and it has a low orientation to cross-functional processes.
- Technology Leader: Information Systems are integrated and orientated to business needs. In spite of this, organizational issues, corporate values and skills are too much oriented towards organizational units and poorly towards processes yet: this is the “to be”. In this case, investments in Analytics can benefit from divulgation, thus promoting investments by other departments. Technology leaders have integrated systems ready to use Analytics, but their organizational structure is not ready yet.
- Slack bureaucracy: there is low alignment, IS and processes are separated among department, each one only aims to its own specific goal. There are no links with enterprise-level strategy nor to IS architecture and integration, nor to organizational processes. Firstly, these companies should evolve towards “technology leader” group, then towards process organization (or, directly, towards a “collective mind” through simultaneous actions on organization and information systems). Regarding the Information Systems level, they should proceed towards better system integration.
- Informal enterprise: typically, SMEs are allocated here. They are oriented to processes, flexible and not separated. From the organizational point of view, each one aims to a single strategic goal, defined by top management. But system integration is yet so far: they should not invest in Analytics, but in basics of Information Systems (e.g. MS Office version update) and proceed step by step towards integration.
- Learning organization: enterprises who evolved, at the same time, technology and business processes (oriented towards strategy and value generation). They are ready for investments in Analytics (Fig. 9.11).

To sum up, appropriate actions to integrate Business, Technology and Organization make possible for each company to gain better allocation. These actions could be oriented towards two main directions: knowledge standardization and knowledge sharing:

- Standardization of behavior: the process will organize people’s behavior, thus producing relevant and predictable results.
- Knowledge Facilitation: the process will sponsor the knowledge sharing among employees and will give value to individual ideas and actions.

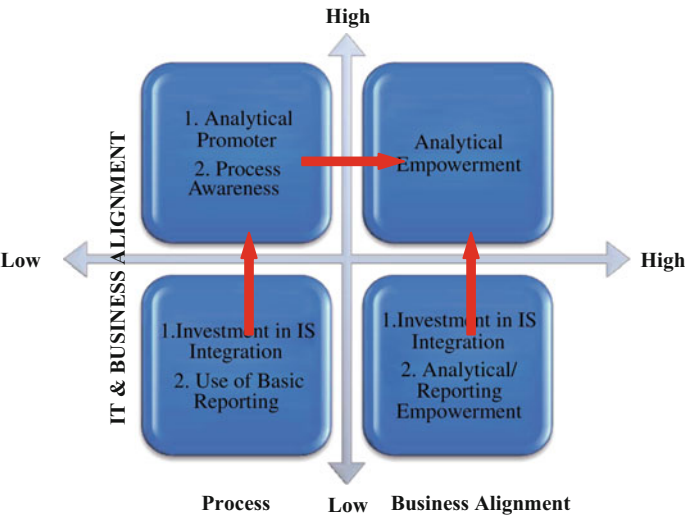


Fig. 9.11 Analytical placement matrix

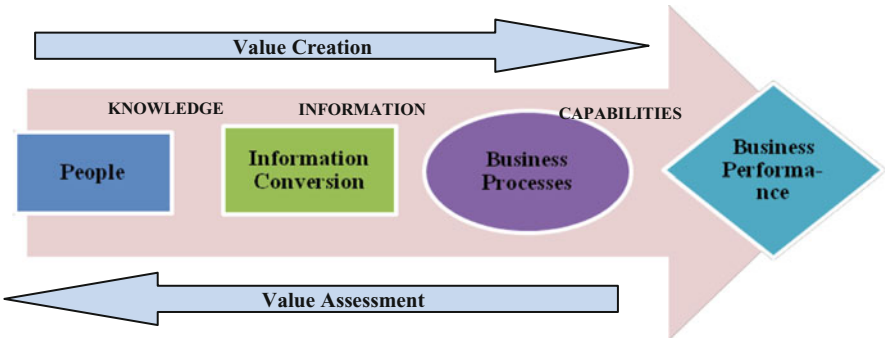


Fig. 9.12 Knowledge to performance process (adapted from Kettinger 2005)

**SIMBA: The Sigma’s Model Methodology**

In this section the methodology used to create the SIGMA model is presented and all the aspects concerning the theoretical parameters constructing the model are analyzed.

In Fig. 9.12, the path from knowledge to performance is outlined. Initially, the knowledge of suppliers, employees, and customers is converted into information that is relevant to the firm’s business processes. By utilizing effective information conversion practices, business processes will have the explicit information required to function optimally. These business processes, when functioning optimally, will produce the capabilities required to succeed in the marketplace (high business

performance). In other words, people are the ultimate source of value creation, while business performance measurements (value assessment) are a by-product of the knowledge-based value creating practices of the firm.

With this understanding of value creation, a new conceptual model and consulting methodology were developed by Kettinger (2005), discussed in the following Sections. The **Strategic Information Management Breakout Assessment (SIMBA)** methodology is designed to guide executives and/or consultants through the process of successfully aligning information conversion practices with the firm's core business processes. In order to determine the optimal means of value creation, the executives should follow a value assessment path. This begins by examining business performance, processes, and information conversion practices and ends with recommendations for collecting, assimilating and utilizing the knowledge of people. The four-stage methodology of SIMBA will require executives to:

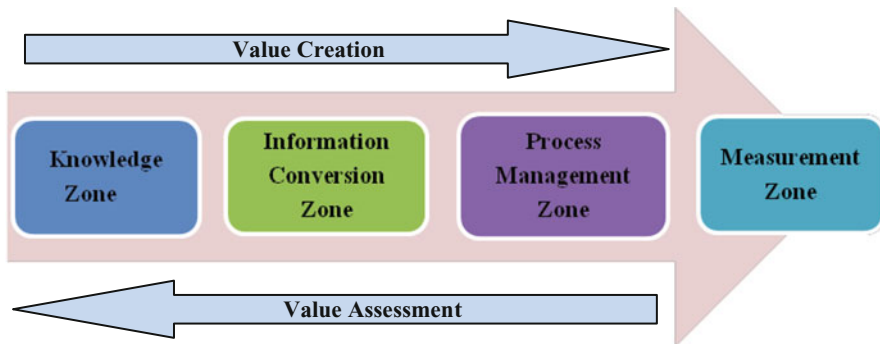
- **Initiate** the project.
- **Diagnose** the firm's present business performance, strategies, capabilities, processes, and sources of knowledge.
- **Envision a Breakout strategy** for the firm's optimal future business performance, capabilities, processes, and sources of knowledge.
- **Design a Transition plan** for the necessary changes to people, processes, information flows, and technologies required to achieve optimal performance.

The SIMBA methodology is accompanied by a conceptual model that divides the firm into four zones. These four zones allow the project team to systematically follow the value assessment path from business performance to the source of value – people. The value assessment path travels through all four zones and requires the completion of the following:

- Business performance goals should be clarified.
- Business capabilities, designed to achieve target performance levels, should be cultivated and supported by well-engineered business processes.
- Business processes should be powered by information that is focused, timely, and accurate.
- The “activities and mechanisms that enable the firm to coordinate, transfer, and/or apply the knowledge of different individuals in the firm to support its production function” should be improved.

Figure 9.13, takes the Knowledge to Performance Process model of Fig. 9.12 and breaks it into four components (or zones) that can be easily examined. These four zones are explained below:

- **Knowledge Zone:** Knowledge resides with people and is the source of value creation for the firm.
- **Information Conversion Zone:** The goal of management is to establish structural mechanisms that convert the knowledge of people into information that can be useful within business processes.



**Fig. 9.13** The four zones (adapted from Kettinger 2005)

- **Process Management Zone:** In addition to delivering the right information to the right business process activity/decision at the right time, business processes need to be properly designed (people, IT, activities, info and metrics) to deliver the correct business capabilities to succeed in the market.
- **Measurement Zone:** Ultimately, the goal of effective information management is better business performance. Measurements such as ROI, number of patents, etc. are means by which a firm can assess its value and competitive position in the marketplace.

These four zones form the basis of the SIMBA conceptual framework. The framework provides a blueprint for harnessing information to improve business practices. Each element of this model is further elaborated in the paragraph following the SIMBA methodology developed by Kettinger W. (2005). The methodology consists of four major stages. The first stage in the methodology is marked by the formation of a project team and setting up the project. The next stage requires a thorough evaluation of the firm's AS-IS performance, capabilities, processes, and knowledge conversion structures. This stage is followed by envisioning the desired goals for the company and identifying and designing the appropriate performance metrics, capabilities, processes, and knowledge conversion structures. Based on observation, interviews, research, and strategic planning, the project team will develop a list of recommendations for the firm. The project concludes with an analysis of the differences between the current and desired state of the firm and charting the path for the required transition. The last step culminates in the preparation of the final report and presentation(s) of the findings to the class and the host company. In the following we report a summary of different stages as discussed in Kettinger W. (2005).

## Stage 1: Initiating the Project

To initiate the project, the project team must identify a sponsor, define the project scope (objectives and deliverables), develop a project plan, and manage the expectations of the firm. In particular, the project team has to secure commitment

from members of the management team. As a consequence, this stage requires the identification of key stakeholders, and the definition of project scope, tasks, and approach. The output of this stage is a detailed project plan, including the following activities:

- Activity 1: Outline Project Scope
- Activity 2: Identify Project Stakeholders
- Activity 3: Determine Project Schedule
- Output 1: Publish Project Work Plan

## **Stage 2: Diagnosing the Current Situation of the Firm**

In this Stage, the following activities will be conducted to lead to the development of an AS–IS overview of the firm.

- Activity 1: Evaluation of AS–IS Performance
- Activity 2: Evaluation of AS–IS Capabilities
- Activity 3: Evaluation of AS–IS Processes
- Activity 4: Analyze how the firm manages information, technology, behaviors and values, and organizational structure
- Output 2: AS–IS Overview of the Firm

### ***Activity 1: Evaluation of AS–IS Performance***

The project team will carry out the assessment of the present performance of the firm, by reviewing the firm's financial and non-financial performance, the firm's current business capabilities, the firm's current knowledge conversion structures. This assessment provides the information required as starting point of the organization's strategic information management plan.

- **Financial:** The project team will measure the firm's profitability in terms of metrics such as e.g. Net Income FROM Operations (NIFO), rate of Return On Assets (ROA), and Operating Profit Margin (OPM). Furthermore, the team will evaluate the firm's production, purchasing, product pricing, and financing decisions. These analyses aim to understand the intensity of the use of the assets by the firm to generate gross revenues.
- **External Assets:** The project team assessment will be focused on more intangible assets, such as brands, customers, suppliers, distribution channels, and business partnerships (the current external assets, how they are cultivated, managed, etc.).
- **Internal Assets:** The project team will analyse and assess the firm's culture and management philosophy and the performance of information systems and management processes.

- **Individual Assets:** The project team will measure the performance of the actual individuals that make up the firm, considering the processes by which individuals are able to learn, share information, develop professional competencies, and adapt to change.

### ***Activity 2: Evaluation of AS-IS Capabilities***

This activity will focus on the business capabilities enabling the firm to achieve its current performance level need to be identified. The project will analyse and evaluate the efficiency and effectiveness of the business processes, the people involved in these processes, the information sources exploited by employees in those processes, and the available supporting/enabling technology.

### ***Activity 3: Evaluation of AS-IS Processes***

In this activity the team should focus on the evaluation of the core business processes as they relate to the capabilities analysed in the previous activity. Each core business process consists of five elements: people, procedures, technology, information, and performance metrics. The team has to identify all employees involved in each core business process, their tasks and activities, the technology and the information they use to perform those tasks and activities. The team will identify the appropriate metrics for the assessment. Special attention should be paid to standardization and knowledge facilitation, considering the four key sources of knowledge, specifically customers, suppliers, employees, and the marketplace with respect to the information they provide to each and every business process under investigation. A list of possible questions that will assist such an evaluation process are provided in Fahey and Prusak (1998).

Finally, the team may map the relationships among the analyzed processes and the elements within each process.

### ***Activity 4: Evaluation of the Information Conversion Practices of a Firm***

The impact of knowledge as a key resource of competitive advantage on a firm's business performance depends on a firm's maturity on the four components of the information conversion process. These components are the focus of this activity, where the project team has to identify how information needs are coupled with employees who make decisions as part of their roles in specific business processes.

Special attention should be devoted to identify the maturity level reached by a firm on each of the dimensions of Information Orientation (IO). Firms with high IO

**Table 9.2** Maturity path for IO components

Maturity path for IO components		
Information technology practices	Information management practices	Information behaviors and values
1. IT for operational support	1. Collecting	1. Integrity
2. IT for business process support	2. Organizing	2. Formality
3. IT for innovation support	3. Maintaining	3. Control
4. IT for management support	4. Processing	4. Transparency
	5. Sensing	5. Sharing
		6. Pro-activeness

maturity use information for competitive advantage, having more agility in the marketplace, and higher business performance (Table 9.2).

The following questions can be used to guide the team through this step of a firm analysis. These questions can be used as a tool to guide and stimulate the creative thinking of the team (source: Kettinger 2005).

#### Questions Related to Information Behaviors and Values:

- How is personal knowledge converted into explicit information that can be used by a firm?
- Does the company provide performance information that allows employees to measure their impact on the business's performance?
- Is information shared? Are people willing to share information? Is sharing rewarded or punished?
- How is information sharing promoted across the company?
- Is the importance of accurate information well-understood?
- Is information regarding mistakes, errors, and failures shared?

#### Questions for Information Management Practices:

- How are businesses trends identified and capitalized on by a firm?
- What technological breakthroughs are impacting the industry?
- Who is responsible for information collection within a firm?
- Does management reward information collection and dissemination?
- Is information easily accessible to customers, suppliers, and employees?
- What tools are available to find, analyze, and interpret information?
- How does the company train people to use information?
- How does a firm keep information up-to-date?

#### Questions Related to Information Technology Practices:

- How is technology used to ensure employees perform consistently?
- Do the company's information systems transact business smoothly?
- What systems link employees, customers, and suppliers?
- Are these systems effective?
- How does technology foster the communication of new ideas?
- What role does technology play in assisting, analyzing, or making decisions?
- Does IT improve business capabilities?

Questions for Organizational Structure:

- What is the organizational structure?
- How is knowledge flow facilitated or impeded by this structure?
- Does the structure promote standardized processes?
- Does the structure facilitate information exchanges?
- What is the informal structure of a firm?
- How is information exchanged?
- What is the real decision making process?

### **Stage 3: Envisioning the To-Be State of a Firm**

This Stage will provide a target for the strategic plan. The project team actively works and interacts with members of senior management to define the optimal target business performance, and the capabilities required. The Stage is initially made up of the following activities, producing as first output the *To-Be Vision of the firm*:

- Activity 1: Develop a To-Be Vision
- Activity 2: Define To-Be Performance/Strategies
- Activity 3: Define To-Be Capabilities

Once defined a To-Be Vision of the firm, the team will use its expert knowledge and out-of-the-box thinking to suggest a solution an employee might not be able to recognize on his/her own. The second set of activities, producing an *Optimal Knowledge Conversion Map* as output, are:

- Activity 4: Target Key To-Be Business Processes
- Activity 5: Define how a firm will manage information, technology, behaviors and values, and organizational structure
- Activity 6: Finalize Optimal Process Structure

#### ***Activity 1: Developing the To-Be Vision of a Firm***

After completing an AS-IS analysis, the team together with firm's executives and C-Level managers have to quickly identify the desired To-Be state of a firm. One particularly effective technique is to describe *a day in the life of a firm in 2015*. The goal is to gain an understanding of where a firm would like to be positioned.

#### ***Activity 2: Defining a Company's To-Be Performance***

Once the To-Be state for a firm is defined, the team has to identify the metrics to assess the fulfillment of the vision on all key dimensions, giving a particular



relevance to financial metrics (to benchmark the performance of a firm against its competitors). Other metrics deal with the external, the internal and the individual assets. These are reported below:

- **External Assets:** The metrics have to focus on the management and growth of a firm's external assets, by looking at industry leaders.
- **Internal Assets:** Even if internal assets of a firm are often difficult for other firms to duplicate and an internal asset, such as a company's culture, can be difficult to change, the project team has to identify the organizational dynamics and management philosophies required to reach the To-Be state defined for the firm.
- **Individual Assets:** The project team should assess what behaviors and individual characteristics are necessary for the firm strategic plan to be successful.

### ***Activity 3: Defining a Company's To-Be Capabilities***

The team should document more formally the new vision of the company, incorporating the findings of all three preceding activities, and having identified the key optimal business performance and related business capabilities. These business capabilities should be unique to allow the firm success in the marketplace. The team may paint a snapshot of the firm as it would appear in 3 years.

### ***Activity 4: Target Key To-Be Business Processes***

The team has to target the key processes to implement in order to achieve the identified business capabilities. A complete analysis of every single process in a firm is out of the scope of this project, where the team should better focus on the most critical of the processes delivering the desired capabilities. The team should identify and represent processes highlighting their importance as well as the interrelationships among all processes, considering five elements: people, procedures, technology, information, and performance metrics. As in the Activity 3 (*Evaluation of AS-IS Processes*), and considering its results, the team has to identify employees that will be involved in the analyzed business process, the tasks and activities these people should perform, the technology they will use, and the information they will need to perform the necessary activities.

### ***Activity 5: Define How a Firm Will Manage Information Conversion Structures***

In this Activity, the knowledge conversion structures will be designed to be highly or less structured, depending on the business processes supported. The project team

should carefully consider the business process and capabilities a firm requires, considering the outputs of stage 2 to know which strengths need to be optimized, and which weaknesses need to be overcome.

Furthermore, the knowledge conversion structures will be also based on industry best-practices that align a firm's business processes with the required business capabilities. To this end, the project team will conduct a rigorous analysis of a firm's Information Management Practices, Technology Management Practices, Information Behaviors and Values, and Organizational Structure. In order to design effective knowledge conversion structures, the project team should simulate the performance of a firm once the new structures are in place. Finally, a questionnaire may be produced with specific questions regarding the information conversion processes, and in particular:

- Questions for Information Behaviors and Values
- Questions associated with Information Management Practices
- Questions related to Technology Management Practices
- Questions for Organizational Structure:

For a set of specific questions for these four types of questions, we refer the reader to the one discussed in Kettinger (2005).

### ***Activity 6: Finalize Optimal Process Structure***

The processes of a firm are to be designed in such a way that the necessary business capabilities are produced. One process a firm can use to align its processes and information management practices can be based on the following process design cycle: (a) *Focus on Goals*, (b) *Identify Users and Business Process*, (c) *Define the Support Process*, (d) *Identify the Technology Platform* and (e) *Implement and Monitor*.

The first step is to focus on the business goal. In doing so, a series of questions like those listed below should be answered: (a) What needs to be done? (b) What tasks or problems need to be addressed? (c) Are there regular failures or bottlenecks? (d) Is information hard to find? The answers to these questions will certainly vary; however, they will often require input from a skilled employee, who understands the needs to the business. The next step is to identify the users and processes that are involved in achieving the business goal. It will also be necessary to determine the necessary information. It is critical that the information is up-to-date. The third step is to define the support processes necessary to deliver the necessary information. Here the following questions should be answered: (a) How will the information be collected, organized, and managed? (b) Who will be responsible for each of these tasks? The fourth step is the selection of technology and tools. In many cases, once the business requirements have been defined, it is possible for the technology to be commercially available. The final step is to implement and then monitor the process. At this point the organization should answer to the following questions; (a) How is the process working? (b) Is a firm

saving money, reducing processing time, or improving decision making? The process could be monitored by surveying the project managers who benefit from the new process. At the end of this step, the team would recap the analysis with a knowledge conversion map linking processes, capabilities, and strategic priorities.

## **Stage 4: Design a Transition Plan**

The final stage is the construction of a transition plan to reach To-Be Vision, that in many cases may be too far reaching for most firms to achieve immediately. The transition plan will discuss the necessary changes to people, processes, information flows, technologies and metrics to achieve optimal business performance. In this stage, the project team will prioritize strategic initiatives and action items. The output will be a comprehensive strategic plan that will lead a firm from its As-Is state to the To-Be vision. Several tools and methods exist at the state of the art and a starting point for the creation of the plan may be, for example, a gap analysis to identify differences between the current status of a firm and the desired To-Be state. Since several interventions may be required (such as e.g. people training, business processes reengineering, etc.), the transition plan needs to provide milestones to incrementally move a firm toward optimal performance. These milestones should be built on 6 months to 1-year timeframes. Nevertheless, to identify the appropriate speed to achieve the firm To-Be vision, the project team must evaluate the firm's ability to change at organizational level and its capability to allocate resources and take risks, for example, by carrying out cost/benefit and risk analyses.

## **Summary**

In this chapter the Strategic Information Governance Modeling and Assessment (SIGMA) model is proposed and analyzed and examples are presented. The SIGMA model seeks to address problems that organizations face when operating in a highly competitive business environments. In such environments companies should be able to understand and adapt to the rapidly changing business circumstances.

In the previous chapters it was reported that organizations follow specific models or patents to respond to the changing business environment. Practice has shown that many organizations have problems in adjusting their practices and strategies as they cannot fully understand the dynamics and the needs of the changing environment or adequately measure important variables that can influence their strategy. Thus, the authors suggest that the adoption of an appropriate model, like SIGMA model, will help organizations to identify and take advantage of IT Business Value and its related opportunities.

The SIGMA model is based on various parameters as these were presented in the previous sections and focuses on: (a) IT absorptive Capacity, (b) Information

Systems Integration Aptitude, (c) Application Integration, (d) Data Integration, (e) Analytics Orientation, (f) Information Aptitude, (g) Business Capability (h) Competitive Actions Portfolio and (j) Competitiveness/Performance. Based on the SIGMA model a tool was developed that will help organizations using the model and thus be able to identify of IT Business Value and take advantage. The last part of the book refers to the SIMBA methodology (Kettinger 2005) which was used to develop the SIGMA model.

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