"Information Management and Enterprise Architecture Planning - A Juxtaposition"

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# Information Management and Enterprise Architecture Planning – A Juxtaposition

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## Abstract

This exploratory report juxtaposes overviews and key concepts pertaining to information management and enterprise architecture planning. Neglecting the management of information as an organisational resource may be the reason for the poor understanding towards information architecture as a critical component of the total enterprise architecture.

The authors view the enterprise architecture approach as a window of opportunity in terms of educating senior managers on the value of information management practices. The article aims to promote an executive level understanding of the role and nature of information as a resource in the organisation so that business owners would consider modelling the organisation as an information-centric business even if it is considered to be a traditional and not necessarily information-intensive business.

The research objectives for this study determined that an exploratory research design be used, focussing on secondary data sources to supply the information managers could use for decision-making. A wide literature study on the topics of strategy, business management, organisational design, information and knowledge management, information systems planning and other relevant topics was performed. Ideas from contemporary writing and established literature were used to sketch the outlines of a conceptual understanding of information management and enterprise architecture (EA).

The analysis of the resources suggested that executive level ownership is required for enterprise architecture initiatives and that the understanding must be established that managing the enterprise architecture is an activity that equates to managing the business strategy and plans. Organisations and managers are urged to adapt architecture initiatives as a means to promote the effective use and maintenance of information quality and quantity. Topics for future research in this area are suggested.

**Key words:** Enterprise architecture planning; information architecture; information management; information technology; juxtaposing.

## Introduction

Managing information as an intangible resource in the 21st century has increasingly attracted the attention of managers and scholars and researchers in the business sciences lately. Unlike many physical resources, information does not easily lend itself to determining the value thereof in an organisation. It has no intrinsic value, and Hellriegel and Slocam (1992) rightfully state that the decision makers in the enterprise determine its value. The sophistication of information technology available in the new millennium enables managers to access relevant information for effective decision making that impacts the planning and execution of business strategies. Information should be managed as part of the integrated business portfolio, as the main integrating factor, and sometimes as the main factor of production. The technology that supports some of these activities is by far not as important as the information itself.

By modelling the modern-day organisation's enterprise architecture, and by emphasising the information capabilities and information architecture (a model of the information resources and processes that support business goals and processes) in particular, it is argued that the value of information as *corporate asset (in the sense of infrastructure that supports value-creation)* and

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*strategic resource (in the sense of an economic resource such as capital, raw material, labour and entrepreneurship)* may be leveraged to increase business value and internal performance. For the purpose of this article, the concern is neither in the first place about IT management or IT investments, or any other approach, nor attempts to quantify the value generated by mere infrastructure or software. On the contrary, it is argued that business value derived from the use of an IT or information system is merely co-incidental. The management and interpretation of the information, which should be seen as a strategic resource that may be leveraged to provide competitive advantage, is what counts (Cravens and Piercy, 2003).

Davenport (Marchand et al., 2000, p. 5) describes an imaginary world obsessed with plumbing to illustrate the obvious oversight found in so many modern day organisations in their approach to managing information resources: *"In this bizarre place, hundreds of magazines and books, and even a few television channels, cover the plumbing industry, celebrating the latest advances in valves, fixtures and pipes…only one plumbing-related issue is overlooked in this strange world – water. Is it clean and fresh? Is water even what consumers want to drink? Are they thirsty?"* The author then continues to explain that information technology (IT) outshines information in the real world just as plumbing technology overshadows water in the imaginary environment described.

### Putting the "I" in IT

According to Davenport (Marchand et al., 2000, p. 5-7) the plumbing analogy described above, is a clear sign of business' obsession with technology. It is estimated that companies and consumers spend over one trillion dollars a year on IT. The fruits of this obsession, according to Davenport, are depressingly sparse. Economists who have difficulty finding correlations between IT spending and productivity, profits, and growth support this view.

Many reasons can be given as to why so much emphasis is placed on technology. The following reasons given by Davenport (Marchand et al., 2000, p. 6) should be noted:

1. "Technological utopianism"– the idea that technology will solve all our problems.
2. The powers of IT vendors – vendors have an interest in our belief that buying more technology will solve our information problems.
3. Most managers have little understanding of how people relate to information. In this regard Davenport refers to Tom Peters who said that success in managing information is 5% technology and 95% psychology. In other words, most IT programmes neglect the human side of the information equation.
4. Many managers do not know what approaches to take or what benefits would result if they opt to take the information-centered route.

Workers, managers and executives with an obvious lack of knowledge and understanding of the emerging information age and its true implications, have to function against the backdrop of a fast-paced, global market space. In this environment, advances in technological development and the imperative to "compete with information", test managers' skills of anticipating and negotiating constant change.

The scene for the identified business problem then, is a business environment increasingly supported by a technology platform that is seen as necessary, but is considered far from sufficient. The subject of the identified business problem is a resource that is misunderstood and often confused with the platform that happens to support this resource at times. The actors are managers and business owners who have fretted about the impact of IT on their business (internally and externally) whilst they should have been more concerned about the role of information and how they plan to leverage it. If the quality of the information is high, and submitted to management in a timely manner, the decision-making by managers can be taken on a more solid basis (Lewis, Goodman and Fandt, 1998). It is not surprising, therefore, that Davenport (Marchand et al., 2000, p. 9) challenges managers to decide whether they want to focus on plumbing or think about water and its use. His plea is that the focus be on the "I" rather than on the "T" in IT: "IT can help at the middle stages of the information life cycle – storage, summary and transmission – but it is not particularly helpful in its creation or use."

Senior managers who do not acknowledge or understand the value of information management practices may be induced by means of the enterprise architecture approach. This provides an opportunity to view the information resources and value adding attributes, separate from the carrier, namely the technology (specifically information technology).

## Problem Statement and Aim of the Article

Many managers and executives do not understand or subscribe to the idea of managing information resources in a coordinated and systemic process similar to those applied in managing marketing and financial or human resources. The implication of this is that there are many attempts to solve business problems by applying an IT or technology solution instead of defining the business problem or requirement, then stating the information requirement and proposing an information solution, only after which the appropriate technology platform is acquired or aligned. The business challenge dictates the information requirements, which must always precede the IT or technology decision.

More worrisome is the prevailing misconception that in the rare instance where information is coined as "a strategic resource", it is often managed by IT specialists or the IT department or, even worse, by functional managers who may know their respective fields but have no grasp of the nature and value of the information inherent to their functions. This is not to say that an IT department (or a functional or line manager) can not develop skills towards effective managing information, but ultimately it must be a strategic imperative driven by the business owner or manager (Lewis, Goodman and Fandt, 1998).

Another misconception that exists is the belief that IT investments may improve business value. A country such as the United States of America sees spending of well over one trillion US Dollars per year on information technology purchases or maintenance, and managers have been trying to link and correlate IT spending and financial performance of the organisation to little or no avail. It is not surprising then that they have not been able to see the wood for the trees when Chief Information Officers (CIOs) in particular have had to literally convince and beg boards for IT investments in the absence of solid metrics to justify this type of spending. Quite simply it can be stated that they have been measuring the wrong thing. Shapiro and Varian in an interview with Kehoe (Marchand et al., 2000, p. 14) urge business people to keep a sense of perspective. "Many of today's managers are so focused on the trees of technological change they fail to see the forest: the underlying economic forces that determine success and failure." The key underpinning of the new economic forces is of course the network effect seen so clearly in the rise of the information economy. With information as currency, new business rules are created, rules for competing are redefined, and tried and tested strategies are reinvented.

The problem statement, in effect, deals with the misconceptions and often incomplete understanding of managers and business owners as to what role information plays in their businesses and their managerial focus – be it on a strategic or operational level, in a directive or supportive role.

The aim of this article, therefore, is to provide a holistic overview of the role of information in business and, one may add, the business of information. The current thinking and established literature from a number of fields such as management sciences, information and knowledge management, and enterprise architecture, are provided. Along with some definitions and tools presented, a broader argument for establishing an information-centric mindset and approach to management problems and business opportunities is proposed. Further, the aim is to establish an understanding towards the business value of information, and emphasise that strategic information management is a matter that requires focussed managerial attention. A link is to be established between the information management function and the Information Architecture Planning component of the more contemporary Enterprise Architecture Planning (EAP) approach. The rise of EAP is seen as a window of opportunity in terms of educating managers on the importance of information management.

## Research Design

The research objectives for this study determined that an exploratory research design be used, by focussing on secondary data sources to supply the information managers could use for decision-making. Malhotra's (2004) opinion that exploratory research is useful to gain insight in a specific area is applicable and fits the objectives for this study, namely to expand manager's understanding for the need to establish an information-centric mindset and approach to aid the strategic management of the firm. Hair, Bush and Ortineau (2000) and Malhotra (2004) classify secondary data as either internal or external secondary data. In this study external secondary data obtained from published material or computerised databases were used. A wide literature study on the topics of strategy, business management, organisational design, information and knowledge management, information systems planning and other relevant topics was performed. Ideas from contemporary writing and established literature were used to sketch the outlines of a conceptual understanding of information management and enterprise architecture (EA) that could be presented to a manager who may not be actively involved in these activities, but who wishes to learn more about them.

The analysis of the resources at hand was followed by the formulation of a logical argument that is documented and presented in the report. Several contemporary issues are discussed as part of, and in support of the argument. Establishing an information-centric mindset and approach to management problems and business opportunities, is proposed in the argument. No empirical studies were performed as part of the primary research but some of the secondary research refers to studies in which empirical methods were used.

## Information as Resource and Meta-Resource

An attempt will now be made to clarify the unique dualistic role of information as both economic resource and strategic corporate asset – attributes that require focussed managerial discipline. Not only information can be seen as the co-ordinating resource (meta-resource), which enables the coordination and utilisation of the other factors of production, it is often the main production factor of a typical information-intensive organisation. By evaluating the nature and value of information as asset and resource, a better understanding of its unique behaviour may be gained and a solid case for a shift in emphasis from IT management to information management is proposed. One of the important enterprise activities, namely the information audit, is discussed. The role and relevance of the 21st century Chief Information Officer (CIO) will be highlighted and some thoughts on knowledge management will be presented.

### *The nature and use of information*

When considered as a commodity, information displays certain unique attributes. It differs from other economic goods in all the aspects according to which normal economic resources or goods may be described. According to Glazer (1993, p. 100) information is not easily divisible or appropriable – by giving information away the value of use is retained. It may not exhibit decreasing returns with use, but may even increase in value with use.

Information is not data, and it is not knowledge. Some knowledge may be seen as a form of information, as well as some data can be seen as a form of information. Many texts would typically show information as a construct on a continuum somewhere between data and knowledge and then attempt to define information as processed data (Hellriegel and Slocum, 1992; Lewis, Goodman and Fandt, 1998; Marx, Van Rooyen, Bosch and Reynders, 1998). This is considered not to be a complete and accurate attempt because it ignores many of the unique characteristics thereof – the plain and simple truth is that information is determined or defined by its use. For example, something may "inform" by merely existing, and other things may have been considered as wise and knowledgeable uttering penned down as textual information in a book, but yet it may have no informational value to a recipient with an information need not addressed by the book. Hair, Bush and Ortineau (2000, p. 45) contend, that "information is created only when the researcher or decision maker narratively interprets the data structures". Simply put, information can be seen as "a representation of reality".

It is commonly accepted among information scientists and librarians that information has value when it is relevant to the task at hand, it is available in the right format at the right place, and is considered fairly accurate and recent. It follows therefore that input that shows these characteristics in a given situation and thus reduces uncertainty may be termed as information with value.

If it is argued that information may be the only resource, which increases in value with use, it is logical to conclude that an organisation's preferences and requirements for using information is intrinsically linked to the attributes that define its nature. In order to understand how organisations use information, Choo (1996, pp. 329-330) argues that without a firm grasp of how an organisation creates, transforms and uses information, the coherent vision to manage and integrate information processes, resources and technologies is not possible. He describes the principal ways in which organisations use information strategically and suggests how these processes could be managed "to design a 'knowing organisation' that is perceptive, wise, and decisive".

In a discussion to indicate how people process information Choo (Marchand et al., 2000, p. 245) points out that information is often referred to as a resource or "thing" that resides or is presented in an artefact. Whilst this is true of information, a complementary view must also be presented, namely that information is the outcome of people constructing meaning from messages and cues. When information is seen as a construct in the human mind, the focus shifts to understanding the social and behavioural processes through which it is created and used.

An aspect of information use that is, however, often not taken into consideration is that the use thereof may turn into abuse or misuse. A particular form of "informational illness" prevalent in modern day organisations is the rise of information overload (Sprout, 1996). Beck and Davenport (2002) contend that having and obtaining information are no longer the challenge. They argue that there is nothing as scarce today as human attention. It must be taken into consideration that information in fact consumes attention and it poses the challenge to business owners and managers to focus the attention of employees and customers alike on that information which is most relevant in a given situation, buying decision or task-performance.

Is it possible then for an organisation to use information in such a way that it increases business value?

### The business value of information

In the age of information, business is no longer conducted in a marketplace, but rather in a market space (such as internet-based businesses). Also the organisation of the business itself has shifted to network structures rather than hierarchies, and limitless digital resources replace the scarcity of physical resources. Many drivers for these changes have been suggested and over time the consensus has shifted. The stages mentioned by Earl (Marchand et al., 2000, p. 17) can be adapted for practical purposes to be seen as stages of a revolution. Our understanding of the forces behind the information age is shaped by:
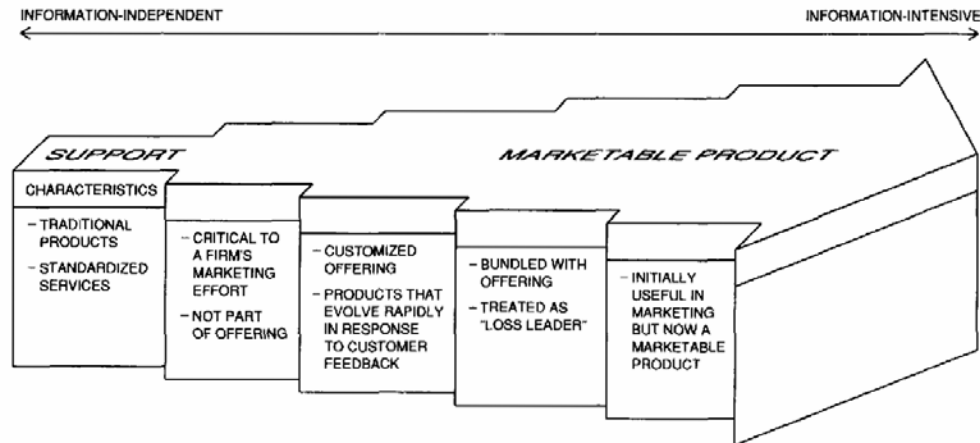
1) the automation of computation through the **computer revolution;**
2) the collapsing of space and time through the **telecommunications revolution;**
3) the **information revolution** which showed the value-creating power of a resource which can be reused, shared, distributed, or exchanged and still multiply in value;
4) a **knowledge revolution** marked by the importance of intellectual capital that supposedly underpins innovation and renewal.

As these forces shaped the economic and business world, traditional as well as information-intensive companies were forced to become information businesses through horizontal and vertical integration.

Wrereas Earl takes a macroeconomic and industry-wide view to describe how businesses are all information-businesses (whether they know it or not), Glazer (1993) evaluates the internal and competing environment of an organisation in his discussion on the information intensiveness of organisations. Information-intensiveness may be viewed as a continuum that allows one to apply an information-valuation methodology to the actual business environment. The continuum (Figure 1) clearly shows how the information component becomes a larger part of the product or becomes the offering itself. Glazer (1993, p. 108) states, "As we move along the continuum, the

underlying dynamic is that of a shift from information as a support for physically based products or services toward information as a wealth-generating asset in its own right."

Glazer implies that companies are starting to feel comfortable with allowing information and its inherent qualities as commodity to reshape the logical structure by which they operate. *It is from this fundamental shift in perspective that this article endeavours to establish the important link between information management and enterprise and information architecture planning activities.*



Source: Glazer (1993, p. 107).

Fig. 1. The information-intensiveness continuum

## Strategic Information Management

### Overview and role of strategic information management

Davenport and Cronin (1988, p. 25) consider strategic information management from two contrasting perspectives – as an instrument of competitive advantage, and as a tool for reducing uncertainty. It has the purpose of ensuring survival; evaluating internal trade-off; and increasing stability.

Porter and Millar (1985) see information and strategic information management as critical toward the assessment of the internal and external environments when assessing the impact (or value activity) of each unit in the network organisational structure. They argue that each value activity performed creates and uses information, which may be exploited within and outside the company to create competitive advantage. One can argue that Porter and Millar see the opportunity for creating competitive advantage as a primary purpose for strategic information management.

Meagher (2002) presents a model that may be used "to augment information professionals' management toolkit" in the hope that better alignment of information management activities with strategic goals and objectives will take place. The model presents twelve building blocks, six of which are classified as core building blocks. Meagher estimates that typical executives with information management responsibilities focus 75% of their attention on one block alone (what he calls "infostructure") and 90% of what such executives talk about is covered by only 5 of the 12 blocks. By familiarising themselves more closely with the other blocks in the conceptual toolkit it is argued that information management professionals could greatly increase their relevance to the organisation.

Burk and Horton in Buchanan and Gibb (1998) describe five revealing steps in the history of information management. These stages clearly demonstrate that the focus of information work has changed from the achievement of the effective and efficient managing documents and technologies to the strategic use and application of information itself:

a) Paperwork management;
b) Management of corporate automated technologies;
c) Management of corporate information resources;
d) Business competitor analysis and intelligence;
e) Strategic information management (SIM).

### *Objectives of strategic information management*

The Association for Information Management Professionals describes six primary objectives of strategic information management, each that ought to be governed by corporate policy and supported by processes and technology (Arma.org; 2002). Following is a brief discussion of these objectives.

- Leverage information for maximum effectiveness throughout the organisation

This objective will require information management professionals to remain relevant in their organisations by learning more about the content of the information used in each business process. An article on Enterprise Rent-a-car (Berkman, 2002) provides a clear example of what it can mean to design a process so that information will be used more efficiently. Enterprise Rent-a-car gets a significant percent of its business from rentals paid for by insurance companies when a client's car is in the repair shop. The old system was paper-intensive, slow and frustrating to everyone, so Enterprise developed a Web-based application that is shared with auto repair shops and insurance companies. Through it, insurance companies can authorize payments, Enterprise can make the cars available, and auto repair shops can provide up-to-date information on when repairs will be completed. This results in better service to the customers and less hassle for everyone. Enterprise has eliminated about 8.5 phone calls and ½ day from a typical rental cycle. In addition to making customer transactions easier to handle, the insurance industry is saving between $36 million and $107 million annually.

- Protect information from a variety of threats and for a variety of purposes

Recent events have brought much-needed attention to the importance of protecting records so that the most critical business functions are restored quickly. In addition, privacy legislation is creating new business requirements for how individual information is handled.

- Monitor the use of information to ensure consistency in information practices

Retention and disposal programmes will remain a strong component of strategic information management. In addition, strategic information management encourages a more proactive role in new areas of compliance, for example through:

- information ownership, stewardship and due diligence in contracts with suppliers and business partners;
- auditing the use of information to ensure it is in the right place at the right time;
- modifying business processes if information is not being leveraged.

- Quantify the value of information

Imagine being able to determine the "worth" of a potential company acquisition based on its information, and not just its physical assets. An effective solution or method for quantifying the value of records and information would help to impress senior management with the value of managing their information and the risks of not doing so.

- Forecast information that will be needed in order to make business units successful

This objective calls for a proactive role in determining what records need to be created. A number of factors will enter into this assessment: compliance with legal authorities, understanding the current workflow and information needs of the business units, working as a partner with business units as they change their processes, and working with IT/MIS to design the technology infrastructure based on information needs.

- Maintain information for legal compliance and long-term access

SIM professionals must ensure compliance with legislative requirements and address the challenges of long-term preservation of records in non-paper-based media. The very fact that some corporate records require special attention in order to meet legislative requirements makes them an asset.

Following is a discussion of enterprise architecture planning in order to juxtapose it with the role of information and information management discussed thus far. The importance of the information architecture component as a crucial ingredient of enterprise architecture will also be looked at.

## Enterprise Architecture Planning (EAP)

In recent years, a new word has appeared more often in journals, conferences and management practice. The word is "architecture", and it is new in the sense that it is being applied to the whole enterprise and not only the information technology industry, where it was a familiar term for many years (Veasey, 2001). The concept of enterprise architecture dates back to the mid-1980s. John Zachman, widely recognised as a leader in the field, identified the need to use a logical construction blueprint for defining and controlling the integration of systems and their components.

Nearly all enterprises are now facing a world of increased rates of change. It is very natural that they should look for help to a concept exploited effectively by an industry, which has contributed so much to that speed of change. Optimism is growing that through enterprise architectures, tools for the management of change and complexity can be created that have a lasting value (Veasey, 2001).

Research undertaken by Gartner (James and Roberts, 2002) shows that business leaders are concerned with the following aspects of their business: attracting and retaining loyal customers; planning and designing the strategy for the business; building a responsive, flexible organisation; using technology for competitive advantage; focusing on core competencies; and increasing speed to market.

The enterprise architecture approach promises to deliver on most or all of those concerns by establishing the so-called "real-time" enterprise – an organisation that can proactively face and negotiate the changes and complexity of the external environment 24 hours per day, 7 days a week.

As argued in the previous section, managing the information resources of an organisation is probably the first route managers should consider when designing and co-ordinating organisations of the information age. It is therefore proposed that senior managers should be introduced to enterprise architecture planning under the auspices of improving the strategic management of their information resources and capabilities.

### *Nature and role of EAP*

Buffam (1999, p. 14) explains the function of a building architect to introduce the concept of architecture in a simple and understandable metaphor. An architect creates a concept of the overall form of a building to fit the intended purpose. He or she then creates a tangible set of blueprints that explains or expresses this concept in order to assist the following people: building owners to verify that the design meets their needs; the architect and engineer, before committing to construction, to verify that the building will stand up to anticipated load, withstand environmental conditions and meet regulatory requirements; and the craftsmen to construct a building that fulfils the concept.

When applied to an enterprise, architecture may be seen as the set of descriptive representations (i.e. models) that are relevant for describing an enterprise in such a manner that it can meet management's requirements of quality be and maintained over the period of its useful life. Architecture, in other words, is knowledge of design (Zachman, 1997).

In a large modern enterprise, a rigorously defined framework is necessary to be able to capture a vision of the "entire system" in all its dimensions and complexity. Enterprise architecture is a framework, which is able to coordinate the many facets that make up the fundamental essence of an enterprise (Stevenson, 2002). Enterprise architecture must provide a holistic, integrated view of the organisation, but in order to contain the complexity of the design problem, it may be subdivided into categories such as business architecture, data architecture, application architecture and technical architecture. The goal of the architecture must be to deliver business solutions. The architecture function must be well staffed and structured and must make its presence felt at the workforce on all major projects (Stevenson, 2002).

Enterprise architecture provides to senior management the basis for obtaining consistent, higher quality answers from both detailed operational data and from informational data processed to answer their specific business analysis questions. An architectural approach allows consistent, higher quality control of the various business processes and their underlying business rules. With an architecturally designed system, the productivity of information system users will likely increase because of better systems analysis and design. An architected system will usually provide a common "look and feel" that makes all systems using it seem more familiar and therefore easier to learn and use (Finneran, 2003).
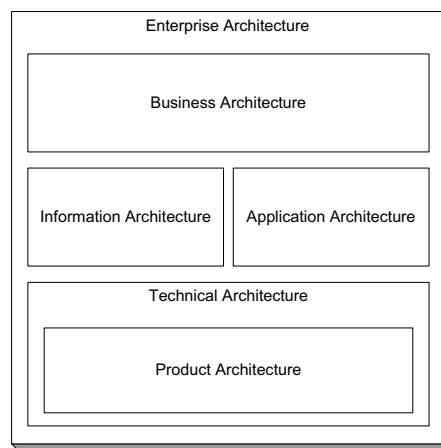
A well-managed enterprise architecture initiative seeks to protect the present information management investment, as much as possible, and encourages the use of metrics to measure the quality and quantity of both business process and supporting Information Technology productivity.

### Components of Enterprise Architecture

Most sources indicate that Enterprise Architecture consists of at least four or five types of architectures divided into two groups. The first group of architectures that may be classified as functionalities that deliver value to the business are architectures concerned with the key business, information, and application. The second group that supports the other are: technical and product architecture. Each strategy is a separate architectural discipline, and enterprise architecture is the glue that integrates each of these disciplines into a cohesive framework. Zachman (1997) developed a framework or structure for logically defining and capturing architecture. For the purpose of this article, Zachman's framework will not be discussed in detail. Rather, based on the suggestions offered by Zachman, a brief summary of architectures that may be classified as functionalities that deliver value to the business, is given below and depicted in Figure 2.

**Business Architecture** is the result of defining the business strategies, processes, and functional requirements. The business already performs Business Architecture when they redefine processes to support the key strategic initiatives of the enterprise. Essentially the Business Architecture takes into consideration the businesses strategy of the firm, its long-term goals and objectives, the technological environment, and the external environment.

**Information Architecture** is the result of modelling the information that is needed to support the business processes and functions of the enterprise. Information architecture spans organisational boundaries and ties the business processes identified in the Business Architecture together by identifying and defining information dependencies. This level is primarily a map of the overall information needs of the firm based upon the firm's Business Strategy. The Information Architecture basically encompasses the application level aspects (e.g. Competitive Intelligence System, Market Research System) that map the information needs on the organisation's specific business needs.



Source: Zachman, 1996. (Available online: http://www.zifa.com).

Fig. 2. Components of Enterprise Architecture

**Application Architecture** provides a framework focussed on developing and/or implementing applications to fulfil the business requirements and to achieve the quality necessary to meet the needs of the business.

**Technical Architecture** which provides the foundation that supports the applications, data and business processes identified into the other three architectural layers.

**Product Architecture** consisting of subsets of Technical Architecture. It identifies standards and configurations for the enabling technologies and products within the Technical Architecture.

The Framework is helpful as an analytical tool to have meaningful, objective dialogue about these choices and to make these choices or to find balance between the choices for the enterprise. The importance of enterprise architecture for the overall business strategy is summarised by Zachman (1999, p. 455): "At the heart of managing change is Architecture, Enterprise Architecture."

### *Information Architecture Planning*

The enterprise architecture conference in Europe in 2002 co-sponsored by Meta Group showed increased emphasis on architecture programmes centred on business and information architectures. It is envisaged that by 2003 40% of Global 2000 organisations will move from narrowly defined technical architectures to holistic enterprise architectures that encompass the business, information, application and technical domain architectures (Gay and Powell, 2002).

It is generally acknowledged that research is needed to categorise and describe techniques for creating enterprise-wide information architecture, clarify organisational circumstances under which an information architecture is of greatest value; and link initiation, development, and evaluation of information architecture to technology infrastructure requirements and to theoretical bases for predicting successful enterprise-wide application of IT (Stevenson, 2002).

Information technologies grow increasingly elaborate, regardless of user requirement, forcing consumers on an upgrade path that many do not wish for and which has interactive consequences. Imagine having that forced upon us in the physical world. A well-architected solution would accommodate the ongoing need for refinement and improvement coupled with a greater awareness of human need and contextual resources (Dillon, 2001).

Information Architecture as a field needs to address such issues and counter the onslaught of technical determinism that pervades the information technology world. While the use of the term architecture has both its supporters and its critics, it can easily be justified in the information domain and, more importantly, used for inspiration and insight (Dillon, 2001).
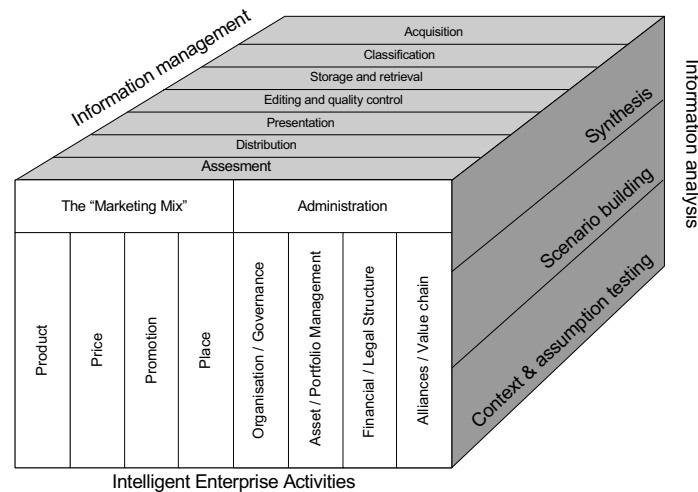
Enterprise Information Architecture also establishes guidelines, standards, operational services that define the enterprise's systems development environment. Once an enterprise's architecture is documented in this way, according to Perkins (2002) it can be used to accomplish the following: facilitate change management; enable strategic information to be consistently and accurately derived from operational data; promote data sharing, thus reducing data redundancy and reducing maintenance costs; improve productivity through component development, management and reuse; and reduce the software development cycle time.

Many organisations invest heavily in developing a blueprint for their company facilities. Unfortunately very few organisations design blueprints for their data and information needs, even though information plays an ever-greater role in the age of total competition. Without knowing the types of data needed and the way they should be used, it would be almost impossible to implement strategic decisions.

To build a world-class organisation, an organisation should have a formal blueprint of its information needs or information systems architecture. Information systems architecture should be independent of its technical architecture and any particular implementation details. Building an implementation-independent information systems architecture is critical because a fast-changing business environment and information technology demand constant updates of or modifications to the information system. Although implementation details may change constantly in business, a company's information needs are relatively stable over time. Information systems architecture attempts to capture these information needs and formalise them (Sang and Bonn-Oh, 1996).

Buchanan (2002; Web seminar interview with Gartner Inc.) from Meta Group defines enterprise architecture as "a pragmatic, broad, holistic and systemic process that bridges the gap between business vision and strategy and the detailed engineering efforts an organisation makes to support that strategy". Information architecture thus has a very specific role. Buchanan indicates that while translating business strategy into business architecture that specifies who will do what relative to the business strategy, the effort must be extended into information architecture that indicates what information must be available to ensure that the business processes are executable. Using this top-down fashion clear auditable linkage can be established between strategies and key IT investments.

Enterprise Information Architecture is thus downstream from Business Architecture and upstream from technical work. As depicted in Figure 3 Meta Group provides a process-based framework for explaining the role and fit of information architecture.



Source: Buchanan (2002, Web seminar interview with Gartner Inc.).

Fig. 3. Meta Group's Process-based enterprise information architecture framework

Three different dimensions or processes of the activity may be identified and are depicted as three sides of a cube. The classic *Information management* activities and disciplines are found at the top of the cube. Any enterprise must set principles and guidelines for how the organisation manages the activities listed at the top of the cube. On the front plane of the cube a variety of topics that the organisation requires information on are displayed. These *"Intelligent" Enterprise* activities are mainly concerned with information on the marketing mix as well as administrative information. The third dimension (*Information analysis*), is concerned with the nature of work (information and knowledge workers) in the enterprise. There are mainly three ways in which workers use information: They synthesise information across a wide range of sources; they build scenarios; and they develop context and test assumptions.

Based on the discussion thus far, it can be argued that Information architecture has many implications for the usefulness and usability of operational and marketing information in an organisation, and may be seen as a critical link in the overlap between managing information and architecting the enterprise.

## Managerial Implications and Conclusion

Juxtaposing information management and enterprise architecture planning disciplines involves defining and implying comparisons between two generally ill-defined and often misunderstood activities. By providing a high-level conceptual framework insofar as the role of information

and information management is concerned, and by discussing in broad terms the enterprise architecture approach, it is possible only to draw some preliminary conclusions and thus formulate a few implications that deserve to be mentioned. Although these are provided as guidelines, it must be understood that it follows on a logical argument and not on empirically tested hypotheses as such. An attempt to contextualise, in broad terms, the activities and functions discussed in this report may lead to a few suggestions. In recognition of the more rigorous testing required on the actual business playing field, this section is concluded with some suggestions towards further research to be done in the field.

At a strategic level, understanding the role information plays in an organisation requires managers to realise how information affects business in general and then how their own businesses may be defined in terms of an information-centric approach.

For operational success, managers need to understand how to proactively manage information and its impact on the organisation. The guidelines towards understanding and reviewing the role information plays in the organisations that can be distilled from this report are as follows:

- Establish an executive level understanding of the role and nature of information as a resource in the organisation.
- Take executive level ownership of enterprise architecture initiatives, and establish the understanding that managing the enterprise architecture is an activity that equates to managing the business strategy and plans.
- Adapt architecture initiatives as a means to promote the effective use and maintenance of information quality and quantity.
- Model the organisation as an information-*centric* business even if it is considered to be a traditional and not necessarily information-*intensive* business.
- Define the information intensiveness of the organisation's products and services and develop scenarios that depict increased information-intensiveness.
- Measure the information orientation of the organisation by looking at the information behaviours and values, information management principles and then the IT management principles.

Some implications mentioned by Choo (Marchand et al., 2000) that supports the guidelines identified and listed above, take the view of seeing information as the outcome of social interactions that create meaning in the minds of workers. The so-called social aspects of information have dramatic impact on information system design as well as organisational design and culture. The principles mentioned by Choo (Marchand et al., 2000, pp. 251-252) are as follows: First of all, information systems need to be designed not just to answer queries but to provide useful information that helps people to solve work-related problems and deals with specific requirements of problem situations. Second, awareness of human information seeking and processing must be increased and involves understanding different cognitive styles, emotional factors and the impact of routines. Third, everybody should be educated to manage the quality and quantity of information that is dealt with. And finally, develop a culture that promotes information sharing.

This paper suggests that the establishment of a dynamic enterprise architecture and in particular a flexible information architecture plan may offer great advances in aligning and incorporating information resources, information systems and information processes with the business strategy and operations. It is anticipated that the role of information as a resource to be managed separately from the management of the IT infrastructure will take time to be established as a priority approach that requires focussed managerial attention.

Possible further research could include the following:

- A study that measures the perceptions of managers toward the management of information – this may include developing an instrument that measures the understanding of managers of information management practices and their role in instilling information values and behaviours in the workforce.
- Empirical research on the effect and use of the guidelines proposed for improving the information awareness and alignment of information management practices with business strategy, and the quantified impact thereof on business performance.

- Research into how enterprise architecture initiatives influence or are influenced by information management practices in small to medium service organisations as well as in large and multinational firms.
- Developing a model enterprise architecture approach that replaces or complements the traditional business plan with a more dynamic and real time business plan that is closely linked with the different levels of enterprise architecture. The focus will be on establishing an organisational framework for anticipating and negotiating change in the internal end external environment.

Many theories surrounding the role and management of information as organisational research have been proposed, but little has been done to date to implement or measure the actual role in organisations. Few benefits of spending more on IT investments per se have been identified, and the IT productivity paradox proves that the "missing link" of the information age is unfortunately the very information itself.

Managers clearly need to differentiate the role of IT management from the strategic role of information management in order to gain competitive advantage from the information resources and capabilities of the organisation. Apart from conceptually separating the value added by the carrier (technology) from the resource (information), an holistic overview of the role of information in business and, one may add, the business of information, is clearly needed and could go a long way towards establishing truly information-intensive organisations.

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