

Propositions pertaining to the dissertation

## **Architecting the enterprise:**

An approach for achieving performance, integration, consistency and flexibility

Mark Patrick MCDONALD

7 December 2005

## Propositions pertaining to the doctoral thesis

### **Architecting the enterprise:**

#### **An approach for achieving performance, integration, consistency and flexibility**

**Mark P. McDonald**

1. Architecting is a management discipline that only has meaning when managers value the enterprise and its total operation above the operation of a single product, business unit, or organization.
2. Traditional management theories based on stable industry and competitive boundaries do not account fully for changes in information technology, global trade regulation and global logistics capabilities. Therefore, the effectiveness of these theories is in decline.
3. In practice, strategic management does not adequately link strategy to action. It relies on line managers to read between the lines to find the operational meaning of strategic pronouncements. This reduces the effectiveness of both strategic planners and operational managers.
4. Current approaches to enterprise architecture concentrate on the design of information technology systems and are therefore inadequate to fully design an enterprise. (Zachman 1999; Gharajedaghi 1999) Achieving enterprise performance involves architecting more than information technology systems.
5. For architecting to have strategic relevance, it must sit within a framework that places strategic value on an enterprise's internal capabilities to generate competitive advantage. (Barney 1991)
6. Without an ability to incorporate business value networks into strategic and operating decisions, enterprises will increasingly find themselves unable to compete on price or on quality of service. (Parolini 1999)
7. Following a standard process does not compromise competitive advantage, following a standard solution does.
8. Management research based on finding similarities of current 'market leaders' make interesting reading but poor business practice. (Collins 2001; Collins and Porras 1994; Tracey 2003; Waterman and Peters 1988)
9. A successful dissertation requires listening to what is said and not hearing what you want to write.
10. Talking you yourself about your dissertation in the presence of others is a sign of deep reflection rather than poor manners.

These propositions are considered defensible and as such have been approved by the supervisor Prof. dr. H.G. Sol. and Prof.dr.P.G.W.Keen

# Architecting the Enterprise

An Approach for Achieving Performance, Integration,  
Consistency and Flexibility

*For Carolyn, Brian and Sarah*

*Cover photography: Brian P. McDonald*



## **Architecting the enterprise:**

An approach for achieving performance, integration, consistency and flexibility

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**Mark Patrick MCDONALD**

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Prof. dr. H.G. Sol

Prof. dr. P.G. W. Keen

Samenstelling promotiecommissie:

Rector Magnificus, voorzitter

Prof. dr. H.G. Sol, Technische Universiteit Delft, promotor

Prof. dr. P.G. W. Keen, Technische Universiteit Delft, promotor

Prof. dr. E.W. Berghout, Rijks Universiteit Groningen

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Prof. dr. ir. R.W. Wagenaar, Technische Universiteit Delft

Prof. dr. ir. H.J.G. Wissema, Technische Universiteit Delft

# Colonphon

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## **Preface and acknowledgements**

This dissertation reflects a longstanding professional interest in how enterprises define and manage themselves. It reflects more than twelve years of personal experience working as a business architect and observing others seeking to manage complexity and change.

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A handwritten signature in black ink, reading "Mark P. McDonald". The signature is fluid and cursive, with the first name "Mark" and last name "McDonald" clearly legible.

Mark P. McDonald  
St. Charles, IL 2005

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# 1

## *Introduction*

### **1.0 New enterprise management requirements are emerging.**

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Managing an enterprise in response to market and technology change is at the core of executive responsibility. The modern enterprise is complex, with that complexity driven by greater market competition, globalization, customer power and new segmentation and increasing use of information technology in products and services. These factors raise the performance level that executives must reach to manage responsibly. At the same time, executives need to evolve the enterprise to remain competitive as today's performance gains erode in the face of competitive pressures. They are turning to an evolving set of tools, management perspectives, models and recommendations to manage these enterprise challenges.

### **1.1 A new environment defines new requirements for enterprise management.**

---

An investigation of individual companies provides insight into the challenges and tools of enterprise management. The interaction and structure of the organization was a significant concern in the formulation of General Motors that directly led to many of the core principles of industrial organization used through the 20<sup>th</sup> century including matrix responsibilities, strategic business units and decentralization (Sloan 1963). Abernathy's study of the automobile industry points to the need to balance short-term performance needs with the ability to change in the face of market competition (Abernathy 1978). Pettigrew's study of Imperial Chemical Industries (ICI) reveals the complexity of interactions and decisions taken to transform the company. Pettigrew highlights the importance of maintaining a balance between enterprise context, the

subject of change and the process of change (Pettigrew 1985). Gerstner's first- person account of the transformation of IBM during the late 1990's further illustrates the balancing of these factors (Gerstner 2003). These situations point to the need for a way to design and integrate the enterprise to achieve its strategy. Developing a methodological approach for enterprise level design would provide a set of tools, techniques and processes for managing implementation of enterprise strategy.

### **1.1.1 Changes in markets and technology are increasing the importance of enterprise management and design.**

Strategy formulation and implementation have grown complex as geographic and regulatory barriers have fallen. The erosion of barriers expands the potential number of competitors at the same time as information and communications technologies are reducing customer search costs. The combination makes the effectiveness of standard approaches for achieving and sustaining competitive advantage less relevant (Stalk, Evans, and Shulman 1992; Hagel and Seely Brown 2005). In an environment where your competition and customers know the market better, via the Internet and other forms of communication, the enterprise must find competitive advantage from within itself rather than from its position in the market.

An approach to building competitive advantage in such an environment flows from designing an enterprise for a combination of current performance and future flexibility (Collins 2004). Enterprises able to manage this combination do so through a dynamic capability that concentrates on enterprise structure and operations (Teece, Pisano, and Shuen 1997). The formulation of a method for enterprise architecting would provide a process for designing and managing the enterprise in the face of these changes. The development and evaluation of a methodology for such a dynamic capability is the intent of this study.

### **1.1.2 A methodology for enterprise design would extend management thinking and practice.**

Enterprise decisions, such as strategy implementation, mergers, or acquisitions, involve changing the enterprise across its business unit and operational levels. Change is disruptive, placing the enterprise's performance and competitive position at risk (Pettigrew 1985). With this disruption in mind, executives often avoid enterprise level change until it represents the

only response to environmental, competitive and internal challenges that make the current situation untenable, what executives refer to as the “burning platform” for change (Connor 1992). An enterprise design methodology would enable leaders to translate strategic decisions into operational actions. Such a methodology would address recurring management issues related to strategy formulation and its operational implementation.

### **1.1.3 This study describes an emerging method for enterprise design.**

Managing at the enterprise level requires defining processes, models and tools. This dissertation develops an enterprise design methodology based on the concepts of capabilities and architecting processes and principles. It examines enterprise architecting in terms of these management requirements:

- Performance -- the ability of a system to produce its intended results with fewer inputs or less waste than alternative or past systems.
- Flexibility -- the ability to change operations without suffering a long-term degradation in performance.
- Integration -- the degree to which individual parts of an enterprise perform their operations in a coordinated fashion, without their individual designs threatening the whole.
- Consistency -- the adherence of similar operations to a standard that enables the parts to all fit together without contradicting one another.

These factors represent a set of goals for enterprise management. An enterprise, for the purpose of this study, is defined as the highest-level organizational entity controlled by a single management team for delivering the customer value-proposition. The enterprise is the unit of analysis for this study. Enterprises must improve their ability to translate strategy and enterprise decisions into operational action as markets grow more global, information-based and competitive. This makes the models, processes and techniques for translating strategy into operational change increasingly important.

#### **1.1.4 This study investigates the use of architecting to meet enterprise management requirements.**

Webster's New Collegiate Dictionary defines architecture as the science of building structures, the formation or construction as the result of a conscious act, the architectural product or work of architecting, and finally a method of building (Webster 2004). Using the dictionary definition, architecture and architecting could provide a model for enterprise design in response to the management requirements stated above.

Developing a method for architecting the enterprise is the subject of this study. The research defines enterprise management requirements based on case studies and research literature. It uses these requirements as a basis for evaluating an enterprise architecting method.

Architecting derives from examining how enterprises achieve a balance between enterprise management requirements such as performance, integration, consistency, and flexibility. By evaluating the case studies of companies facing enterprise level challenges, this study seeks to address the following issue:

*How does an enterprise design increase performance without jeopardizing its flexibility?*

The question explores how enterprises can organize themselves for current performance while remaining able to change in response to future conditions. The research goal therefore is to evaluate the following proposition:

*Enterprises that follow a design methodology based on capabilities will create an enterprise architecture that incorporates enterprise management goals of performance, integration, consistency, and flexibility.*

The research seeks to develop such an enterprise design methodology by describing architecting deliverables, tools, and techniques.



### **1.1.5 Architecting is the term used for the enterprise design methodology under study.**

This study will use the term architecting to describe the enterprise design processes and artifacts created in response to applying design principles and rules to meet the enterprise management goals. Ross (2003) defines architecting as the process of creating an architecture. Architecture is the artifact of the architecting process that contains the organizing logic to achieve enterprise strategy and enterprise management goals. This study adopts Ross's definition and uses the term enterprise architecture to refer to the design models, templates, rules and patterns used to reflect strategic and enterprise level decisions in operational terms.

For the purpose of this study, enterprise architecting is defined as the deliberate design of the enterprise as a whole. This is in contrast to the design of a part of the enterprise, such as a business unit, information system or operation.

The scope of enterprise architecture discussed in this study encompasses strategy, organization, information technology, business processes and other systems within the enterprise. This is in contrast to the common information technology term "enterprise architecture" that refers to the design of enterprise-wide IT systems and infrastructure (Spewak and Hill 1992; Zachman 1999). Throughout this dissertation the terms architected and architecture-based refer to developing an enterprise architecture covering information technology, business process, human capital, organization and other elements of the business.

### **1.1.6 Architecting views an enterprise as a dynamic system of relationships, elements and capabilities.**

Architecting an enterprise involves defining the enterprise in terms that create a basis for making design decisions. Following this approach, an enterprise is multi-dimensional with strategic decisions having implications across customers, markets, processes, information technology, etc. (March and Simon 1993).

Enterprise leadership involves issues of managing enterprise complexity and integrating elements to achieve the strategic intent. An enterprise is a complex encompassing technical systems that perform actions and

social systems that coordinate these actions (Taylor and Felton 1993). As a complex system, an enterprise has multiple facets that define its scope and operation. Architecting is a process for understanding these facets, their relationships, and the design to achieve management objectives. This understanding is the basis of an architecting process. Architecting is a method for managing the enterprise as a whole.

Architecting views a business as a system and the design process as a methodology responding to the dynamics of that system. Enterprise dynamics have led to applying systems thinking to management disciplines (Beer 1994; Checkland 1998; Ghoshal and Granton 1998; Gharajedaghi 1999). Applying systems thinking to enterprise management views the enterprise as an active purposeful system working toward a complex set of objectives including achieving strategic, operational and shareholder goals. However, capturing enterprise dynamics in a format usable by business managers is a challenge given the complexity and variety of organizational components and forces at work.

#### **1.1.7 Current approaches to enterprise management concentrate on the parts of an enterprise.**

Current management approaches to enterprise change often focus on a particular aspect of an enterprise as the primary target of design and management. Focusing on a particular aspect of the enterprise – such as products, processes, or organization – supports the notion that strategic decisions involve optimization within a specific dimension. Such an approach may optimize one aspect of the enterprise to the detriment of others in a deterministic system (Ackoff and Gharajedaghi 1996).

Different schools of thought optimize particular enterprise aspects. Organizational theorists focus on the organization design as the primary means of implementing strategy (Mintzberg 1993; Galbraith 2002; Nadler and Tushman 1997). Business process proponents view process as the key to strategy implementation (Hammer and Champy 1993; Davenport 1993). Measurement and performance reporting provide make the balanced scorecard or strategy map the tool for a strategy-driven organization (Kaplan and Norton 1996; Stewart 1991). Others focus on a specific issue in enterprise-level processes such as knowledge management (Pfeffer and Sutton 2000) or the change process itself (Kotter

1996; Taffinder 1998; Conner 1992). Concentrating on a single aspect of the enterprise or enterprise process has some merit. However, the decomposition of enterprise challenges into functional categories and their concentration into a single problem set can undervalue the relationships between the elements and the interconnected nature of the enterprise (Alexander 1964). This study looks at an approach that concentrates on designing and managing the enterprise as a system to evaluate its fit with the challenges of changing markets and technologies.

## **1.2 Market and technology forces shape requirements for enterprise architecting.**

---

Enterprise management tools and techniques evolve and respond to market and technology forces. Enterprise management, in this context, is defined as the ability of executives to achieve strategic goals by changing operations within a controlled cost, schedule and risk parameter. These factors shape the methodology design. Markets and technology change define new requirements that provide a basis for evaluating emerging models, tools and techniques.

### **1.2.1 Enterprises face factors beyond their control that shape the management environment.**

Competition and technical innovation create an environment of rapid change characterized by increased global competition, greater use of business networks and the rising importance of managing change successfully. This environment threatens the effectiveness of management techniques and tools (Hagel and Seely Brown 2005). It challenges traditional tools and techniques for managing and leading enterprises.

- Deregulation of global and domestic markets and industries has removed regulatory barriers to entry and created new sources of competition that over time give customer choice a greater role in shaping markets.
- Falling global trade barriers and enhanced global logistics are increasing the level of competition. This reduces geographic location as a competitive barrier and places a new global requirement and pressure on performance. Enterprises are increasingly faced with the need to meet global rather than local

market performance standards for cost, price and availability (Friedman 2005).

- Electronic commerce and Internet-based technologies are increasing the use of business-to-business exchange making “automated” commerce more prevalent. According to Gartner, a technology research firm, electronic commerce encompassed 1.3 trillion Euros in 2003 and was growing at a rate of 70 percent per year. This increases the requirements for internal integration as the enterprise cannot afford the cycle time and cost penalties associated with hand-offs and exceptions between internal departments or functions. This places a premium on end-to-end consistency within the enterprise.
- Increasing involvement of suppliers providing contract services – outsourcing – is expanding in reach and range (Keen 1991). Enterprises no longer have to own or control every aspect of their value proposition to be successful in the market. This challenges traditional notions of vertical integration and control of enterprise capabilities as the open value-web replaces the closed value-chain (Parolini 1999).

A cumulative effect of these forces is the need to manage in an environment of accelerating change and rising performance requirements (Fine 1998). At the same time, traditional barriers to entry previously used to manage competitive advantage are falling due to the increased use of technology and business networks that give enterprises access to a broader source of market capabilities.

### **1.2.2. Enterprises have responded to this environment with a focus on performance at the risk of flexibility.**

Realizing sustained performance in an environment of rising competition and technological change requires that enterprises find a balance between current performance and future flexibility. Enterprises can increase current performance to preserve their position in response to competition. However, optimizing short-term performance represents a temporary action since enterprises must adapt to compete through time. This introduces a requirement for future flexibility at a time when enterprise performance is at risk. The challenge is how the enterprise becomes as efficient as possible now while remaining able to change for the future.

Researchers and executives commonly see enterprise management requirements for performance and flexibility as competing goals (Abernathy 1978; Leonard-Barton 1995; Treacy and Wiersema 1997). Enterprises often meet their performance goals through raising the level of integration within their operation and with trading partners. The increasing level of integration between automobile original equipment manufacturers and their suppliers provides an example of increasing integration. An enterprise can also raise performance by increasing the consistency within its operations by consolidating or divesting non-strategic operations. The divestment of “non-core” operations is an example of a management activity to increase consistency. IBM’s sale of its PC operations to Lenvono reflects a desire to increase its consistency and focus (IBM 2004).

### **1.2.3 An engineered methodology can provide an enterprise with the ability to meet emerging environmental challenges.**

Enterprises face forces that are beyond their individual control. Following a methods engineering discipline, external factors shape the design of an actionable methodology (Rolland and Prakash 1996; Tolvanen, Rossi, and Liu 1996). In the case of an enterprise design methodology, these factors form propositions that define requirements for enterprise architecting. Figure 1 below models the relationship between these factors, the propositions and the requirements for enterprise architecting. The model is further developed in the second chapter.

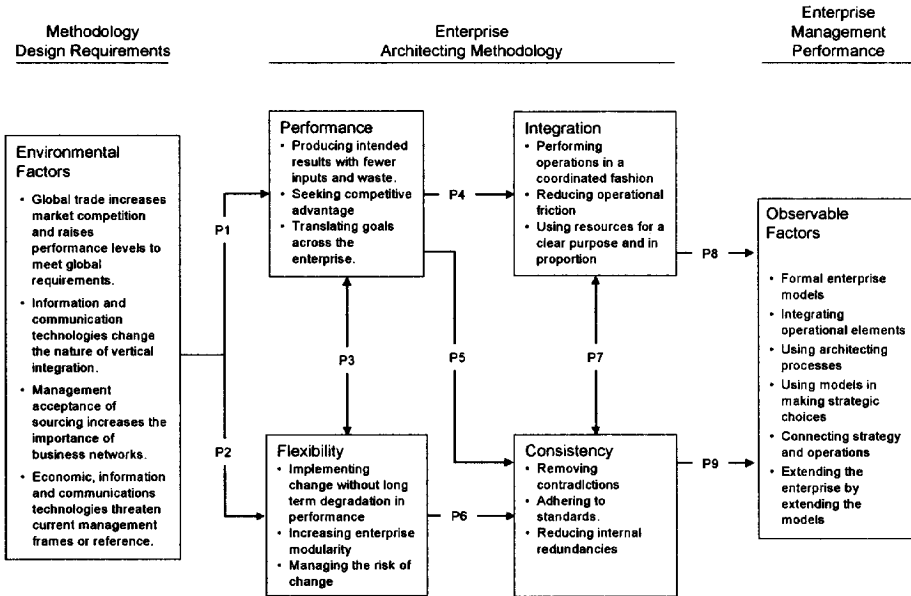


Figure 1. Engineering an enterprise architecting methodology connects methodology design requirements with observable management performance.

These environmental factors shape enterprise architecting and management decisions made by executives seeking to achieve the enterprise management goals of performance, integration, consistency and flexibility. For example, increasing global trade raises performance levels, requiring an enterprise design that produces its intended results using fewer inputs and less waste. In this way, enterprise-architecting methodology design is a response to its environment.

### 1.3 Action-oriented research provides the basis for describing an enterprise design methodology.

This study describes a method for enterprise architecting based on an understanding of the environmental factors and management goals facing most enterprises. The research builds on the observation of environmental trends, a review of existing literature and exploration of case studies. All provide a basis for describing an enterprise design methodology in terms of a way of thinking, working, modeling and managing the enterprise (Sol 1988).

### **1.3.1 The research goal is to define and evaluate a descriptive method for enterprise architecting.**

Identifying an emerging management practice requires studying executive responses to new environmental forces and challenges. Combining a descriptive model and observable factors provides the basis for evaluating the proposition that enterprises following a design methodology will create an enterprise architecture that incorporates the enterprise goals of performance, integration, consistency and flexibility.

Translating strategic and enterprise level decisions into management and operational change requires achieving a level of integration and consistency to perform efficiently, while maintaining flexibility for the future. Evaluating sample case studies and existing research provides a basis for defining an architecting methodology meta-model, tools and processes. The result is an enterprise architecting methodology definition that:

- Operates in a defined context with requirements and propositions that can be observed and evaluated.
- Describes a way for managing enterprise design decisions that are difficult to quantify into manageable models because they have a diverse scope.
- Identifies practices, processes and templates in order to describe the emerging practices associated with enterprise architecting.
- Brings together research and ideas from multiple management disciplines into an overall framework that links enterprise-level decisions into existing operational and management tools and techniques.

### **1.3.2 The scope of an enterprise architecting method includes processes, tools, techniques and rules.**

The scope of an enterprise architecting methodology includes descriptions of its processes, tools, techniques and rules. This methodology should be actionable in nature and applicable to the design and management of modern enterprises. Researching the concepts of an enterprise architecting, this study seeks to form a methodology including the following components:

- Processes for organizing the decisions and activities required to architect an enterprise.
- Tools for capturing the scope of the enterprise, inventorying its relationships to the external environment and internal dynamics.
- Techniques that provide perspectives on design problems and methods to achieve the enterprise goals.
- Rules in the form of patterns and guidelines for designing the enterprise architecture.

### **1.3.3 An enterprise architecting methodology extends management knowledge by through processes, tools and techniques.**

The value of an enterprise architecting methodology rests in providing a defined way to perform an enterprise design that business managers can apply readily. The applicability of a design methodology places a set of qualitative requirements for the methodology, including these abilities:

- To translate and connect strategic- and enterprise-level decisions to operational changes.
- To provide rules and guidelines that can be applied to current and future enterprise issues.
- To model the enterprise in terms and concepts consistent with business management concepts such as organization, process, application, metric, etc.
- To translate enterprise-level decisions into actions for individual disciplines such as organization design, process engineering or information technology architecture.

These qualitative requirements define a method that management can readily understand as it provides then with the necessary operational direction, and builds upon rather than replaces proven techniques and disciplines (Christensen 2003; Whetten 1989; Galunic and Eisenhardt 2001).

### **1.3.4 A case-based research approach identifies emerging**



#### **1.3.4 A case-based research approach identifies emerging patterns and approaches for architecting the enterprise.**

A case-based research approach provides a way of deducing the tools, techniques, and rules associated with an enterprise architecting method. Selected exploratory case studies illustrate the enterprise-level needs. These cases provide positive and negative examples of effective enterprise management. The case studies enable an exploratory approach to building architecting theory and methodology (Yin 1994). Exploratory case studies form the basis for the requirements of architecture-based tools, techniques and rules.

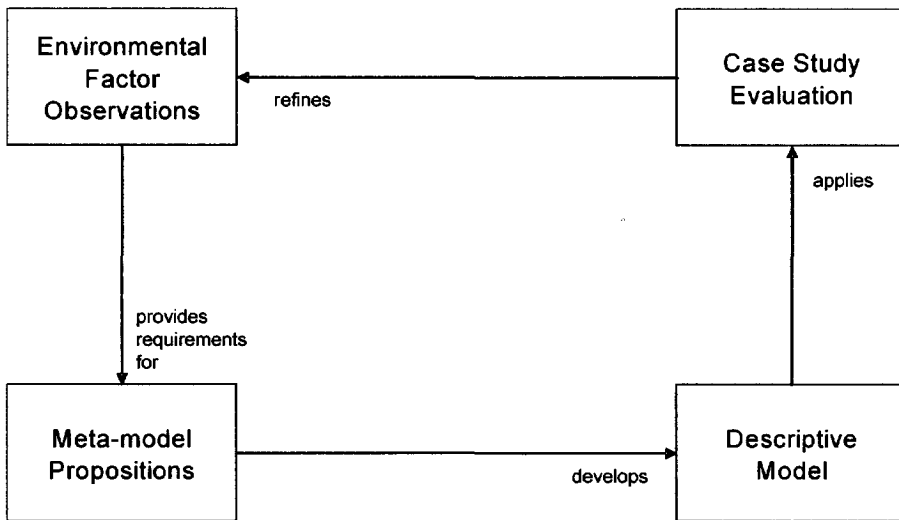
#### **1.4 This dissertation presents an inductive path for identifying architecting tools and techniques.**

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The study follows an inductive approach to identify the emerging processes, techniques, and tools associated with enterprise design. This study organized these processes and techniques into a repeatable framework through combining the inductive analysis with a methods-engineering approach (Rolland and Prakash 1996; Tolvanen, Rossi, and Liu 1996).

##### **1.4.1 The study follows an inductive strategy to describe and evaluate a method for enterprise architecting.**

Matching a case-based approach with an inductive-hypothetical research strategy defines the research methodology for this study (Yin 1994). This structures the study into four phases shown in figure 2 below. The first phase involves observation and reflection on the environmental forces shaping the need for enterprise design. Observation is followed by the development of requirements and a meta-model for an enterprise-architecting methodology. The meta-model and requirements in turn shape an enterprise architecting method described in the third phase of this study. The final phase evaluates the applicability of the method through evaluating two applications of enterprise-level design. The evaluation results in a refined empirical model including gaps and areas for additional research and evaluation.



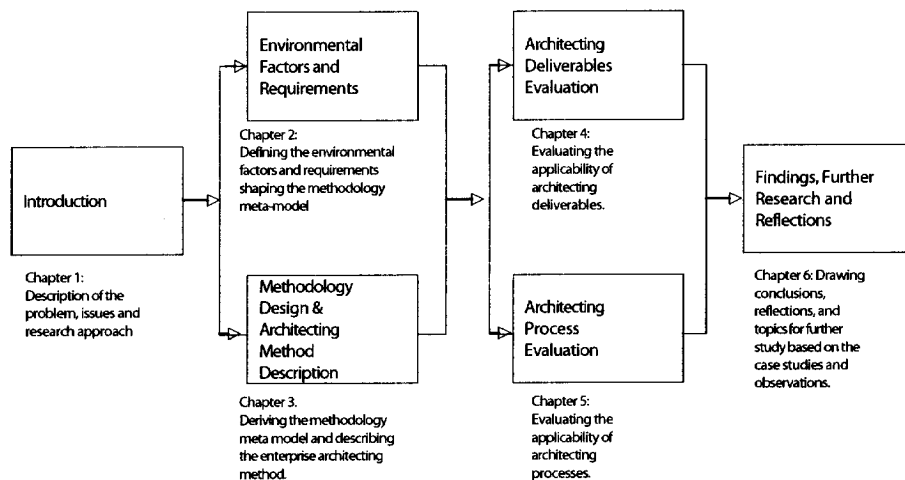
*Figure 2. An inductive-hypothetical research strategy provides a basis for identifying a descriptive model that is refined through case-study evaluation.*

The dissertation reflects the stages of an inductive-hypothetical research design. Chapter one provides a description of the research problem, approach, goals and requirements. This chapter sets the scope of the research in terms of defining the means to derive a descriptive model for an enterprise architecting method. Chapter two derives the requirements for an enterprise architecting method based on exogenous factors that are determined by economic and technical forces, current research findings and case studies. That chapter develops these into a requirements model for an enterprise architecting method. Chapter three describes the way to thinking in the form of the enterprise architecting meta-model and reviews architecting processes and architecting deliverables.<sup>1</sup>

The remaining chapters evaluate the fit of the enterprise architecting method with actual case studies. Chapter four applies and evaluates the enterprise architecture models defined in the enterprise architecting method by applying it to a case study, that of CEMEX, an \$8 billion global cement company. That chapter concentrates on evaluating the fit of these tools and models with the prescriptive model to identify strengths, weaknesses and gaps in the model. Chapter five applies and

<sup>1</sup> A detailed description of the enterprise architecting method is contained in the first Appendix.

evaluates the architecting process by applying it to the author's own experience in architecting Accenture's Service Lines. Accenture is a global management and technology consulting company with revenues in excess of \$13 billion. Chapter five evaluates the process and qualitative aspects of the model in order to identify strengths, weaknesses and gaps. Chapter six reflects on the findings and identifies opportunities for further evaluation and research based on the practical challenges of designing and managing at the enterprise level. Figure 3 summarizes the chapter structure.



*Figure 3. This dissertation seeks to identify and evaluate enterprise architecting based on case studies and approach and models based on the context, cases and propositions for enterprise design.*

### **1.4.3 The inductive approach builds on methods-engineering techniques to describe an enterprise-architecting methodology.**

Developing an enterprise-design methodology involves working through a method-engineering approach that organizes the different levels of methods design based on environmental requirements and case study experience. Methods engineering is the discipline of designing and constructing repeatable design processes (Rolland and Prakash 1996; Tolvanen, Rossi, and Liu 1996). A methods engineering framework consists of three levels: the meta-model, the methodology and the related management practices (Brinkkemper 1990). For this study, the

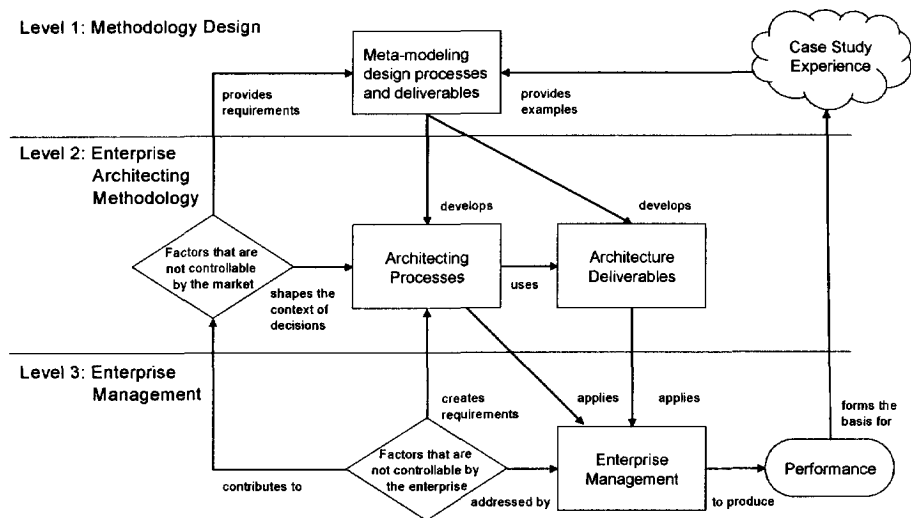
following levels are used to describe and evaluate the enterprise-design methodology summarized in the research proposition.

Level 1: Methodology Design develops the meta-models, design processes and deliverables for describing the proposed enterprise-design methodology. A meta-model is a conceptual model of a method (Brinkkemper 1990). The meta-model represents a *way of thinking* about environmental requirements and case study experiences that form requirements for methodology processes and deliverables. This meta-model is discussed in Chapter two.

Level 2: The Enterprise Architecting Methodology describes the processes and deliverables applied in designing the enterprise. These are developed based on the meta-model. Architecting processes represent the sequence of activities and rules associated with making enterprise-design decisions. Architecting deliverables form the design artifacts and reflect enterprise-design decisions. Formulation of the enterprise architecting methodology is the topic of Chapter three.

Level 3: Enterprise Management decisions and actions are the result of applying architecting processes and deliverables to management decisions. Enterprise performance is the result of these decisions. Observing the characteristics predicted by the architecture processes and deliverables would be an indication of applying an enterprise-design methodology. Such observations form a basis for refining methodology-design models and the enterprise-architecting methodology. The experiences of CEMEX and Accenture in enterprise architecting are reviewed in chapters four and five respectively.

Figure 4 below shows the interactions across these levels. Adapted from Tolvanen, Rossi and Liu (1996), the methods-engineering discipline provides a way for organizing the concepts explored in this dissertation.



Adapted from Tolvanen, Rossi and Liu (1996)

*Figure 4. Applying a method-engineering approach involves working through the different levels of abstraction that connect methodology design with management decisions.*

## 1.5 Architecting is a response to enterprise management challenges.

Translating strategic and enterprise decisions into operational changes is a persistent policy and management issue (Beer and Eisenstat 2000). The environmental factors outlined in this chapter, and discussed in more detail in Chapter two, increase the importance of managing the enterprise as a whole for performance and flexibility. Current approaches for enterprise management concentrate on a particular aspect as the primary tool or level for communications. These approaches, while focused and conceptually straightforward, concentrate on a single aspect of the enterprise rather than addressing the dynamics found in a modern enterprise.

A method that describes the processes and deliverables for designing an enterprise that meets requirements for performance, integration, consistency and flexibility responds to these challenges. It would also extend current management theories and practices based on the practices and experiences of enterprises facing these emerging requirements. This is the topic of the next chapter.

# 2

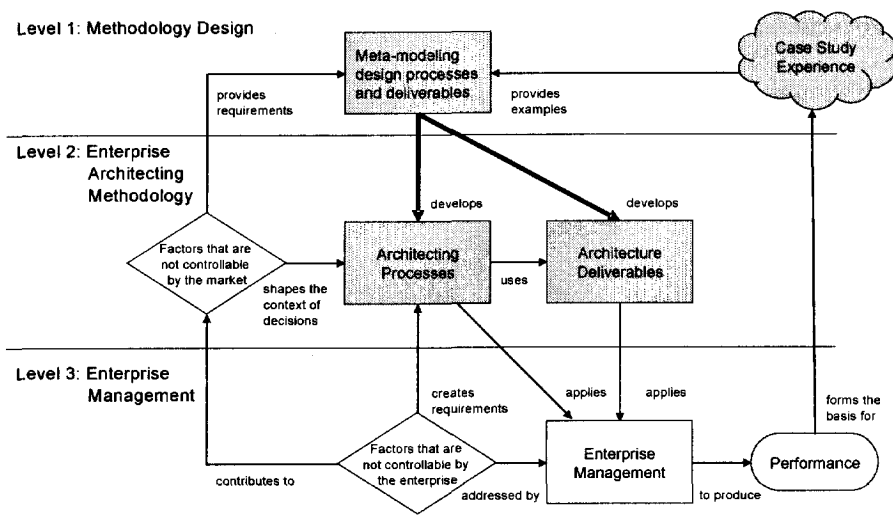
## *Environmental Factors and Requirements*

### **2.0 Multiple forces shape the requirements for an enterprise architecting methodology.**

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Methods engineering begins by creating a meta-model of design processes and deliverables in response to factors that are beyond the control of the enterprise (Tolvanen, Rossi, and Liu 1996). This chapter addresses such first-level issues in methods engineering as the factors outside the control of the enterprise and outside the control of the market. These factors are highlighted in figure five.

The meta-model is based on reviewing market forces, examining current research and evaluating case studies of companies facing enterprise design challenges. The resulting requirements model provides the context for developing a methodology meta-model and case-study criteria. Chapter three then develops a description of the enterprise architecting methodology.



Adapted from Tolvanen, Rossi and Liu (1996)

Figure 5. Methods engineering begins with requirements based on exogenous factors.

## 2.1 Economic and technical changes shape requirements for enterprise architecting.

Economic and technological advances create opportunities and threats for the enterprise. Over the last ten years, changing trade regimes, ever-improving information and communications technology and evolving concepts of business alliances and sourcing have disrupted traditional ideas of markets and industries (Christensen 1997; Sanchez 1997; Iansiti and Levien 2004; Parolini 1999). These changes describe the context for architecting the enterprise. These forces include:

- Increasing market competition created by increased global trade and decreasing domestic and international regulation (Hagel and Seely Brown 2005; Fine 1998). For example, the World Trade Organization's deregulation of the garment industry is changing the entire structure of that industry.
- Declining value of vertical integration as eCommerce and Internet technologies decrease transaction costs and barriers to collaboration (Coase 1937; Downes and Mui 1998).

- Increasing use of business networks as a basis for competition as management accepts and applies new sourcing strategies (Aruajo 2003; Barney 1999; Keen and McDonald 2000).

Each of these forces increases the importance of architecting the enterprise as they place additional demands for performance and flexibility. This section observes the enterprise implications of these forces and the enterprise approach to architecting. The resulting context will then provide a basis for reviewing case-study experiences and the existing research literature.

### **2.1.1 Global trade increases market competition and raises performance requirements.**

The creation of the European Union, the North American Free Trade Area (NAFTA) and other free trade areas point to the reduction or elimination of global trade barriers over the past 20 years. Global logistic capabilities are increasing at the same time with the result that the competitive reach of companies is growing from local and regional markets to global markets. As markets expand, competition in individual market increases as global players join local and regional incumbents (Bossidy and Charan 2004; Friedman 2005).

As geography declines as a source of sustainable competitive advantage, the number of potential competitors increases. This places downward pressure on margins and accelerates the pace of competition (Tushman et al. 1986; Sanchez 1998). In response, enterprises look to raise their internal efficiency.

Competing in global markets place new requirements on the enterprise for greater efficiency and flexibility (Teece, Pisano and, Shuen 1997; Parolini 1999). Enterprises respond by increasing internal efficiency and by accelerating product development cycle times to anticipate or respond to products and services introduced by an increasing number of competitors.



### **2.1.2 Information and communications technologies change the nature of vertical integration.**

The introduction of Internet technologies and the growth of eCommerce are persistent forces changing coordination costs and capabilities. The changes created by information technology in market and operational structures have drawn significant research, for example, by Broadbent and Weill (1998), Davis and Meyer (1998), denHengst and Sol (2002) and Keen and McDonald (2000), among others. Applying transaction cost economics to the topic of the Internet as an integrative force have also been popular subjects of study. Changing transaction costs should, according to Coase (1937), lead to changes in enterprise structure (Afuah 2003). The net effect is the decreasing importance of the vertical integration of enterprise capabilities.

In an environment of advanced information and communications technologies, the enterprise can benefit from assembling networks that align their own capabilities with capabilities obtained from the market. This enables the enterprise to concentrate on its sources of competitive advantage and lease the rest of its requirements (DeKegel and McDonald 2001). Where technology reduces search and transaction costs organizations, enterprises are forming horizontal networks based on a blend of internal and external capabilities – a value network – such as eBay, Amazon, or the online travel sites (Afuah 2003; Bovet and Martha 2000; Parolini 1999).

A horizontal or value network organizes itself around processes and capabilities to deliver value to customers. This extends the traditional strategic decision of “buy vs. build” to one of “buy, build, lease, or partner.” The notion of a horizontal network organized around value is seen as a way to manage local as well as global organizations (Tallman and Fladmoe-Lindquist 2002). Amazon and Google, for example, continue to build on their IT technology and customer service platforms that add value to the capabilities they obtain from their partners. As information technology enables greater breadth and depth of collaboration, the value of the enterprise’s internal capabilities increases, since they must form the basis for competitive advantage.

### **2.1.3 Management acceptance of sourcing increases the importance of business networks.**

Increased global competition and new technologies change enterprise strategy and actions. Management acceptance of new strategies such as alliances and joint ventures moves these potential changes into proven practice. The rise in sourcing arrangements, such as contract manufacturing, services, alliances, joint operating agreements and other third-party arrangements indicate management acceptance of a new strategic tool – sourcing.

Management acceptance of sourcing makes capability-sourcing decisions strategic. This blurs the boundaries between enterprises and functions as companies collaborate to form horizontal value networks rather than vertical value chains (Keen and McDonald 2000). Enterprises use sourcing to gain access to market capabilities quickly and at a managed cost. Raben (1999) and Dyer and Singh (1998) illustrate the use of sourcing and cooperation in creating strategic advantage between organizations.

### **2.1.4 Economic, information and communications technologies threaten current management frames of reference.**

Trade liberalization and information and communications technologies are creating “frame-breaking change” (Tushman and Newton 1986). This type of change upsets traditional notions of competitive advantage, markets and products. The current context breaks the traditional frames of reference for many enterprises. Increased competition created by falling global trade barriers and enhanced global logistic capabilities turn local markets into globally competitive markets (Bossidy and Charan 2004; Friedman 2005). Advances in information and communications technologies reduce the effectiveness of vertical integration and internally developed capabilities as new entrants lease capabilities from value networks (Afuah 2003; denHengst and Sol 2002; Negroponte 1995). The combination of these changes forms the context for a new set of needs for enterprise management that include:

- Raising performance levels consistently to meet global requirements.

- Improving enterprise ability to change successfully by reducing the variance between expected and actual results to conserve resources and sustain performance.
- Improving the pace of change execution to respond to customers and competition.
- Expanding strategic options to include sourcing capabilities outside the enterprise structure to take advantage of horizontal value networks.

Enterprises that are able to manage frame-breaking change are those that re-orient themselves to new “frames” of references. That re-orientation starts with the effective convergence and integration of strategy, structure, people and processes (Tushman and Newton 1986). Achieving integration and consistency among those factors is an enterprise architecting goal. The response of management executives to these factors defines the depth of requirements for an enterprise design methodology.

## **2.2 The response of firms to these environmental factors provides positive and negative examples of enterprise design.**

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The use of example case studies for theory building provides a way to learn from current practice (Yin 1994). The case studies presented in this section illustrate management responses to the environmental factors discussed earlier. These cases include situations that call for managing complexity at scale. The experience of enterprises such as Dell, UPS Toyota and General Electric can help identify aspects of enterprise architecting. However, since these companies have already been the subject of much study, further in-depth analysis of them is likely to be seen as re-interpretations of existing research.

The five case studies reviewed in this section were selected based on criteria indicating enterprise level change. Some of the companies covered in this review managed enterprise change successfully, others less successfully. The cases and their primary focus of analysis include:

- McDonald's Corporation's its implementation of its Made for You™ initiative illustrates the need to integrate across business process, technology and human performance.
- CDW that demonstrates the ability of an enterprise to extend its business by extending its enterprise design.
- Southwest Airlines demonstrates the value of consistency between its strategy and capabilities.
- AT&T's acquisition of TCI illustrates the need for implementation changes for strategic initiatives.
- U.S. Federal Enterprise Architecture (U.S. FEA) involves the use of an enterprise architecting method to increase coordination and government performance

Figure 6 below recaps these cases and their selection criteria.

	Complexity at Scale	Introducing change	Extending the model	Size of Organization
McDonalds - Made for You, Global Quick Service	Yes, as kitchen operations require managing dozens of menu items and cycle times of seconds.	Yes, implementing new kitchen system to improve product quality, service and menu flexibility.	Yes, opening new restaurants and adding menu items	Large, with over 30,000 restaurants in 100 countries.
CDW, Technology Distributor	Yes, filling more than 15,000 orders per day, managing an inventory of more than 100,000 different items.	Yes, stable business model following extensions for public sector and internet store.	Yes, moving model from commercial to public sector.	Smaller, 3,600 employees generating \$4 billion in sales.
Southwest Airlines, Domestic Airline	Yes, managing all aspects of airline operation.	Yes, responding to security changes and competitors imitating elements of the model	Yes, moving the model to new locations within the U.S. and the model is being copied by other competitors.	Medium, 33,750 employees serving 60 locations in the US with hundreds of daily point to point flights.
AT&T's acquisition of TCI, Global Telecom	Yes, integrating telecommunications and cable to create a new media company.	Yes, the acquisition would require significant changes to core AT&T to realize benefits.	Yes, the merger intended to enable AT&T to offer new digital services.	Large, with multiple business units and millions of customers.
U.S. Federal Enterprise Architecture Government	Yes, large national scope incorporating all 50+ major agencies.	Yes, changing agency and functional silos toward more citizen centric government	Yes, the FEA model is being adopted by 50+ major agencies and some states.	Large, with over 100 US federal agencies and significant budget.

Figure 6. The case studies were selected based on characteristics that describe enterprise wide change.

### **2.2.1 McDonald's Made for You™ initiative highlights the limitation of architecting without integrating.**

McDonald's is the largest global quick-service restaurant chain in the world. With more than 30,000 locations and 2004 annual revenues of \$19 billion, McDonald's is one of the world's largest and most successful franchise-based business models. Consistency of operations is a hallmark of its strategy and each store follows a mandated franchise architecture for products and operational processes. In this way, McDonald's built a strong record for designing store systems and processes. However, when store systems changed radically that track record did not keep it from architecting new information systems without integrating them with store personnel and processes.

In the late 1990's, McDonald's strategy called for growing the number of store locations and the range of menu items. Jim Cantelupo, then CEO at McDonald's, sought to implement this strategy through changing the core restaurant systems to use new kitchen management systems and technology known as Made for You™ (Barrett and Gallagher 2003).

#### **Made for You represented a new architecture in support of a greater diversity of menu items.**

Made for You (MFY) represented a departure from the systems McDonald's had used for a number of years. In the prior architecture, the kitchen assembled small batches of the standard menu items made available to customer on a just-in-time basis. This system worked well with the company's limited and highly standardized menu. However, the increasing importance of local market tastes and changing tastes for heather foods led McDonald's to expand the diversity of the menu items beyond the capacity of the standard kitchen systems. MFY provided an advanced kitchen system that costs franchisees \$18,000 to \$50,000 per store to install (Barrett and Gallagher 2003).

In the face of this cost and added complexity, McDonald's offered to support outfitting restaurants in order to have all of them on the new system by 2000. This resulted in special one-time charges of \$162 million in 1998 (McDonald's 1998 Annual Report). The goals for this new system included:

- serving fresher, better-tasting food while reducing customer wait times.
- supporting future growth through product development by more easily accommodating an expanded and more localized menu.
- improving customer satisfaction through allowing the special ordering of menu items with no penalty in service.

Implementation of the MFY technology occurred concurrent with company system upgrades related to Year 2000 computer fixes. Implementing these new systems involved new point of sale systems, kitchen equipment and facilities layout and retraining kitchen staff to be able to move from the assembly of small batches of standard menu items to preparing menu items to order. The risk associated with this change appeared manageable, as a similar system had been in operation at a primary competitor (Adams 2003).

**Made for You challenges the McDonald's franchise system.**

Made for You was a significant change to the franchise system. The process approach for MFY was tuned to the scenario of an individual customer order. That new process required that sandwiches be made one at a time instead of in batches. Since each sandwich has its own preparation rules, employees lost the previous speed/scale efficiencies gained through batch preparation. This slowed down service to the worst in the market. Wait times went up to 163 seconds versus 127 seconds at Wendy's, creating a 6 percent drag on sales based on company estimates (Gogoi and Arndt 2003).

Store managers adjusted to the new system as the skill requirements for the MFY processes exceeded current workforce capability. Stores typically staffed kitchen positions with new employees. However, the diversity in activities required to fill individual orders increased the complexity of the job. This forced store managers to move their "best people" from the drive-through to kitchen. This hurt drive-through sales and service – the most profitable part of a quick-service restaurant (Adams 2003).

The system worked well during off-peak hours when the pace of orders slowed. However, during peak hours, the orders arrived faster than could

be individually filled, creating long lines of impatient customers. The MFY system had capabilities to build “buffer stock” during peak periods that would have enabled it to handle peak demand better. However, according to a former franchisee, this capability was not activated per corporate instruction.

**Made for You demonstrates that success requires integration between strategy, architecture and business elements.**

McDonald’s franchise architecture assumed a standard, but somewhat limited, menu. When the strategy called for a more diverse and flexible menu, McDonald’s leaders recognized the need to change the franchise architecture, including changes to business process, store systems and equipment. However, these systems when implemented demonstrated the need for integration at the strategic, architectural and operating level. The MFY system did not fully integrate or take into account the process complexity with workforce abilities. This created mismatches between the kitchen crews and the activities they were asked to perform. Training did not overcome this mismatch as the process required different cognitive skills – in this case the need to make “fast decisions and switch tasks minute to minute” – than the workforce hired to do the job was able to handle. The resulting degradation in performance had significant impact on service levels, costs and customer satisfaction (Adams 2003).

The implications of McDonald’s MFY point to the additional complexity associated with introducing change to an already complex and integrated system. In this case, the system included the business processes and information systems and the interaction between technical, physical and intangible elements. The lack of integration had real consequences on business performance. In addition, the MFY system worked well in certain situations and poorly in others. This experience points to the requirement to evaluate new capabilities against multiple scenarios and testing their fundamental assumptions (e.g., orders treated individually even during peak periods). Finally, MFY points to the power of an integrated design, as the real business consequences from disrupting the consistency across elements was over \$1 billion in lost sales, based on 1999’s annual sales in the United States market alone.

### **2.2.2 CDW integrates uses its “account manager” model to grow and remain flexible in a changing market.**

CDW is the largest computer reseller in North America with revenues of \$5.7 billion. CDW sells technology equipment, software and implementation services to small- and medium-sized businesses and public sector agencies in the United States and Canada. The company was founded in 1984 and now has 2,900 employees and 360,000 customers, 170,000 of whom are active Internet customers. It operates across multiple channels including the phone. Internet sales totaled \$892 million in 2003 with more than 1.3 million Web orders. In 1998, CDW formed a special purpose group to address the public sector marketplace – CDW-G is now a primary supplier to the U.S. Federal Government, state and local jurisdictions.

CDW has a demonstrated record of consistent sales and profitability growth, even during the recent economic difficulties. As of 2004, CDW had experienced 48 consecutive quarters of EPS growth and it generated a 331 per cent increase in sales from 1998 to 2004 despite product prices falling 10-15 per cent per year during this period. This has given CDW above-market rates of return compared to other technology companies such as Hewlett Packard, Microsoft, IBM, Cisco and others.

The company attributes this consistent performance, in part; to a business model that supports CDW reaching its customers and that enables the company to scale its business (CDW 2004 Annual Report). That business model consists of the following elements:

- Personal Sales/Account managers who are the single point of contact for all customer interactions.
- Logistics and shipping supporting 24 annualized inventory turns in 2004 through the use of advanced technology and real time information. The company ships more than 90 percent of orders received before 5:00 p.m. the same day.
- Vendor partnerships that are critical to providing product choice, diversity and reseller revenues.

This business model is graphically represented in the company’s “Circle of Service” shown in the Figure 7 below.



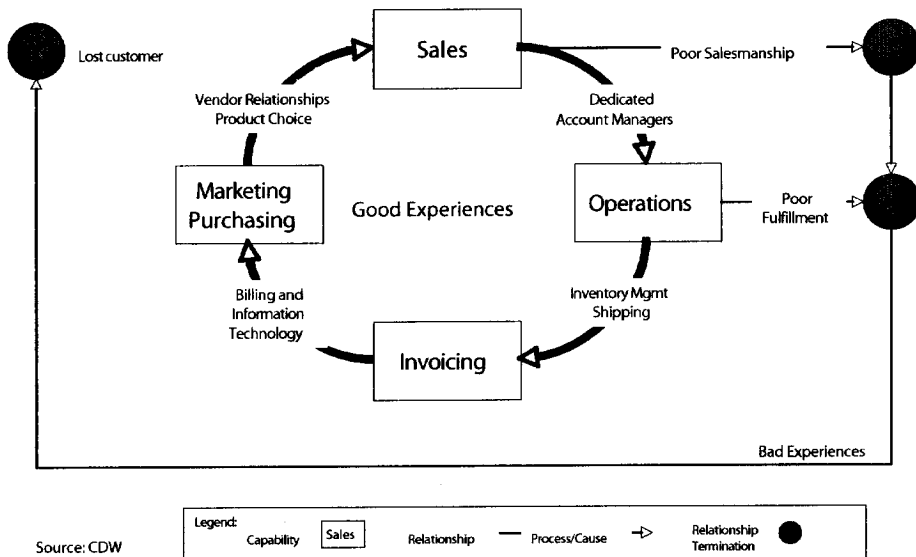


Figure 7. The “circle of service” model reflects the dynamics of the CDW architecture

CDW’s growth strategy centers on increasing the reach and efficiency of its relationship-based business model. The elements of this strategy include:

- Increasing the productivity of co-workers so that it can continue to grow in an environment of deflating product prices.
- Expanding the customer base, as CDW currently has relationships with only five per cent of its identified addressable marketplace.
- Further penetrating existing accounts with a broader range of products and services, for example, networking products and integration services.
- Optimizing the product mix to bring a portfolio of products to keep CDW attractive to its customer segments.
- Strengthening brand awareness for CDW to expand the customer base through increased name recognition.
- Expanding through selected acquisitions, such as CDW’s purchase of assets related to Micro Warehouse in 2003.

CDW announced in its third-quarter 2004 conference call that it plans to use its existing relationship-based model to achieve financial performance that is targeted to be ten per cent above the industry (Klien and Harczack 2004). These targets provide requirements for defining CDW's enterprise architecture.

**The account manager is at the center of CDW's model.**

Selling computer equipment, software and services is a highly competitive field involving relationships with companies that are both suppliers to CDW and competitors via their own direct channels. This requires that CDW not only offer a unique capability, but also that the capability must be value-added for it to provide an effective competitive differentiation in the crowded marketplace. CDW's strategy rests on providing superior service and knowledge to the small- and medium-sized businesses that other companies often overlook.

Other companies thought that providing "high-touch" services to the small- and medium-sized market segment was uneconomical given the large number of firms and their relatively small individual purchases. CDW's model makes this market financially attractive by assigning each account a named account manager and routing all correspondence between CDW and the customer through that account manager. Placing the account manager at the center of the customer-CDW relationship provides a continuity of experience and focus associated with a high-touch approach. CDW makes this approach scaleable and economical by concentrating account managers in call center locations – making the primary channel of communication the telephone (and email) rather than onsite sales call the primary channel of communication. The CDW model fulfills orders through an advanced logistics and warehouse management system that keeps inventory levels low.

The elements of CDW's model are tuned to these core capabilities. For example, account managers receive 12 – 18 months of product and sales training prior to working unsupervised on their own accounts. This gives them the breadth of product knowledge needed to handle customer questions without referring them to specialists.

The account manager is the face of CDW and all of its capabilities support the customer experience. Information systems, such as customer contact, inventory, order management and business intelligence applications view the account manager as the primary recipient of customer and product information. These systems support account managers handling the total customer relationship and requests as account managers see all customer orders and prior contact history, including calls to the support desk. The CDW account manager-based architecture has demonstrated its flexibility as the company continues to introduce new products and has opened a new line of business, CDW-G, largely by replicating this model for the public sector.

**CDW actively manages its model to achieve results and expand its business.**

CDW recognized the need to have a scaleable model for operations in the face of competitive pressures, declining product prices and changing product cycles. CDW must evolve and extend its business model if it is to grow. Managing the CDW architecture places a focus on sales productivity, invoice size and customer acquisition as the company must grow unit volumes 10 – 15 per cent a year in order to keep up with declining prices for hardware and software. Revenue growth only occurs when it achieves unit and value sales growth in excess of this figure.

CDW must evolve its capabilities to remain competitive in the marketplace. As a re-seller, the risk of a poor decision to CDW's growth and margins is substantial, since competitors and substitutes are plentiful. CDW demonstrates the potential of architecture to extend the reach and scale of a business. CDW have effectively evolved its architecture to launch CDW-G, integrate Micro warehouse to extend the business and support continued top and bottom line revenue growth. The following summary is based on an ongoing review of CDW's investor conference calls, annual reports and investor publications.

- CDW introduced an Internet based channel ([www.cdw.com](http://www.cdw.com)) in 1997. The Internet channel is a dynamic version of the company's catalogue. The company used this new channel as a way to extend its basic account manager model, rather than compete with it. The Internet is a channel available at the customer's discretion. CDW continued

to count Internet sales as part of the account manager's overall sales, and it integrated Internet-order history into the customer's account history. CDW has also used the Internet as a source of new services. One example is the development of the Software License Tracker™ that manages customer software licenses.

- CDW expanded the reach of its business model through the creation in 1998 of its government subsidiary CDW-G. CDW-G extends the account manager-based system to the specific needs of the public sector. CDW-G uses dedicated account managers who understand the unique procurement requirements involved in the public sector market. By extending its core business model to address a specific market, CDW has been able to create a new source of revenue without disrupting its core business or creating additional expense.
- When CDW was founded in 1984, the number of products and their complexity were relatively small when compared to the current market. Since that time, the proliferation of suppliers, technologies, and their integration has exceeded the capacity of any individual to handle on their own. This has CDW's competitors to move from individual-based sales and service to team-based selling strategies. CDW has handled these challenges by creating technology specialists to provide tiered support while maintaining the primary customer-company connection with the account manager. In 2004, CDW had 150 of these specialists. All customer interactions, even those involving second-tier support, are captured on the same system and visible to the account manager.

**CDW demonstrates the ability to evolve and extend its enterprise architecture to support continued growth in a highly competitive environment.**

CDW's model represents a deliberate design – an architecture – for addressing the small- and medium-sized marketplace. Its success in the marketplace and its ability to evolve this model attests to its flexibility and performance. This is noteworthy in that sticking to a model and its execution has worked in an environment where intermediaries have faced increasing pressure on sales and margins. CDW's model shows the following characteristics:

- The CDW model and its dynamics form a clear statement of how the business works at an operational level – the “circle of service.”
- The model supports the strategy, supplying services and activities that directly connect with the marketplace and company aspirations: its focus on providing high touch service in an economical way to small- and medium-sized companies.
- The model is flexible and transferable – the use of the CDW core model to create CDW-G and expand operations into Canada.
- The model builds around a defined purpose – supporting the account manager – that enables the organization to define the goals of a consistent architecture and make integration decisions.

CDW’s ability to bring together the account-manager service model, technology, logistics and other capabilities illustrates the power of an integrated business model. CDW’s superior record of performance indicates the potential of a model-based approach to enterprise management.

### **2.2.3 Southwest Airlines achieves above market performance through consistently applying its business model.**

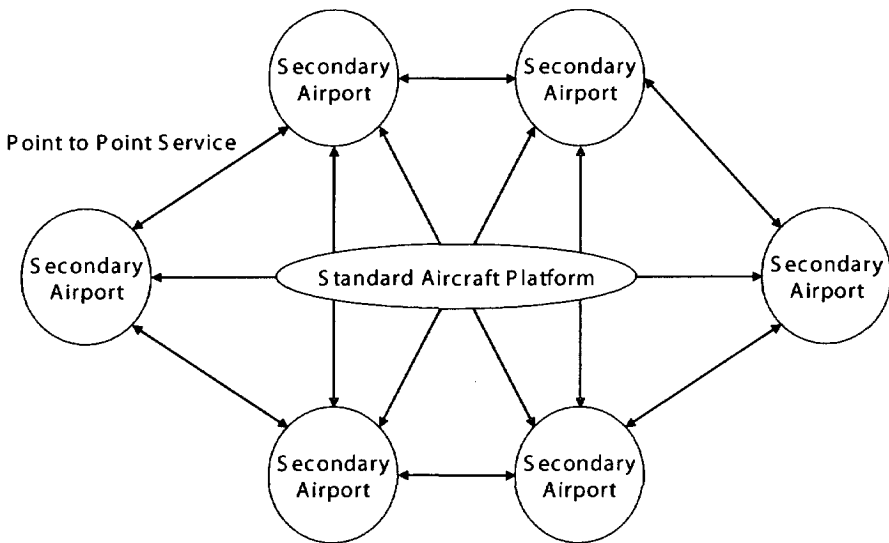
Southwest Airlines is the fourth-largest air carrier in the United States. Founded in 1971, Southwest flew 63 million passengers on 381 B737’s on a route network of 338 non-stop city pairs in 2004. Researchers often use Southwest Airlines as an example of a well-run company (Hamel and Prahalad 1994; Treacy and Wiersema 1997, Treacy 2003). Southwest’s strategy is based on providing low-cost point-to-point service for business and leisure travelers. With an average flight distance of 548 miles and 90 minutes, Southwest’s primary competition is the automobile. It implements its business strategy through a range of operating decisions that when taken together describe an architecture for the business. The following list is the result of a review of the company’s quarterly investor calls and publications.

- Low-cost attracts a larger share of travelers choosing to fly. These passengers keep individual flight yields higher than the competition, increasing revenue per mile.

- The high frequency of scheduled trips between city pairs makes flying Southwest a viable alternative to driving.
- Point-to-point flights reduce the dependence on weather and flight conditions at any one airport and increase on-time performance. The average plane spends only 25 minutes at a gate prior to departure versus the industry average that is closer to 45 minutes per gate.
- Flying into secondary airports reduces congestion. It also enables Southwest to be the dominant carrier in its airports. The dominant carrier enjoys lower gate rentals and operating costs. Southwest has a 69 percent share in its top 100 city-pair markets.
- Southwest's standardized aircraft fleet and delivery architecture based exclusively on the Boeing 737 aircraft simplifies maintenance and operations and enables greater interchangeability between parts and crews.
- Low operating costs – among the lowest among major carriers. About half of Southwest's sales take place on the Internet.

The Southwest model enables the company to manage its operations on a proactive basis. For example, it hedges more than 80 to 85 per cent of its fuel costs in the futures market (Gittell 2003). According to its quarterly investor calls, Southwest will continue to replace approximately 10 per cent of its fleet in 2004/5 with planes that are newer and less expensive to operate while other carriers are canceling or postponing capital expenditures (Kelly 2003).

In January 2002, Southwest invested \$10 million in airport check-in upgrades to automate ticketing, baggage tags and gate processes to address increasing wait times created by new security requirements. The company wants flying Southwest to continue to be more attractive than traveling by car. Figure 8 represents the combination of these factors.



Based on analysis of Southwest Airlines

*Figure 8. The components of Southwest Airlines' business model integrate to deliver lower cost and higher performance*

Southwest Airlines considers the impact on its business model when it makes investments and strategy decisions. For example, during the last three years (2001-2003) Southwest has continued to invest in its routes and operations, growing as the rest of the market remains stagnant or shrinks. The performance results demonstrate its success.

- Expanding its routes by 5 per cent at a time when the industry is contracting 17 per cent.
- Remaining profitable for over 30 years.
- Maintaining some of the lowest costs in the industry: \$0.07/passenger mile versus \$0.11 for the industry.
- Twelve straight years (1990 – 2002) rated best in customer service with the lowest customer complaints.

Southwest manages an integrated business model focusing on the low-cost, short-haul market. The model is simple, well understood and

communicated throughout the organization. This supports a strong culture of customer service and workforce focus on a positive customer experience (Gittell 2003). The model links the service delivery platform (aircraft), operations technology and operational decisions around a focus on safe and low-cost operation.

The components of the model fit together and management understands the value of integration and consistency. For example, many of Southwest's competitors are regional airlines linked to major carriers, for example, American Eagle, Delta Connection and United Express. Regional carriers have made the transition from turbo-prop to jet planes that can hold as many as 100 people. Regional jets offer lower operating costs than Southwest's Boeing 737-based fleet and might fit well with Southwest's strategy. Southwest President Gary Kelly responds to questions about moving to regional jets not in terms of the aircraft's lower cost, but in terms of it making the Southwest model more complex by having two airframes (Kelly 2003). The Southwest model and management's support for it provide an example of the value of integration and consistency to current and expanding operations:

- Consistency – Southwest applies its business model across its operations to provide high availability and low costs by using a single aircraft, secondary airports and point-to-point routing.
- Integration – the model brings together the elements of Southwest's strategy into a coherent whole focused on being a low cost airline. Examples here include a single aircraft platform and hedging fuel purchases.
- Performance – the company has consistent profitability and growth at a time when the industry as a whole is suffering. In late 2005, four of the seven major U.S. characters have filed for Chapter 11 bankruptcy.
- Flexibility – the company successfully changed elements of its business model, implementing electronic boarding passes, without disrupting operations. It has the ability to extend its model, for example, starting service in Philadelphia, which is Southwest's first entry into a competitor's hub location.



#### **2.2.4 AT&T's acquisition of TCI illustrates the need for integration to achieve strategic intent.**

AT&T was the primary provider of local and long-distance telephone service in the United States until 1984 when the company was required to spin-off local phone service into seven regional telephone companies. Divestiture left AT&T as a primarily long-distance telephone and data networking company with more than 60 million customers. However, as competition in this market intensified, AT&T sought new sources of revenue and extensions to its business model, primarily through acquiring other companies including National Cash Register (NCR), Olivetti and Teradata, with mixed results.

In 1999, AT&T sought and won the right to offer local telephone service, bringing it into competition with the regional telephone companies that were originally part of AT&T. As a central part of its strategy, AT&T sought to offer local service without having to pay local access fees to the regional telephone company. Cable television technologies offered AT&T a way to provide a range of services to residential customers and bypass the local telephone infrastructure. The strategy suited AT&T, which feared being left out of the emerging "digital age" and becoming your grandmother's long distance company. The "digital age" referred to a shift in markets and competition away from physical assets and toward informational assets (Negroponte 1995). At this time, AT&T's competitive advantage rested on its network infrastructure – a physical asset. The company sought to use this asset in making a move into information services.

AT&T's acquisition of TCI was part of a "facilities-based" strategy to provide integrated services after it encountered challenges in forming effective alliances with the highly fragmented cable industry (Kupfer 1999). TCI provided the company with a way to gain advantages of scale, as its 21 million customers made it the largest cable company at that time. AT&T added to that scale through a subsequent purchase of Media ONE in 2000, creating the critical mass to attract other cable partners toward an AT&T-based industry standard for media, voice and data communications over the cable infrastructure. That infrastructure represented the AT&T platform and the core of a revised business model to compete.

The strategy called for integrating TCI with AT&T to provide a platform for offering every communications service to American consumers including integrated local/long-distance voice, high-speed Internet and video-cable services. AT&T executives saw the combined company as a platform for growth and profitability as in 2000 it served an \$81 billion dollar market in which AT&T only collected \$23 billion. The strategy envisioned that an integrated multi-channel communications company would reduce its customer churn in long-distance telephone service. Realizing this strategy required integrating operations across AT&T and TCI from the front office (sales and consumer contact) to the back office (operations and administration) in order to create a single, unified company. In the front office this required creating an integrated offering that appealed to customers with the back office producing the “single bill” that demonstrated integrated services.

In 2001, AT&T sold its cable interests originally valued at more than \$100 billion to Comcast for \$72 Billion

AT&T's strategy required orchestrating several changes simultaneously to integrate its technology, processes, products and operations in order to provide a bundled service to the more than 20 million customers who were previously customers of AT&T or TCI. Specifically the integration required:

- Upgrading TCI's network to support digital cable and cable-based telephone service.
- Creating an integrated offering to AT&T's 40 million current customers.
- Opening new markets through creating alliances with a network of other cable companies.
- Serving these customers through a consolidated back office and ensuring them a single 'view' of the business rather than having to deal with multiple business units.

The company did not integrate its operations, running the integrated service out of two separate business units: broadband with cable-TV,

local phone and Internet services, and a consumer business unit with long distance, wireless and dial-up Internet. The resulting "integrated offering" failed to gain market traction or critical mass. Out of the original 20+ million long-distance subscribers of both companies, only a fraction purchased a semi-integrated offering: 1 million cable-telephone customers, 1.5 million high-speed Internet customers and 3.5 million digital video customers (Schaff 2001).

In 2001, the company confessed its failures and announced its intent to divest the cable-related assets at a loss of more than \$32 billion. The CEO Michael Armstrong defended this decision, saying that "we believe that these businesses can grow far beyond what a consolidated AT&T would have otherwise. Initially, we thought that other cable companies would partner with us in offering cable telephony. We were wrong. Given another dollar to spend, the cable companies we spoke to would spend it on new video channel, data service or content production, not on a service like telephony that they really didn't understand" (Blumenstein and Grant 2004).

**The effectiveness of AT&T's market strategy was ultimately challenged by the requirements for integrating its operations and offerings.**

AT&T's acquisition moves represented a market-shaping strategy that required the company to make a scale play to gain market share both to prove the business model and encourage others to join its strategy. The need to build a value network with AT&T at the hub required buying market share and proving its presence in an expanding market of digital services to the home. This investment sought to protect AT&T's core long-distance phone by using cable as a channel to compete for local phone service. The TCI acquisition was the cornerstone of that strategy.

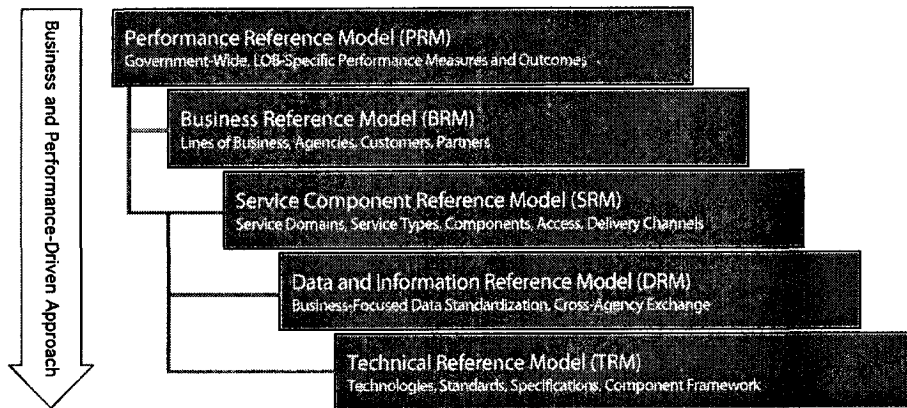
However, the implementation requirements were larger than originally thought. The strategy carried significant performance requirements, as a facilities-based strategy demanded significant outlays of capital and equipment at a time of increasing use of leveraged value-network relationships. Each cable-telephone home required an investment of \$400 to \$500 to connect to the network. This was a commitment of financial capital that AT&T would have to make for several years ahead of realizing revenue from it.

AT&T's strategy called for an integrated operation, yet from the perspective of the customer, the business was not organized as an integrated service delivery operation. Operational systems and processes were not created to reflect the integrated offering. AT&T sought to move beyond a holding company strategy with its acquisitions and integrate them at the offering and operations level. However, it did not achieve the level of consistency and integration required to make that strategy successful.

This case shows the consequences of creating a gap strategy formulation and implementation. The inability to integrate the company to realize a unified customer experience compromised AT&T's future as evidenced by the announcement on January 31, 2005 that the company had agreed to be acquired by SBC Communications, one of the "baby bells" created in the original breakup of the company in 1984.

### **2.2.5 The U.S. Federal Enterprise Architecture (U.S. FEA) uses enterprise architecting to increase performance**

Civilian agencies within the U.S. Federal government represent approximately 20 percent of the gross domestic product of the United States. According the President's budget requests in 2003-2004, government spending on information technology would exceed \$60 billion. In 2002, the U.S. Office of Management and Budget (USOMB) initiated the development of a Federal Enterprise Architecture (U.S. FEA). The goals of the U.S. FEA included identifying opportunities to simplify processes and to unify work across the agencies and within the lines of business of the federal government. The intended result of the U.S. FEA is a more citizen-centered, customer-focused government that maximizes technology investments better to achieve mission outcomes (U.S. FEA PMO). The U.S. FEA follows structures based on the Zachman framework, which is a widely known information technology architecture model. It classifies the business of government into the reference models shown in Figure 9 below.



*Figure 9. The Federal Enterprise Architecture uses a series of reference models to streamline government operations.*

**The U.S. FEA creates a common classification framework for identifying potential technology investments duplications.**

The U.S. Federal government spent over 2.1 trillion dollars in 2003 on operations. The U.S. Office of Management and Budget (USOMB) has oversight authority for this spending and for conducting agency and program reviews of IT spending. The U.S. FEA sought to provide a shared classification scheme for all agencies to facilitate comparisons between agencies and programs in order to identify investment duplications, opportunities for shared services and channels for delivering services electronically to citizens. The frameworks within the U.S. FEA include the following:

- A Performance Reference Model (PRM) that standardizes performance measurement for major IT investments. The PRM consists of four measurement areas: Mission and Business Results, Customer Results, Processes and Activities, and Technology. There are twenty categories within these areas.
- A Business Reference Model (BRM), that provides a framework for defining government activities in terms of functional classifications. The BRM defines four business areas: Services to Citizens, Modes of Delivery, Support Delivery of Services, and Management of Government Services. These comprise thirty-nine lines of business and one hundred and fifty three sub-functions.

- A Service Component Model (SCM), which supports business and application services that run across governmental boundaries and provides a basis for common or shared services. The Service model identifies seven types of services including Customer Services, Process Automation Services, Business Management Services, Digital Asset Services, Business Analytical Services and Support Services.
- A Data Reference Model (DRM), which defines the standards and approaches for categorizing, exchanging and structuring data throughout the U.S. Federal Government. The data-reference model provides the structures to enable greater data sharing.
- A Technical Reference Model (TRM), which captures the standards and technologies used by government agencies to deliver services via information technology. The technology reference model defines standards for the following areas: Service Access and Delivery, Service Platform and Infrastructure and Business Management Services

**The U.S. FEA represents a bottom-up approach to architecting the enterprise.**

The U.S. FEA provides a way for individual agencies, departments and programs to place IT investments into a common framework. Given the complexity and scope of the U.S. Federal government, the U.S. FEA takes a practicable approach to achieve the goals of an architected enterprise

The FEA faces a challenging task given the diversity of the set of enterprises known as the U.S. Federal Government. The term “government” implies a unitary whole but in practice these are largely independent agencies ranging from the equivalent of small- to medium-sized businesses to the largest organizations in the world. These agencies are in many instances competitors for resources and authority rather than collaborators for service and efficiency. A major reason for the development of the U.S. FEA was to help bring them together as an enterprise with common goals, shared resources and tight relationships.

The U.S. FEA’s goal of identifying common and reusable services represents one use of architecture. Ideally, the U.S. FEA would help the USOMB and the agencies identify common services and systems for

reuse rather than redundant IT investments. However, an architecture alone will not achieve these goals, particularly given their intended impact on federal budget allocations, and this highlights some of the gaps in the U.S. FEA approach. While there have been some successes, the U.S. FEA represents a partial enterprise architecture.

- The U.S. FEA is largely an information technology architecture governing technology investments. While the business reference model defines the standard services of government, it does so in a way that replicates current agency structures. This reinforces rather than re-architects the way government operates as the lines of business largely reflect the missions of current government agencies. Achieving significant consolidation and elimination of redundant operations requires a different construct than redefining agency missions in terms of services.
- While the U.S. FEA is part of the President's overall management agenda, it does not fully address the budgetary governance and management practices that connect agency importance with funding levels. In the current environment, the size of the budget and budgetary increases represent a proxy for importance. The goal of the U.S. FEA to reduce redundant IT spending runs counter to this culture.
- The U.S. FEA is an administrative tool wielded by the executive branch of government. The U.S. Federal system however has two other branches that influence the structure and budget of the government. The judicial branch can impose operational requirements on federal agencies through court rulings. The legislative branch directly funds and directs operational activities that are not within the scope of the U.S. FEA.

The U.S. FEA represents a bottom-up approach to architecting through providing a standard framework and construct for defining governmental activities and IT investments. There has been some success. The U.S.D.A. identified \$162 million in savings through applying the U.S. FEA framework to its IT investment portfolio.<sup>2</sup> While substantial, this is a tiny fraction of total government IT expenditures of around \$60 billion that are within USOMB's purview.

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<sup>2</sup> <http://www.whitehouse.gov/omb/egov/a-1-U.S.FEA.html>

The effectiveness of an enterprise architecture framework requires more than modeling the enterprise. It demands coordination with management and operating processes to implement the enterprise design. A classification framework without an alignment with financial, business governance, and leadership directives can only have limited results. The Government Accountability Office (GAO) has raised similar concerns, asking whether the U.S. FEA should really be considered an architecture when it lacks a transformation roadmap. A GAO review of the U.S. FEA also cited a lack of consistency within the architecture as a point of concern (Hite 2004).

Architecting an enterprise is a change process that involves more than defining the framework and blueprint. It requires incorporating the enterprise's culture, behaviors and rewards – a broader approach than the U.S. FEA's focus on information technology.

#### **2.2.6 These case studies outline propositions for enterprise architecting.**

The case studies reviewed in this section provide examples of enterprise initiatives managing their resources for competitive advantage and growth through creating or extending performance, flexibility, integration and consistency. They illustrate approaches to managing the enterprise and implementing strategic change. The cases provide both positive and negative examples that facilitate defining propositions for a descriptive model of enterprise architecting. These case studies provide a basis for building propositions for an enterprise architecting method based on enterprise management:

- Performance, the ability to produce intended results with fewer inputs and resources, reflects the effective implementation of strategy. The consistent performance and growth of CDW and Southwest indicate the performance potential of companies that adhere to a business model and use it to expand into new markets (CDW-G) or expand existing operations (Southwest Airlines).
- Flexibility involves making changes to the operation without suffering a long-term loss in performance. Southwest and CDW demonstrated flexibility as they made investments during times



of down markets to change their operations and performance. In contrast, AT&T reinforced traditional models through the acquisition of TCI by keeping customer-facing assets in separate business units. McDonald's Made for You initiative demonstrated the business impact of failing to anticipate mismatches in kitchen operations, a gap between the enterprise architecture design and its implementation.

- Integration, the degree to which individual parts perform their operations in a coordinated way with other parts of the system, forms the basis for operational performance at both the macro and micro scale. AT&T's acquisition of TCI in pursuit of an integrated digital offering to the home required the difficult task of integrating products, operations and customers. McDonald's Made for You kitchen system sought to support added menu diversity and freshness, however, the systems implementation did not properly integrate it with store operations and workforce abilities.
- Consistency, the use of standards to enable components to fit without contradiction, is a requirement for achieving performance at scale. The U.S. Federal Enterprise Architecture achieved only limited consistency. Southwest Airlines and CDW, on the other hand, both evolved their defined business models to enter new markets and make investments during a down market in order to continue growing and increase performance. This was possible, in large part, because the intended changes were consistent with the overall business model.

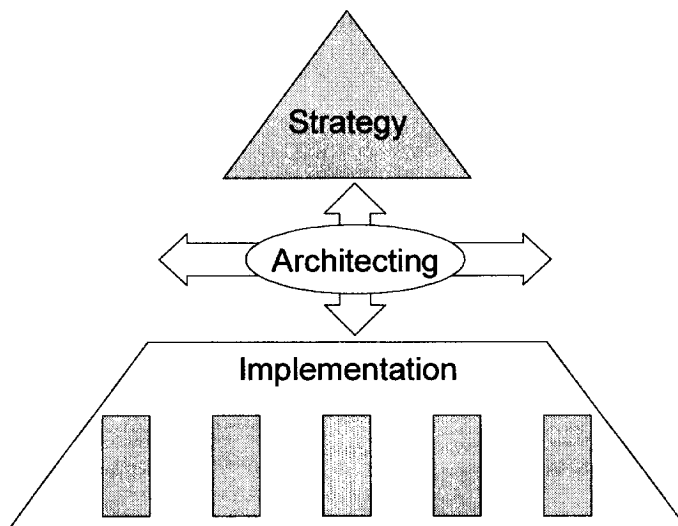
These enterprise management objectives provide guidelines for the development of an enterprise architecting method. Achieving these objectives involves an approach that links strategic decisions to operational actions. A review of management research provides additional requirements for an enterprise architecting methodology.

### 2.3 Management research provides structural requirements for enterprise design.

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Research into the theory of the firm, strategy formulation, change management and change implementation provides frameworks and approaches for an enterprise design. This review concentrates on research related to meeting the enterprise needs and defining requirements for the enterprise architecting method described in Chapter three.

Architecting the enterprise involves designing the enterprise to reflect strategic decisions in operational activities and decisions. This requires connecting strategy formulation to implementation. An architecting method should connect operations and strategy across enterprise elements such as culture, organization, process and technology as shown in Figure 10 below.



*Figure 10: Architecting occupies a space that covers multiple implementation disciplines.*

Architecting fits into a space between strategy and implementation. In filling this space, an enterprise architecting method is concerned with issues of enterprise structure, relationships and capability and how they translate strategic decisions into implemented change. The following research concepts shape the requirements for an enterprise architecting method:

- Architecting uses a resource-based view of the firm.
- Architecting scope operates across multiple implementation disciplines.
- Architecting an enterprise leverages established principles of building architecture.
- Architecting is a dynamic capability.

The research review focuses on these concepts and their shaping of an enterprise architecting method. This research and the environmental factors generate the methodology design requirements.

### **2.3.1 Architecting applies a resource-based view of the firm to connect strategic competitive advantage with enterprise organization.**

There are many theories of the firm and definitions of an enterprise and its strategy. Theories based on enterprise strategy in terms of competitive positioning concentrate on the enterprise relative to market strengths, weaknesses, threats and opportunities (Chandler 2001). These views give little opportunity for architecting the enterprise as a way of changing its competitiveness since the enterprise is conceived as either a victim or a beneficiary of its market environment rather than having the capacity to change that market with its own internal capabilities. For architecting to have strategic relevance, it must sit within a framework that places strategic value on an enterprise's internal capabilities and their ability to generate competitive advantage. This is the central tenet of a resource-based view of the firm (Barney 1991; Eisenhardt and Brown 1998; Hamel and Prahalad 1994).

A resource-based view of the firm provides the concepts that facilitate enterprise architecture and management by connecting strategy with operational capability. Specifically:

- An enterprise's internal structure and abilities are strategically important and a basis for gaining and maintaining competitive advantage. This raises the importance of the need to concentrate on changes in enterprise structure (Barney 1991).

- An enterprise internal structure consists of capabilities. A capability can be thought of as a configuration of resources that are operated together to create enterprise value. An enterprise described as a set of capabilities provides a unit of analysis for enterprise design and management (Halé 1995).
- Uniqueness and, therefore, strategic value derives from the capabilities and their qualities such as integration, consistency and flexibility; this establishes that quality of design is a source of competitive value (Barney 1991).

A resource-based view of the firm provides the basis for achieving strategic intent through managing an enterprise's internal structure. Creating capabilities that are valuable in their own right, uncommon among competitors, and hard to imitate with few equivalent substitutes is an approach for implementing strategy (Barney 1991). These criteria establish design requirements for the enterprise's capabilities and how they are sourced. An enterprise would look to "lease" capabilities from trading partners that do not support a source of competitive advantage. This establishes the vertical connection between strategy and implementation. An enterprise architecting method, however, requires horizontal connections across the elements that comprise enterprise operations. The AT&T case illustrates the need for both, as the company focused on vertically integrating its actions and paid less attention to horizontal links.

### **2.3.2. The scope of architecting extends across multiple implementation disciplines.**

A resource-based view of the firm points to the strategic importance of an enterprise's capabilities. Implementing an enterprise strategy in this context involves changing business activities, resources, management models and organization. Making these changes is the subject of considerable practitioner and action-based research. This research generally focuses on a particular business element as the locus of change. Such a focus generates detailed implementation techniques but not an integrative framework for implementing change across these business elements. Reflecting on the complexity of managing and implementing enterprise-level change broader approaches is needed to cover the business elements within a capability. These elements focus on the following areas:

- Business process – the organization and design of the enterprise activities that produce outcomes for customers. Business process techniques view the design of the activities, rules and steps in terms of their customer impact as a primary means for implementing enterprise change (Davenport 1993; Keen 1997; Hammer and Champy 1993). Additionally, business process methods such as TQM place a high value on consistency, the elimination of operational variation, as the means to improving performance (Deming 2000; Pande, Neuman and Roberson 2000).
- Organizational design – the distribution of responsibilities and interactions among groups of personnel resources. Organizational design techniques look at how the enterprise aligns with its environment (Miles and Snow 2003) or distributes relative authority across levels within the organization (Mintzberg 1993; Galbraith 2002).
- Information technology – the application of computing power, telecommunications and electronic information to automate and support business activities. The view is that information technology drives the enterprise and its capabilities (Downes and Mui 1998; Negroponte 1995; Hagel 2002).
- Performance management – the use of performance information to guide management decisions and actions. The Economic Value Added (EVA) techniques pioneered by Stern provide a performance-management-based approach to decision making (Stewart 1991). Using Balanced scorecards to move toward a “strategy-driven” organization reflect using performance management as the primary means of enterprise management and change (Stewart 1991; Kaplan and Norton 1996 and 2004).

Each specific discipline represents an element of enterprise operations. A methodology design that could bring these disciplines together would be able to address the breadth and depth of enterprise design.

**Information technology manages multiple components through an architecture.**

Information technology faces a similar challenge in designing sub-elements such as multiple types of hardware, software, networks,

applications and data into a functional system. Zachman (1999) addresses these challenges through creating a framework for what he calls enterprise architecture. This enterprise architecture is not the same as the focus of this dissertation as it concentrates on technical elements and how they are organized across the architecture. However, it shows how to organize and integrate relevant elements into a single definition. This framework, therefore, has a strong influence on business thinking and practice in integrating IT and the organization.

The Zachman framework applies building architecture concepts to the different views of information systems (Zachman 1999). It organizes the enterprise technical architecture into six architectures or views and three distinct descriptions. This organization manages the complexity of information systems through defining separate architectures that integrate horizontally to the “view” and vertically by their subject area (Spewak and Hill 1992). Zachman derived the framework, shown in Figure 11 below, from talking with architects about how they design and build structures. Following that analogy, Zachman concentrated on the different views and levels of abstraction used to represent complex and integrated designs in the form of the documents listed below. The Zachman framework has been adopted by a number of large enterprise architecture projects, including the U.S. Federal Enterprise Architecture (U.S. FEA).

	Data Description	Process Description	Network Description
Scope Description (Ball Park View)	Business class entities	Business process classes	Business locations
Model of the Business (Owner's View)	Entity relationship diagram	Functional flow diagram	Logistics of network
Information Systems Model (Designer's View)	Data model	Data flow diagram	Distributed systems architecture
Technology Model (Builder's View)	Data design	Structure chart	Systems architecture
Detailed Description (Out of Context View)	Data base description	Program	Network architecture
Actual System	Data	Function	Communications

Figure 11: The Zachman framework structures technology elements into different perspectives and domains.

The Zachman framework shows how to organize many elements into a single framework. Its adoption in the field of technology design is indicative of the ability of an organized set of documents to reflect an overall enterprise wide design. However, this framework only represents a portion of the elements required to architect an enterprise. Integrating virtual and physical spaces is one of the challenges not addressed in this architecture approach (Huang 2001). Defining a broader model that brings together these business elements with strategic decisions is a significant requirement of an enterprise architecting method. Using Zachman's terminology, architecting should provide a 'ball park and owner's view' of the operations in light of the strategy. These views enable strategists and architects to see the scope of change required to realize their strategy.

### 2.3.3 Enterprise architecture leverages the principles of architecting buildings and structures.

The study of architecture is thousands of years old. The development of architecture provides a strong metaphor for enterprise architecting in that

it is principle-based, concentrates on defining the proper interrelationships between elements, and has a practical focus. Architectural principles provide high-level rules and guidelines for individual design decisions.

Vitruvius outlined the fundamental principles and sequences for architecture during the time of the Roman Empire (Vitruvius 1960). He set down the rules for designing cities, ports, public structures, machines and weapons. Vitruvius establishes a sequence of decisions for architecture that have applicability to enterprise design and management. That sequence starts with an understanding of the environment, establishing boundaries, defining the internal organization and, finally, defining the reusable or common components. As Figure 12 demonstrates, his architecting principles have analogies with those of enterprise management.

Principles of architecture	Description	Enterprise requirements
Order	The members of the work are considered separately and are in symmetric agreement with the whole.	Consistency
Arrangement	The members are in their proper place and are appropriate to the charter of the work in order to achieve a plan (reflection) and solve problems (invention).	Integration and consistency
Eurhythmy	The members are in proper proportions based on their properties and they all correspond symmetrically.	Consistency
Symmetry	The members are in proper agreement individually and in accordance with the part selected as a standard.	Integration
Propriety	The members are constructed using prescriptive principles, they are useful, and they fit with the environment.	Performance
Economy	The members are constructed with the proper management of materials and cost so as to be suitable for all.	Performance

*Figure 12. Vitruvius's founding principles of architecture are consistent with current enterprise management requirements.*



The architecting principles of Vitruvius support enterprise management goals of consistency, integration and performance. However, they do not address issues of flexibility and dynamics. The absence of flexibility principles can be attributed, in part, to the static nature of stone structures and technologies. Classical notions of the permanence of well-designed structures held that change was not expected when the structure was designed right in the first place. Since Vitruvius, others, including Le Corbusier (1986) and Giedion (1966) have expanded architecture ideas and concepts in reaction to current or prior trends, new materials and building technologies. The durability of these principles and their ability to change reflect their potential application to architecting enterprises.

Alexander's (1964) work on design patterns, the design process, and managing design complexity provides tools for enterprise design and management. These techniques provide ways to simplify design problems through the application of systematic approaches to achieve a "good fit" between the designed form and the context/problem it was designed to resolve. In defining the approach to achieving good fit, Alexander provides concepts for handling complex and dynamic design issues including the following:

- Defining the problem-set the design seeks to address. This becomes the context bounding the problem. For example, the design of a sun-room for a residence.
- Defining the form that is the solution to the problem. The form that gives the designer control within the context of the problem. In other words, it is the solution scope.
- A lack of fit exists when the form does not meet the requirements of the problem. This creates the issues that are the focus of design that seeks a good fit.
- Establishing a pattern that describes problems that occur repeatedly in the environment and provides the core of the solutions to these problems defined in a reusable way.

Alexander points out that the complexity of problem contexts and forms changes the nature of design from a process of trial and error and "unselfconscious" design to a process with greater emphasis on

application of design rules, patterns and a more self-conscious design process (Alexander 1964). This change is necessary as the design process moves from simply removing misfits to understanding and tackling new context/problems where complexity adaptation requires a more powerful response. In terms of architecting an enterprise, Alexander's work provides techniques for defining the scope of the enterprise in terms of specific sets of problems that, while interconnected, designers can address with solutions applied in each particular context or pattern.

The definition and application of patterns are of interest in enterprise design. Designers apply individual patterns repeatedly to similar design situations to improve consistency and reduce complexity. Enterprises are complex, but with repeating patterns such as the design of a customer service job that is involved in many processes. In addition, designers can nest patterns within each other. For example, a design pattern for a country town would involve patterns for streets, housing, etc. (Alexander 1977). An enterprise designer faces similar nested design issues that design patterns may address.

#### **2.3.4 Architecting is a special type of capability – a dynamic capability.**

In a resource-based view, an enterprise can be described by its capabilities (Barney 1991). Competitive advantage rests in the ability to define and manage the resource combinations in creating and managing overall enterprise capability. Therefore, there is a need for specialized capabilities that manage and evolve operational capabilities (Stalk, Evans, and Shulman 1992; Galunic and Eisenhardt 2001; Teece, Pisano, and Shuen 1997).

Strategy formulation and product development are among the enterprise's capabilities that concentrate on enterprise structure. These capabilities form a special class of "dynamic capabilities" that define how combinations of competencies and resources are developed, deployed and protected for competitive advantage (Teece, Pisano, and Shuen 1997). Architecting the enterprise is an example of these dynamic capabilities.

Dynamic capabilities concentrate on integrating, building and reconfiguring resources and capabilities for implementing strategic intent and value (Eisenhardt and Martin 2000). The goals of a dynamic

capability are similar to the goals of enterprise architecting. Achieving this is the goal of the enterprise architecting methodology. Therefore, the characteristics of dynamic capabilities can provide a guideline for defining an enterprise architecting method. Those characteristics include the following:

- Concentrating on the organization and manipulation of multiple resources to form new productive assets and capabilities.
- Generating the flexibility to respond to changes in customer demands and market conditions.
- Focusing on understanding the internal dynamics of the enterprise.
- Taking advantage of technology developments and innovation.
- Designing the enterprise's internal processes and activities.
- Concentrating on the deployment and evolution of enterprise capabilities.

Dynamic capabilities represent the way in which enterprises renew their resources in the face of changing technology, customer and market conditions (Galunic and Eisenhardt 2001). Without this capability, competitive advantage falls back to defensive positioning as the enterprise is unable to evolve and improve its capabilities. The experience of AT&T and McDonald's illustrates this phenomenon. Research into dynamic capabilities outlines the characteristics of this ability with the goal of finding the combinations of assets that create fresh sources of value. An enterprise architecting method should look to the characteristics of a dynamic capability as it represents a process of changing enterprise capabilities to implement strategic intent.

## 2.4 Environmental, case study and research literature define a requirements model for designing an enterprise architecting method.

Building an approach for enterprise architecting involves understanding the propositions and requirements for evaluating its effectiveness. Building a requirements model brings together environmental, research literature and case study observations into a set of observable criteria. The propositions underlying this model connect the environmental factors influencing methodology design with the practices of enterprise architecting and management. These propositions can be organized into an influence model to illustrate the interactions and interdependencies. Figure 13 shows this model.

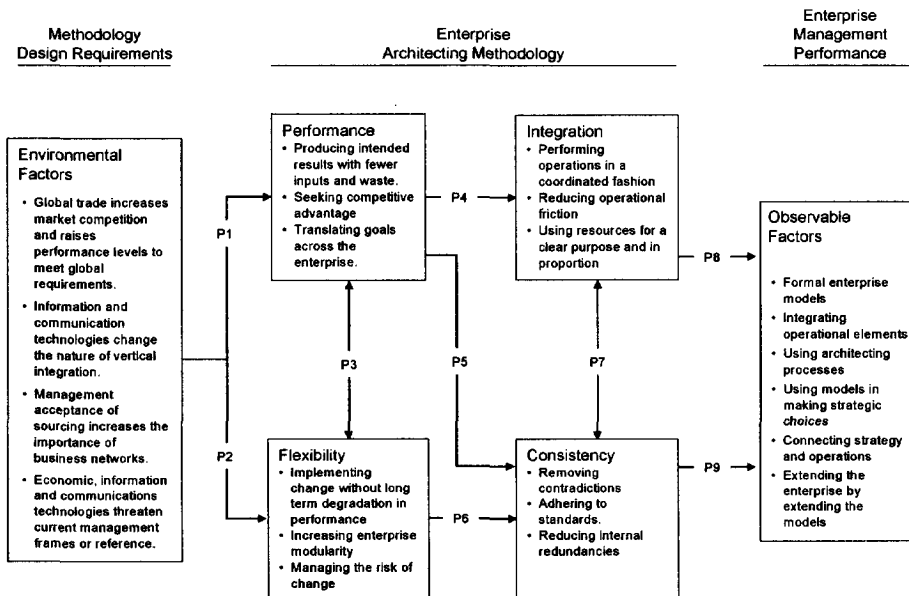


Figure 13: Case studies and research provide the basis for an influence model for enterprise architecting.

The model organizes the relationships between environmental factors, enterprise management and enterprise-design requirements to create observable criteria for enterprise architecting. The first set of propositions (1 – 3) explores the relationships between the environment and the concepts of enterprise management. The goals of enterprise

management provide the context for enterprise design. The next set of propositions (4 – 7) address the connection between management goals and design goals. Finally, the last set of propositions (8 and 9) explores the connection between enterprise design decisions and its observable changes. Taken together, the propositions create a model for developing and evaluating an enterprise-architecting methodology.

#### **2.4.1 The enterprise environment sets the context for enterprise management.**

Managing the enterprise in an environment of increased competition and rapid change requires achieving and sustaining immediate performance improvements while remaining able to implement changes in response to future needs. In achieving these goals, managers must balance between short-term performance and future flexibility. An architected enterprise could be expected combine low-level design for operational performance with high-level design to support flexibility. In this regard, the following propositions would emerge:

**Proposition 1:** New competitive pressures increase the management focus on achieving and sustaining performance through producing its intended results with fewer resources and/or waste. An effective enterprise architecting method would include enabling the enterprise to manage its capabilities for competitive advantage to sustain performance gains (Barney 1991). It would provide the means to translate performance requirements to operational decisions (Kaplan and Norton 1996).

**Proposition 2:** Added competitive pressure increases the demand for enterprise flexibility in response to changing market and customer needs. Flexibility involves being able to design and implement change without a long-term degradation of enterprise performance. An effective enterprise architecting method would provide the means to increase enterprise modularity (Galunic and Eisenhardt 2001; Hendersen and Clark 1990). An effective enterprise architecting method would also provide tools for managing the risk of change through clearly defining its scope and intent (Pettigrew 1985; Taffinder 1998). An effective enterprise architecting method would enable the enterprise

to extend current models into new markets without compromising current performance (e.g., CDW, Southwest Airlines).

**Proposition 3:** Increase in enterprise management attention to architecture reduces the conflict between performance and flexibility requirements. An effective enterprise architecting method should provide the basis for making strategic sourcing decisions to achieve required performance levels without compromising core operations (Afuah 2003; Aruajo, Dubois, and Gadde 2003; Barney 1999). It would reduce potential formation of core rigidities created either through over optimization or limited use of enterprise learning (Abernathy 1978; Leonard-Barton 1995). CDW and Southwest Airlines provide examples using the models to change and extend their enterprise. Southwest uses a model approach to address security requirements and extend its route map.

An environment of increasing competition, technical innovation and expanding business-sourcing options challenges traditional ideas of enterprise management. These forces increase management attention and focus on improving performance and flexibility. An enterprise architecting method should give leaders greater flexibility in managing the enterprise.

#### **2.4.2 Propositions for enterprise management form the basis for enterprise design activities.**

Requirements for current performance and future flexibility influence the propositions for enterprise design. These requirements set the context for enterprise design and the need for integration and consistency. The enterprise architecting method should support these design requirements evaluated by the following propositions.

**Proposition 4:** An increased focus on enterprise performance increases the need for integration to coordinate and reduce the cost of operation. Enterprises realize above-market performance when they organize and manage transaction costs below those in the marketplace (Coase 1991). They achieve this through reducing the friction between

elements within the enterprise. An enterprise further raises performance by deploying its enterprise assets in ensuring the optimal proportion and appropriate relationships to reduce waste (Vitruvius 1960). McDonald's experience with its Made for You restaurant system offers an example of the performance impact of inadequate integration.

**Proposition 5: An increase in performance increases the requirement for consistency across the enterprise.** Architects make greater use of standards that resolve common design issues to meet increased performance demands. This improves the fit of the design with its intended objectives and helps remove contradictions that degrade performance (Alexander 1964). It also reduces variance and costs. AT&T's acquisition and integration of TCI provide an example of the performance implications of an inconsistent implementation. CDW has remained consistent with its account executive model as it has added technical specialists to handle product complexity. In creating CDW-G they have replicated this model to address the public sector model successfully.

**Proposition 6: Increased focus on flexibility raises the value of enterprise consistency to facilitate change.** Enterprise consistency minimizes change design and implementation efforts by using standard solutions. Consistency tightens the connection between expected and actual results from a change initiative. Further, it facilitates the adoption of change and best practices as each part of the enterprise has a standard set of capabilities (McDonald and Rowsell-Jones 2004). The U.S. FEA initiative seeks to exploit consistency through standardizing services across a business reference model that defines consistent lines of business across agency jurisdictions.

**Proposition 7: An increase in enterprise design activities raises the importance of integration and consistency.** CDW and Southwest Airlines exhibit high degrees of both characteristics. The combination enables each to improve its performance by raising the degree of integration within the enterprise. CDW concentrates

on integrating and applying the account executive role and circle of service consistently. Southwest Airlines applies its model in choosing new destinations and evaluating alternative equipment.

An enterprise design improves integration and consistency and provides a basis for managing performance and flexibility. Raising integration among capabilities reduces friction and resource requirements and raises the level of consistency across the enterprise. Together the two support performance and flexibility requirements by reducing redundancies and contradictions within the design and enabling repeatable solutions to common design and implementation issues.

### **2.4.3 The application of enterprise design and management principles should create observable artifacts of enterprise architecting.**

An enterprise architecting method contains the tools, techniques and rules necessary to meet enterprise management and design requirements. The application of such an approach should be observable in terms of the processes followed, the design artifacts created and the rationale for management decisions. Propositions regarding these observations provide a way for evaluating the extent to which an enterprise engages in enterprise architecting.

**Proposition 8:** Increased enterprise design uses models to achieve integration and connect strategic decisions to operational actions. Integrating the elements of an enterprise in a model provides a tool to manage relationship complexity in the design process (Zachman 1999; Spewak and Hill 1992). An enterprise architecting method requires models to capture the interaction and relationships between its components.

**Proposition 9:** Increasing consistency comes from applying a design process. Consistency emerges from the application of standards that reduce contradictions and redundancies. Implementing a design process raises the repeatability and consistency of architecting designs (Paulk, Weber, Curtis, Chrissis 1995). An enterprise architecting process would



require a defined approach to resolving recurrent design issues.

Enterprise design requirements for integration and consistency influence the nature of enterprise architecture artifacts and form criteria to evaluate the extent of architecting activities. Observing the use of enterprise models in connecting strategy to operations and their use in management decision making are indicators of an enterprise architecting method. These indicators reflect enterprise management and design decisions seeking to increase performance, integration, consistency and flexibility – the base requirements for managing in a dynamic environment. Figures 14a and 14b below summarize these propositions into a single table.

Proposition	Enterprise Design Requirement
P1: Increased competitive pressures increase management focus on achieving and sustaining performance.	<ul style="list-style-type: none"> <li>• Produce intended results with fewer inputs and waste.</li> <li>• Seek competitive advantage through concentrating on unique enterprise resources.</li> <li>• Translating performance requirements across the enterprise to manage and improve performance.</li> </ul>
P2: Increased competitive pressures increase the need for enterprise flexibility.	<ul style="list-style-type: none"> <li>• Implement enterprise change without long-term degradation in its performance.</li> <li>• Improve enterprise modularity</li> <li>• Improve the ability to manage the risk of change</li> <li>• Enable entry into new markets without compromising current performance.</li> </ul>
P3: Increased enterprise management reduces the conflicts between performance and flexibility requirements.	<ul style="list-style-type: none"> <li>• Provide the basis for making strategic sourcing decisions without compromising core operations.</li> <li>• Reduce the formation of enterprise core rigidities.</li> </ul>
P4: Increased focus on enterprise performance increases the need for integration.	<ul style="list-style-type: none"> <li>• Perform operations in a coordinated fashion.</li> <li>• Reduce operational friction and cost.</li> <li>• Use resources in the right proportion and for the right purpose.</li> </ul>

*Figure 14a. Propositions derived from analyzing environmental factors, case study experience and recent research literature provide enterprise design requirements. (One of two)*

Proposition	Enterprise Design Requirement
P5: Increased enterprise performance increases requirements for consistency across the enterprise.	<ul style="list-style-type: none"> <li>• Remove contradictions that degrade performance</li> <li>• Increase adherence and use of standards and patterns for similar design decisions.</li> </ul>
P6: Increased focus on flexibility raises the value of enterprise consistency to facilitate change.	<ul style="list-style-type: none"> <li>• Increase the use of standard solutions</li> <li>• Improve definition of the scope of a change initiative</li> <li>• Reduce the gap between expected and actual results of a change initiative</li> </ul>
P7: Increased enterprise design activities raise the importance of integration and consistency.	<ul style="list-style-type: none"> <li>• Reduce the number of unique design decisions</li> <li>• Improve cycle time for change initiatives</li> <li>• Reduce unintended consequences of change initiatives</li> </ul>
P8 Increased enterprise design uses models to achieve integration and connect strategic decisions to actions.	<ul style="list-style-type: none"> <li>• Improve the management of complex relationships within design elements</li> <li>• Increase the connections between strategic decisions and enterprise design decisions</li> </ul>
P9: Increasing consistency comes from applying a design process.	<ul style="list-style-type: none"> <li>• Increase the use of proven solutions to common problems</li> <li>• Enable learning and improvement in enterprise design</li> <li>• Raise the repeatability of design processes.</li> </ul>

Figure 14b. Propositions derived from analyzing environmental factors, case study experience and recent research literature provide enterprise design requirements. (Two of two)

## **2.5 Enterprise architecting propositions flow from environmental, research and case-study experience.**

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Designing an enterprise architecting method involves understanding the propositions it should address. Understanding the environment, relevant research and case-study experiences provide the basis for deriving these propositions. These propositions form an influence model describing the expected management and design characteristics of using an enterprise architecting method. The specific propositions from this model provide an ability to evaluate the enterprise-architecting method described in the next chapter.

# 3

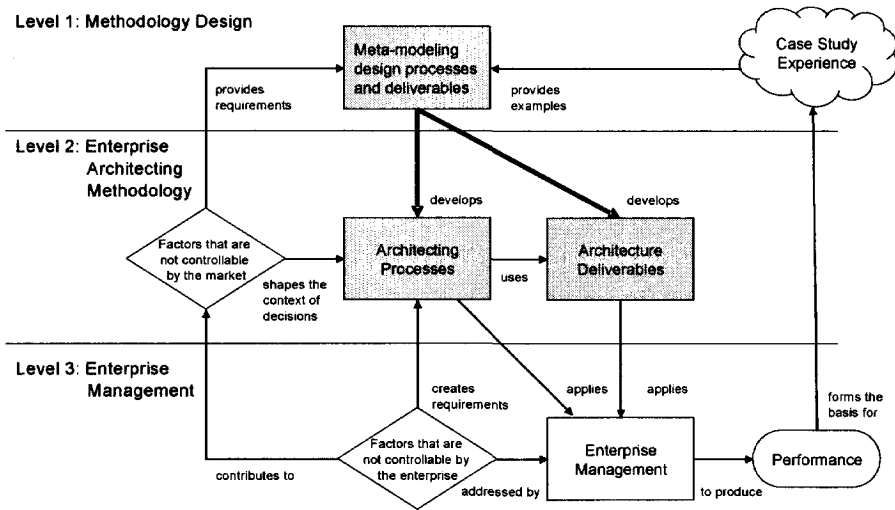
## *Architecting Methodology Design*

### **3.0 An enterprise architecting methodology includes management models, rules and processes.**

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The environmental context, research literature and example case studies reviewed in Chapter two provide requirements for developing a method. Using these requirements, it is possible to deduce an approach for architecting in terms of new ways of thinking, modeling, working and managing. These “ways” connect and reinforce each other to create a framework for defining a process based on its requirements and the cognitive, diagrammatic and process models required to meet these requirements. The selected structure focuses on describing an architecting process across four dimensions using a framework for constructing processes for new problem areas (Sol, 1990).

This chapter begins with a description of architecting meta-models that represents the way of thinking about enterprise design. A meta-model is a conceptual model of a method (Brinkkemper 1990). The meta-model forms the basis for developing the architecting process that organizes design decisions and activities. The architecting process and methodology meta-model further define the architecting deliverables that capture architecting decisions. Figure 15 highlights the aspects of the methodology-engineering model covered in this chapter.



Adapted from Tolvanen, Rossi and Liu (1996)

**Figure 15.** Methods engineering uses a meta-model as the basis for developing architecting processes and deliverables.

### 3.1 An enterprise architecting method can be described by ways of thinking, modeling, working and managing.

Architecting an enterprise is a design process that described in terms of a methodology. The way of thinking about architecting reflects the problem set and its relative priorities that develop the method design. It sets the context for defining the problem space using meta-models for describing the connections between the concepts used in enterprise design. The meta-model organizes the presentation of architecting information generated by architecting processes through a way of modeling. These meta-models, shown in Figure 16, develop the activities that form the architecting processes described in the way of working.

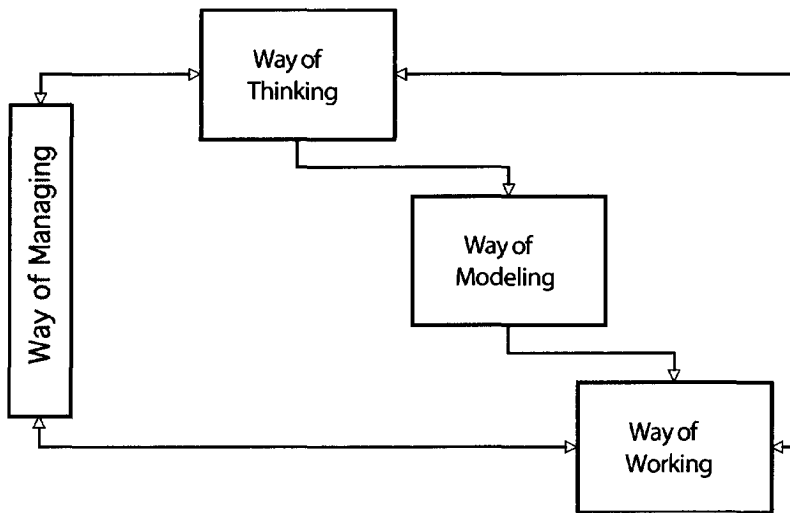


Figure 16. An enterprise architecting method can be described in terms of ways of thinking, modeling, working and managing.

Using the “ways” model, the chapter begins with the way of thinking to develop the concepts involved in the methodology design. These concepts form the basis for the methodology meta-model. Next, the meta model forms the basis for the architecture deliverables – the way of modeling. Finally, these deliverables are positioned within an architecting process that describe the way of working and the way of managing an architected enterprise.

### 3.2 An architected way of thinking views the enterprise as a designable system.

From a practitioner point of view, the challenges associated with architecting rest on the concepts, models and rules used to define the architecture. All three should be clearly defined, interrelated and concentrated on organizing the information needed to design and manage the enterprise. In meeting this challenge, the architect needs concepts that capture enterprise scope and relationships clearly without overwhelming the architecting process with complexity and nomenclature.

Management must think of the enterprise as a designable system, or else there is no reason to engage design (Checkland 1981). As a system,

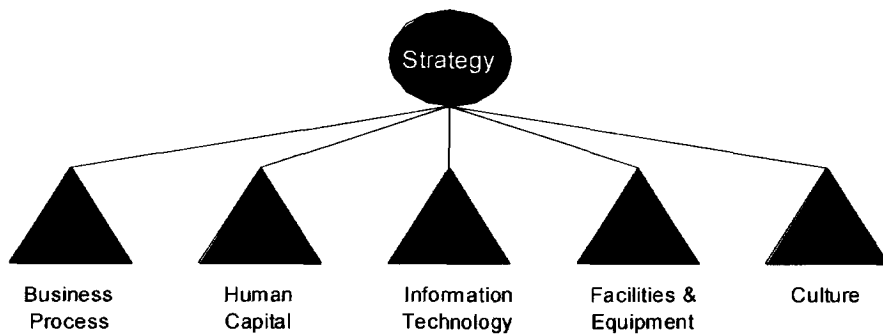
the enterprise consists of identifiable parts and relationships that reflect what it does and what it produces. The enterprise's operational behavior is the focus of the enterprise-design process. The enterprise becomes designable when its parts and relationships operate according to a plan – the design – in a consistent way. These designs document decisions that can be deployed and tested. Finally, both the process of designing the system and the system itself can evolve and improve in response to changes in its environment, technology or system performance.

The way of thinking about architecting an enterprise therefore rests on how management and architects view the enterprise as an operational system with constituent parts and relationships between those parts. Thinking in those ways is the basis for the way of modeling. The following sub-sections will describe how the ways of thinking organize architecting concepts.

### **3.2.1 A model of the problem space forms the first meta-model of methodology design.**

A view on a design involves capturing the way that the designer seeks to reduce complexity in terms of how they break the subject and the design problem down into parts (Alexander 1964). A traditional view of an enterprise looks to reduce complexity by decomposing the problem into common parts (Sloan 1963). Under this model, the enterprise designer thinks in terms of how each process, information system, organization, etc. fits with the enterprise strategy. Change initiatives such as McDonald's MFY™ and AT&T's integration with TCI reflect this view as they concentrated on the individual components of the strategy rather than the enterprise as a system in relation to the strategy.





*Figure 17. A functional decomposition “way of thinking” breaks the problem space down into like-components at the expense of understanding their integration or operation.*

In the model above, the problem space is subdivided into independent but related categories such as business processes, portals, applications, etc. This specificity reflects an organization used in research and management techniques such as business process re-engineering, technical enterprise architecture and organizational design (Hammer and Champy 1993; Spewak and Hill 1992; Mintzberg 1993).

While this view maps into individual disciplines, it does not capture the enterprise or operational context. Decomposing the problem space into individual disciplines can be effective for designing individual components in terms of their strategic impact by isolating the relationship between the element and the strategy. This way of thinking gives each element its own strategic relevance. However, this view may not incorporate the relationships between the elements required to realize strategic goals. Using a functional decomposition model hides the challenges of integrating these areas into a cohesive and operationally efficient business. For this reason, the architecting view concentrates on understanding operational rather than structural complexity.

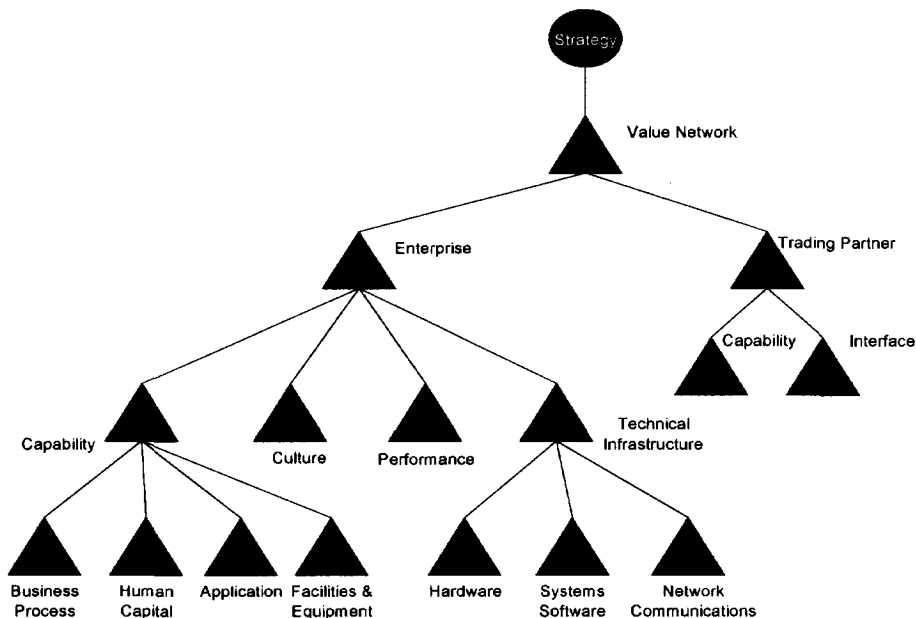
### **3.2.2. An architecting model of the problem space incorporates an operational view.**

Architecting views the enterprise in terms of its operational structure and performance. This is in contrast with traditional views that decompose the enterprise along research disciplines such as business process, organization structure, product or technology. Understanding the

differences between these two views highlights the difference between traditional and architected views of the enterprise.

If architecting an enterprise resolves the design problem of improving performance without sacrificing flexibility, then a decomposition of the problem space should include an operational dimension. The architected mental model introduces an operational focus through the concepts of capability and the value network. Figure 18 shows a view of the problem from this perspective.

An enterprise strategy is delivered by capabilities that work together in a value network of trading partners. From the perspective of an architecting way of thinking, a capability is defined as the set of business elements that work together to create a distinct outcome. Business elements include the aspects such as business processes, organization, human capital and technology. However, these are brought together into the capability concept rather than being directly connected to the strategy. Both this concept and the value network are discussed in detail in this chapter.



*Figure 18. An architected way of thinking views the enterprise in terms of its operational factors.*

### **3.2.3 The architecting problem-space concentrates on capabilities and the value network.**

An architected view introduces the concepts of capability and the value network into the problem-space. Breaking the problem-space into the notions of a value network and capabilities improves its ability to capture operational dynamics. A capability provides a point of integration across the business elements that are operated together. This increases the modularity of the enterprise design by creating loosely coupled capabilities that have a strong degree of internal cohesion (Booch 1994). A value network enables the architect to distribute capabilities across its trading partners. This expands the architecture space, given the strategist and architect more ways to implement the strategy using either internal or external capabilities. The remainder of this section discusses these concepts and their position relative to other architecting concepts.

### **3.2.4 Capability provides an operational view of the enterprise.**

An enterprise consists of people, organizations, products, services, processes, information technology and many other elements. These form a complex system and a challenge for architecting. A resource-based view of the firm defines an enterprise as sets of resources that are controlled by the enterprise to enable its competitive advantage (Barney 1991).

An enterprise architecture way of thinking uses the concept of capability to define the “resource sets” an enterprise uses in realizing competitive advantage. Capability is an abstraction of the enterprise into distinct and interconnected operations that can be designed to reflect strategic priorities and goals.

The capabilities within an enterprise can be described along process, product or geographic lines. For example, CDW defines its capabilities in terms of its processes such as Sales, Operations, Invoicing and Marketing/Purchasing. The U.S. Federal Enterprise Architecture defines the government’s capabilities in terms of lines of business. The concept of a capability enables the architect to do the following:

- Define the enterprise in terms of its operations rather than its structure, creating a focus on the end-to-end activities.
- Integrate the business according to its capabilities and the interfaces between them to reduce the complexity of the problem.
- Create a dynamic model of the operation and interrelationships within the operation that collaborate to product results.

### **3.2.5 Capabilities exist in a value network that extends beyond the enterprise.**

An enterprise architecting way of thinking starts with defining the capabilities required to realize the strategy and support competitive advantage. However, an enterprise does not have to own all of these capabilities to achieve its strategy. Enterprises can use networked relationships like contract manufacturing, outsourcing and off-shoring that provide sources of capability that can generate competitive advantage, provided they are properly designed (Afuah 2003). Enterprises do not exist in isolation, so an enterprise architecting method needs to consider capabilities outside existing enterprise boundaries.

An enterprise architecting method needs a way of thinking about the capabilities without being limited to the capabilities it owns. The alternative way of thinking is the value network. The value network is a group of enterprises collaborating in defined roles to deliver a value proposition to customers and the market (Parolini 1999).

Value networks contain an enterprise, customer, intermediaries and suppliers. It represents the trading participants in a particular market. Individual actors in the value network provide the capabilities that collectively enable commerce. An architecting way of thinking forms a value network by:

- Defining the full scope of the capabilities supporting the enterprise's customer value proposition.
- Accessing a broad set of capabilities that extend beyond those within the enterprise or its traditional value chain.
- Sourcing capabilities with the appropriate value network actors and defining the interfaces between these actors and their capabilities.

A value network enables architects to design the enterprise architecture without being bounded by the company's legal structure. This increases flexibility and performance as enterprises can lease rather than buy or build the services they need. An extended design space creates additional freedom to configure a strategic set of capabilities by concentrating on their collective operational outcomes rather than ownership structures.

### **3.2.6 Capabilities consist of business elements that connect strategy to operations.**

Architecting involves implementing operational changes that achieve enterprise strategy and intent. Architecting therefore needs a way to connect abstractions such as strategy and capability with tangible operational changes to processes, information technology, jobs or the organization structure. The architecting way of thinking achieves this by defining the internal structure of a capability in terms of the specific resources used to create its outcome-- its elements.

A capability consists of different types of elements that define its internal structure. These elements include business processes, human capital, organizational responsibilities and technology (including facilities, equipment and information technology). Specific configurations of these elements constitute a particular capability. For example, Southwest Airlines' flight maintenance capability is built on using a specific type of equipment – the Boeing 737 with specific processes for its maintenance and specific skills. An airline with multiple aircraft types would need to develop multiple instances of its flight maintenance capability.

Each capability involves a configuration of business elements that can be unique to that capability. However, a number of elements, including the strategy, culture, performance and technical infrastructure, are often common across the enterprise and shared by more than one capability. Elements such as business process, application software and enterprise are more often capability-centric and tailored to the specific needs of the capability.

Changing a capability involves changing its business elements in a coordinated way. McDonald's MFY demonstrates an uncoordinated

capability change, driven by information systems. Southwest Airlines' introduction of new passenger boarding processes provides a positive example. Changing business elements occur through management techniques such as organizational design or application development to the elements within a capability. In this way, the architecting process manages enterprise complexity through capability abstraction, but connects that abstraction with operational changes through the business elements. The way of modeling reflects this characteristic.

### **3.2.7 A conceptual model for the way of thinking provides the basis for the way of modeling.**

Architecting thinks of the enterprise in terms of its capabilities, their elements and the value network. This gives an architect an operational rather structural mindset. This focuses design decisions on the competitive advantage of its resources (Barney 1991). Using this view, architecting decisions concentrate on designing the capabilities to achieve the strategy, the integration of elements within those capabilities and their distribution across a value network. These constructs should give a design process the ability to handle the scope and complexity of a modern enterprise. Organizing these concepts into a set of rules codifies the way of thinking and defines the requirements for the way of modeling the concepts within the enterprise architecting methodology. The core concepts include the following:

- A business is defined by its capabilities.
- Capabilities exist in a value network of the business, customers, suppliers and other actors.
- Each capability consists of business elements.
- The enterprise, value network, capabilities and elements form a designable system.

Figure 19 below illustrates these concepts and their relationships. It provides a meta-model view of the relationships between the actors involved in an architected enterprise.

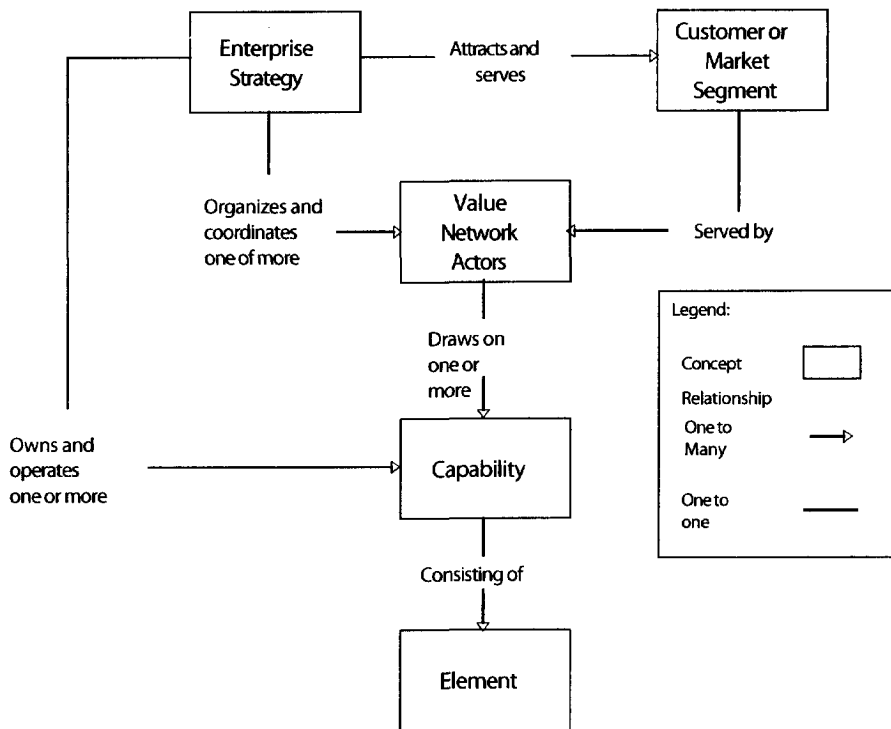


Figure 19. The architecting methodology meta-model identifies the core concepts and relationships for enterprise architecting and provides a basis for developing enterprise architecting deliverables and processes.

### 3.2.8 The way of thinking completes the first level of methods engineering.

The first step in method-engineering involves developing a concept model of the problem-space to define its scope and relationships. This meta-model represents the way of thinking about the design process and provides a basis for developing methodology deliverables and processes at the next level to form the enterprise-architecting methodology. This is the focus of the next section.

### **3.3 The methodology meta-model uses deliverables to translate the way of thinking into the way of modeling.**

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The challenge of architecting rests in capturing the complexity of the enterprise in a set of workable models. These models should describe the information needed to direct the implementation of strategic decisions and support the enterprise change-process. The way of modeling seeks to achieve this goal through a few models rather than detailed and overly specific designs. The way of thinking keeps architecting concentrated on the subject – achieving the strategy and enterprise goals – rather than on completing the models.

The way of modeling structures architecting concepts into actionable diagrams and rules. Modeling enterprise architecture deliverables requires translating concepts like capability, element and value network into specific representations that are applicable to recognized management challenges. The architecting models benefit from translating the way of thinking in their modeling approach.

Relationship diagrams lend themselves to illustrating items and the connections between them (Nayatani 1984). In architecting, the diagrams show the relationships at the same level of abstraction, for example capabilities and elements. The diagrams define both an inventory of items and their relationships. The models exist at specific levels within architecting concepts. The three main types of models proposed in architecting the enterprise are the following:

- The Value Network Diagram: captures the actors and capabilities involved in bringing products and services to market for particular customers and customer segments. This diagram captures the scope of enterprise and its activities.
- The Capabilities Diagram: outlines the relationship between capabilities within an enterprise, capturing its operational scope and interfaces to network players.
- The Capability Blueprint: defines the scope of a capability in terms of its constituent elements. This diagram identifies the implementation scope of the capability.



These models connect architecting concepts into a higher-level model in Figure 20 containing the relationships between enterprise concepts and models.

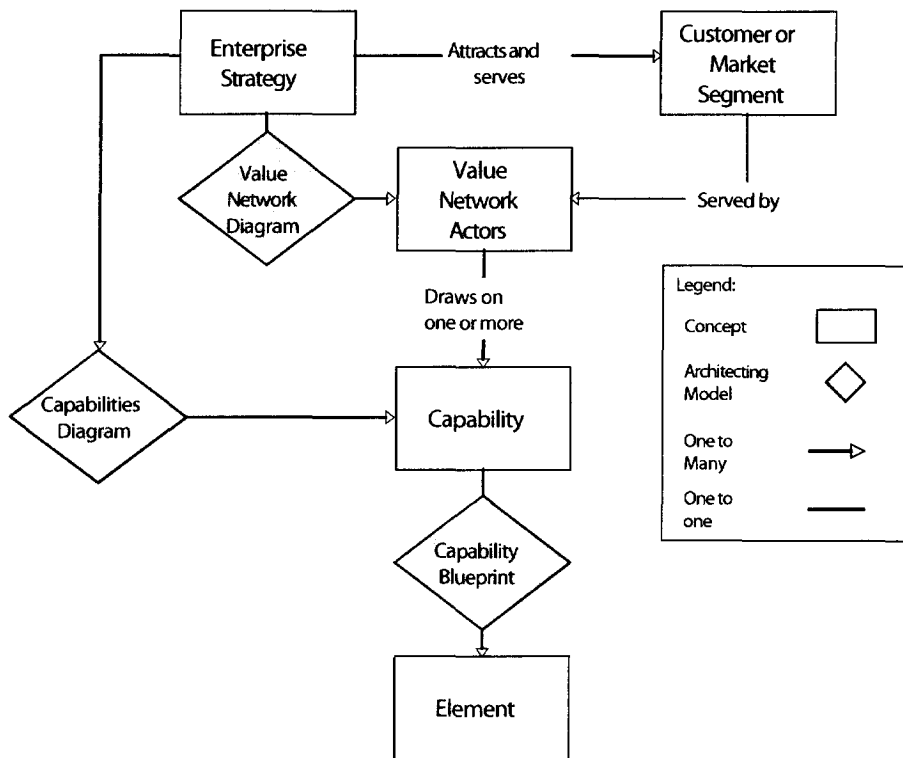
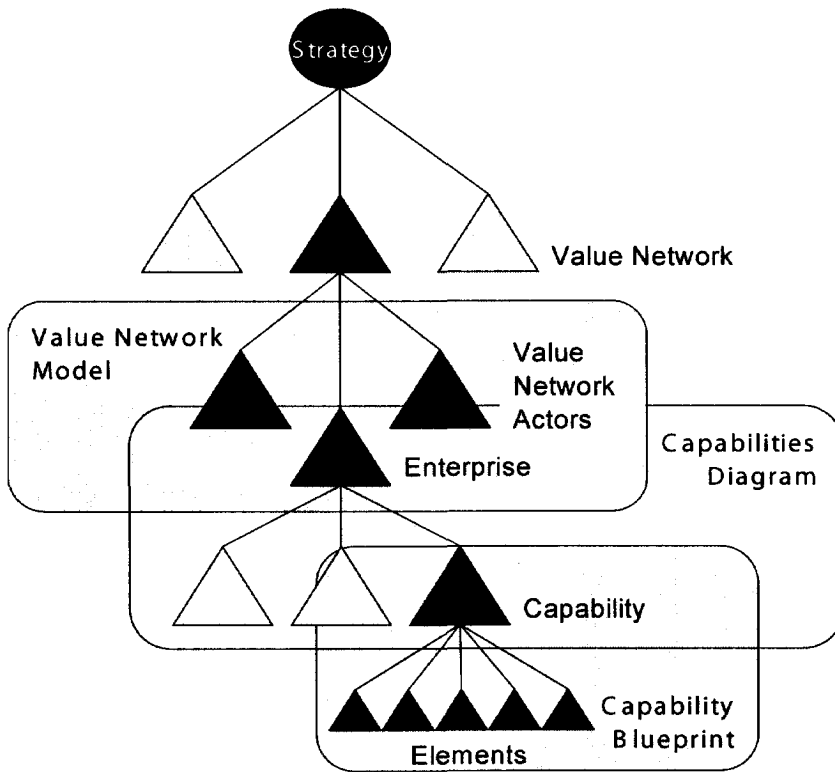


Figure 20. Architecting models capture the relationships between architecting concepts in terms of architecting deliverables.

Architecting models connect the relationships required to design the enterprise. The relationships between concepts (the boxes) and the models (the diamonds) provide a guide for describing architecting processes and deliverables. Figure 21 below overlays the deliverables with a model of the problem-space developed in the way of thinking.



*Figure 21. The way of modeling covers the relationships defined in the way of thinking.*

This section concentrates on the architecting deliverables, their structure, rules and examples based on the case studies presented in Chapter two. These models represent the application of the way of thinking into deliverables for capturing enterprise architecture design that lead to the way of working.

### 3.3.1 The value network diagram models the scope of the enterprise.

If an enterprise exists in a “business ecosystem” then the architecture design needs to include the relationships among the actors in that ecosystem (Keen and McDonald 2000). A value network is a group of enterprises collaborating in defined roles to deliver a value proposition to customers and the market.

A value network is a flexible structure involving different actors in different roles (Parolini 1999). The value network organizes the enterprise in terms of its structure. An enterprise can have a unique value network for each value proposition it takes to market. A model of the network appears in Figure 22. For example, the Virgin group has grown into a multi-billion dollar company through building specific value networks for its airline, train, credit card and cellular phone businesses (McCosker 2000). This characteristic of a value network enables management to make sense of the complex set of inter company relationships where firms collaborate in one market and compete in others. In this way, the value network provides a “ball park” view of the architecture defining its overall shape and scope (Zachman 1999).

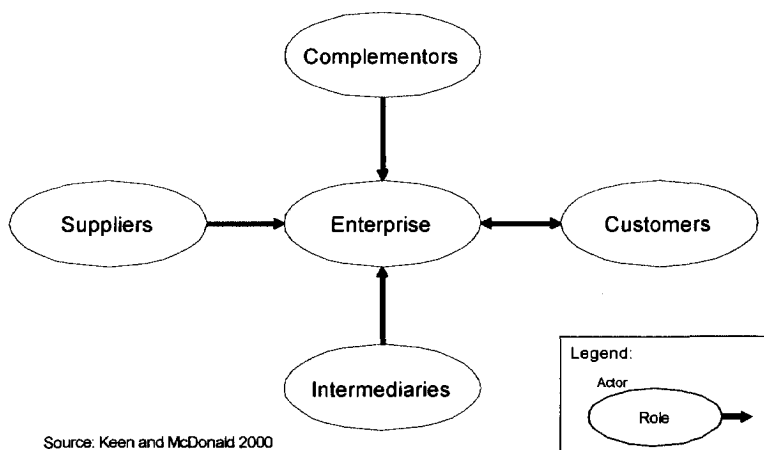


Figure 22. A value network model describes the roles, relationships and capabilities used to deliver a value proposition to customers.

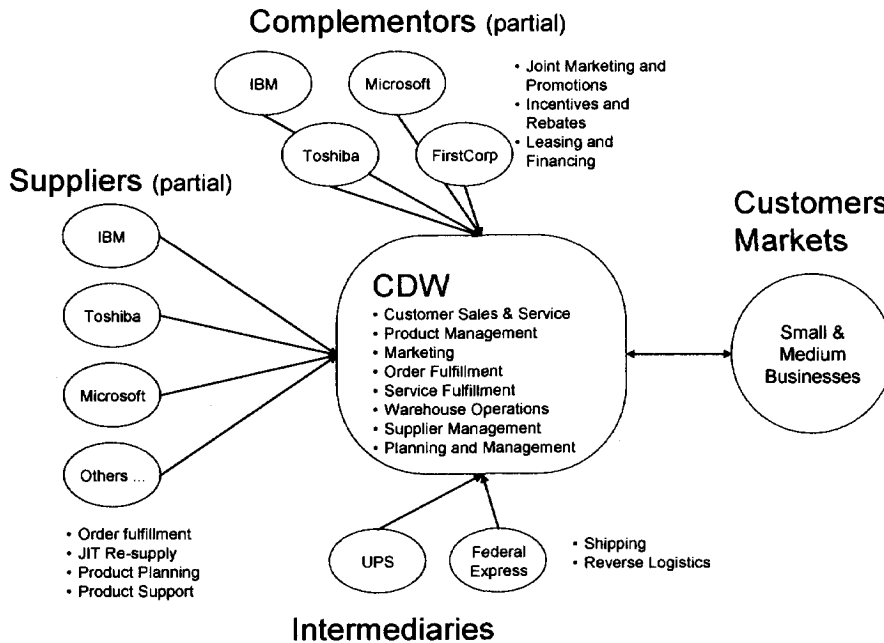
An enterprise participates in one or more value networks, playing different roles in each. Those roles include:

- The Enterprise is the central node of the value network and the focal point for architecting decisions. The enterprise sits at the center responsible for integrating the products and services provided by other actors in the network that form the customer experience. In this regard, it is the hub of the customer value proposition.
- Suppliers provide products, services and materials that are the basis for additional enterprise products and services. Their role may be visible to the customer through relationships like co-branding or marketing alliances. Customers distinguish the enterprise from the supplier as they have a relationship with the enterprise and expect it to guarantee the performance of all players in the value network (Keen and McDonald 2000).
- Intermediaries provide products and services that reduce the cost and increase the effectiveness of the customer value proposition. Financial services and logistics companies are common instances of this role. Global logistics companies like FedEx or UPS act as shipping intermediaries, while banks issuing credit cards are payment intermediaries.
- Complementors offer products and services that extend the value of the customer value proposition by enhancing the quality, value or performance of the enterprise product or service. Field service companies providing on-site product support and repair represent a complimentary service.

Value networks enable executives to make sense of complex relationships. For example, Sony is a manufacturer of the VAIO brand of personal computers. It has a set of suppliers, including chip, storage, video and other component suppliers. Sony uses contract suppliers such as Flextronics to perform assembly and testing. In that value network, Sony is the enterprise. However, Sony also provides monitors for the computer maker Dell. In that value network, they are a Dell supplier even though both companies compete in the personal computer market. So, while Dell manages its own value network, Sony participates in two – its own and Dell's.

An enterprise establishes a value network to bring together the portfolio of capabilities required to compete in a market and serve a particular customer. The value network diagram captures the breadth and depth of the capabilities and business relationships that matter to strategy (Keen and McDonald 2000).

The value network diagram represents the highest-level model in the architecture, capturing the enterprise relationships and capabilities involved in attracting and delivering results to targeted customers and markets. There is one value network for each market and customer strategy. This helps manage complexity and link architectures to specific revenue streams. CDW, for example, uses many of the same capabilities to serve small- and medium-sized businesses. CDW uses a slightly different value network in serving public sector organizations through its CDW-G subsidiary, including specific configurations of sales, service and account management capabilities tailored to the needs of public sector purchasing. Figure 23 represents a value network derived from the CDW case study



Based on an analysis of CDW

*Figure 23. CDW's value network describes the scope of operations involved in serving small- and medium-sized businesses.*

A value network identifies the sourcing of the capabilities involved in reaching enterprise goals. The value network diagram captures the portfolio of capabilities and business relationships used to meet customer and market needs. This diagram identifies on a single page the following aspects of the strategy and enterprise value proposition:

- The customers and markets that define the scope of the value network.
- The capabilities required to deliver intended results.
- The actors involved in supplying these capabilities.
- The capabilities that remain within the enterprise, defining its operational scope.

The value network diagram establishes the overall scope of the architecture in terms of the customers/markets, capabilities and actors. It defines the capabilities supplied through a networked relationship and

those that are retained by the enterprise. This enables the architecting to take advantage of sourcing options available in the market.

### **3.3.2 The capabilities diagram defines the internal structure and operations of the enterprise**

The capabilities diagram represents the enterprise subset of the value network. This diagram introduces additional information into the architecture design concerning the internal and external interface requirements, information flows and relationships between capabilities within the enterprise. In this capacity, the capabilities diagram serves a function similar to a context diagram used in modeling information technology requirements. The capabilities diagram represents Zachman's "owner's view" in terms of what the enterprise operates to lead the value network.

The elements of this diagram include capability definitions, the relationships between capabilities, the information flows between capabilities and the interaction between internal capabilities, value network actors and customers. This information establishes the operational scope and organizes the enterprise's internal structure according to its operational interactions and dependencies. Figure 24 below is a sample capabilities diagram based on the CDW case study.

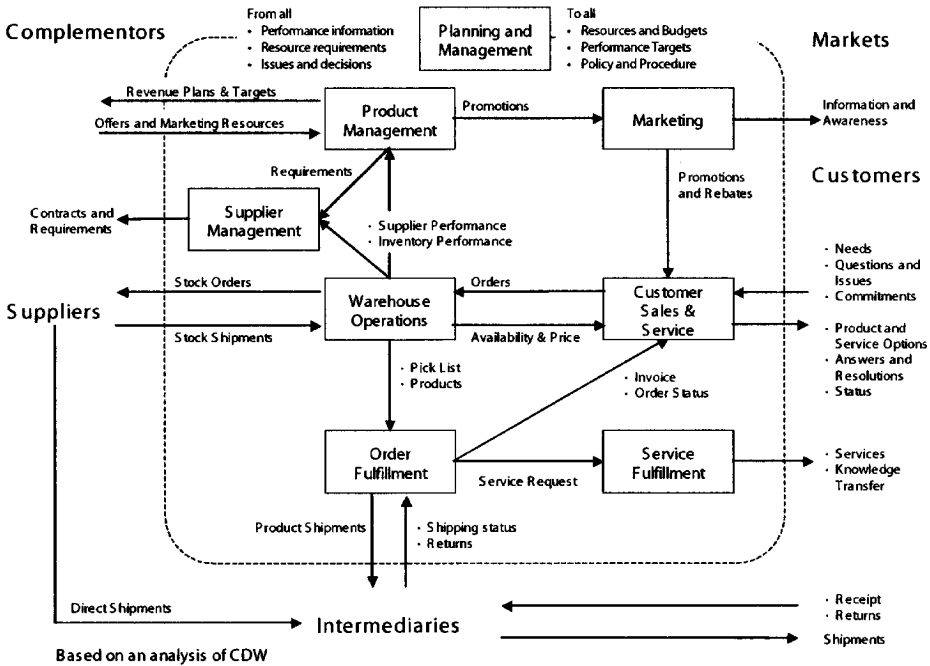


Figure 24. The capabilities diagram illustrates the interactions involved in supporting CDW's small and medium enterprise value network

CDW's capabilities diagram for the small and medium enterprise-value network represents an example of the architecting decisions required in strategy implementation. From the architect's perspective, this diagram reflects the distribution of operational responsibilities within the enterprise. The architect, working in conjunction with the strategy planners and business leaders, determines the following:

- The identity and detailed description of each capability within the enterprise.
- The scope of each capability in terms of its outcomes and relationship with other internal capabilities, external trading partners or customers.
- The dependencies between capabilities for information and outcomes.
- The interactions among capabilities required in producing end-to-end results and outcomes.



The capabilities diagram contains decisions that reflect CDW's strategy for small- and medium-sized enterprises. Specifically, CDW combines customer sales and service into single capability and single point of contact through an account manager. CDW also maintains warehouse operations within the enterprise in support of its value proposition based on delivering a wide selection of products. The scope and separation of order-fulfillment from service-fulfillment represents another architecture decision for CDW. The separation recognizes the operational distinction between shipping products and providing services. However, it is interesting to note that CDW supports delivering an integrated invoice to customers, which it provides through the order fulfillment capability. This decision means managing and billing for services in the same manner as products – simplifying the customer interface.

The capabilities diagram enables the architect to define and evaluate different capability combinations and relationships to meet value network requirements. It models the behavior and relationships among capabilities within the enterprise and with its external environment. This sets the stage for modeling the internal structure and behavior of each capability in the form of individual capability blueprints.

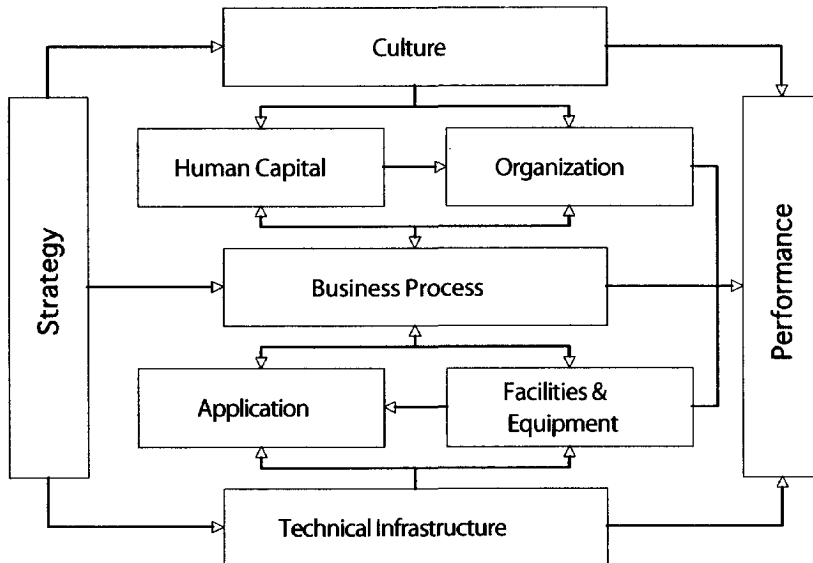
### **3.3.3 A capability blueprint consists of business elements that capture its detailed design.**

A capability is the major architecting component of an enterprise. Within each capability, component parts define its operational characteristics and capacities. These describe the capability at a sufficient level of detail to implement changes. The capability blueprint represents the last of the architecting deliverables and it provides a designer's view of the architecture in terms of the elements that comprise each capability found in the capabilities diagram.

Architecting enterprise change at a detailed level presents two principle challenges. The first the challenge is in defining and managing the specific elements and scope of each capability during the architecting and implementation process. In large change initiatives, the number of elements involved can become unmanageable. The second challenge is managing the consistency of elements that exist in more than one capability. For example, capabilities often share organizational

structures or information systems. Architects need a way of identifying and communicating shared elements during the architecting and design process.

The capability blueprint addresses the challenge of defining the list of elements within each capability and the general relationships between the classes of elements. The resulting model concentrates on organizing elements into relationships for detailed design and implementation. The capability blueprint organizes the elements for each capability used in implementation. In this way, the blueprint sets the context for the individual disciplines involved in building business processes, jobs, etc. Figure 25 below presents the model for the capability blueprint:



*Figure 25. The business elements within a capability define how the capability operates, achieves its strategy and meets its performance requirements.*

The capability blueprint defines the types of elements found within the capability and the relationship between the element types. The relationships between the element types define rules for integrating elements within the capability. The way of working discusses these rules in detail. The element types found within a capability are the following:

- **Strategy:** entails statements of the organization's direction and intent
- **Performance:** describes the operational, financial and other measures and targets that reflect achieving the strategy.
- **Culture:** captures the shared beliefs and norms for the organization. These define the context in which the workforce looks at the world and the beliefs it holds about that world.
- **Technical infrastructure:** embodies the hardware, systems, and network and communications software used in support of the applications, business processes facilities and equipment.
- **Business process:** captures the rules and activities required for creating results and outcomes for a defined customer.
- **Human capital:** contains the roles, skills, competencies, and rewards associated with the workforce carrying out the capability.
- **Organization:** structures jobs and the distribution of responsibility and authority that reflect the governance arrangements for the capability.
- **Application software:** represents information technology for automating business process rules, workflow or the capture/presentation of information.
- **Facilities and equipment:** describes the physical environments and tools used to deliver the capability. This includes but is not limited to factories, offices and mobile locations and production machinery.

A capability blueprint connects with the specific elements within a capability that when executed together deliver outcomes and performance. In this regard, the blueprint represents the bridge between strategy formulation and architecting and the individual element disciplines such as business process design, enterprise design and technology design. The blueprint performs these functions:

- Identifies the operational scope of the capability in terms of its component elements.

- Captures the strategic contribution and performance targets for the capability.
- Highlights opportunities and occurrences where individual elements are used across multiple capabilities.
- Communicates the capability context that sets the tone for element-level design and implementation decisions.

In this context, the capability blueprint represents the conceptual design of the capability. The blueprint supports enterprise integration requirements by describing the capability in terms of the set of parts that need to work together to deliver its strategic outcomes and meet its performance requirements. It provides an implementation-independent view of the types of elements that need to be in place to support the strategy and meet its performance requirements. Figure 26 below is a sample capability blueprint derived from the CDW case.

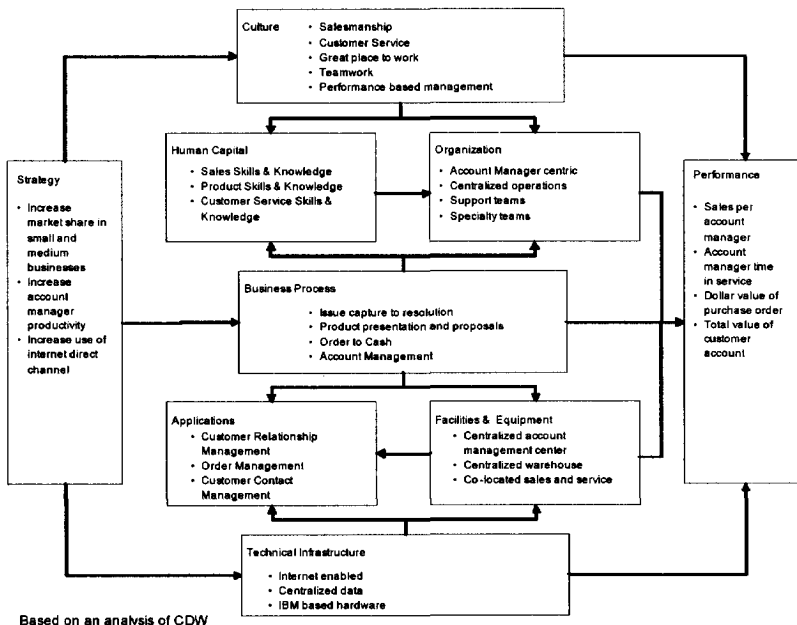


Figure 26. The sample capability blueprint for CDW's Customer Sales and Service capability shows the palette of elements that integrate to deliver required performance and strategic outcomes.

The capability blueprint captures the elements involved in each capability and defines the pallet for detailed design and implementation. Like an artist with measures of paint, the architect uses the specific elements within the blueprint to design and integrate the capability. The blueprint provides a vehicle to translate higher-level strategy and architecture decisions into capability specific actions and performance targets. One or more capabilities can share individual business elements. This is frequently the case for elements such as Technical Infrastructure, Culture, Application Software and Organization. In these cases, the blueprint will reference these cross capability elements and design them in a coordinated fashion. This aspect enables the architect to assign responsibilities for specific elements in terms of their design, implementation, operation and support for reuse.

### **3.3.4 The architected way of modeling captures complexity using multiple models.**

Architecting supports the concepts defined in the way of thinking by providing deliverables to capture and organize architecting information. Architects define the scope of the enterprise in terms of an inventory of its items and the relationships between these items. Architecting deliverables, such as the value network, define the actors and relationships involved in delivering the enterprise's customer value proposition. Figure 27 below illustrates the different levels of abstraction associated with each of these architecting deliverables and the issues they address.

Architecting Concept	Architecting Diagram	Issues addressed
Value network	Value Network Diagram	<ul style="list-style-type: none"> <li>• Who are the customers and target markets?</li> <li>• Who are the trading partners?</li> <li>• How are capabilities sourced across trading partners?</li> </ul>
Capability	Capabilities Diagram	<ul style="list-style-type: none"> <li>• What is the operational scope of the enterprise?</li> <li>• How do capabilities work together to produce end-to-end results?</li> <li>• What are the interfaces between capabilities and trading partner relationships?</li> </ul>
Capability element	Capability Blueprint	<ul style="list-style-type: none"> <li>• What is the scope of each capability?</li> <li>• What is the strategic and performance context of the capability?</li> <li>• What are the elements involved in the capability?</li> <li>• What are the relationships between capabilities?</li> </ul>

Figure 27. Architecting deliverables support the way of thinking by providing tools to address architecting issues.

### 3.3.5 The architecting deliverables complete the methodology design.

The way of modeling uses its models to build upon one another and cover the scope of the enterprise. The architecting model captures the enterprise's scope and interrelationships at three distinct levels: the value network, the enterprise and the capability. These levels build upon each other to provide a manageable set of definitions without undercutting the view of the enterprise as a dynamic system. These models represent the models or work products of the architecting process. The way of working describes this process.

### **3.4 Architecting processes organize deliverables and personnel into a repeatable way of working.**

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A way of working captures the organizations and activities involved in achieving a particular goal. In the case of architecting an enterprise, the way of working addresses the team structures and activities involved in completing the architecting deliverables and in meeting the enterprise management requirements. The architecting way of working reflects the particular challenges of designing the relationships and capabilities required to achieve enterprise strategy. If the way of modeling defines the structure for organizing the concepts contained in the way of thinking, then the way of working organizes the activities and resources involved in creating these models. In meeting these requirements, the way of working should address the composition and types of teams involved in architecting, the processes they follow, the rules they use, and the relationship of those processes to other enterprise management activities.

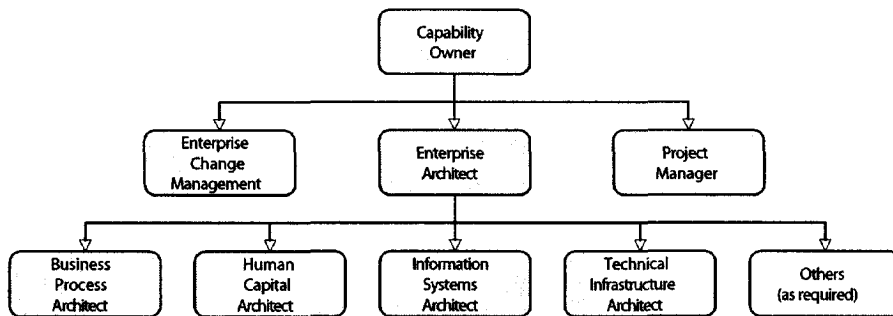
Experience indicates that effective enterprise architecting provides direction rather than dictation to design and implementation teams (McDonald and Rowsell-Jones 2004). An architect provides direction for two reasons. First, the time and costs involved in defining a detailed architecture for an enterprise are prohibitive without a simplifying and organizing set of directives. An enterprise architecture is likely to lose its strategic relevance in the time it takes to complete such a fully defined architecture. Second, an architecture driven top-down through the organization often reduces the enterprise's commitment and ownership of the change process. Without sufficient degrees of freedom to resolve design and implementation issues, local managers and operations feel less accountable for achieving results. An architecting way of working would provide approaches to handle these situations.

#### **3.4.1. Architecting involves multi-skilled teams to support a comprehensive view of the enterprise.**

Architecting requires addressing the enterprise in terms of its external actors, capabilities, and elements, and the relationships between them. Experience indicates that while an individual architect may be able to define the enterprise structure at a capability level, understanding the fit

and relationship between capabilities and their elements involves a depth of knowledge and breadth of resource requiring a team approach. Figure 28 illustrates a sample team structure.

A multi-skilled team is an organized group with a diversity of skills working toward a common set of models and schedule. In architecting, this creates the structure for assessing and mobilizing subject matter expertise. Based on experience, this team ranges in size between three and twelve people who are co-located and assigned full time to this task.



*Figure 28. An architecture team organizes the roles required to define the enterprise architecture and manage the change process.*

The roles within an architecting team vary with the intent of strategy and scope of change required. Enterprise change involving multiple capabilities, new trading relationships, etc. can require sub-teams covering each of these architecture areas. Individual roles may not require a full-time person assigned to them in cases of smaller architecting initiatives, such as updating an individual capability with new information technology. Based on the author's experience, the following roles form the core of an enterprise architecture team.

- **Capability owner:**, the executive sponsor for the change effort who is responsible for realizing the benefits of architecting the capability.
- **Enterprise architect:** the individual responsible for the fit between enterprise strategy, goals and requirements and the enterprise architecture. The enterprise architect is the lead designer on the team.



- **Project manager**: a specialist who is responsible for the architecture team's progress against its plans. In a smaller architecting effort this role may be played by either the capability owner or enterprise architect, if they have the required skills and experience.
- **Enterprise change management**: a specialist managing the change adoption processes including communications, change assessments and change implementation. They work with the capability owner to build awareness and ownership for the new capability within the enterprise.
- **Business process architect**: the person responsible for the design of business processes, distributing processes across the capabilities, and identifying business process requirements for human performance, information systems and other elements.
- **Human capital architect**: the person who assesses the skills, experience knowledge requirements and roles involved in performing the capability and meeting its performance requirements. The human capital architect will also design upgrades to the job structure as required.
- **Information systems architect**: the person who carries responsibility for the design and fit between the business processes, human capital and information systems. The architect, or the information systems architecture team, design the application software, data and interfaces required to support the capability.
- **Technical infrastructure architect**: the person who works in conjunction with the information systems architecture in designing the network, communications, hardware and operating systems support for the information systems. This position may be part-time or incorporated with the information systems architect in situations where the technical infrastructure will remain unchanged.
- **Other architects may be added when their skills as needed**. For example, new capabilities that involve redefining the enterprise organizational structure might require an organization architect. Implementing new facilities and equipment would require a team to design the layout and environment.

The example described above represents a single team and the basic building block for organizing enterprise architecting. While the example above concentrates on the team involved in architecting a single capability, enterprises can scale their architecture through using multiple teams working in a matrix of relationships.

### **3.4.2 Architecting teams scale through replicating themselves for each capability.**

Architecting is enterprise-centric and will often involve the design and implementation of multiple capabilities which would be a challenge for a single architecture team to manage. The architecting way of working handles this by replicating the architecting team structure across the individual capabilities while retaining a coordinating architecture team at the enterprise level. The structure for a set of architecting teams supporting enterprise-wide transformational change is outlined in Figure 29 below.

A large architecting team structure should be organized into sub-teams with the multiple skills required to define the architecting deliverables. Such team structures would need to be scaleable to fit the scope of change required to achieve the strategy. Architecting involving a single capability relies on a single architecting team working directly with a capability owner. Multi-capability architecting requires replicating capability-centric teams under the guidance of an enterprise-level team to define the new enterprise architecture.

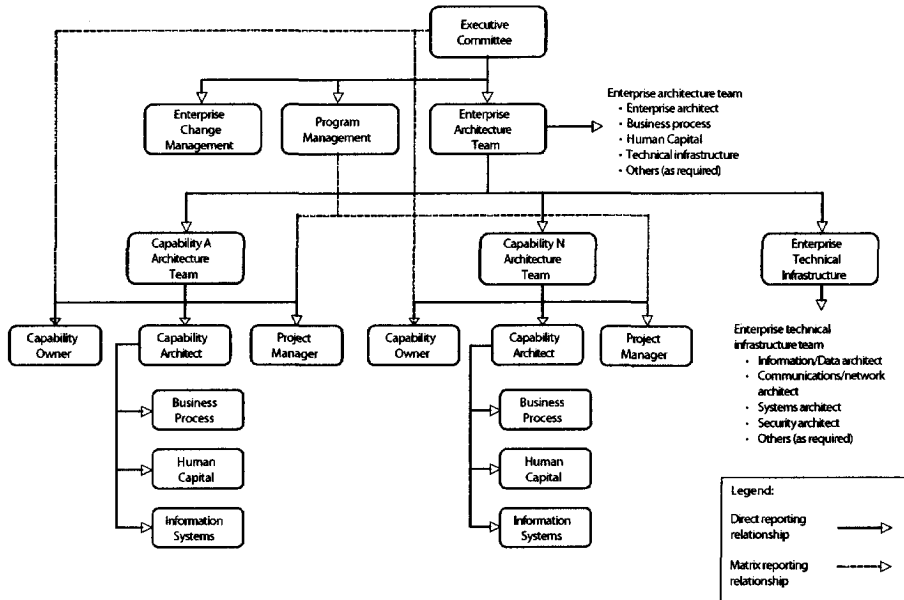


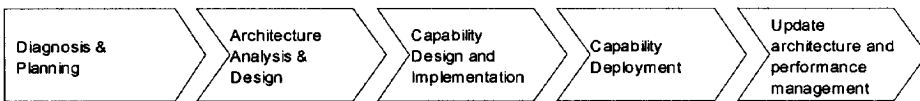
Figure 29. Architecture teams scale by repeating their structure for each capability with a senior architecture team at the enterprise level.

Enterprise-wide transformation change involves changing or creating multiple capabilities as part of the same change initiative. In this situation, architecting works along two axes: one for the enterprise and one for each capability. The enterprise architecture team is responsible for the fit between the capabilities across the enterprise and its value network. The enterprise-architecture team defines the value network and capabilities diagrams to provide guidance to individual capability teams working on their blueprints. The enterprise architecture team works with an enterprise technical infrastructure team responsible for managing technical infrastructure requirements shared across the enterprise.

The enterprise architecture team and technical infrastructure teams provide vertical coordinating bodies for enterprise-wide transformational change. However, coordination is facilitated through horizontal relationships (Galbraith 2002). Figure 29 has horizontal relationships representing matrix reporting relationships among capability owners and the executive committee and among project and program managers. Experience indicates that these matrix relationships open lines of communication across the transformation effort while maintaining direct reporting relationships.

### 3.4.3 An architecting way of working follows a repeatable process.

The way of working for architecting involves multi-skilled teams using a defined and repeatable process. If architecting is essentially a design process, then there are many possible approaches to organizing architecting-process steps. Based on experience, defining the architecting process in a series of sequential steps clearly communicates the connections and dependencies between each step. The actual execution of these steps is often iterative in nature, following a spiral approach involving major decisions as constraints on the remaining design processes (Boehm 1988). The architecting process described in full consists of five steps with the first three steps the focus of architecting team activities (see Figure 30 below).



*Figure 30. An architecting process consists of five steps presented sequentially for clarity but executed iteratively.*

The architecting process is decision-driven, supporting consistency with a strategy and integration among the capabilities across the enterprise architecture. The choices and actions of the architecture team form constraints for the remaining steps in the process. In this way, the architecting team addresses an issue in the same manner across the enterprise. The process is iterative within each step and between steps. It executes each step in order to meet a set of exit criteria. The architecting team iterates between steps when exceptions in a downstream step require the team to revisit earlier decisions. Appendix I contains a description of the architecting process. Figure 31 below summarizes the decisions, models and exit-criteria that drive the architecting process.

Process	Decisions	Deliverable	Exit criteria
<b>Diagnosis and planning</b>	<ul style="list-style-type: none"> <li>• What are the gaps between the strategy and current operations?</li> <li>• What are the approaches to closing these gaps?</li> <li>• What is the implication on enterprise capabilities and their distribution across the value network?</li> </ul>	The value network diagram.	<ul style="list-style-type: none"> <li>• Closing the identified gaps in a way that will realize the strategy and address performance issues.</li> <li>• The intended value network will deliver the customer value proposition</li> <li>• Trading partners exist for the capabilities distributed to trading partners.</li> </ul>

*Figure 31a. The architecting process can be described by its decisions models, exit-criteria and exception conditions*

Process	Decisions	Deliverable	Exit criteria
<b>Architecture analysis and design</b>	<ul style="list-style-type: none"> <li>• What is the scope of each capability within the enterprise?</li> <li>• What are the relationships between capabilities required to deliver the customer value proposition?</li> <li>• What are the interfaces between capabilities and trading partners?</li> </ul>	The capabilities diagram, one per value network.	<ul style="list-style-type: none"> <li>• The value network contains the capabilities required to achieve the strategy, address performance gaps and deliver the customer value proposition.</li> <li>• The enterprise retains control and responsibility for the customer relationship across the value network.</li> <li>• The capabilities sourced across trading partners do not compromise enterprise competitive advantage now or in the foreseeable future.</li> </ul>

*Figure 31b. The architecting process can be described by its decisions models, exit-criteria and exception conditions*

Process	Decisions	Deliverable	Exit criteria
<b>Capability design and implementation</b>	<ul style="list-style-type: none"> <li>• What is the scope of each capability in terms of its elements?</li> <li>• What elements are shared across capabilities?</li> <li>• What is the distribution of responsibilities among the elements to achieve required performance goals?</li> <li>• What parts of the existing environment will be re-used, changed or removed to implement the new capability?</li> <li>• How well do the elements integrate to deliver the intended outcomes and performance levels?</li> </ul>	<p>The capability blueprint, one per capability in the capabilities diagram.</p> <p>Business elements are designed, built, tested and integrated.</p>	<ul style="list-style-type: none"> <li>• The capability blueprints are complete, identifying all of the elements and their relationships.</li> <li>• The capability as designed to achieve its strategic and performance requirements.</li> <li>• The capability design can be implemented according to budget, schedule and risk requirements.</li> <li>• The capability implementation teams are formed and have the skills to deliver the architecture as defined.</li> <li>• The capability elements meet performance requirements as built.</li> <li>• Operations are prepared to receive the new capability.</li> </ul>

Figure 31c. The architecting process can be described by its decisions models, exit-criteria and exception conditions

Process	Decisions	Deliverable	Exit criteria
<b>Capability deployment</b>	<ul style="list-style-type: none"> <li>• When will the operating units be ready to receive the new capability?</li> <li>• What is the sequence for deploying changes for this capability, other capabilities, and other initiatives within the change program?</li> <li>• What is the actual performance of the capability?</li> </ul>	Deployment of completed capability elements into the operations environment	<p>The capability is deployed and stabilized in the operating environment.</p> <p>Line management performance criteria are updated to reflect new performance requirements.</p> <p>Updates to the architecture and capability based on actual experience are identified and communicated to the architecture team.</p>
<b>Update architecture and performance management</b>	<ul style="list-style-type: none"> <li>• How current should the connection be between the architecture and operations?</li> <li>• What is the relationship between actual and designed performance, what changes are necessary to close any gaps?</li> <li>• What local improvements should become part of the architecture and deployed to other operating units?</li> </ul>	The architecture design remains current with the operating environment, local improvements, and innovation.	<p>The architecture as designed no longer supports the enterprise strategy or its performance goals.</p> <p>The evolution of operations no longer reflects the architecture as designed or</p>

Figure 31d. The architecting process can be described by its decisions models, exit-criteria and exception conditions



#### **3.4.4 Architecting connects enterprise design with enterprise change processes.**

Architecting an enterprise involves changing enterprise capabilities and elements. The architecting process therefore is linked into enterprise change processes. This makes execution of architecting processes an important element in building the readiness and acceptance of change. A change initiative gains traction when people understand its rationale, scope and schedule (Severance and Passion 2002; Pettigrew 1985; Kotter 1996; Connor 1992). Architecting provides the information needed to address these questions by expressing the nature of change in terms of capabilities and business elements. This enables managers and the workforce to understand and assess the operational dynamics of change.

If an organization accepts change once its workforce understands the reason for change (its context), the scope of change (its content) and the approach to change (the course of action), then architecting must support all three to promote the change process. The architecting process in its decisions and the information it creates supports these aspects of the change process.

The architecting team builds the context for change during the diagnosis and planning steps by identifying gaps between the enterprise strategy and current operations. These gaps form the value proposition for moving to the architected solution. The architecting deliverables form the content of change defined in terms of the capabilities and elements required to realize the strategy and improve performance. These capabilities and elements form the basis for estimating and planning the change process and therefore support the course of action as the enterprise assesses the time required to deliver the new architecture.

Effective change occurs when content, context and course of action are in alignment (Pettigrew 1985). The architecting way of working supports the change process by defining each of these and providing the ability to manage their integration through the contents of the architecture, its organization into releases and the communication of its value proposition.

### **3.4.5 The architecting way of working provides a scaleable and repeatable process for making complex decisions.**

Architecting provides a design of complex systems and ensures the harmony between individual design elements across that system. To that end, architecting an enterprise entails concentrating on changing the business in an integrated fashion. It uses a capabilities focus to identify the points of integration and guidelines for the integration between elements within that capability. In this way, an architect can divide enterprise-wide design into specific capability and element decisions while maintaining the dynamics and points of integration at both levels.

Case studies and research into governance indicate that a company with a strong model of its operations is able to connect a change in strategy with changes in its operations (Weill and Ross 2004). An architected change uses the strategy to identify and communicate the specific capabilities and business elements requiring modification, replacement or removal. This helps the organization in these ways:

- Define the scope of change in operational terms through the specific capabilities and elements within a capability that will change and, more importantly, that will remain in some respects constant.
- Improve the understanding of the inter-relationships among capabilities and elements to reduce the risk of the “unintended consequences” created when changes in one part of the enterprise create problems in others.
- Communicate the alignment of the reasons for change with the required actions to address those reasons. This enables management to align its actions with the overall change effort.

### **3.4.6 The way of working and modeling develop the second level of the methods engineering model.**

An architected way of working that meets these requirements addresses designing static structures and organizational dynamics. The way of modeling captures these structures in the context of the way of thinking. The way of working organizes the processes involved in defining the content of these models, the team structures required and the dependencies with other enterprise change processes. Appendix I contains architecting process details. The quality of a

process, however, rests in how it is managed. An architecting way of managing is the focus of the next section.

### **3.5 The way of managing applies the architecting models to achieve enterprise goals.**

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Concepts, processes and models define the structure of an architecting methodology. The enterprise management goals form the basis for managing the architecting process by defining rules and guidelines to increase performance through raising integration, consistency and flexibility. Deriving the ways of managing from these goals is the focus of this section and the third level of the method-engineering model. The challenge in managing an architecting process involves defining as few rules as possible to reach the best architecture solution while preserving the openness that supports creativity (Galunic and Eisenhardt 2001). The way of managing discussed in this section concentrates on the rules and guidelines for capabilities and business elements.

#### **3.5.1 Architecting design rules seek to increase enterprise integration.**

Integration is the degree to which the individual parts of a capability perform their operation in a coordinated fashion. Integrating capabilities and elements within capabilities involves hundreds of decisions. The requirement for integration calls for guiding these decisions according to rules that define how these components fit and exist in their proper relationships. Based on evaluating the case studies, research literature and experiences in supporting large-scale change programs, there are generally defined rules for integrating the elements within a business capability. These involve ensuring a fit between these four high level factors:

- Why – defines the strategy of an enterprise in terms of its intent and the relative priority of investments and management attention.
- What – defines the business processes, performance measures and performance targets that will create the results outlined in the strategy.
- Who – captures the people aspects of the enterprise structure expressed in terms distribution of responsibilities, and workforce skills and behaviors needed to carry out the business processes within their performance targets.

- How – the technology in terms of the tools, facilities and infrastructure used to support the business processes and enterprise in delivering the strategic intent.

These factors define the high-level requirements for integrating enterprise capabilities and form a way of managing architecture design decisions. Figure 32 below shows these requirements, defining integrated relationships in bold and highlighting common points of non-integration in italics.

	Why	What	Who	How
Why		Business process performance supports achieving strategic goals.	The organization understands the contribution of their responsibilities and skills to achieve the strategy.	The technology, tools, facilities and infrastructure is sufficient to achieve the strategy
What	The activities performance and performance targets will not produce the results required by the strategy.		There are clearly lines of accountability for performance. The business processes and measures are achievable within the skills and knowledge of the organization.	The technology, tools, facilities and infrastructure have the capacity and functionality to support the business activities within defined performance targets.
Who	The organization does not see how its skills or understand how their responsibilities achieve the strategic goals.	The organization is not able to perform the business processes to create the required results or realizing the performance requirements.		The organization has clear lines of governance concerning, technology, tools, facilities and infrastructure.
How	The technology, tools, facilities and infrastructure will not support the strategy.	The business processes required to achieve the strategy are not adequately supported by the technology, tools,	The organization does not have the skills to make effective use of the technology, tools, facilities or infrastructure	

Adapted from Hamilton and McDonald

**Figure 32.** High-level integration requirements describe the fit between elements.

While high-level integration requirements capture the intent of an integrated architecture, they provide limited guidance in how to bring together the complex set of relationships among the strategy, people, processes, technology, etc. These detailed rules capture the patterns for achieving integration among business elements found in the Figure 33 below.

Managing architecture integration involves applying rules to the architecting process. In the architecting process, these rules form criteria to evaluate the level of integration and fit between elements. In the architecting process, these rules integrate business elements. The statements contained in the matrix on Figure 33 and 34 describe the integration between pairs of business elements. Collectively they form 'a way of thinking' that architects make to integrate the elements within a business capability.

	Strategy	Performance	Business Process	Human Capital	Organization
Strategy		The performance measures express the operations consequences of the strategy	The business processes deliver results supporting the customer value proposition	The workforce understand their role in creating value, the skills and behaviors required to deliver the customer value proposition	There are clear lines of responsibility and accountability for delivering the results called for in the strategy
Performance	The strategy will not be achieved as operational routines and performance targets deliver a different set of results than those called for in the strategy		Strategic performance targets are measured by business process results establishing a basis for day-to-day management and process improvement	Workforce evaluation factors and performance targets are subsets of strategic performance targets. These support the relevance of building specific skills and supporting behavior	Organizational performance measures are consistent with organizational responsibilities and accountabilities
Business Process	The strategy can be achieved at a higher cost or lower performance as emphasis is placed on processes that do not create strategic results	Performance measures must be manually assemble or inferred as they are not a designed part of the business process		The workforce as the skills to execute the business process	The organizational division of responsibilities match the role and jobs required for process execution. There are clear process owners
Human Capital	The strategy is viewed with skepticism as the workforce cannot make the connection between what they know and the results they are asked to deliver	Performance measures are not taken seriously as they are disconnected from the workforce. They are either seen as un-achievable or inconsequential	The business process execution cost or quality suffers as the processes are either too complex or too simplistic for skill levels		The division of responsibilities create the appropriate blend of skills and behaviors
Organization	The strategy does not have clear execution responsibilities and therefore decisions are based on other factors such as influence, power or relationships rather than strategic criteria	Performance requirements are unimportant as they do not drive resource allocation decisions	The business processes stress the organization as the way of working is not aligned with the distribution of responsibilities. People have to contradict the organization to properly execute the process	Workforce skills and behaviors do not fit with organization responsibilities. The organization will not invest in or support the skills to reach the critical mass required to deliver business results	
Application	The strategy does not influence application investments as the strategy is insufficient to determine the right investments. Decisions default to solving operational issues which are more tangible to the business and technology organization	Performance measures are arbitrary and subject to interpretation as there is not alignment of workforce, process or application measures	The business process requires hand-offs, manual translation, or re-entering data as process boundaries are not support by the application suite	Workforce skills either exceed application requirements reducing worker attention, or they require new skills beyond the reach of the current workforce	Without clear governance, the application seeks a "least common denominator" approach to support everyone. This dilutes its strategy relevance and leaders organizations to create their own applications
Facilities and Equipment	The strategy does not drive capital investments and resource allocation decisions as it does not consider the current state of facilities and the gaps required to deliver the results called for in the strategy	Performance measures are not achievable given the current configuration, capacity or deployment of facilities and equipment	The business process requires work-around, interruptions, or fragmented execution as they cannot be fully supported by existing facilities, equipment or layout	Workforce skills do not fit the location, facilities or equipment requirements. This creates safety, cost, cycle time or quality concerns	Investment cycle times and service levels suffer as there is divergent responsibilities between facilities governance and business governance
Culture	The strategy is rejected by the workforce as it does not fit with their values, behaviors, self image and beliefs. At best the strategy is seen as less relevant or detached from reality. At worst the gap is so large that the credibility of the senior executive team is called into question	Performance measures are ignored, downplayed or subverted by the workforce who cannot see how these criteria fit with their behaviors and beliefs	The business processes ask people to make decisions or perform activities that are inconsistent with their beliefs, rewards, self image, or behaviors	The organization structure does not match the influence structure requiring management to implement consequence management styles as a means of control	The organization structure does not match the influence structure with the result that management is required to use consequence management to handle where management style does not match beliefs, values or social structures
Technical Infrastructure	The strategy is cost or service prohibitive as the infrastructure cannot support performance, cost or scalability requirements	Performance targets are not achievable given the support capabilities of the technical infrastructure or they support over investment in technology investments	Process requirements either exceed support for collaboration, security, and communications as they do not use the capability of the technology infrastructure	The workforce does not have the information orientation to take business advantage of technical architecture capabilities (Machand)	Investment cycles and service levels suffer as there are divergent responsibilities for technical and business governance

Figure 33. A detailed integration matrix captures rules for improving the relationship between elements. (one of two)

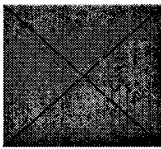

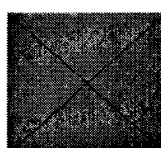

	Application	Facilities and Equipment	Culture	Technical Infrastructure
Strategy	Application quality and performance are aligned with the priority results called for in the strategy. The applications are the best they can be where it matters most and good enough in other areas.	Capital assets deployed according to strategic requirement for customer service, cost and quality.	The strategy builds upon the beliefs, values and behaviors of the organization. The strategy does not require significant or immediate changes in values and beliefs.	The network, communications, data management and other infrastructure elements are scaled and sources to meet strategic performance goals.
Performance	Applications capture and report actual performance to create transparent and unbiased performance data.	Workplace facilities and equipment have the capacity to meet cost, quality, cycle time and availability performance targets.	Measurement is clearly linked to believed and core values. Measurement itself is part of the organization's culture and management practices.	The technical infrastructure captures and reports technical performance consistent with operational requirements. Technical performance measures are consistent across technical platforms.
Business Process	The applications automate business process rules and provide the information required to support process decisions and execution.	The facilities layout and production cycles are in synch with process activities.	Business processes call for the workforce to perform activities and make decisions in keeping with their core values and beliefs.	The technical infrastructure supports application and process connectivity, security and capacity requirements.
Human Capital	The applications are usable given the required workforce skills. They present information in format and factor that support skills and reinforces desired behaviors.	Operating requirements for facilities and layout match the skills with workforce skills and behaviors.	Workforce skills and behaviors are consistent with core values and beliefs.	The technical infrastructure encapsulates technical complexity to the point that technical skill requirements do not the skills required to execute the job.
Organization	Application and operational requirements fall within clear lines of organizational responsibility. Application requirements and investment decisions are clearly defined.	The facilities and equipment have clear lines of governance that are aligned with responsibility for executing the strategy.	The organizational governance structure reinforces core beliefs, values and behaviors.	The technical infrastructure governance is clearly defined with execution and investment responsibilities aligned with line responsibilities.
Application		The facilities and equipment support application availability at the place of need.	Applications do not require decisions or provide information that would compromise core values and beliefs.	The technical infrastructure provides computing, information, connectivity and security requires by the application and business rules.
Facilities and Equipment	Applications cannot be executed in the operational environment. For example, the facilities do not provide sufficiency security, linkage to information, communications or a usable environment.		Facilities and locations create a desirable work environment when they are consistent with enterprise beliefs and values.	The technical infrastructure has the right facilities and physical infrastructure to support its operation.
Culture	Applications do not seem relevant to the business as they require activities that run counter to beliefs and values.	Facilities, equipment and locations are not attractive to the workforce. The enterprise must either pay a premium, recruit different personnel or source results with another company to gain greater cultural compatibility.		The technical architecture provides a level of collaboration and connectivity that the organization views as appropriate.
Technical Infrastructure	Applications cannot meet their performance requirements given the technical infrastructure requirements that are too costly by requiring the infrastructure capabilities that the organization is unable or unwilling to support or invest in.	Facilities and equipment unnecessarily constrain the service support, service levels, or scalability provided by the technical architecture.	The technical architecture is over architected or faces under investment as the organization does not understand or accept the level of investment required communication, collaboration, transparency and security.	

Figure 34. A detailed integration matrix captures rules for improving the relationship between elements. (two of two)

### **3.5.2 Architecting supports consistency through applying patterns to common design issues.**

Consistency is the adherence to a standard for similar operations that enable the parts to all fit together. Experience indicates that applying standards and the same solutions consistently across the enterprise provides a tool for managing complexity (McDonald and Rowsell-Jones 2004). This accelerates the design process and improves design quality as common solutions reduce the design workload and increase the use of proven solutions.

A design pattern is a solution to a problem that occurs repeatedly in an environment (Alexander 1964, 1977). Patterns give architects a starting point or template for design that they tailor to fit the circumstances or need for innovation. They reflect the linkages between elements and capabilities. They capture both the structure and the systems dynamics of these linkages and provide a starting point for assembling an overall business architecture.

Architecting supports using patterns consistent approaches to resolve complex design issues. Patterns such as a job description or the operation of a retail location provide a re-useable design for one or more capabilities. These design patterns increase consistency in making architecting decisions. Appendix 2 provides examples of common architecting design patterns as a way of illustrating the technique. Each enterprise would develop a set of design patterns specific to its strategy and structure and provide a way of capturing the tacit information and knowledge generated in the architecting process. The examples in the appendix illustrate patterns for defining an enterprise as a set of capabilities, distributing capabilities across a value network and process integration.

### **3.5.3 Performance is the primary design requirement throughout the architecting process.**

Performance may be defined as the ability to produce intended results by using fewer inputs or creating less waste than other systems. Clear measures and targets are practices for raising enterprise performance and achieving enterprise strategy (Kaplan and Norton 2004). Performance requirements play an important role in determining when the architecture



is complete. The architecture design is complete when it demonstrates its ability to meet these performance criteria. In this way, performance forms part of the exit-criteria for managing architecting activities.

As discussed in the way of working, architecting processes are iterative and issue-driven, often following a type of spiral development process. While this facilitates exploring design options, it also requires clear criteria to manage design iterations. Incorporating enterprise performance requirements into the way of managing guides these design iterations. Meeting performance requirements become the exit criteria for architecting activities creating a type of performance based V-model (Ryan et al. 1998). In this way, performance becomes embedded in the way of managing.

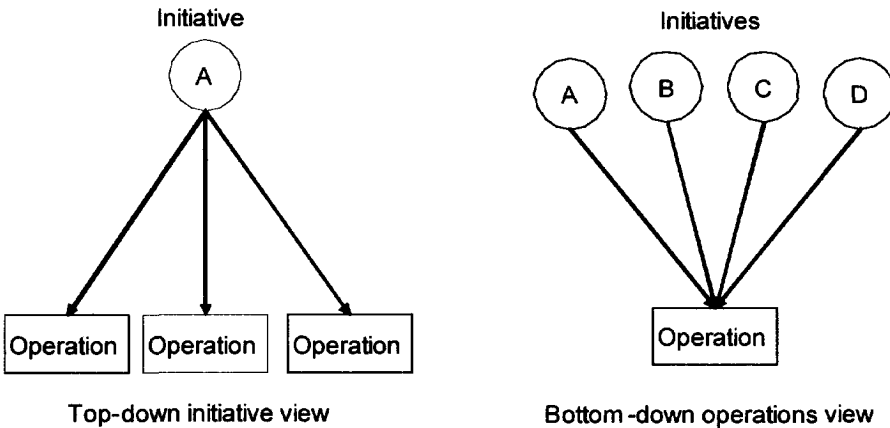
#### **3.5.4 Architecting concentrates on operations as the point for flexibility.**

Flexibility, when defined as the ability to change operations without suffering a long-term degradation in performance, concentrates on increasing the capacity to change. Over-frequent change tends to erode the capacity for change (Kotter 1996; Taffinder 1998). However, implementing enterprise strategy requires change to meet goals and objectives. An architecting approach supports flexibility in its way of managing implementation of new or revised capabilities.

A traditional top-down view sees each initiative as separate and unique, existing in its own right and deployed to individual operations. This perspective measures enterprise flexibility in terms of the number of initiatives an enterprise completes. The greater the number of initiatives, the more flexible the enterprise (Connor 1992). However, this view does not account for the disruption each initiative causes to enterprise operation.

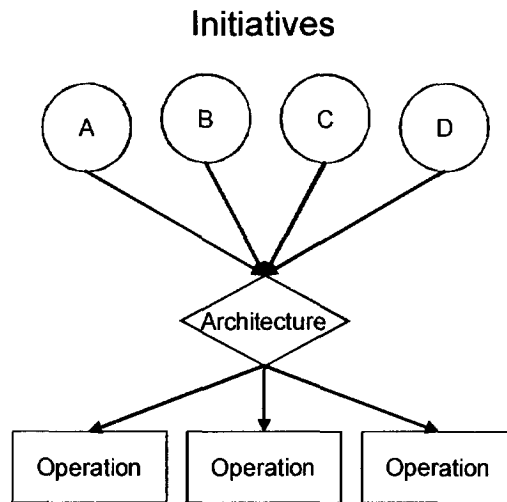
Flexibility as defined here provides a different view of change initiatives. Shown in figure 35, individual change initiatives do not exist in isolation and must include a view of the operation relative to itself and the other change initiatives. Gaining this perspective requires looking at the initiatives from an operational or bottom-up perspective. The operation, rather than the initiative is at the center. This enables the architect to

design for flexibility by increasing the coordination between individual change initiatives into a single operation.



*Figure 35. Flexibility views the relationship between initiatives and operations from the bottom-up.*

An enterprise can increase its flexibility if it is able to blend the concentration of a top-down view and achieve the benefits of managing implementation at the operational level. Architecting provides a way of managing the change process through consolidating individual initiatives in terms of their impact on the value network and enterprise capabilities. Individual initiatives can be managed around specific capabilities or value networks involving multiple capabilities. Individual initiatives are consolidated through a single enterprise architecture with the changes required by that architecture deployed into the operations through new releases as shown in figure 36 below.



*Figure 36 Architecting provides a management tool for coordinating multiple initiatives and deploying them to operations.*

In this way, architecting provides a way of managing the focus needed for individual initiatives and operations. The architecting process manages this perspective through concentrating on the operation as a deployment unit and breaking implementation into multiple initiative releases that represent configurations of the architecture, as explained in Appendix 2. Architecting manages flexibility by providing an enterprise-level view for coordinating individual initiatives into single operational releases to improve their capacity for change.

### **3.6. Architecting processes design and manage the enterprise in a dynamic environment.**

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Enterprises need the ability to implement strategies consistently across their organizational components in a timely manner. Architecting provides a way of thinking about the enterprise and connecting strategic initiatives with the specific operational changes required to implement the strategy. Making that connection involves capturing the enterprise structure, its relationship with its trading partners and the relationships within its constituent parts. The architecting concepts of capability, value network and business elements provide the means of modeling the enterprise in response to strategic initiatives and external context. This provides a new way of working at strategy implementation, placing

architecting activities between strategy formulation and implementation to manage the scope of change that sets the stage for managing the enterprise as a set of capabilities and elements.

An architecting description presents the concepts, models, activities and management rules for managing the enterprise. In the next two chapters, case studies evaluate how well architecting enables them to achieve the enterprise goals. The first case concentrates on the fit of architecting models to capture and highlight enterprise issues. The other case focuses on the architecting experience. Together, the case analyses evaluate the potential of architecting to meet the enterprise management requirements.

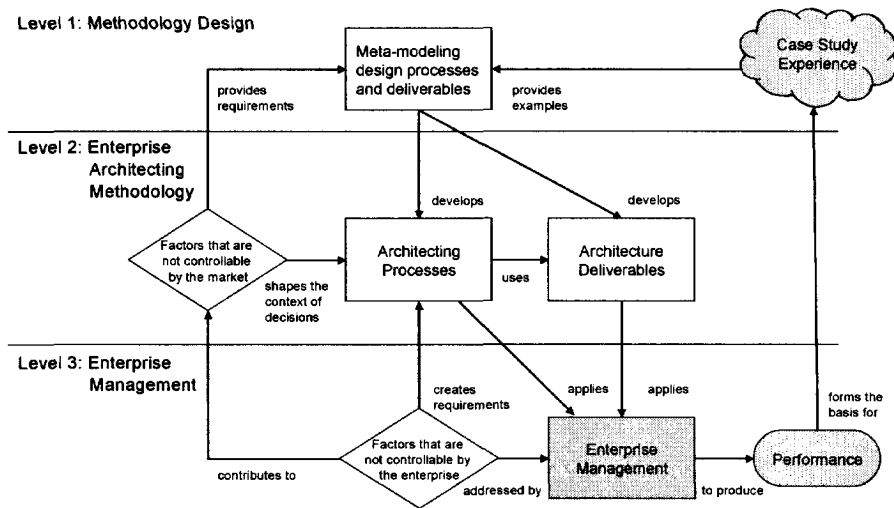
# 4

## Architecting Deliverables Evaluation

### **4.0 Case studies provide a way to evaluate the architecting methodology.**

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Architecting involves translating strategic goals into operational decisions and structures. Given the complexity and scale of architecting decisions, defining a one-size-fits-everyone approach is inappropriate. Each situation has a unique context creating some variation in enterprise architecting. This makes evaluating the enterprise architecting method presented in Chapter three difficult. This chapter and Chapter five illustrate applications of the enterprise architecting methods and examine case studies in order to refine further the methodology design, processes and deliverables, focusing on the highlighted areas in Figure 37. In Chapter six, these cases are compared with the enterprise architecting method to assess the enterprise architecting experience.



Adapted from Tolvanen, Rossi and Liu (1996)

Figure 37. Case study experience enables comparison between actual experience and the proposed architecting method.

#### 4.1 Comparative evaluation tests the fit between architecting propositions and case-study reality.

A comparative case-study approach evaluates the methodology by testing it against case experience (Yin 2003). In this and the following chapter, we will take up two distinct cases, and use them to assess the methodology. This section describes and evaluates the case studies in these terms:

- The degree to which the cases achieve the goals of enterprise management and design: consistency, integration, performance and flexibility.
- The ability of the architecting deliverables to provide the tools necessary for capturing the information and decisions generated by an enterprise design.
- The degree to which that method reflects the techniques and rules used by the cases to reach their designs and results.
- The degree to which the case studies illustrate the architecting method support the research propositions.

#### **4.1.1 The selected case studies evaluate the architecting model.**

Evaluating the fit between the architecting method, defined in Chapter three, and enterprise experience involves selecting cases for evaluation. Two problems emerge immediately. First, enterprise architecting involves information about issues of strategy, structure and tactics that is often closely held by the enterprise for competitive reasons. Second, the notion of enterprise architecting is an emerging management practice, so the cases will most likely exhibit architecting behaviors without giving them a formal name. The cases selected for the evaluation therefore should involve enterprise-wide design and change to provide observable information. This leads to selecting cases with the following characteristics:

- Complex enterprises that work with multiple capabilities.
- Enterprises facing the need to make significant and complex change.
- Enterprises that are taking a structured approach to that change.

Two evaluative cases were selected based on these criteria. CEMEX is a global cement and construction products company headquartered in Monterrey, Mexico. Accenture is a global information technology and strategy consultancy headquartered in Bermuda. The CEMEX case study is discussed in this chapter with a focus on evaluating architecting deliverables and their ability to capture enterprise information and scope. The Accenture case is discussed in Chapter five and focuses on evaluating the architecting process and decisions.

#### **4.2 CEMEX architected its business through the CEMEX Way.**

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Founded in 1906, CEMEX is one of the largest cement companies in the world, with 2004 revenues in excess of \$8 billion. It operates in more than 30 countries with 25,000 employees and a production capacity of 83 million metric tons per year. CEMEX's strategy calls for it to be the largest and most profitable global cement company. In March of 2005, CEMEX completed its acquisition of RMC Group plc. for \$5.8 billion dollars. The combined company would have total revenues of more than \$15 billion. This acquisition is pending and therefore not part of this case analysis.

Cement is a mature business with international, national and local companies operating in a fragmented marketplace. Growing revenue at the top end of this market has largely come through industry consolidation rather than organic growth. Margins are thin and leverage is high in this capital intensive industry, placing a premium on integration and efficiency.

In 1992, CEMEX acquired two large national cement companies in Spain. It was two years before these companies were fully integrated into CEMEX. It found that running many different operations was costly and inefficient, and since it could only grow by making further acquisitions, it decided to re-architect its business along eight process lines – into what it now calls the CEMEX Way.

#### **4.2.1 The CEMEX Way grew out of a need to consolidate and standardize operations.**

Cement is a process-based industry consisting of individual manufacturing facilities distributed across the globe. The performance variance across different plants in the early 1990s was broad. This created the opportunity to enhance operations through replicating best practices worldwide. This would increase the company's competitiveness in support of significant global expansion (Brews and Bugos 1998). It would also improve cash generation in anticipation of the debt service requirements associated with the expansion (Dombey 1997).

CEMEX's Chairman of the Board and Chief Executive Officer, Lorenzo Zambrano, believed that the combination of information technology and business process investment provided an important tool to achieve these goals. He believed that improved technology integration would enable CEMEX to better align the technical capabilities with its business strategy, and to create and protect the company's knowledge capital (Chung and Marchand 2005). Finally, the commercial use of Internet technologies opened new possibilities for a company that was already a technology and process innovation leader (Keen 1997).

Accelerating post-merger integration is critical to CEMEX's strategy given the financial leverage used to acquire large national cement



companies. This way was an area of particular competitive opportunity for the company, since its explicit plan was for growth to come from acquisitions (Chung and Marchand 2005). In 1992, CEMEX's acquisition of Valenciana and Sanson required two years to complete. After implementing the CEMEX Way, the company integrated Southdown, a larger U.S. acquisition, in less than four months. CEMEX estimates that improving logistics using the CEMEX Way at Southdown would bring an additional \$15 million in savings, representing an immediate increase in pretax profits of 5 per cent (The Economist 2001).

#### **4.2.2 The CEMEX Way provides a single design applied across the enterprise.**

The CEMEX Way is a global initiative to establish standard capabilities across the whole company and for managing those capabilities through a focus on management metrics and the deployment of best practices. The CEMEX Way, initiated in the 1990's, is based on senior management's view of the opportunities in moving to single managed platform across the global company. Prior to implementation of the CEMEX Way, the company had multiple processes from acquired plants and companies. Moving to a single integrated set of process-based capabilities provided an opportunity to standardize products, share best practices, and build production and commercial capabilities in the developing countries that represent a significant part of the company's markets (Brews and Bugos 1998).

Implementing global integrated processes became the way to help CEMEX grow faster and become stronger through process excellence. The company communicated the value proposition related to enterprise architecting in many ways (see Figure 38 below).

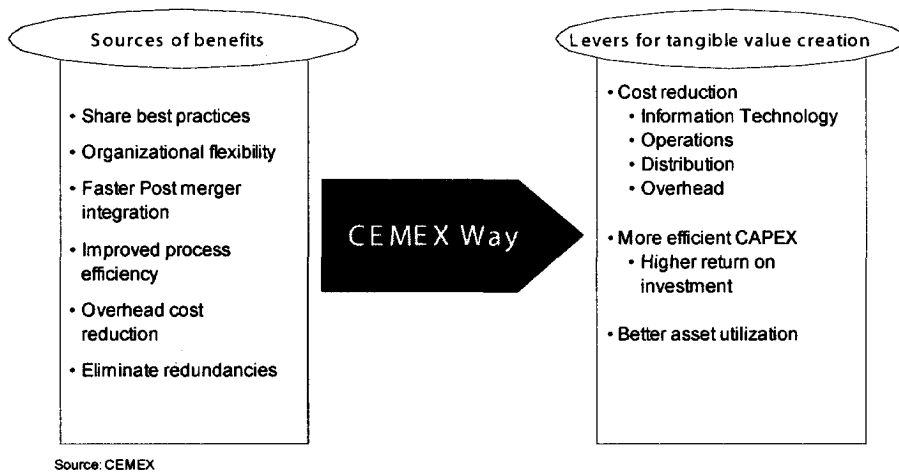


Figure 38. The CEMEX Way connected strategic sources of benefit with operational levers.

The current customer service strategy for CEMEX reflects the design considerations entailed in the CEMEX Way. <sup>3</sup>

- Consistent end-to-end customer experiences across points of contact and service channels.
- Expanded offerings to satisfy builders' growing demand for a complementary range of popular building materials, and one-stop shopping with a corresponding savings in time, logistics and money.
- Breaking the industry's paradigm of limited service to assure consistent product quality, less waste, more responsive and more flexible response to customers and business shifts, and greater client savings in all of the company's markets.
- Versatile and convenient technological solutions to satisfy and fulfill customers' needs through different electronic initiatives like online storefronts and mobile sales technology.

<sup>3</sup> [http://cemex.com/cs/cs\\_cs.asp](http://cemex.com/cs/cs_cs.asp)

#### **4.2.3 The CEMEX Way integrates technology, organization and process elements in its approach to enterprise design and management.**

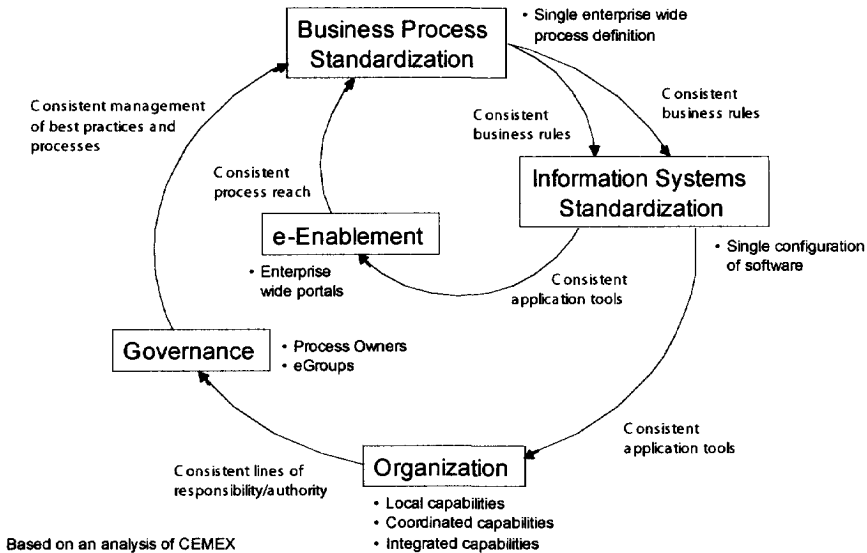
The CEMEX Way strategy has three main components that unify its enterprise architecture. These components represent how CEMEX communicates this strategy to itself and the external environment. In this regard, each component represents a major initiative. Combined, these initiatives comprise the integrated design that CEMEX currently manages and improves. Based on a discussion with the company, the components of the CEMEX Way includes the following:

- Business Process and Systems Standardization – the implementation of standard processes and systems across the enterprise.
- Organization – reorganizing the company and its job responsibilities to balance the operation of global processes in local environments.
- Governance – the mechanisms to make management decisions and implement best practice improvements.
- E-enabled Business Processes – applying technology to use information more intelligently and efficiently through automation and innovation.

Each of these components represents an important aspect of the CEMEX Way. Viewed individually they represent initiatives that many organizations have undertaken. For example, implementation of Enterprise Resource Planning (ERP) systems often seek standardized processes (Davenport 2000). Likewise, reorganization frequently redistributes responsibilities in an effort to improve performance (Mintzberg 1993). The total quality movement has demonstrated the value of best practices (Hackman and Wageman 1998). Applying Internet technologies can improve operational efficiency and customer service (Keen and McDonald 2000).

Viewed as a system in Figure 39, the components of the CEMEX Way reinforce each other to create consistency across business processes,

information systems, organizational governance and use of Internet technologies. The planned interaction among these components creates reinforcing feedback mechanisms for the CEMEX Way that represents their “way of thinking” about the company as a complex system (Ackoff 1996).



*Figure 39. A systems view of the CEMEX Way reveals how its components re-enforce each other and drive further improvement.*

Reviewing the components, in turn, illustrates the designed interactions that CEMEX uses in gaining performance, integration, consistency and flexibility.

#### **4.2.4 The CEMEX Way defines the company in terms of eight core processes that form its business capabilities.**

In order to increase the effective global management of CEMEX, the company recognized its operations in terms of its core processes and the need to standardize them. Each process is supported by a configuration of information technology, process and organizational components. In architecting terms, these processes form CEMEX’s business capabilities. They include the following:

- Commercial and Logistics – processes involved in sales, service, customer relationship management, order management, distribution and fulfillment.
- Ready-Mix – processes involved in managing and delivering pre-mixed cement directly to construction sites.
- Planning – entails the activities for strategic and capacity planning including planning for new plant and equipment investments.
- Operations – includes processes for management of the production plants, the company's knowledge base, research and development, and information technology.
- Finance – the processes for treasury operations, including cash management and capital investment management.
- Accounting – the processes for operational accounting, including business unit accounting and the preparation of management reports and scorecards.
- Procurement – the activities involved in purchasing production and non-production materials, including supplier relationship management.
- Human Resources – the processes for managing personnel, determining workforce requirements, recruiting, training and development.

These processes became the anchor for development of CEMEX's architecture.

#### **4.3 The CEMEX Way resulted in an enterprise-wide designed system.**

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In order to meet the strategic need for improved performance and reduced post-merger integration time, CEMEX redesigned its enterprise, creating a system of capabilities and supporting elements. This system defines the enterprise in terms of its core process capabilities consistently across the globe. Achieving an enterprise-wide solution required resolving a number of design issues including the conflict between global processes and local execution. Understanding how CEMEX addressed these issues and the process it used provides insight on its enterprise-level design process and its fit with the architecting deliverable.

#### **4.3.1 Business processes and information-systems standardization manages performance through consistency and continuous improvement.**

The CEMEX Way integrates the company around core processes representing a single way of working across the enterprise. A process includes a consistent set of management metrics, a single configuration of application software and a common technical infrastructure.

Standard enterprise processes define activities across its locations and the application of consistent performance measures and targets for managing operational performance. Standard processes and metrics also enable an active program of continuous process improvement. For example, during CEMEX's second quarter 2004 earnings call with investment analysts, the company pointed to improvements in its operations processes generating a recurring performance improvement of \$70 to \$80 million per year through the adoption of best practices in finance and accounting processes. (CEMEX 2004)

Standard information systems support standard processes. CEMEX employs a single set of information systems. For example, company core enterprise and financial management systems run on a single global instance of JD Edwards Enterprise Resource Planning software. Ready-Mix, a specialized concrete product business unit, operates on a custom-built software solution with a single configuration used across the globe. The consistency between business process and information systems reinforces each other through automation of business rules and through providing common IT tools across the enterprise.

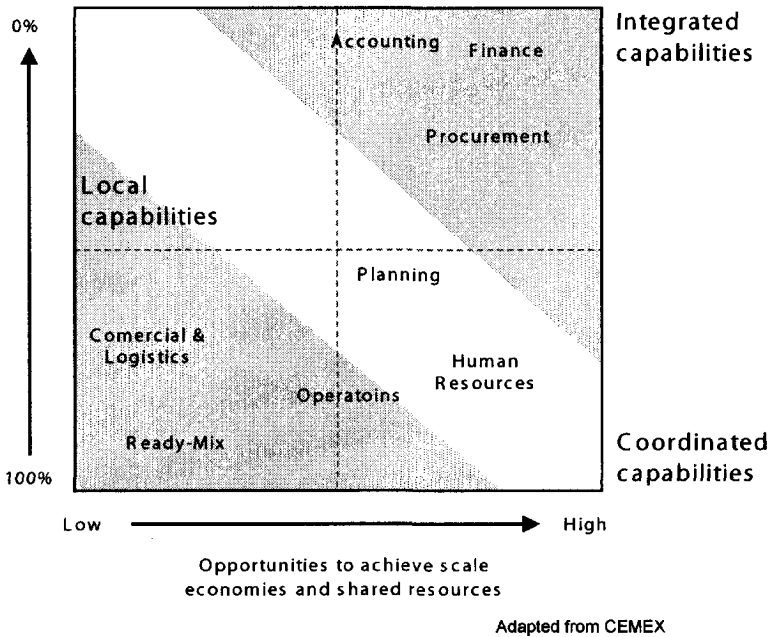
#### **4.3.2 CEMEX's organizational design reflects the need for global integration and local flexibility.**

Operating a single core process across more than 30 countries and local markets challenges the organizational structure. Each country and market had unique requirements and customs that were supported by different systems and processes prior to the CEMEX Way. The requirement for a single core process across the enterprise created a need to change the organization structure and governance to support processes and information systems.

CEMEX implemented its organizational structure to balance the requirement for enterprise-wide processes with the realities of executing those processes in a diverse set of local markets. In making the compromise between global and local needs, CEMEX identified three organizational patterns and then integrated its core processes with those patterns.

- Local capabilities are organized based on geography to enable a degree of local execution and recognize the reality of lower opportunities for scale. These capabilities are the customer-facing functions, and they account for 88 percent of CEMEX's headcount and 77 percent of its operating cost.
- Coordinated capabilities use a blended model with a strong central enterprise-wide organization and smaller local presences. The blended model enables CEMEX to coordinate enterprise-wide processes with local regulatory and cultural requirements. These capabilities represent a small portion of CEMEX's overall operation, accounting for 4 per cent of the company's headcount and 9 per cent of its operating cost.
- Integrated capabilities use an enterprise-wide organization and apply a consistent set of rules across the company. This enables CEMEX to gain operating efficiencies from capabilities such as accounting, finance and procurement. Enterprise capabilities represent 8 per cent of the headcount and 14 per cent of its operating cost.

Figure 40 below reflects the distribution of CEMEX's capabilities across these models.



*Figure 40. CEMEX's organization structures integrate local execution with global processes.*

In the past, the organizational structure was geographic with local plants, sales and operations existing within national silos which limited integration and performance. The CEMEX managers we spoke with called this organizational model the first to be based on the nature of the business processes.

The use of a blended organizational structure in conjunction with enterprise-wide business processes represents an example of architecting. CEMEX achieved consistency within elements as the organization model is the same across the company, and integration between elements as organizational roles and responsibilities fit a single process design.

#### **4.3.3 The CEMEX Way defines governance focused on performance improvement.**

CEMEX established process owners and a central team for implementing process improvements. It formally assigns owners, called process owners, to each capability. The concept of process owners has been problematic for process-centered organizations mainly because those



assigned to the role were accountable for business processes with little control or influence over their execution (Hammer 2001). At CEMEX, process owners are working executives with strong authority, who perform this responsibility in conjunction with other operational responsibilities. Process owners have performance targets and budgeted resources to invest in improvements. A member of the executive team sponsors an individual, providing boardroom access and sponsorship for process improvements. As a team, process owners at CEMEX have the authority, resources and responsibility for making sustained improvement. This creates executive visibility and direct lines of accountability for performance improvements resulting in CEMEX's strong operating margins when compared to its two global competitors: Holcim and Lafarge.

The best practice implementation organization within CEMEX is eGroups. Consisting of approximately sixty people, eGroups provide the business process, organization and metrics design skills needed to quantify and to transfer best practices across the organization. The deep skills of these units are not required in each part of the company so the eGroups are centralized and operationally report to the Chief Information Officer, who has an enterprise level role. The eGroups receive their projects from the process owners based on their requirements and funding.

#### **4.3.4 CEMEX's use of e-enabled business processes drives performance, flexibility and innovation.**

The final core element of the CEMEX Way revolves around the use of e-enabled business processes to drive scalability, efficiencies and innovation. E-enabled business processes support automation and information that feeds the identification of best practices and performance improvements (Economist 2001).

The e-enabled processes fit with the organizational model as the pervasive nature of the Internet supports central enforcement of global standards. CEMEX's initial e-enabled processes included procurement, factoring of financial payments, and workforce education – all of which represent coordinated or integrated capabilities.

CEMEX has used the Internet as a source of innovation through applying information at the point of need. For example, cement trucks are connected via wireless technology to the dispatch and order management systems, providing order delivery in real time. Sales of cement and Ready-Mix concrete are coordinated via the web – a first in the industry. The availability and accuracy of information enables CEMEX to automate individual cement plants – allowing drivers to load their trucks automatically at the plant based on the truck number and its assigned order, creating savings in materials and delivery costs and raising customer service.

#### **4.3.5 The CEMEX Way provides an enterprise-wide design that includes its supporting components.**

The CEMEX Way does not exist in isolation. Rather it uses a number of supporting components that fuel the cycle of implementing best practices to an enterprise-wide architecture. Performance measures are an important part of the CEMEX Way. Since there is a single process base across the enterprise, there is a single set of performance measures for each process and a single definition of these metrics across the enterprise.

Performance information is critical to the success of the transfer of best practices across the company and its agility. Performance data quantifies the actual improvements found in a particular plant or location. This reduces the risk of investing in phantom practices that perform well in one location but cannot be transferred to others. The performance metrics also provides a strong indicator of the expected benefits from adopting the best practice, and this drives the business case for investment and helps set new operational targets.

Technology makes performance measurement at CEMEX practical and highly efficient. The company uses sophisticated data and communications systems to capture production and performance information ranging from sales data to remote sensors placed on individual cement truck and production kilns. The performance information is visible to all managers, including Chairman Zambrano, real-time information on performance (Brews and Bugos 1998). At CEMEX, this system produces management reports automatically, without the need for managers to aggregate and transfer data across systems.

#### 4.3.6 The CEMEX Way followed a defined design and implementation process.

The architecting process at CEMEX ran from March 2000 to September 2003. At times, it focused more on individual capabilities, at other times on the enterprise as a whole. According to CEMEX, the process occurred in five steps, as outlined in the Figure 41.



Based on discussions with CEMEX

*Figure 41. Implementing the CEMEX Way involved a staged process.*

The five steps were the following:

- Preparation, initiated in March 2000, defined the scope and methods to be used on the project and the role of e-Groups and their training.
- Defining the CEMEX Way required nine months from March 2000 to December 2002. This phase involved creating a base model of the capabilities and process maps for particular capabilities (see selection approach details below). These capabilities and their process maps became the base definition of the CEMEX Way. Once defined, the e-Groups developed an overall implementation plan for the various countries to reach a single defined process.
- Preparation for implementation occurred from September 2001 to December 2001. Here the e-Groups did detailed implementation planning, based on gap analysis of each country and its operations. These gaps including adjustments and changes to information systems and design of the new organization.
- Implementation, which established the CEMEX Way in the countries and processes, began in January 2002 and was complete in September 2003. During this time, the eGroups rolled out the model and transitioned people to new processes and information systems. The deployment put some capabilities into production

earlier than others. Finally, the company implemented support processes through a global support center (GSC).

- From September 2003 to today, CEMEX has been in operational mode, managing the capabilities defined in the CEMEX Way and implementing best practice improvements across the organization. According to officials at CEMEX, the company implemented more than 120 enterprise-level improvements in the last 12 months.

Implementation of the CEMEX Way required choices, since the company had multiple processes across the world performing similar tasks. CEMEX committed to an alternate approach to re-designing from a clean sheet of paper or trying to reconcile multiple processes into a single global standard. The eGroups selected one of the existing processes and made it the enterprise standard. CEMEX then managed the risk associated with the potential shortcomings through placing the global standard under continuous improvement via the eGroups and process managers. In this way, CEMEX officials believe that they saved approximately two years in the definition and implementation process.

The CEMEX Way solution reflects architecting multiple elements and concentrating on consistency across the enterprise. The conscious management of the key elements of the CEMEX Way reflects an intentional design of its capabilities and the elements within its capabilities. With the solution description as a background, we can look at the process CEMEX used to architect the enterprise.

#### 4.4 The CEMEX Way can be described using the architecting deliverables.

The CEMEX Way resulted in a new architecture for the company that can be described using the architecting deliverables presented in Chapter three. These models define company business scope – in a value network, its operational scope – in a capabilities diagram, and the individual elements in a capability blueprint. Implementation of the CEMEX Way occurred independently of the architecting deliverables defined in this dissertation. However, applying architecting deliverables to the CEMEX Way provides a way to compare and evaluate the efficacy of the architecting deliverables efficacy. This section of the chapter presents the CEMEX organization in terms of the architecting deliverables. The final section of this chapter reflects on the fit of these models and their ability to represent the CEMEX Way design.

##### 4.4.1 CEMEX operates in a vertically oriented value network.

The cement industry is vertically oriented with individual companies owning the raw materials, production and distribution of cement products. CEMEX is a vertically organized with ownership of the production, distribution and sales; this is typical for this industry. Figure 42 below presents the CEMEX value network, showing the chain of relationships from the supplier, to CEMEX (① in the diagram) and then to its customers (②). The value network diagram captures the different relationships that reflect two important other lines of business for the company: Ready-Mix and trading operations.

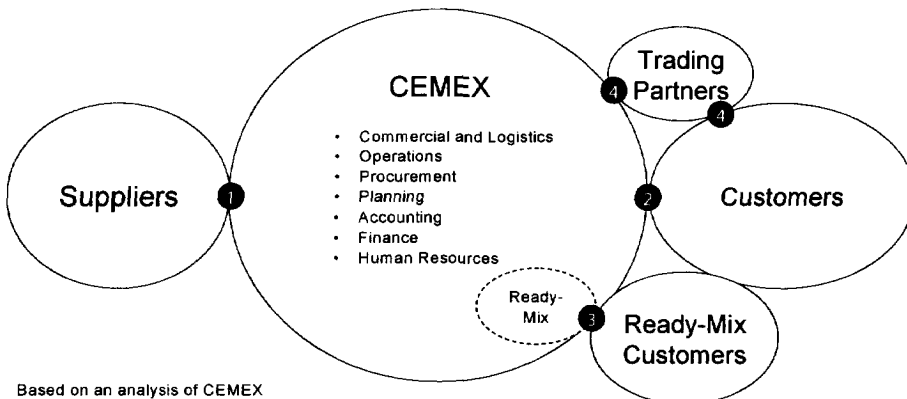


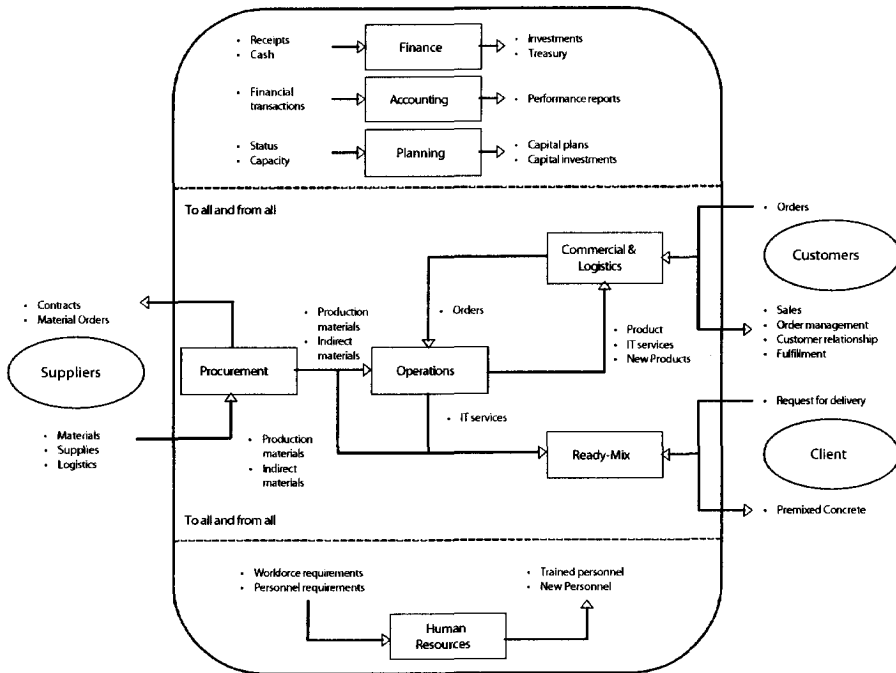
Figure 42. CEMEX value network diagram defines the scope and business relationships.

The value network captures two particular relationships and innovations within the vertical model. Ready-mix (③) is an independent product line that involves delivering pre-mix concrete to construction sites on a just-in-time basis. Ready-Mix involves its own set of capabilities and hence its own set of relationships in the value network; it has been widely praised in the business press as an outstanding example of industry-changing processes innovation using technology (Keen 1997; Brews and Bugos 1998). CEMEX operates a trading operation (④) that allows the company to serve customer needs beyond its current operations through trading capacity and in-transit international shipments of cement with other companies globally on an almost real time bases.

#### **4.4.2 CEMEX integrates its capabilities to provide customer service and operational performance.**

CEMEX's capabilities reflect its process focus and vertical integration. The CEMEX Way calls for standardization of activities through the creation of standard enterprise-wide processes. These processes represent individual capabilities, as they contain specific combinations of processes, tools, technologies and organizational structures. CEMEX's capabilities are captured in Figure 43 below.

CEMEX's single process definition deployed across each of the company's geographies creates a basis to identify, develop and implement best practices. The capabilities diagram reflects CEMEX's process-based approach as process forms the basis for defining its capabilities. Each capability contains a company process with clearly defined interfaces and responsibilities. Each process is managed as an integrated whole by the process owner. The capabilities diagram illustrates these processes and their interactions with each other.



Based on an analysis of CEMEX

Figure 43. CEMEX capabilities diagram captures the capabilities and major interactions with external players.

#### 4.4.3 CEMEX's process-defined capabilities integrate multiple business elements to deliver required performance.

The core processes of CEMEX include more than activities and rules. CEMEX includes human performance, technology and facilities in defining and operating these processes. The capability blueprint model provides a means to capture the elements involved in these capabilities. Figure 44 below is a sample blueprint outlining the elements of the Ready-Mix processes, a distinct capability at CEMEX with its own application software, business processes, and activities.

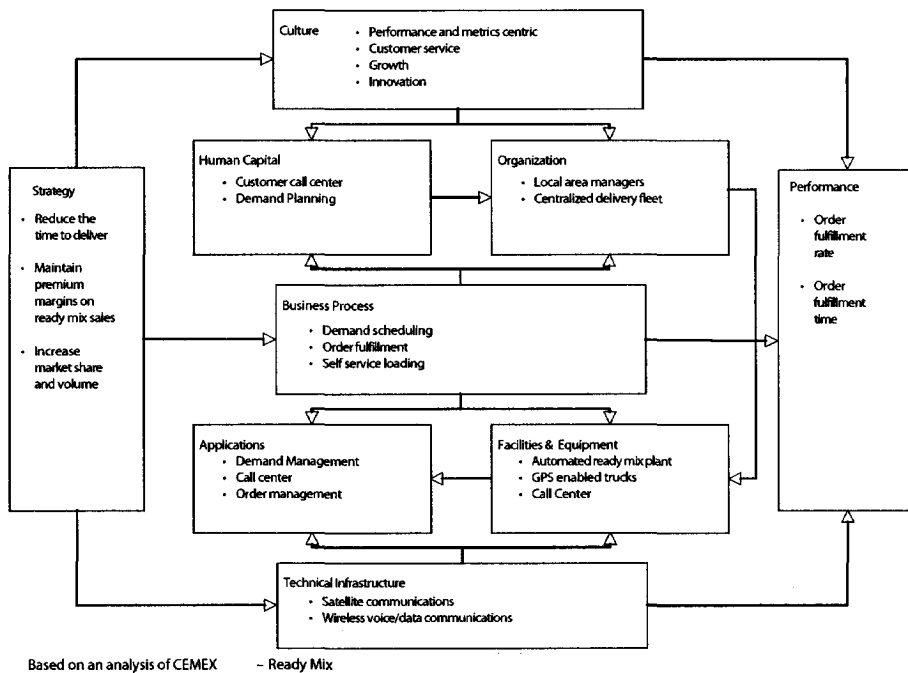


Figure 44: CEMEX – The capability blueprint defines the elements used to delivery the Ready-Mix strategy and performance.

The re-architecting of Ready-Mix in the late 1990's provides an example of the integration of elements to achieve distinct market capability. That re-architecting illustrates the element-to-element integration required to deliver improved business performance. The way of thinking behind the design of the Ready-Mix capability provides insight into architecting the CEMEX Way.

#### 4.5 Ready-Mix offers an example of integrating business elements to deliver performance.

Ready-Mix is a special value-added cement product delivered and poured directly at the customer's construction site. It commands higher margins than traditional mix-on-site products. However, Ready-Mix concrete must be poured within 90 minutes of being mixed, or else it hardens, ruining the load and potentially the delivery truck. This places a premium on the integration between delivery scheduling and delivery fulfillment. The design of the Ready-Mix process describes how CEMEX integrates the elements of its business capabilities.



#### **4.5.1 CEMEX approached Ready-Mix from a performance perspective.**

The Ready-Mix business has always suffered from erratic customer scheduling, since deliveries might be delayed because of poor weather or construction delays. CEMEX's competitors focused on improving the scheduling process – a natural response given that scheduling inefficiencies seem to be the primary challenge in managing Ready-Mix. CEMEX, however, took a fresh look at the Ready-Mix, using a process view. Rather than focusing on improving customer scheduling – an incremental approach, a team assigned to improve Ready-Mix processes recognized the core issue as one of erratic demand. Instead of improving how it scheduled resources, the company focused on being able to respond to changing demand.

CEMEX defined new demand management processes and a dynamic scheduling application after investigating other organizations facing a similar problem. A group studied the Houston 911 emergency call-center operations, utilities responses to gas leak service calls, FEDEX, and pizza delivery companies. These enterprises all delivered products or services under tight timeframes in the face of erratic demand.

#### **4.5.2 The Ready-Mix capability emphasizes unique combinations of process, technology and facilities.**

CEMEX's Ready-Mix solution revolves around changing the model of filling customer orders. In the traditional model, deliveries were managed at the plant level. Each plant was a hub for the delivery trucks and deliveries were scheduled based on runs from the plant to the jobsite. This model, shown to the left in Figure 45 below, emphasizes getting the right truck from the plant to the delivery site.

CEMEX turned this model inside out, managing demand at a regional level and moving responsibility for the fleet of Ready-Mix trucks from the plant to a call center. In the new process, trucks are dispatched to orders based on anticipated demand, with deliveries being dynamically scheduled, sending the closest Ready-Mix truck with the right product to the delivery site. This is shown on the right side of Figure 45 below.

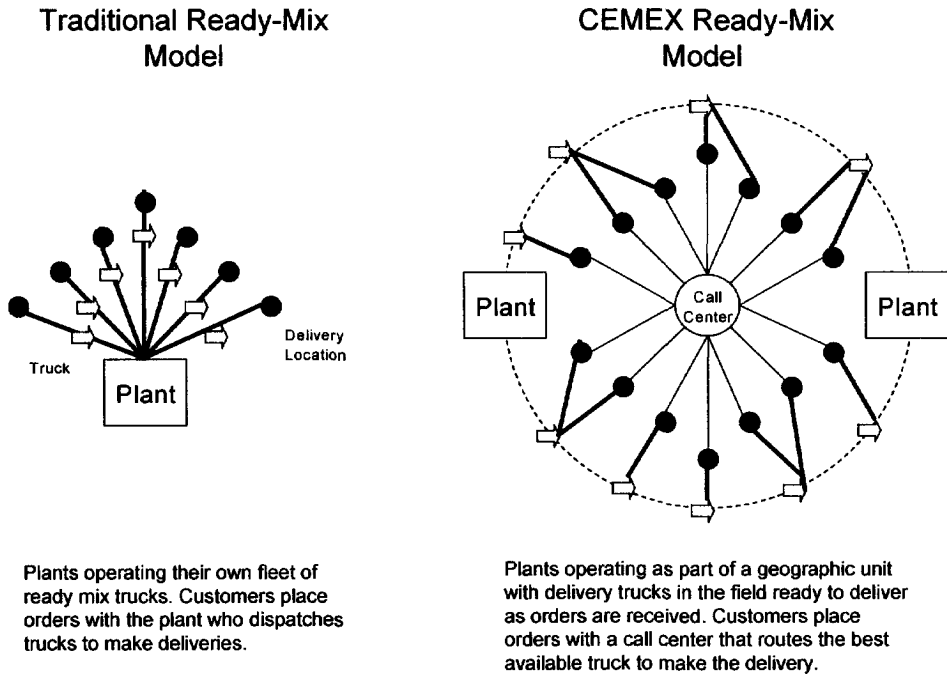


Figure 45. CEMEX's Ready-Mix concept changes relationships between location, trucks and plants.

#### 4.5.3 The Ready-Mix capability design creates a new configuration of business elements.

Achieving the strategy and performance goals associated with Ready-Mix requires a new configuration and integration of the elements within this capability. This offers an example of the level of integration required to re-architect a part of the business. At CEMEX, implementing this new capability involved integrating a number of elements including the following:

- Changing responsibilities for Ready-Mix deliveries from the individual plant to a regional call-center to enable greater aggregation of orders and predictability of demand.
- New processes for call-center professionals to handle customer orders and dynamically schedule deliveries based on customer need for product, the customer's location and the location of the nearest delivery truck.

- New applications to support dynamic scheduling and managing the fleet of delivery trucks made available to the call center. These applications relied on sophisticated mathematical algorithms.
- New facilities and equipment to increase the mobility of delivery and plant assets. These facilities include changes to the Ready-Mix truck and the cement plant. Ready-Mix trucks have wireless access and global positioning satellite links. This enables the call center to know which product is on which truck and where that truck is located. An order is then directly routed to the driver in the field. Technology in the cement plants has also changed with plants adding automation that allows the driver to pull up and have the right product loaded onto the truck based on the orders it will deliver that day.

Integrating the elements is critical for improving the performance of CEMEX's Ready-Mix capability. Using the CEMEX Way, this combination of technology, process and organization is deployed across the company wherever Ready-Mix products are offered. According to CEMEX, the new capability has increased productivity by 35 per cent, reduced fuel and reduced equipment costs, all while guaranteeing shipments within 20 minutes of the schedule delivery.

The CEMEX Way in general and the design of Ready-Mix in particular reflect an enterprise-wide design and management. The CEMEX Way, while not formally organized according to the architecting deliverable outlined in Chapter three, does provide an opportunity to compare its results against those outlined in the architecting method.

#### **4.6 The CEMEX case provides the basis to compare and evaluate architecting processes and deliverables.**

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The CEMEX Way is an outgrowth of requirements for improved performance and support for a growth-by-acquisition strategy. In response to competitive pressures, CEMEX sought to raise performance by increasing the integration and consistency across its global operations. Since their inception, CEMEX has used these enterprise-wide processes as a basis for improving its operating and strategic performance.

##### **4.6.1 The CEMEX Way is enterprise-wide in its design and management focus.**

The CEMEX Way is enterprise-wide as individual local/national processes were replaced by a common definition, metrics and process owner responsibility and authority. The CEMEX Way defines a single model for the company's operations from the United States, to the Philippines, to Brazil. The common process description enables the company to manage its performance from the enterprise-wide process owners (top-down) and from the sharing of best practices among operations in the field (bottom-up). The combination has led CEMEX to implement continuous process improvement initiatives that generate enhanced performance.

CEMEX represents an architected response to requirements to raise operational and strategic performance. CEMEX chose to implement an enterprise-wide set of processes to achieve their strategy. The design created an enterprise architecture in the context of CEMEX's national-based operations and organizational structure to create global processes that could be executed locally. CEMEX used information technology, in the form of robust global communications and a centralized ERP system, to support these enterprise-wide processes. Deployment of standardized processes, technology and metrics across the company's operations supports the enterprise-wide nature of this design.

##### **4.6.2 The architecting deliverables support capturing the enterprise design of the CEMEX Way.**

The CEMEX Way involves designing sets of processes, information technology, organization, skills and performance measures. The architecting deliverables can describe the enterprise-wide design and

support an integrated design. The enterprise-level decisions involved in implementing the CEMEX Way are summarized in the Figure 46 below.

Architecting Deliverable	Deliverable Requirement	CEMEX case points
Value Network Diagram	Capturing the actors and capabilities involved in bringing products and services to market.	The value network is able to describe the types of actors involved in CEMEX's value network, including the specialized actor relationships involved in Ready-Mix.
Capabilities Diagram	Describing the relationships and interfaces between capabilities within the enterprise.	The capabilities diagram provided a context level process flow by identifying major models and interfaces among capabilities.
Capability Blueprint	Defining the scope of a capability in terms of its constituent elements.	The capability blueprints captured the elements involved in CEMEX's process based capabilities.

*Figure 46. The architecting deliverables support describing the design of the CEMEX Way.*

Implementing the CEMEX Way required detailed design, construction, testing and deployment of new capabilities using implementation approaches for process design, information systems implementation and element-specific techniques. The CEMEX Way supports this integrated approach as CEMEX performed detailed design using process-map models that incorporated process, personnel and technology considerations (Garcia interview 2004). The architecting deliverables provide a way to re-create the high-level design of the CEMEX Way. They describe the CEMEX Way and capture the integration of process, technology and organizational aspects. The architecting deliverables and the blueprint, in particular, support identification of the elements required to operate an integrated capability.

**4.6.3 Evaluating the enterprise architecting method involves comparing CEMEX's experience with architecting outcomes and requirements.**

Applying the enterprise architecting methodology view developed in Chapter three to CEMEX's experience provides a way to evaluate the efficacy of the architecting deliverables and process. The CEMEX Way meets the criteria for an enterprise architecting method covering an enterprise scope, reflects the company's strategic intent, and achieves the enterprise management goals of performance, integration, consistency and flexibility. CEMEX used an enterprise-level design and management approach to improve its performance while maintaining flexibility. The company deploys an enterprise architecture, embodied in the CEMEX Way, to reduce post-merger integration cycle time and implement best practice improvements to manage the enterprise for profitable growth. The ability of the enterprise-architecting method to describe the CEMEX Way and model its structures supports its use in enterprise design.

The CEMEX case concentrated on examining architecting deliverables. The next case, the evaluation of Accenture's Service Lines, illustrates the processes and decisions involved in architecting another global business.

# 5

## Architecting Process Evaluation

### **5.0 Case studies provide a way to evaluate the architecting process.**

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Architecting is a design process requiring decisions and reflecting those decisions in architecture deliverables. The CEMEX case provides an opportunity to assess the fit of the architecting deliverables to a specific enterprise-design effort. Evaluating the architecting process requires understanding design decisions and considerations and how they are supported in the enterprise-architecting methodology. The case of Accenture's Service Line implementation provides this opportunity, as the author played the role of lead architect in this transformation. This case study looks at the ability of the architecting process to structure and guide decisions to achieve the enterprise management requirements.

### **5.1 Accenture's Service Line approach represented a global strategic change initiative.**

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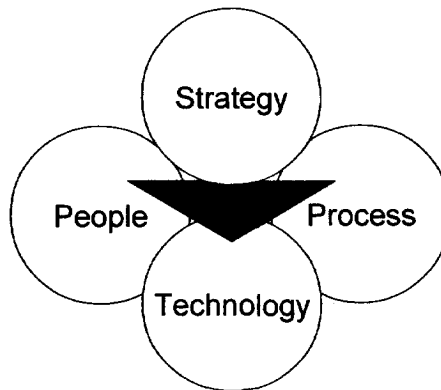
Accenture, formerly known, as Andersen Consulting, is a global management consulting and technology services company. With fiscal year 2004 revenues of \$13.7 billion and operations in more than 40 countries, it is a global company with complex operational requirements.

In the late 1990's, Accenture extended its offerings from traditional management and technology consulting to outsourcing and other business models. This forced it to change its organization and client service-delivery model, which it accomplished by developing a Service Line architecture. In order to understand the architecting decisions involved at Accenture, it is necessary to provide a background on the company and the context that created the need to change.

### 5.1.1 Business Integration represented an internal focus to building workforce competencies.

Prior to the new initiative, Accenture concentrated on client engagements that implemented information technology solutions. These engagements varied in size but involved a team of consultants working with the client. Once implemented, the engagement was closed and the consultants were assigned to another engagement.

The Accenture client service-delivery model was based on a concept called Business Integration (BI) illustrated in figure 47. In the BI model, Accenture cultivated the ability to supply a unique set of skill sets to each client. The move to BI competencies was the company's implementation of a strategy based on its core competencies. BI focused on consulting engagements that were deemed unique to each client situation because they valued developing custom applications or highly tailored business processes.



Adapted from Accenture.

*Figure 47. Business integration competencies defined the way Accenture built and marketed its skills.*

The market demand for deep functional skills applied to individual client issues began to change in the late 1990s with the advent of enterprise resource planning (ERP) software and the implementation of industry-standard solutions rather than enterprise-unique ones. These factors eroded the value of deep functional skills in favor of industry- and solution-specific solutions.



At the same time, increased interest in the business application of Internet technologies undermined the value of traditional consulting skills. Such consulting was viewed as part of the “old slow” way that did not fit with the dynamic markets emerging at the beginning of the dot.com boom. Smaller organizations such as Razorfish, Lante, and MarchFirst appeared to have greater agility and specific technology and marketing skills not found at larger consultancies. The net effect was tremendous pressure on the BI model and its reliance on professionals with broad general skills (Sweeney 2004).

Addressing these challenges involved overcoming a number of market and operational challenges. An effective replacement for BI would need to enhance Accenture’s ability to do the following:

- Develop more skills and solutions defined in terms that customers would recognize and that could be differentiated to enhance Accenture’s revenue structure.
- Enable the building of a portfolio of skills to manage a broader diversity specialization and depth of market solutions.
- Describe a career path supporting different workforce models including traditional consulting, operations, outsourcing and affiliated companies that would attract outstanding recruits to the company and ensure their retention and growth.

These requirements defined the essential gaps in BI. Senior management sought to address those gaps through a new model called Service Lines. This model was a strategic response to the need to bring more recognizable skills and solutions to the market in a continued evolution from providing services to delivering solutions.

### **5.1.2 Accenture changed from BI competencies to Service Line capabilities.**

Service Lines were built on a new architecture encompassing Accenture’s client-service delivery and workforce development models. Design of Service Lines began in the spring of 2000 with implementation in the winter of 2001, and it involved changing a 75,000-person multi-billion dollar enterprise from four

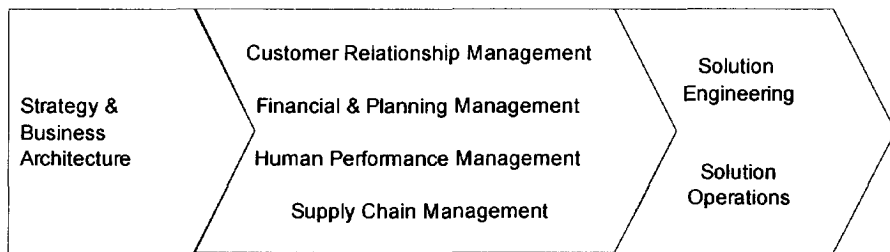
business integration competencies into seven Service Lines. Figure 48 below shows the strategic goals for Service Lines.

Strategic Goal	From: Business Integration	To: Service Lines
Client Service Strategy	Deploy a set of broad-based knowledge and professional skills organized around major business elements: strategy, people, process and technology.	Multiple complementary technical, operations, solutions and professional skills organized around a matrix of industry and solution sets such as Customer Relationship Management in Financial Services.
Business model	Revenue growth tied to workforce size with revenues generated from consulting fees under time and materials or fixed fee arrangements.	Diversify sources of revenue growth possible from sources including consulting fees, outsourcing contracts, alliance revenues and market capital appreciation.
Time to market for new capabilities	Build capability paced by the career development model with new capability areas reaching critical mass in eighteen to thirty six months	Build capability at speed at the point of need with capabilities reaching critical mass in six to nine months.
Management structure	Geographically organized resources centered on regions or local offices	Market Unit organized resources managed on a regional level to support global clients.
Value Requirement	Deliver skilled professionals able to define and implement unique solutions	Deliver market solutions and services generating significant business impact at low risk.
Workforce Strategies	Single workforce model and career path based on a consulting pyramid.	Multiple workforce models incorporating consulting, outsourcing, alliances and other forms of service delivery.

*Figure 48. Meeting the Service Line requirements involved designing workforce, go-to-market, and innovation capabilities.*

### 5.1.3 Service Lines sought increased market relevance for the company's capabilities and offerings.

Service Lines represent the organizational construct for building workforce skills, knowledge capital, operational capabilities and market solutions. Service Lines have three principal responsibilities: building market-relevant skills and solutions, providing deep skills to client engagements, and managing the portfolio of alliances and third-party relationships. Figure 49 below shows the Service Lines replacing the business integration model.



Adapted from Accenture.

Figure 49 Accenture Service Lines reflect a greater market focus.

Each Service Line concentrates on an area of marketplace interest. The Service Line descriptions are the following (Accenture 2004):

- Strategy and Business Architecture—helps clients develop strategies to deliver current earnings and position themselves for the future.
- Customer Relationship Management—helps companies acquire, develop and retain more customers, increase the value of these customer relationships and enhance the economic value of their brands.
- Supply Chain Management—helps clients improve performance by applying leading-edge approaches to operating-model design, sourcing and procurement, demand planning, manufacturing, product design and fulfillment.
- Human Performance—creates and implements strategies to solve human resources, workforce and culture change issues crucial to operational success.

- Finance and Performance Management—helps clients create finance and business performance management capabilities to drive improved profitability.
- Technology, Research and Innovation—researching, inventing and commercializing cutting-edge business solutions using new and emerging technologies to help drive clients' growth and give them first-mover advantage.
- Solutions Engineering—designing, building and deploying complex industry-specific, reusable and scalable solutions that typically integrate business processes, technology and human performance components.
- Solutions Operations—providing a range of outsourcing solutions for helping clients manage technology infrastructure, applications and business processes

#### **5.1.4 Architecting Service Lines involved meeting defined design considerations.**

Developing the Service Line architecture represented an evolution of Accenture's core models and processes. Developing the Service Line architecture involved addressing issues of client service delivery processes, workforce competencies, organizational structures, software tools and performance metrics. The Service Lines had to work within a number of constraints that became the following design considerations:

- Define an architecture supporting business consulting engagements, outsourcing and alternative business models.
- Create a structure reducing the barriers to move from BI Service Lines.
- Increase the flexibility and resilience of the organization to create, deploy and gain value from new products and services.
- Incorporate the needs for multiple career paths, workforce models and compensation structures into the enterprise
- Create a consistent approach across Market Units and geographies to leverage skills, knowledge and experiences, while enhancing the ability to serve large global clients.

Achieving these goals in a market relevant way involved changes to Accenture's approach to competency and offering development. Alternative approaches such as re-organization or implementation of new knowledge management systems would not deliver the level of change necessary to achieve Accenture's goals.

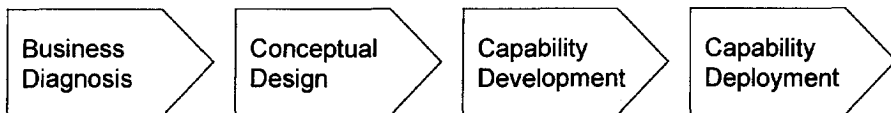
## **5.2 Implementing Service Lines required applying a process and team structure to resolve core operating issues.**

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The competitive viability of a professional service firm, such as Accenture, rests on the quality of its personnel, their knowledge and their skills. Changing how such an organization builds its personnel, its market offerings, its skills and its knowledge involves significant change. Accenture followed a structured process in making and implementing the required design decisions. Its architecture deliverables reflect many of these. Understanding these issues and how they were resolved sheds light on how the architecting process in practice.

### **5.2.1 Accenture's architecting process structured the enterprise into layers.**

The architecting teams followed a collaborative and open process. The teams gathering input and issues from throughout the organization. The process for architecting the Service Lines consisted of four phases moving from diagnosis of the issue to deployment of new Service Line capabilities (see Figure 50 below).



*Figure 50 Accenture architecting process*

**Business Diagnosis** was conducted from the fall of 1999 to the spring of 2000 involved identifying the strategic issues, market requirements and structural challenges

facing the company. The final decisions were circulated within the executive team to build consensus on the need to change the workforce and client service delivery model.

**Conceptual Design** conducted from the spring of 2000 to the fall of 2000 developed the Service Line Architecture, the implementation plan and rules for specialization. The primary architecting activities occurred in this phase of the process.

**Capability Development** involved changing and creating the support mechanisms to enable and sustain the move to Service Lines. This activity began in the summer of 2000 and completed in the fall of 2000.

**Capability Deployment** involved the transition of workforce personnel, competency models and leadership teams within the operating units around the world. This process began in the fall of 2000 and completed in early 2001.

### **5.2.2 Implementing enterprise-wide change required an organization that blended leadership, design and technical skills.**

Meeting these goals within the design considerations became the task of the Service Line architecture team. The Service Line Architecture team was formed in May of 2000 as a cross-functional team to design the Service Line client service model and workforce delivery model. The team was in place until September 2000 when the Service Line architecture was deployed to the field. The architecture team consisted of the following roles:

- **Change Leader** – the senior partner responsible for enterprise strategy.
- **Executive Committee** – former leaders of each of the business integration competencies: strategy, process, people and technology, plus key members of the Market Units.
- **Service Line Architect** – responsible for the creation of the conceptual design and reconciliation of design issues across

business integration competencies, Service Lines, geographies and industry Market Units.

- Human Resource Architect – responsible for the regulatory and systems impact of Service Lines on the workforce and its operations.
- Communications – creating the messaging and communications plan for deployment of Service Lines at the executive and workforce levels.
- Design Teams – addressing specific design aspects of the Service Line model such as compensation, career planning, education and training, and staffing levels.

This team focused on defining the Service Line architecture, transition strategy and operational processes. It worked as a geographically disbursed team with members located predominately in Europe and North America. Collaboration involved a set of shared tools (Lotus Notes, PowerPoint, etc.), scheduled conference calls and ad hoc calls to address issues. The team met face to face every six weeks to review progress and resolve larger design issues.

### **5.2.3 Architecting Service Lines required resolving fundamental operational issues.**

Shifting from internally focused to market-based competencies changed the nature of relationships across the company. The enterprise architecting method provided a forum for raising these issues and reflecting decisions in terms of the Service Line architecture designs. The ability of an architecting process to handle these issues illustrates its broader ability to handle enterprise-level strategic change. The architecting process addressed the following issues in creating the Service Line architecture.

- What is a Service Line?
- What is the relationship between Service Lines and Market Units?
- How do Service Lines work together in the field?
- How will Service Lines operate in smaller markets?

- How will Service Lines build workforce skills and competency in the Market Units?
- What should be the cost of building and operating a Service Line?

#### 5.2.4 The architecting process provided a structured approach for addressing the issues involved in designing and implementing Service Lines.

Strategy implementation raises numerous structure and relationship issues regarding enterprise. The enterprise-architecting method provides a structured method for organizing these issues. Accenture addressed these issues at specific steps of the architecting process and deliverables shown in Figure 51 below:

Architecting Issue	Description	Architecting Process	Architecting Deliverable
What is a Service Line?	Service Lines needed a sufficient scope of responsibility to influence Market Units without competing with them.	Business Diagnosis	Value Network
What is the Service Line -- Market Unit relationship?	Service Line needed to complement Market Unit responsibilities while having enough of an external face to build market relevant skills and offerings.	Business Diagnosis	Value Network
How do Service Lines work together in the field?	Service Lines needed to provide deep skills without compromising the Market Unit's ownership of the client relationship and engagement results.	Conceptual Design	Capability Diagram
How will Service Lines operate in smaller markets?	Smaller Market Units need the full scale of Service Line content and skills to support growth; but they did not have the revenue base to support a full Service Line investment.	Capability Deployment	Capability Diagram
How do Service Lines build competency in the Market Units?	Service Lines are a competency center for building deep skills and new offerings. The Market Units required market relevant skills at scale and ready deployment of new offerings.	Conceptual Design Capability Development	Capability Diagram Capability Blueprint
What should be the cost of building and operating a Service Line?	Management would support increasing the number of competency units from four to seven provided there was a standard model for what they would cost to build and operate.	Capability Development	Capability Blueprint

Figure 51. A structured enterprise architecting method supported the resolution of complex implementation issues.



The CEMEX case study evaluated the architecting process from a deliverable perspective. The Accenture case study evaluates the enterprise architecting method from a process perspective. The next section reviews the issues resolved and models created in each phase of the architecting process.

### **5.3 The Service Line architecture process structured strategic decisions and communicated them to the global organization.**

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Implementing the Service Lines involved transitioning from four BI competencies to seven Service Lines. Rather than architecting each Service Line independently, the process created a model for individual Service Lines to follow that facilitated development and deployment in these ways:

- Providing a standard definition and inventory of what was within a Service Line to quantify its resource requirements.
- Describing a Service Line design that would be the pattern for all Service Lines to follow.
- Communicating the Service Line design and its intent clearly across the company.

This approach supported a degree of consistency between Service Lines that was necessary to estimate their implementation cost and schedule, and to measure their performance.

#### **5.3.1 Business diagnosis established the scope, relationships and distribution of responsibilities across the Accenture value network.**

Understanding the scope, responsibilities and relationship between the Service Line and other players within Accenture was the focus of business diagnosis activities. As discussed earlier, Service Lines were a response to the need to build more market-accessible competencies and offerings. This required a move from internally focused competency units to a set of market-facing competencies that could be sourced anywhere.

The business diagnosis process identified a number of gaps that Service Lines would need to fill in meeting their strategic objectives. These gaps centered on the broader set of players required to deliver market-facing competencies and offerings. Service Lines would need to define their relationship with clients, Market Units and Alliance Partners who were increasingly important in reducing the time-to-market for new offerings. Within this area of concern, business diagnosis activities centered on the following:

- Identifying the types of players involved in delivering market-facing competencies and offerings.
- Defining a comprehensive model of a Service Line and its contribution to the enterprise.
- Clarifying the relationships among the parties involved in generating market demand and serving clients.

The number of personnel in Market Units versus Service Lines became an issue for business diagnosis and reflected a concern about the relationship between these two entities. The leadership supported the goal of increasing the market visibility of Service Line competency and recognized that Market Units would continue to house the majority of the consulting workforce. An agreement was reached that 90 per cent of the workforce would be in Market Units, with the remaining 10 per cent in Service Lines. This agreement, known as the 90/10 rule, provided resources to build deep skills and new offerings within the Service Lines and a process for building Market Unit skills at scale. The relative size of the two organizations set the guidelines for their activities and responsibilities that, in turn, shaped the rest of the architecture.

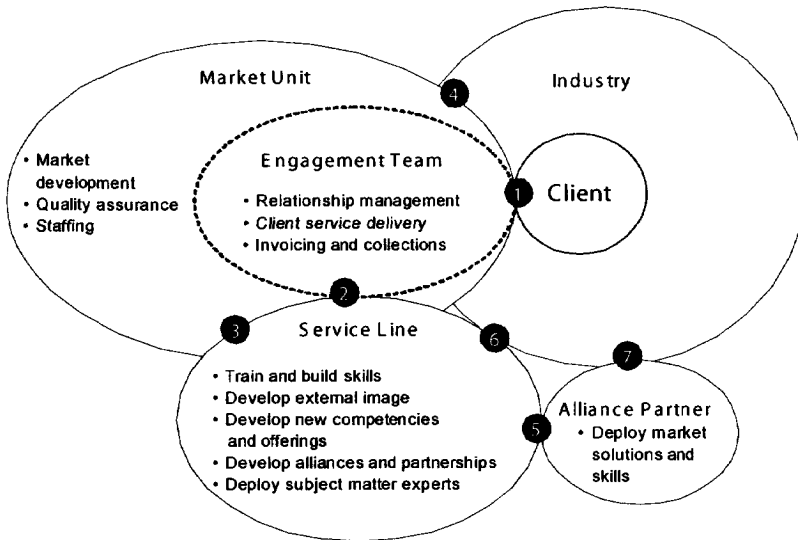
Specifically, this decision required Service Lines to concentrate their resources on building and deploying to the Market Units. The Service Lines did not have the resources under the 90/10 rule to go to market independent of a Market Unit. This decision shaped the type of capabilities found in the particular Service Line and its role in the value network.

The Value Network defined the boundaries and responsibilities involved in bringing multiple parties together to provide an integrated solution

to the client. Clear boundaries were important in establishing answers to management concerns regarding revenue recognition, market development responsibilities, personnel recruiting and development, and product development. The value network diagram used to define Service Line relationships involved the following players:

- Clients – who had specific business issues and opportunities they wished to address.
- Industry – the context in which the client operates and competes such as the financial services industry, contract manufacturing, airlines and e-commerce retailing.
- Market Unit – Accenture's deployment of resources and its focus on a specific set of industry and client challenges. The Market Units at the time of Service Line design were Communications and High Technology, Financial Services, Government, Products and Resources. Each Market Unit has its own profit and loss responsibilities and houses the majority of company personnel. A single market unit may incorporate multiple industries.
- Service Lines – Provide the organizational structure to house deep solution and subject matter skills. They are responsible for developing skills within Market Unit personnel. Service Lines contain a number of "centers of excellence" which house personnel available to provide subject-matter expertise across the Market Units.
- Engagement Team – The specific resources dedicated to addressing a particular set of client issues or opportunities. The engagement team consists of personnel from both the Market Unit and Service Line.
- Alliance Partner – The relationships with third-party companies and organizations to provide specific market or solution skills outside of the Market Units and Service Lines.

The architecting team developed a value-network framework to understand the relationships between these players by illustrating the interactions among players within and outside of Accenture. The Value Network helped define the touch points within the company and the roles played by the Service Lines, Market Units, engagement teams and alliance partners (see Figure 52 below).



Based on an analysis of Accenture service lines.

*Figure 52. Accenture's Service Line value network defines the actors, relationships and capabilities involved in realizing the Service Line strategy.*

The value network established the relationships and scope between the players in the Accenture value network in terms of statements forming rules about Service Line responsibilities and relationships.

- ❶ Engagement teams deliver services to clients.
- ❷ Service Lines support engagement teams through deploying subject-matter experts to engagement teams.
- ❸ Service Lines support Market Units in training and developing skills, market offerings, alliances and partnerships.
- ❹ Market Units develop the market through their interactions with the industry.
- ❺ Service Lines manage alliance-partner relationships and coordinate deployment of market solutions and skills.
- ❻ Service Lines develop the external image of Accenture in the industry for their offerings (e.g., customer relationship management in financial services)
- ❼ Alliance partners deploy market solutions and skills to the industry to build image and demand.

These statements form the pattern and rules that define the Service Lines place in the enterprise, its scope relative to the other actors and the relationships needed to fulfill this scope. The Value Network model captures the scope and relationships in a single graphic that communicated the resolution of these issues.

### **5.3.2 Conceptual design refined responsibilities and relationships into a specific model for Service Line capabilities.**

Business diagnosis defined the scope of the value network required to deliver market-facing competencies and solutions to its clients. Resolving these issues set the context for the conceptual design for the responsibilities and relationships of specific players. The Service Line architecture process used the information and decisions made in business diagnosis as the basis for the design of the Service Line capabilities diagram.

Rather than define each individually, the enterprise architecting method sought to define the pattern for each Service Line. The Service Line architecture was a design model for all seven of the company's service lines. The Service Line architecture therefore needed to provide a model that incorporated the design needs of seven distinct groups. Figure 53 below is an example of the Service Line capabilities diagram deliverable.

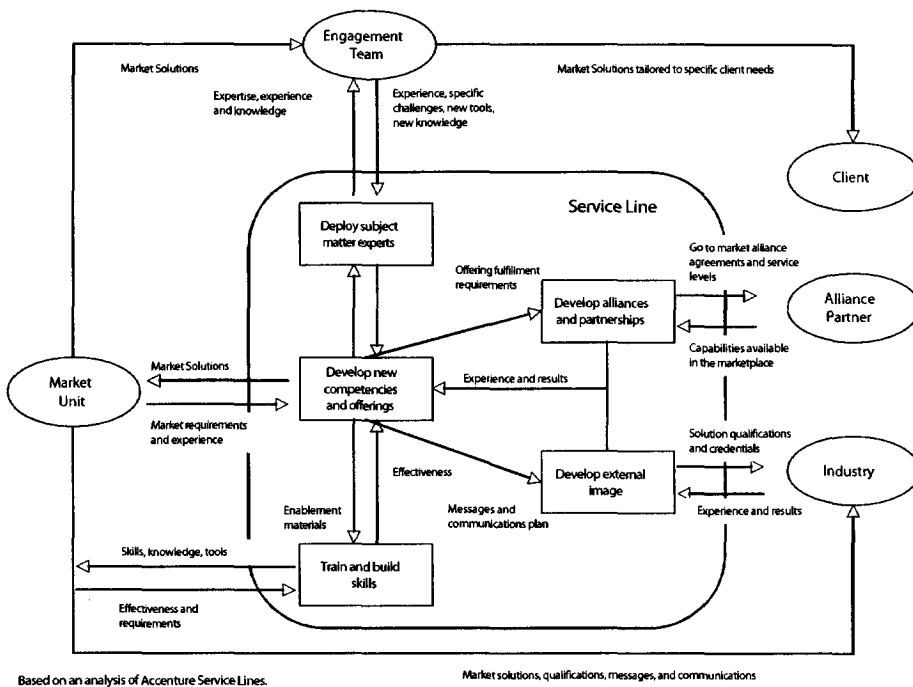


Figure 53. The Service Line Capabilities diagram described the operational scope of Service Lines.

The capabilities diagram defined a Service Line's operational scope and interfaces addressing issues related to how Service Lines worked with engagement teams, alliance partners, the industry and customers. For example, the capability "Deploy Subject Matter Experts" is carried out through a relationship with the engagement team and not directly with the client. Consistency between the value network model and capabilities diagram built confidence in the Service Line architecture.

Service Line capabilities reflect a pattern for the individual Service Lines. Consistency across Service Lines was particularly important to the success of the design. The client service model called for the ability to bring multiple Service Lines together at a client site on complex engagements. This requires the service lines to have compatible ways of working to reduce set-up cycle times and improve coordination. The use of a common design reduced implementation time and improved consistency between Service Lines.

### **5.3.3 The capability development stage provided the necessary implementation details.**

The need for consistency extended into each Service Line capability, in terms of a blueprint that defined the capability elements. The blueprint captured the elements required to support its strategic contribution and anticipated performance measures. Since the capabilities were a standard, the capability blueprints provided a consistent basis for defining the implementation scope for each Service Line. Similar to the capabilities diagram, the blueprints used to implement Service Lines followed a common pattern to increase the predictability and planning of Service Line resources and implementation timeframes. Figure 54 below is a blueprint for one capability within the Service Line.

Development of individual capability blueprints addressed issues related to how Service Lines would build competency in the Market Units. The capability blueprint provided a basis to evaluate the ability of the capability to deliver against its strategy and performance requirements. These evaluation criteria included the integration rules described in the way of managing and additional criteria including the ability of the capability processes to deliver the capability's strategic and performance elements, the adequacy of information technology (applications and infrastructure) and the alignment of organizational roles, skills and knowledge to the processes and performance requirements. Gaps in the design versus anticipated performance requirements were resolved during the Capability Development stage.

The capability blueprint provided an inventory of the elements required to operate the capability and therefore a basis for estimating its implementation and operations costs. This was particularly important, as the prior BI competency organizations had many of the same elements as the new Service Lines. This inventory enabled implementation teams to identify and evaluate current elements quickly and identify the changes required to implement the new strategy as well as the budget required.

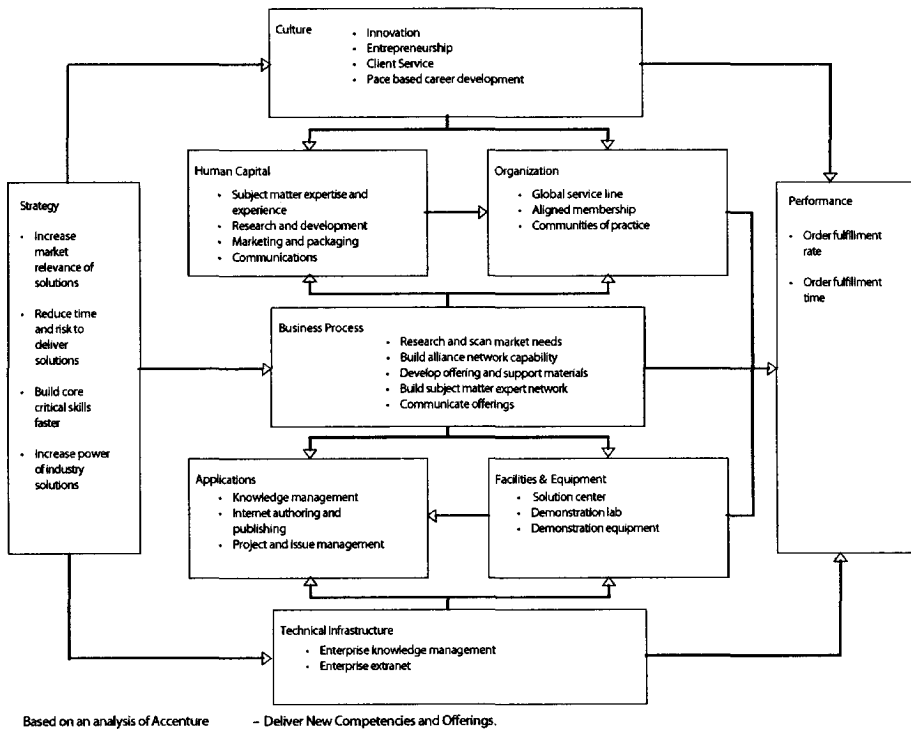


Figure 54. The capability blueprint for "Delivering new competencies and offerings" provides an example of Service Line design.

The capability blueprint represents a palette of the elements used in supporting the capabilities performance measures and outcomes. Defining the palette supports consistency across Service Lines and facilitates defining the financial and personnel resources required to implement each capability, as designers knew the set of resources they had to work with in delivering the processes, applications and organization used in operations.

### 5.3.4 Capability deployment tested and refined the architecture through review and implementation activities.

The Service Line architecting process involved deployment of the architecting into the operating environment over a relative short period – September 2000 to February 2001. Deployment activities were ongoing throughout the architecting process. Early in the process, deployment activities concentrated on design reviews with Market Unit leadership



to understand their issues and gain support for the Service Line design. These reviews were followed by the creation of Market Unit deployment teams that extended the range of input into the architecture. This process created a leadership network responsible for implementing Service Lines in the field.

Orientation for each successive level of leadership involvement focused on “how this would work in the real world.” An issue arising from a deployment review was that smaller geographies did not have the number of personnel to support this specialization. This point was resolved by amending the Service Line architecture to enable Service Lines themselves to deploy mini-competency centers in smaller geographies. These competency centers provided resources across all Market Units within a location. This decision placed greater emphasis on the Service Line’s “Deploy Subject Matter Experts” capability in those geographies. This exception to the architecture increased its applicability across the enterprise and caused a revision of the 90—10 rule in certain geographies.

The architecting deliverables were updated to reflect the resolution of implementation issues raised through the deployment process. The work performed in capability deployment resulted in a number of deliverables specific to the implementation of Service Lines including rules-based mapping from BI Competencies to Service Lines, revised requirements for job evaluation, updating career path designs and reorientation of the knowledge management system.

Architecting and implementing Service Lines required a structured approach to address complex issues in a consistent way. The need for an enterprise architecting method becomes evident when one considers the potential for the thirty-five different combinations possible if each of the seven Service Lines was uniquely designed by each of the five Market Units.

## **5.4 Accenture's implementation of Service Lines addressed enterprise wide strategic issues.**

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Accenture's use of a structured process for architecting Service Lines reflects the capacity of an enterprise-architecting method to resolve and implement strategic change. Review of this case study concentrated on how the enterprise architecting method organizes architecting issues and communicates architecting decisions clearly and consistently. At Accenture, the enterprise architecting method defined a consistent solution that enabled the company to deploy the enterprise architecture quickly with lower risk as evidenced by the 90-day program in which the Service Line design was deployed across Accenture. In those three months, Service Lines replaced BI competencies and 75,000 personnel transitioned to new Service Line competencies and career paths. This level of coordination and global deployment was made possible, in part, by a clearly articulated architecture.

### **5.4.1 Service Lines represented an enterprise-wide challenge.**

Service Line implementation meets the selection criteria for evaluating enterprise architecture. Accenture is a complex enterprise with global operations and multiple Market Units leveraging capability within and outside of the firm. Transitioning that organization from BI competencies to Service Lines represented a significant change. Accenture delivered this change through a structured process that resulted in creating the Service Line architecture highlighted in this case study.

### **5.4.2 Designing and implementing Service Lines was possible through a structured approach.**

The move from BI competencies to Service Lines represented a strategic shift in the way Accenture developed the skills and market offerings. It also reflected an application of the enterprise-architecting method defined in Chapter three. Defining a new global organization and transitioning to it demanded significant coordination across a global enterprise. Following an architected approach facilitated that coordination through the following:

- Defining a process for the diagnosis and making structural and operational decisions. The Service Line architecture approach provided a set of activities, milestones and models for managing

the project. This provided a work plan for managing the course of action.

- Defining the solution—the architecture – in terms that enabled management to understand how the new organization would work, how it would achieve its objective and how it would realize the strategy. This became important in building commitment to the shift to Service Lines and reducing deployment objections.
- Creating a forum via the architecture for discussion of alternatives and consideration of the entire design. The defined architecture provided a focus for debate and improvement of the design.
- Representing a complex design graphically to facilitate communicating the elements and relationships within Service Lines and between Service Lines and other players in the value network. Creating consistent and comprehensive design enabled managers to handle questions and objections quickly that accelerated the deployment of Service Lines.
- Providing a format to focus on a comprehensive solution encompassing organizational, process, application and other elements. This made Service Lines a tangible entity with defined resources, budget requirements, personnel and responsibilities.
- Convening a small team with skills from across the organization to manage the architecture development and support. This created leverage within the organization and a single point of contact and version of the architecture design.

The enterprise-architecting method was instrumental in creating the initial architecture designs and patterns for Service Lines as it provided a vehicle to discuss and surface a broad range of issues. This led to greater consistency in approach across the Service Lines.

#### **5.4.3 The architecting process supported refining the architecture through iterations between process steps**

While the architecting process is presented as a series of sequential steps, in execution there was considerable iteration between steps to refine and adjust architecting decisions. The issues raised during the architecting process drove iteration and refinement to respond to Service Line, Market Unit and team comments and criticism.

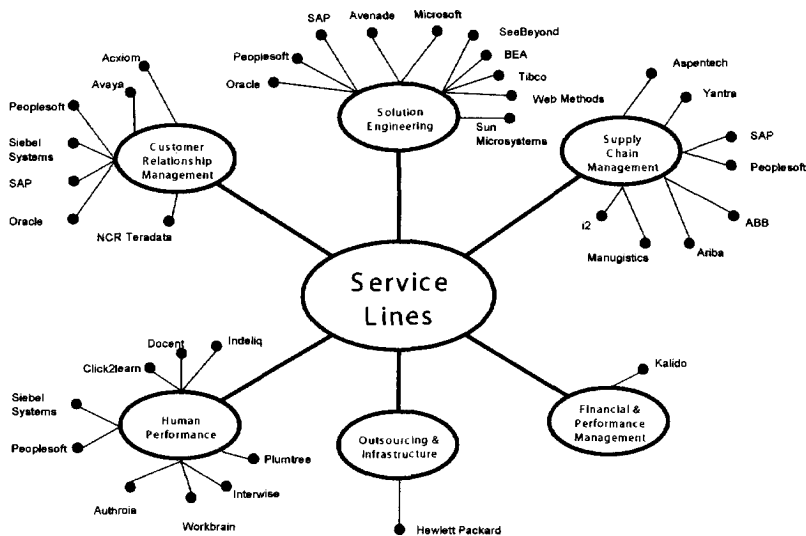
The Service Line architecture was complex, involving multiple relationships, capabilities and business elements. The ability to iterate the design in response to issues was an important factor in achieving its goals. Iteration enabled the design team to address complexity as it emerged through the review process rather than trying to second-guess the issues and potential objections of the Market Units.

These iterations proved important in building support and ownership of the Service Line architecture. For example, the Service Line design assumes that the Market Units in a particular geographic would have sufficient size to support building required skills within the Market Unit. This assumption was critical in determining the personnel in the Market Units versus those assigned to Service Lines – the 90—10 rule discussed earlier.

Managed iteration led to creation of a relatively straightforward design that could be modified to meet specific situations. Executive leadership and the architecting team managed these iterations by focusing on design changes necessary to address the issue and meet the goals of the Service Line strategy. In that way, the iterations concentrated on improving the architecture's applicability while meeting a release schedule.

#### **5.4.4 The Service Line design has enabled Accenture to build a network of alliance partners.**

This enterprise architecting method enabled Accenture to manage the global scope and complexity of the relationships across the value network. This has led the company to deploy a set of innovation networks through focused and repeatable capabilities covering alliance partner selection, negotiation and management. The extent of these replicable processes to manage complex networks is shown in the Figure 55 below:



Source: <http://www.accenture.com> September 1, 2004

*Figure 55. The Service Line architecture provides a standard approach for managing Accenture's innovation networks.*

These networks form around context-based alliances that are managed using an architecture-based approach. This network extends Accenture's qualifications and attractiveness to the market and potential technology partners, giving it the advantages of collaboration associated with an innovation network (Dittrich 2004).

#### **5.4.5 Service Lines give Accenture greater flexibility to respond to changing market needs.**

The Service Line architecture provided a flexible base for future innovation as Accenture has continued to refine and extend the core Service Line model. The original seven Service Lines have been re-organized into three major areas and aligned with different delivery models shown in the Figure 56 below.

Consulting	Technology	Outsourcing
<ul style="list-style-type: none"> <li>• Customer Relationship Management</li> <li>• Finance and Performance Management</li> <li>• Human Performance</li> <li>• Strategy &amp; Business Architecture</li> <li>• Supply Chain Management</li> </ul>	<ul style="list-style-type: none"> <li>• Mastering IT*</li> <li>• Accenture Technology Labs*</li> <li>• Business Intelligence*</li> <li>• Enterprise Integration*</li> <li>• Enterprise Solutions</li> <li>• Microsoft Solutions*</li> <li>• Mobile Solutions*</li> <li>• Radio Frequency ID (RFID)*</li> </ul>	<ul style="list-style-type: none"> <li>• Business Process Outsourcing*</li> <li>• Application Outsourcing*</li> <li>• Technology Infrastructure Outsourcing*</li> </ul>

\* New service lines since 2000, as of September 1, 2004

Source: [www.accenture.com/services\\_home.html](http://www.accenture.com/services_home.html)

*Figure 56. The original Service Lines have expanded to meet market needs.*

The persistence of Service Lines, implemented in February of 2000, attests to the ability of the architecture to adapt to changing economic conditions, for example, the crash of the NASDAQ followed by the reverberations of the U.S. 9-11-01 and Madrid 3-11-04 terrorist attacks, which severely disrupted both Accenture's and its clients' business operations. The Service Line architecture has provided a template for launching more than eight new Service Lines – most of which represent a further specialization of the original Solutions Engineering Service Line. The Service Lines were part of Accenture's strategic transformation from a single business model, concentrating on providing consulting services, toward a multi-track model with consulting, outsourcing and other sources of revenue.

Accenture's use of an enterprise-architecting method to design and implement Service Lines coupled with the CEMEX Way provides the basis to compare their experience with that described in the enterprise architecting method in Chapter three. The final chapter of this study compares the case experiences of these two organizations to evaluate the architecting deliverable and its ability to meet the enterprise management requirements for performance, integration, consistency and flexibility.

# 6

## Findings and Reflections

### **6.0 This study sought to describe an enterprise architecting methodology using an inductive approach informed by case studies.**

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Enterprise management is becoming increasingly important in an environment of economic, regulatory, technological and business changes. These changes complicate approaches to enterprise management and strategy implementation (Hagel and Seely Brown 2005; Stalk and Shuman 1992). Past responses to change have involved optimization of current capabilities to drive performance and productivity improvements. However, over-optimization can create rigid systems that while effective in the short run, are not able to change readily in the face of new requirements (Abernathy 1978; Leonard-Barton 1995).

This study has structured an inductive approach to identify emerging enterprise design processes, tools and practices in response to this environment. The first three chapters of the study provide a conceptual and methodological structure for the study. Chapters four and five provided empirical case studies of enterprise-wide design. This final chapter seeks to place the study and its results into a broader context with the purpose of contributing to management thought and practice. This contribution involved exploring approaches to find the right balance between current performance and future flexibility, this study asked the following research question:

*How does an enterprise design increase performance without jeopardizing its flexibility?*

The research thesis that motivates this dissertation is the following:

*Enterprises that follow a design methodology based on capabilities will create an enterprise architecture that incorporates enterprise management goals of performance, integration, consistency and flexibility.*

Given the critical character of performance, integration, consistency and flexibility to enterprise success, developing a systematic approach for achieving these goals would be a contribution to management research. This research proposes an enterprise-architecting methodology as that systematic approach.

The research bases this methodology on an inductive analysis of case-study companies facing these enterprise challenges and an examination of the economic, regulatory and technology forces influencing enterprise management. These cases and forces provide the basis for assembling a requirements model for developing the proposed enterprise-architecting methodology.

The requirements model developed in Chapter two provides a basis for evaluating the applicability of the enterprise-architecting methodology to specific case-study experiences. This comparative case analysis identifies the strengths and areas for improvement in the proposed enterprise-architecting methodology.

This research intends to contribute to management thinking and policy management by demonstrating that the management goals of performance, integration, consistency and flexibility do not have to compete or be mutually exclusive. An enterprise can manage these goals by applying a design approach based on architecting the enterprise from a capabilities point of view. Using this point of view, the research proposes an enterprise architecting method that provides a repeatable process for enterprise design and management. Through using this method, the research seeks to illustrate that an enterprise can increase current performance without jeopardizing future flexibility.



## **6.1 The research follows a structured approach to develop and evaluate a proposed enterprise-design methodology.**

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This study sought to develop and evaluate an enterprise-design methodology based on requirements grounded in actual case experiences and current economic and technical forces. These design requirements form the basis for developing what this study calls the enterprise-architecting methodology.

Once developed, the enterprise-architecting methodology was compared against the actual experience of two cases of enterprise-wide design. The comparison provided the information needed to evaluate actual experience against the predictive model (Yin 1994). The comparison looks to find similarities between the actual case experience and the requirements supported by the architecting model to determine the fit between the model and case experience.

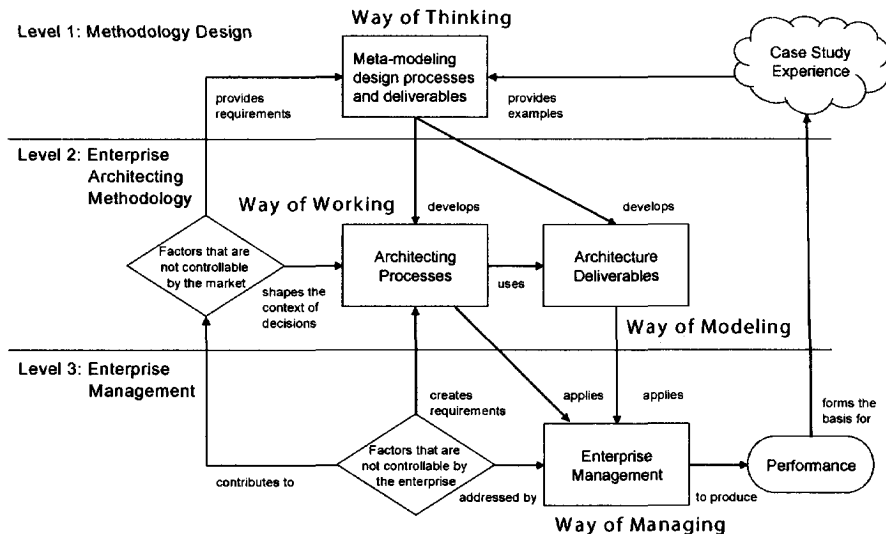
The comparison of the enterprise-architecting methodology with case study experience provides the basis for evaluating the proposition and making improvements to the enterprise-design methodology. Reflection on the findings has identified items for further research that go beyond the immediate goal of this study in developing and evaluating a general methodology for enterprise design.

### **6.1.1 The research process followed an approached based on methods engineering to develop the proposed enterprise-architecting methodology.**

The architecting methodology development followed a methodology framework, as shown in Figure 57 below. The research integrates this methods engineering framework with the “ways” framework used for constructing processes for new problem areas (Sol, 1990). Together these frameworks describe the enterprise-architecting method and its support for the proposed enterprise-management requirements.

The methodology development process starts with understanding factors that are beyond the control of the market or the enterprise. These factors form requirements for meta-models that are the basis for a methodology. The meta-model captures the way of thinking about enterprise design in

terms of its concepts and relationships. The way of thinking expressed in these meta-models leads to the development of architecting deliverables that describe the way of modeling and a way of working in terms of the processes and team structures used to create architecting deliverables.



*Figure 57. Development of the enterprise-architecting methodology incorporates methods engineering and the “ways” framework to define new processes based on an understanding of exogenous factors and on case-study experience.*

### 6.1.2 The research developed a requirements model based on economic factors and case experience to evaluate the architecting methodology.

The enterprise architecting methodology deliverables and processes flow from an inductive analysis of case studies, research, and an analysis of the economic, regulatory and technical forces to define requirements for enterprise management. The information presented in Chapter two represents an analysis of these factors and their formation into a requirements model for methodology engineering and evaluation.

The enterprise-architecting methodology described in Chapter three supports the requirements for enterprise management and design

identified in the literature and example case studies. These requirements provide the conditions for evaluating the applicability of the architecting methodology and its fit with case study experience. These requirements include the following:

- Producing intended results with fewer inputs and less waste.
- Seeking competitive advantage through concentrating on unique enterprise resources.
- Translating performance requirements across the enterprise to manage and improve performance.
- Implementing enterprise change without long-term degradation in performance.
- Providing the basis for making strategic sourcing decisions without compromising core operations.
- Reducing operational friction and costs
- Using resources in the right proportion and for the right purpose.
- Removing contradictions that degrade performance
- Increasing adherence and use of standards and patterns for similar design decisions.

The requirements model developed in Chapter two reflects research and positive and negative example case studies related to enterprise design and implementation. For example, CDW has used its “circle of service” model to create and sustain a competitively differentiated position in the face of commodity pressures from Dell and Hewlett Packard., Likewise, Southwest Airlines has designed its enterprise to be among the most cost-effective in the industry through the integration of a single aircraft type, route structure and the selection of airports. On the contrary, McDonald’s Made for You restaurant system concentrated on implementing new technologies with limited recognition of workforce performance requirements and constraints.

The requirements model below is the result of an analysis of the environmental factors driving changes in enterprise management

and the example case studies. The requirements model captures the expected results that should be realized when applying an enterprise-design methodology. The requirements model connects environmental context with enterprise management and design approaches that result in observable elements of enterprise architecting.

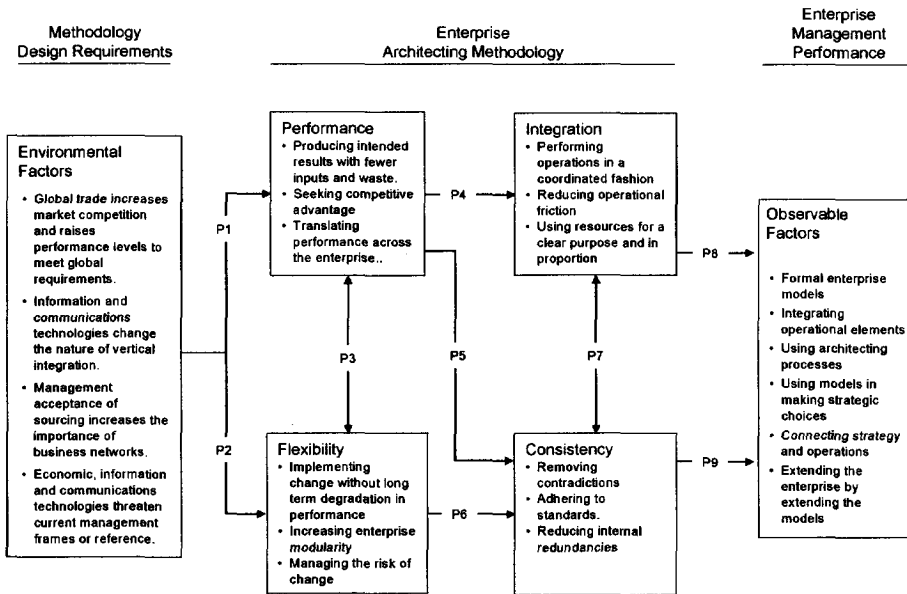


Figure 58. The methodology design requirements were developed from observation of environmental factors that were used to evaluate the predicted results.

Development of an observable-requirements model is part of meeting the research goal of describing a generally applicable model for enterprise architecting. By using such a model, the research seeks to shed light on a formal design process that makes issues of strategic implementation and enterprise design more explicit and repeatable. The enterprise management goals of performance, integration, consistency and flexibility can be observed from a combination of financial and behavioral performance. Specifically, one can observe the ability of an enterprise to meet these requirements through observing different factors within the enterprise:

- Performance requirements can be observed from the enterprise's core financial measures that demonstrate the enterprise's ability

to create intended results with fewer resources and less waste than its competitors. In addition, the use of performance criteria in design is expressed in the deployment of performance targets in the management and control systems.

- Integration requirements can be observed from the level of coordination across enterprise elements and trading partners. It can also be observed in terms of its relative operating margins that are indicative of internal operational friction created by poor fit between capabilities and elements.
- Consistency requirements are reflected in the use of standard solutions and operations in response to recurring management or operational challenges, and the absence of competing internal operations that would generate contradictions as similar problems are addressed in different ways increased implementation and operational costs.
- Flexibility requirements can be observed from an enterprise's ability to evolve its business model and operations. For example, CDW's use of its core business model in creating CDW-G, its government section, demonstrates the flexibility of its enterprise capabilities.

### **6.1.3 Comparative analysis provides a way to conduct a qualitative analysis of the applicability of the enterprise-architecting methodology.**

A comparative analysis provides a way to evaluate the fit between the proposed methodology and the experience of enterprises facing challenges addressed by this methodology. This study used the enterprise-architecting experiences at CEMEX and Accenture as a basis for comparing the deliverables and processes described in the enterprise-architecting method with case-study experience. By comparing the two, this study sought to evaluate the fit between actual experiences against the predictive model to evaluate the proscriptive architecting model (Yin 1994).

Similarities between the actual case experience, the methodology and the requirements support the method's applicability to address the enterprise-management requirements. Observed differences between the method's predicted and actual experience would either indicate

gaps in the methodology, characteristics, or unique case situations that would not be expected in a generic model. The enterprise-management propositions and requirements structure the process of comparing the enterprise architecting methodology with case-study experience in terms of selecting case studies that reflect enterprise-design challenges and provide the basis for evaluating the fit between the method and that experience. That process is described in figure 59.

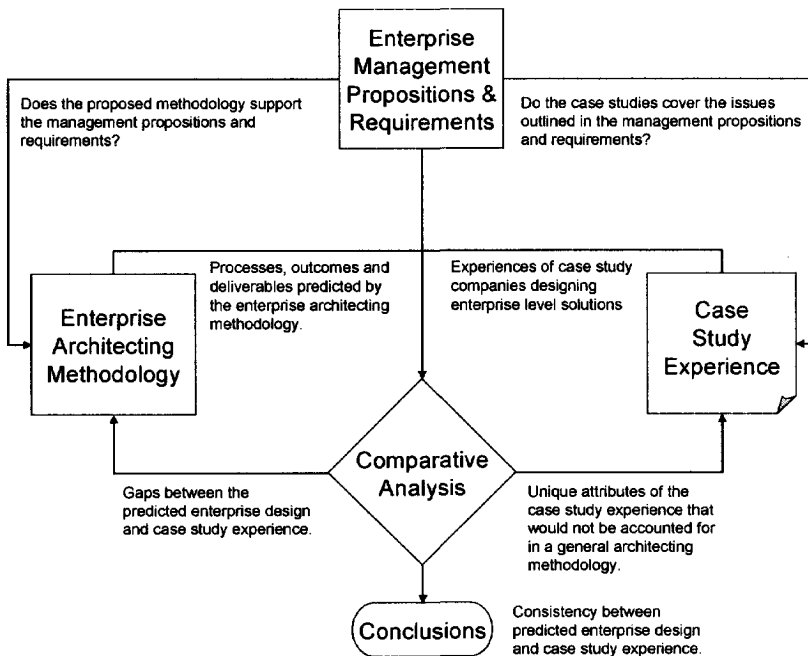


Figure 59. Enterprise management propositions and requirements form the basis for comparing the methodology with case-study experience.

## 6.2 The case studies provide experience for comparing the methodology and the research propositions.

CEMEX and Accenture each sought to implement large-scale change in response to strategic needs and followed a structured approach to design and implement those changes on an enterprise-wide basis. The experience of these cases provides the information needed to conduct a comparative analysis and evaluation of the enterprise-architecting methodology. This comparison summarizes the detailed analysis conducted in chapters four and five and provides an overall assessment of the applicability of the methodology.

The comparative evaluation and analysis in this section is organized around the propositions and requirements defined in the requirements model.

### 6.2.1 Architecting supports enterprise management goals for performance and flexibility.

In response to increased competition and technical innovation, enterprises have increased their focus on managing performance and flexibility. An architected enterprise should be able to achieve strategy results with less resources and waste. Accenture's Service Line implementation focused on speed as its performance measure. Accenture used its Service Line architecture to deploy this strategic initiative to its global operation of more than 90,000 employees in under 90 days. The observable experience of CEMEX supports its ability to achieve its strategy of being the most profitable global cement company through acquisitions that are leveraged by rapid productivity and process improvements. The CEMEX Way architects performance into company management with the result that it has outperformed its major global peers over the past five years, generating a substantially higher net profit margin. Figure 60 below shows the sales, profit and margin ratios for CEMEX and its two primary competitors. It should be noted that 2003 saw a recession in the construction industry.

Fiscal Years ending 12/31 (millions in local currencies)

		2000	2001	2002	2003	2004
CEMEX (USD)	Sales	5,621	6,923	6,543	7,164	8,149
	Net Profit	1,052	1,501	591	731	1,501
	Net Margin	19%	22%	9%	10%	18%
Holcim (SF)	Sales	13,531	13,644	13,010	12,600	13,215
	Net Profit	1,035	1,031	797	932	1,153
	Net Margin	8%	8%	6%	7%	9%
Lafarge (Euro)	Sales	12,216	13,698	14,610	13,658	14,436
	Net Profit	726	1,114	456	728	868
	Net Margin	6%	8%	3%	5%	6%

*Figure 60. CEMEX has experienced above-market performance compared to its two closest rivals since the implementation of its enterprise architecture -- the CEMEX Way.*

Flexibility, defined as the ability to change without suffering a long-term degradation in performance, is another requirement for enterprise design. CEMEX has demonstrated flexibility as it has reduced the time required to integrate an acquisition from 26 weeks to 6 weeks since the implementation of the CEMEX Way (Brews and Bugos 1998). CEMEX uses its enterprise architecture—the CEMEX Way—to reduce post-acquisition integration time by moving new companies to this single model. CEMEX is able to acquire new companies and maintain strong financial performance, as illustrated in the Figure 60 above.

***Proposition 1 – Increases in competitive pressures increase management focus on achieving and sustained performance.***

Increased competitive pressures created by globalization, deregulation and technology place greater management focus on enterprise performance. Architecting seeks to support this proposition by incorporated performance requirements into enterprise design and design decisions including the design of capability-specific performance measures in the capability blueprint. The use of a deliberate design across the enterprise should lead to greater integration and consistency across the enterprise.

The CEMEX Way arose from Chairman Zambrano's desire to implement a performance-oriented culture to compete effectively in global markets. The initiative created a single kind of performance reporting across the company (Brews and Bugos 1998). This focus enables it actively to manage performance on a consistent basis. In 2004, CEMEX pointed to an additional \$55 million dollars in savings in administrative expense by implementing "a single platform", the CEMEX Way (CEMEX July 16, 2004).

Other examples found in the cases point to the use of a model design as a means of focusing on growth and performance. CDW's strategy to grow faster than the market using a differentiated service built around a "circle of service" (Klien 2004). Southwest Airlines adoption of a single aircraft platform to maintain its operating model and performance also attests to the relationship between competition, performance and use of a business model (Kelly 2003).



***Proposition 2 – Increased competitive pressure increases the need for enterprise flexibility.***

Competition introduces new entrants, products and services that require an enterprise response. Flexibility becomes an important part of enterprise competitive advantage as failure to change often creates core rigidities that limit the enterprise's ability to compete (Leonard-Barton 1995). Architecting increases flexibility through creating an enterprise design that can be improved and extended in response to competitive and performance pressures (McDonald and Rowsell-Jones 2004).

The CEMEX Way is an active program that introduces change on an ongoing basis. The CEMEX Way is supported by organization structures (process owners and EGroups) that have a mandate to continue to identify and deploy best practices across the company. To that end, CEMEX in 2003 implemented more than one hundred and twenty individual improvement projects ranging in scale from one to two weeks to a few months (Garcia 2004). Updates to the CEMEX Way reflect the flexibility of this architected approach. Accenture used its Service Line architecture as the basis for further refinement in response to changing market conditions. Over the past two years, Service Lines have expanded from the original seven into sixteen specializations. This degree of change has been facilitated through using a consistent model for Service Lines to maintain responsiveness to changes in market needs.

Enterprise architecting provides a balance between strategy, performance and flexibility. It provides an enterprise point of reference for strategy implementation. A single point of reference and flexibility may seem incompatible. However, enterprise architecture enables organizations to perform the following change management tasks more effectively:

- Defining the scope of change in terms of the capabilities, elements and relationships that need to change to implement the strategy.
- Communicating the changes to the workforce and managers in concise terms of what will change and what will remain constant.
- Understanding the interactions and consequences of changing one aspect of the enterprise in terms of the impact of the change on related capabilities.

- Modeling the performance of the current capabilities and proposed future capabilities based on established capability performance criteria.

These tasks build a common context and understanding of the strategic initiative and its impact on operations. The advantage of such an approach is apparent when one considers what is often a more natural alternative to it, where each strategic initiatives is interpreted by individual business units and operations that may not arrive at the same conclusions, decisions or choice of strategic direction.

***Proposition 3 – Increased enterprise management attention to architecture reduces conflicts between performance and flexibility.***

Managing the tension between current performance and future flexibility is at the center of the challenges facing individual companies and industries (Abernathy 1978, Sanchez 1997). In response to this tension, management practice calls for separating these two issues and manage the enterprise according to one of three value disciplines that held the organization could only optimize one aspect of its strategy: customers, products or operational excellence (Treacy and Wiersema 1997). Following this line of reasoning, enterprises established separate divisions to isolate it from the rest of the business. For example, General Motors with its Saturn Division, Continental Airlines with Continental Lite, and the many companies that established eCommerce business units apart from the core enterprise. These instances point to an organizational rather than architected response to the need to balance performance and flexibility.

The architecting process requires strategists and designers to address the balance issue. As an example of balancing performance and flexibility, the CEMEX Way architected the potential conflict between global processes and local execution through balancing process-standardization propositions with the appropriate organizational structures. This blended model distributed capabilities in a manner to support their global performance with the flexibility required by local market execution.

Accenture's Service Lines created a base pattern and model design for the seven original Service Lines. In this regard, the architecture provided a framework for setting up organization, processes and technologies

for such diverse activities as formulating corporate strategy and implementing large-scale ERP systems. Its success reflected the ability of the initial Service Line architecture to be flexible enough to adapt to different contexts and applications while retaining the performance focus to deliver year-over-year profitability and cash generation growth.

Market, technology and competitive forces place a premium on performance and flexibility (Sanchez 1997). Enterprise management therefore must incorporate a focus on achieving current performance targets while providing future flexibility. While performance and flexibility are often thought of as competing requirements, CEMEX and Accenture have demonstrated ways to manage the enterprise to achieve both.

Architecting provides a focus on performance through supporting capabilities that deliver competitive advantage (Barney 1991). Architecting builds enterprise flexibility in providing a model that enables clear definition of the scope and organizational impact of change initiatives.

Enterprise architecture must include tools to manage enterprise performance and flexibility. CEMEX in particular, illustrates the power of connecting the enterprise design to the management model in terms of its ability to integrate acquisitions and implement improvements across the enterprise. Separating the enterprise design from the management model renders both less effective. A management model working without an enterprise design faces each decision in isolation, with limited visibility to proven solutions to recurring problems, and it is unable to identify “best” practice as each operation is slightly different. Likewise, when enterprise design is separated from the management model it becomes a planning exercise that will not be effectively reflected in management operations or actions.

#### **6.2.2 Architecting supports enterprise design goals for integration and consistency.**

Performance and flexibility represent enterprise management goals that are realized through the design of the enterprise. Integration, as defined earlier, is the degree to which individual parts of a system perform their

operations in a coordinated fashion with other systems. The integration of elements across enterprise capabilities improves performance by reducing friction and transaction costs (Coase 1937). Consistency criteria revolve around the adherence to a standard for similar operations that enable individual parts to fit together without contradicting one another. Consistency across capabilities enhances future flexibility, as changes can be readily deployed across the enterprise.

Architecting supports propositions for performance and flexibility through a structured design process that captures the enterprise's strategic and operational scope. The value network defines enterprise strategic scope in terms of its trading partners, interfaces and capabilities. These define the components that enable the enterprise to make capability-sourcing decisions. The capabilities diagram supports internal flexibility through defining the relationships and interfaces between capabilities. This enables the architecture to define the scope of change in specific operational terms and limit that scope to specific capabilities and interfaces rather than the entire operation.

***Proposition 4 – An increased focus on performance increases the need for integration.***

Architecting supports integration through describing the rules that increase the fit between elements within a capability and the linkages between capabilities found in the capability-diagram model. These rules and the model provide tools to identify and improve coordination within and across enterprise capabilities.

The CEMEX Way integrates potentially disparate operations into a single enterprise standard across its eight core processes. Process diagrams define these processes, bringing together elements of people, process and technology. CEMEX uses these integrated models as the target to implement when the company acquires another company, reducing post-merger integration time and improving the synergies generated from the acquisition.

Accenture's Service Line architecture provides an integrated model for developing the skills and market offerings within the company. Defining the internal structure of Service Lines established an operational model

that defined resource requirements and performance expectations. From an external perspective, the Service Line architecture describes the interaction, roles and responsibilities between Market Units, Service Lines and alliance partners. Providing an integrated model for how these parties interact reduces the cost of maintaining and operating an alliance program.

***Proposition 5 – An increased focus on performance increases the requirement for consistency across the enterprise.***

Consistency enhances performance through reducing redundant activities across the enterprise. Architecting defines an enterprise-wide design to identify potential duplication and opportunities for reusing capabilities or elements. Architecting defines standards that reduce contradictions within individual operations and between operations, thereby further enhancing consistency.

The CEMEX Way provides a consistent model for the core processes it executes across the enterprise. Having “one way” has reduced operational waste, as illustrated by its industry-leading EBITDA margin of 30 per cent. This is in contrast to its performance prior to implementing the CEMEX way or the performance of its competitors highlighted (see Figure 60 above). CEMEX has achieved this rate through establishing a defined set of processes, skills and metrics that reinforce each other and provide a basis for improving performance through sharing best practices.

The design of the Accenture Service Lines uses the integration concept to identify and design the full complement of elements required to operate a Service Line in the capability blueprint. Integration requires completeness and the Service Line designs created a standard and complete definition of the Service Line elements. This provided a basis for estimating resource requirements to transition to and operate individual Service Line organizations.

***Proposition 6 – Increased focus on flexibility raises the value of enterprise consistency.***

The combination of a single point of reference and flexibility may seem incompatible in the light of organizational and object-based systems-design theories that hold that that flexibility comes from a design with high cohesion within individual elements and loose coupling between elements (Booch 1994; Wieck 1979; Jacobson et al. 1992). Management theories follow this approach by advocating decentralization as an organizational model to get closer to the customer and respond faster to market needs. However, having an enterprise architecture appears to refute this proposition by enabling enterprises to change effectively and rapidly. For example in 2004, CEMEX implemented over 200 changes across its enterprise, raising financial and operating performance (Garcia 2004). An enterprise architecture enables organizations to perform the following change management tasks more effectively:

- Defining the scope of change in terms of the capabilities, elements and relationships that need to change to implement the strategy.
- Communicating the changes to the workforce and managers in concise terms of what will change and what will remain constant.
- Understanding the interactions and consequences of changing one aspect of the enterprise in terms of the impact of the change on related capabilities.
- Modeling the performance of the current and proposed future capabilities based on established capability performance criteria.

These tasks build a consistent view, context and understanding of the strategic initiative and its impact on operations. Without such a view, strategic initiatives are open to potentially conflicting and localized, rather than enterprise-centered, interpretation by business units. While such decentralization of organization and operations is a common approach in strategy formulation, it can fall short of providing consistent customer-service levels and predictable financial performance.

The architecting process defines value network players, capabilities and elements consistently across the enterprise. Implementing change without degrading performance requires a clear definition of the scope of change and the repercussions of that change to enterprise operations (Pettigrew 1985). Architecting supports both of these goals. The architecture design creates an inventory of the enterprise's trading relationships, capabilities and elements from which to assess the scope of change. Architecting also models the interaction of value network players and the capabilities to understand the impact on operations.

CEMEX has used a consistent definition of its core processes – the CEMEX Way – as a basis for managing incremental and transformational change. Continual updates to the CEMEX Way implementation has generated more than \$150 million dollars in operational savings through the improvement of current or elimination of duplicate activities (CEMEX 2004). Consistency in operating a single enterprise model is central to the success of the CEMEX Way. A consistent model enables it to automate its management reporting process and to provide comparative performance metrics across the company. These consistent measures identify “best practices” that show up in the metrics when one plant's performance is well above average. The consistent enterprise model enables these best practices to be implemented readily across CEMEX in a matter of weeks or months, since they involve making the changes consistently across the system.

The Accenture architecture provided a standard for the operations and activities required to operate a Service Line. This model served as the basis for budget and resource estimates to implement and operate services. This enabled Service Lines to marshal the operational resources required to move from BI competencies within six months of deployment. This was made practical by all of the Service Lines following a single design template – the Service Line architecture – in setting up their individual operations. Without a standard architecture to impose consistency, the individual Service Lines would become operational at different times with different levels of maturity. That situation would not have enabled Accenture to make a coordinated move to Service Lines, reducing its ability to respond to the new market conditions.

***Proposition 7 – An increase in enterprise design activities raises the importance of integration and consistency.***

Architecting supports the concept of enterprise design to address competitive, market and technological pressures. Bringing capabilities together into an integrated and consistent design is the primary goal of the architecting process. The architecting deliverables support achieving an integrated design through connecting the customer value proposition with enterprise capabilities and capability elements. Architecting supports consistency through the standard rules and models associated with defining the enterprise design. Both Southwest Airlines and CDW operate consistent models in the face of rapidly changing markets. Dell is another example, as it has expanded product lines while keeping its business model intact. Amazon, the large Internet retailer, uses a consistent fulfillment model and is becoming the preferred online order fulfillment organization for retailers like Toys R Us and Marks and Spencer. All of these firms use architected integration as a source of competitive advantage.

Integration provided CEMEX with a path to a consistent approach across the organization, reducing the diversity of local operations in favor of a standard global approach. This replaced a series of local operations and rules that enabled CEMEX to implement a global performance management framework and culture – the CEMEX Way. Other examples of this level of consistency exist at organizations that have a comparable ‘way.’ Other organizations with a consistent way of doing business across their geographic and operational units to one extent or another include Dell, FedEx, Wal-Mart, Southwest Airlines and General Electric.

The Accenture Service Line architecture provided the basis for resolving integration and collaboration issues in terms of the scope of Service Lines and responsibilities between Market Units, engagement teams and Service Lines. The architecture defined clear responsibilities for key activities including professional development, staffing and market development. This clarified Accenture’s internal operations and external face to alliance partners and the market. The Service Line architecture provided a design to resolve the scope of responsibility issues consistently across the enterprise.



The CEMEX Way represents an application of enterprise architecture that is integrated within each of its capabilities and applied consistently across the countries in which CEMEX operates. It defines a single approach to its core processes. The performance benefits that flow from this enterprise design are reflected in an EBITDA margin that outpaces its competitors. CEMEX demonstrates its flexibility through implementing best practices and acquisitions using its common enterprise architecture.

Architecting promotes integrating enterprise operations through defining the capabilities and elements required to deliver its customer value proposition. Architecting supports applying these designs consistently across the enterprise to identify and eliminate redundancies.

### **6.2.3 Architecting creates observable artifacts.**

Architecting creates an enterprise design based on a combination of models, performance requirements and new ways of thinking about enterprise management. Architecting deliverables, such as the value network and capabilities diagram, provide visible examples of an enterprise design.

A diagram is not the only observable effect of architecting. Architecting often includes a change in the way of thinking among executives as they recognize and make decisions based on the architected model. An example of this way of thinking is Southwest Airlines recognition of the potential adverse impact on its business model of incorporating regional jets into its fleet. This is observed not in a design document, but in the responses that Southwest executives give when industry analysts question the company on incorporating this aircraft fleet into its operations. In these cases, the response is remarkably consistent in describing the Southwest model as being based on a single aircraft type and stating that the company's leaders see no reason to change the model at the current time (Kelly, 2004). This is an example of observing the presence of an enterprise architecture without having to see the physical diagrams. Observing either architecting models or architecting ways of thinking demonstrates the application of enterprise architecture.

***Proposition 8 – Increased enterprise design uses models to achieve integration.***

Models capture enterprise design and dynamics. Architecting organizes and represents the enterprise in a defined set of models: the value network, capabilities diagram and capability blueprint. These models reflect an emerging trend in architecting and provide a proscriptive approach for future application. However, application of an enterprise design based on an architecting way of thinking will result in models that capture the dynamics and structure of the enterprise.

The CEMEX Way represents a model of the company's focus on centralization, standardization and performance. The central model in the CEMEX architecture covers the eight core processes that make up its the operations. CEMEX uses its architecture as a management tool, citing it as the reason it can achieve consistent growth, integrate acquisitions quickly and continue to lead in its industry (Brews and Bugos 1998).

Accenture's Service Lines represent a model for building and deploying market solutions consistently across the enterprise. The model became the focus for deploying Service Lines in the field and for managing the expectations and interactions among Service Lines, Market Units and client teams. It set the operational scope of Service Lines, provided a pattern for implementation and established the resources required to operate a Service Line.

***Proposition 9 – Increasing consistency comes from applying a design process.***

Architecting should increase the consistency of design decisions and solutions across the enterprise. This comes from applying a stable set of rules, principles and activities to the design problem. The result is an observable consistency in enterprise decisions and actions that can become part of the company's culture. CDW's circle of service is an example of a consistent design that has become ingrained in the enterprise and its culture.

The CEMEX Way is the company's defined enterprise design process for incremental and transformational change. The process recognizes and

incorporates operational and geographic issues in its rules and processes. Consistently applied, the CEMEX Way creates a unified approach to its eight core processes that facilitates the identification and sharing of best practices across the company.

Accenture's Service Lines followed a consistent design process, beginning with creating a Service Line model, then applying that model to the individual Service Lines. The result was a consistent definition of Service Line capabilities, responsibilities and interactions. This consistency was a desired outcome of the enterprise design. Client engagements could involve multiple Service Lines, and inconsistency between Service Lines would raise engagement costs and reduce quality.

#### **6.2.4 The cases illustrate how the enterprise architecting method supports the research propositions.**

The CEMEX and Accenture case studies provide a means of evaluating the enterprise architecting methods support for the research propositions. Based on these evaluation cases, the enterprise architecting methods described in Chapter three support the propositions to varying degrees (see Figure 61 below).

Proposition	Found	Comments
P1: Increases in competitive pressures increase management focus on achieving and sustained performance.	Yes	The cases study companies pursued enterprise level designs in response to competitive pressures to increase and sustain financial and market performance.
P2: Increased competitive pressure increases the need for enterprise flexibility.	Partially	Flexibility was not the initial driving force for the enterprise design. The cases initially sought a single enterprise-wide design to consolidate operations and gain efficiency. Once achieved the companies gained flexibility using a consolidated model.
P3: Increased enterprise management reduces conflicts between performance and flexibility.	Yes	The case study companies faced the need to change effectively while maintaining or improving their performance. They did so by managing change formally and reducing conflicts across geographic (CEMEX) or organizational (Accenture) lines.
P4: An increased focus on performance increases the need for integration.	Yes	The case study companies targeted changes on integrating operations across geographic and functional lines. This focused resulted in removing redundancies to improve performance.
P5: An increased focus on performance increases the requirement for consistency across the enterprise.	Yes	The case study companies manage consistency in response to the need to drive greater performance. CEMEX is the clearer example, as it directly attributes performance improvements to the CEMEX Way.

Proposition	Found	Comments
P6: Increased focus on flexibility raises the value of enterprise consistency.	Partially	The case study companies place a value on consistency across the enterprise, however consistency only one of the items on the management agenda.
P7: An increase in enterprise design activities raises the importance of integration and consistency	Partially	The investment in an enterprise design is supported by increased focus on integration and consistency, particularly at CEMEX.
P8: Increased enterprise design uses models to achieve integration.	Partially	The case created conceptual designs of the enterprise consistent with the architecting deliverables. A model for model match was not expected, given the needs of individual businesses and industries.
P9: Increasing consistency in enterprise design comes from applying a design process.	Yes	The case study companies produced enterprise level architectures and solutions. The applied the architecture across geographies and lines of business within the enterprise.

*Figure 61. Case-study company experience demonstrates a fit between architecting methods and the research study propositions.*

### **6.2.5 A general model of enterprise architecting uses a few simple rules to create enterprise specific designs.**

Based on the cases, a general model of enterprise architecting based on capabilities, a value network, and capability blueprints appears able to organize and explain enterprise design decisions. CEMEX and Accenture exhibit characteristics predicted by the enterprise architecting method described in Chapter three and fit into and support the propositions described in Chapter two.

Based on these findings, architecting deliverables, tools and techniques provide a method for answering the research question that motivates

this study: How does an enterprise design increase performance without jeopardizing its flexibility?

The application of the same model in two different industries, cement and professional services, indicates that the general model described in Chapter three is industry independent and can be used to understand and make design decisions in different industries. So it appears that while architecting requires design models to organize and structure the enterprise components, these models do not lead to the same solution. Architecting, therefore, provides a standard model that companies can apply uniquely and therefore is strategically-based on their sources of competitive advantage.

The ability of a general model to produce enterprise/industry specific solutions gives architecting strategic relevance. Such relevance increases the applicability of architecting. As the forces creating the need for an enterprise-wide capability design evolve, the tools and techniques to manage the enterprise will change. An evolution of enterprise design using enterprise-architecting deliverables described in this research would rest on the following principles:

- An enterprise can be defined and operated as a system of capabilities
- An enterprise does not have to own all required capabilities to be competitive or have competitive advantage.
- An enterprise will reduce the time required to change capabilities and achieve business scale using architecture and a value network.
- An enterprise that knows its capabilities, the elements within the capabilities and their relationships is better prepared to manage its performance and remain flexible than one that does not.

These principles reflect application of the enterprise architecting way of thinking described in Chapter three. However, there can be alternative explanations for the behaviors and rules observed and associated with enterprise architecting methods. The next section reflects on potential alternative explanations, the implications for architecting and opportunities for future research.

### **6.3 Evaluating alternative explanations completes the view on the cases and enterprise-architecting method.**

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This research investigated the applicability of an enterprise architecture approach to achieving the enterprise performance and flexibility through greater integration and consistency. While the case studies support the research propositions to varying degrees, there may be alternative explanations for the observed fit between the architecting deliverables and the cases.

Architecting involves designing at the enterprise-level to translate strategic intent into operational actions and change, combining integration and flexibility as the primary goal rather than favoring one at the expense of the other. However, some of the success we have attributed to enterprise-architecting could be due instead to some other factor:

- Strong management ability involves effective strategies, implementation and management.
- A single line of business supports tighter enterprise management, naturally leading to a more integrated, consistent and flexibility enterprise.
- The recent economic downturn of the early 2000s required consolidation to improve efficiencies that could be interpreted as using an architected approach.
- Information technologies, such as enterprise resource planning, support enterprise-wide standardization and therefore deliver the same results as following an architected approach.

The remainder of this section discusses each of these alternate explanations for how an enterprise achieves the goals of performance, integration, consistency and flexibility.

#### **6.3.1 Management ability involves effective strategies, implementation and management.**

Management ability could be a factor in the companies we examined success at connecting strategic intent with operational change. A number of the companies used as case studies are widely and publicly recognized as well as well-managed and led, including CEMEX,

Accenture, McDonald's, CDW and Southwest. Each of these enterprises has management strength and depth that could explain their ability to implement strategy and remain flexible.

However, superior managers are not always able to manage the enterprise or its strategy effectively. Consider AT&T's acquisition and integration of TCI and its net effect on the company. In this case, C. Michael Armstrong, who had a long and distinguished track record as a strong manager and leader, was unable to ensure the effective implementation of the changes needed to realize AT&T's new strategy. McDonald's MFY strategy illustrate that a strong team can, on occasion, fail to resolve major challenges in implementing change. Beyond the case studies evaluated in this research, the history of other top managers such as Fiorina at Hewlett Packard, Galvin at Motorola, Nassar at Ford and Akers at IBM indicate a need to manage integration and flexibility in addition to corporate strategy. It is striking that in the case of both Hewlett Packard and Motorola; the visionary executives were replaced with relatively little known executives with a history of strong operational performance and hence are more likely receptive to opportunities for enterprise architecting.

The relationship between management ability and architecture is expected to be positive. Effective management teams that are able to achieve their strategy and manage the enterprise often do so through having a model and design for how the enterprise works. CDW, Southwest and CEMEX each have formal models used in managing their organization. The potential for management ability to be an alternative explanation cannot be completely ruled out, after all people make designs and implement change. However, a conclusion of the case studies is that the combination of management ability and architecture produces stronger results than that of direct or comparable competitors, e.g., CEMEX (versus Lafarge and Holcim). Another example is Southwest Airlines versus both major carriers such as US Air, United Airlines and American Airlines and other low-cost carriers such as America West, Independence Air, Jet Blue and Air Tran.



### **6.3.2 A single line of business supports tighter enterprise management.**

Enterprise management involves managing complexity. The number of lines of business is one indicator of enterprise complexity, assuming that managing a single business line enterprise is less complex, and that an enterprise therefore would be more able to achieve its goals across a single line.

The logic connecting the number of lines of business to complexity is sound, as fewer lines of business increase the focus of management attention. CDW has two lines of business (CDW and CDW-G), Accenture has five lines of business, and the U.S. FEA manages thirty-nine identified lines of business. While CEMEX has a single core business, cement manufacturing, it has used its enterprise architecture to expand its lines of business into cement trading, construction company logistics, eCommerce, and financing.

While the architecting case studies included enterprises with multiple lines of business, the focus of the architecting deliverables rested at the value network level. The value network defined the capabilities required to support its customer value proposition. The enterprise architecting method envisions that an enterprise may have multiple value networks without consideration of the number of lines of business. The relationship between single business lines and value networks is worth exploring, as each is the focus of management attention. A tentative hypothesis here is that the organizing focus, discipline and standardization facilitated by enterprise architecting enables a company to add and extend value networks without adding complexity to its operations.

### **6.3.3 The 2000– 2003 economic downturn required consolidation.**

Economic recession and declining demand provoke many of the responses and actions predicted by an enterprise architecting method. Enterprises seek to reduce costs and boost returns through increasing integration, eliminating redundancies, streamlining processes, and out-sourcing operations. All of these actions reflect proven management approaches for handling weak demand or increased competition.

While an enterprise may centralize and consolidate in the face of difficult situations, a distinguishing characteristic of the companies in the case studies was their ability to use their model to grow in challenging economic conditions. During that time, the airline and high-technology industries were suffering severe downturns that would normally call for defensive strategies such as cost-cutting. However, both Southwest and CDW expanded sales and profits at this time, indicating that something other than economic conditions explains their success, for example, architecting. CEMEX, while experiencing negative growth in 2002 due to economic conditions, it recovered quickly and continued its growth.

#### **6.3.4 Information technologies support enterprise-wide standardization and integration.**

Information technology has moved from supporting individual business functions to supporting enterprise-wide processes. IT applications such as enterprise resource planning (ERP), supply chain management (SCM) and customer relationship management (CRM) give enterprises the ability to support a global operation with a single piece of technology resource (Davenport 2000, Severance and Passino 2002). CEMEX, for example, used this integrative power to implement and sustain the CEMEX Way. CEMEX operates from a single instance of J.D. Edwards' integrated ERP software (Chung and Marchand 2005).

Information technology and architecting are increasingly interrelated in that integrating IT enables integrating the business and its value network partners (Hagel and Seeley Brown 2005). However, having enterprise-wide systems in place does not construe by itself an enterprise architecting method. The evaluation of these case studies did not concentrate on evaluating the relationship between technology and architecting. However, evolution of a single enterprise-wide application is more indicative of enterprise-level design decision. Broadbent and Weill's study of IT infrastructure and business performance indicate the existence of a connection between the two. Furthermore, their work suggests a number of IT infrastructure decisions, such as the level of common infrastructure and the direct support of strategy and technology, that would influence enterprise architecting decisions (Broadbent and Weill 1998). The connection between IT infrastructure and enterprise architecting is an area for further investigation.

### **6.3.5 Reviewing the possible alternative explanations further refines architecting concepts.**

Enterprises can achieve the goals of performance, integration, consistency and flexibility through some of the means outlined above. However, it is the ability of the enterprise to achieve, sustain and then improve on those goals that distinguishes an enterprise-architecting method. Enterprises such as CDW, Southwest, CEMEX and Accenture have achieved strong records of performance through managing their enterprise, its elements and the relationship between these elements.

An architecture-based approach provides a means to link strategic, operational and daily management decisions in terms of specific capabilities and business elements. Application of the strategy and its operational implications distinguishes architecting deliverables and models from their business model counterparts.

### **6.4 The research implications of architecting involve different views of enterprise strategy and design.**

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Abernathy (1978), Pettigrew (1985), Gerstner (2004), and others point out the complexity of managing enterprise change to achieve these competing objectives. The research framework for this dissertation is based on the need for enterprises to achieve current performance without creating core rigidities that would compromise future flexibility.

This has led to development of a method for enterprise architecting based on an empirical line of investigation. That investigation has sought to connect traditional thinking about strategy and organization with architecting principles as a means to address new requirements for performance, flexibility, integration and consistency. The research seeks to connect the following points in developing a method for enterprise architecting:

- Research into strategy formulation and organizational design flow from a common theme—that enterprise design explores the interaction between the external environment and internal structure. There are many schools of thinking regarding this relationship. Strategists including Chandler and Porter

see strategy as the driving force in determining organization structure. Organizational design theorists including Mintzberg (1993), Galbraith (2002) and Quinn (1999) concentrate on the design of the organization and its distribution of responsibilities. A capabilities view, espoused by Barney (1991), Hamel and Prahalad (1994), and Stalk (1992), focuses on organizing the company's activities to realize the strategy.

- Improvements in technology, communications and logistics coupled with increasing market openness have created an environment of dynamic competition that threatens to disrupt orthodox theories of strategy and organization design (Christensen 1997; Fine 1998; Nadler and Tushman 1997). Brown and Eisenhardt point to the declining effectiveness of traditional theories (Brown and Eisenhardt 1997).
- The result is research into organizations gaining greater fluidity in helping the company tune their strategy and organizations to enable them to better “sense and respond” in a dynamic environment (Hamel 2000; Hagel and Seely Brown 2005; McGee 2004; Teece, Pisano, and Shuen 1997).
- The term “architecture” and the application of architecting principles have not been an integral part of responding to these challenges. It is not part of mainstream strategy or organizational thinking, yet it is a commonplace term, particularly in the management of information technology as a means to manage complexity and improve systems flexibility (Gharajedaghi 1999; Zachman 1999; Spewak and Hill 1992).
- The contribution of this research to management thinking is the incorporation of architecting principles, methods, tools and techniques in a more formal sense in the design of the enterprise and implementing its strategy. The research has formalized these principles into a method for enterprise architecting for capability building that reflects a fusion of strategic, organizational and capability-based thinking.
- Formalizing architecting concepts, methods and techniques into a formal enterprise design methodology helps demonstrate the following points. First, an enterprise architecting method illustrates the merit of architecting principles in addressing

enterprise strategy and organizational issues. Second, the development of a structured method moves these issues closer toward a scientific management discipline, rather than relying on the art of individual management leaders. Finally, this research provides a body of case-study experience for demonstrating and evaluating architecting as a practical management tool.

- The prior proposition and post-analysis conclusion is that architecting provides a path to resolving potentially conflicting management goals of performance and flexibility. This significant finding merits additional review and extension.

#### **6.4.1 Architecting couples an internal resource-based view of the enterprise with traditional external views of strategy formulation.**

Architecting involves managing strategic positioning and resource-allocation decisions that involve a resource-based view of the firm. Defining an enterprise-architecting methodology involved bringing together concepts of strategy formulation and its distinctions between an external view of strategy as market position (Porter 1984) and an internal view of strategy based on enterprise resources and capabilities (Barney 1999). Both are required to support an effective design.

Architecting uses an external view to take advantage of its relative market/industry position and the capabilities available across potential trading partners. CDW is an example, as it has positioned itself as a value-added intermediary between technology vendors and commercial middle-market customers. Companies like Toys R Us and Marks and Spencer have looked to Amazon.com to provide online fulfillment capability that they could not build on their own. The value network reflects these strategic choices. The architecture uses an internal view to determine the capabilities it will build, buy or lease to deliver the customer-value proposition. The capabilities diagram and capability blueprints capture strategic resource-based decisions. Combining these two aspects reflects an emerging view of strategy in a post-Internet environment that involves making choices regarding the enterprise's activities (Porter 1997).

#### **6.4.2 Enterprise architecting is a dynamic capability.**

Architecting supports the characteristics of a dynamic capability. A dynamic capability is defined as the processes involved in managing the configuration of resources to achieve strategic intent (Teece, Pisano, and Shuen 1997; Galunic and Eisenhardt 2001; Eisenhardt 2002). The concept of dynamic capability is at the core of architecting. Enterprise architecting is one of these capabilities that enable the enterprise to evolve and change successfully in an environment of changing markets. In this regard, the definition of the enterprise-architecting method, its team structure, its processes and its rules provide a detailed example of a dynamic capability.

#### **6.4.3 Architecting concepts are applicable to designing a modern enterprise.**

The principles and concepts of architecting physical spaces are applicable to enterprise design. Architecture, particularly the design of physical spaces, rests on a set of principles (Vitruvius 1960). Principles of order, arrangement, symmetry, propriety and economy used in the design of structures translate into the enterprise goals evaluated in this dissertation. The ability to transfer these principles into operational models, techniques and rules for architecting an enterprise reflects an extension of the work done by Zachman and others in the area of enterprise-technical architecture. The enterprise-architecting method described in this dissertation extends the reach and depth of these concepts in terms of sourcing and capability decisions and addressing a broader palette of technology, process, organization and human capital elements.

#### **6.4.4 A view on architecting expands current management thinking.**

The enterprise architecture approach outlined in this dissertation reflects tools, techniques and approaches for operationalizing the enterprise goals and requirements. Meeting these as an objective involved bringing together research on strategy, architecture, implementation and dynamic change. The result is the application of principles from architecting physical structures to architecting enterprises. In this way, this dissertation represents a contribution to the development and exposition of enterprise management and design. Applying the criteria described by Whetten (1989) for making a theoretical contribution, this investigation sought the following:

- Researching an issue of importance. The research question has value in that enterprises will be increasingly required to achieve their current strategy and raise their short-term performance without jeopardizing their flexibility and longer-term innovation and expansion.
- Altering views in important ways. The enterprise-architecting method provides techniques for achieving enterprise goals that have largely been considered mutually exclusive (Abernathy 1978; Leonard-Barton 1995; Treacy and Wiersema 1997).
- Extending current thinking. Introducing architecture principles into the design of enterprise capabilities and business elements expands current notions of architecture outside of the IT discipline.
- Linking to existing relevant research. Architecting principles and techniques reflect research into the sources of competitive advantage gained from enterprise resources (Barney 1999) and the active management of the enterprise through dynamic capabilities (Teece, Pisano, and Shuen 1997; Galunic and Eisenhardt 2001).
- Describing how the change affects the accepted relationships among components. The enterprise-architecting method defined in this dissertation offers new insight on how to view the firm in terms of its capabilities and rules on the proper relationships across business elements.
- Changing the practice of organizations. The techniques, tools and rules associated with enterprise business architecture represent a set of practices that use the concepts of value networks, capabilities and business elements to bridge the gap between strategy formulation and operational implementation.

This dissertation reached these conclusions through a case-based approach to defining architecting propositions that were applied to evaluating case studies to investigate the fit with those propositions. This exploratory case-study approach represents an inductive approach for developing a theory of how to architect the enterprise to achieve its goals. The use of a case-study approach facilitates the identification and description of

tools, techniques, processes and rules for architecting that set the stage for additional inquiry into the efficacy and factors driving its successful implementation.



## **6.5 The enterprise-architecting method opens additional areas for research and study.**

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Enterprises face increasing competition and change as changes in market structures; regulation and technology pose new challenges. An approach for pursuing the enterprise goals discussed in this dissertation involves applying an enterprise-architecting methodology to management and design activities. This dissertation describes the principles, techniques, tools and rules involved in operationalizing enterprise design. The investigation identified additional opportunities for future research to refine the model and demonstrate its efficacy.

### **6.5.1 The use of architecting deliverables in enterprise simulation would enable evaluation of enterprise designs and performance.**

Performance, a primary enterprise goal, flows from the integration and consistency of elements and their relationships. The enterprise-architecture models outlined in the dissertation provide graphical models of static relationships in terms of the relationships between trading partners, capabilities and business elements. These models could provide a basis for dynamic simulation models to evaluate enterprise design options and evaluate their ability to meet performance requirements. These models, outlined in Chapter three, provide a starting point for building enterprise-level simulations reflecting strategic decisions and their operational impact.

Understanding the ability of enterprise simulation models to improve enterprise-design processes would be the primary focus of this additional research. This is made possible through development of a general method for enterprise architecting based on observable factors that can support organizations in their 'rehearsing the future.' This investigation would involve evaluating the fit of these models and additional information to support simulation, the availability of required information during the architecting process and the impact of simulations on enterprise-design effectiveness. An investigation in this area might further refine the architecting processes and reduce risk through increasing the visibility of design decision consequences.

### **6.5.2 The use of architecting as a design model for describing dynamic capabilities.**

Dynamic capabilities are a particular type of capability that manage the configuration of resources to achieve strategic intent. The research literature on dynamic capabilities focuses on their role in a resource-based view of the firm (Barney 1991; Teece, Pisano, and Shuen 1997; Galunic and Eisenhardt 2001; Eisenhardt 2002). However, defining the structure, processes and tools within these dynamic capabilities represents an area for further research. Leveraging the architecting model description in Chapter two and Appendix 1 offers a potential model for defining dynamic capabilities in detail.

### **6.5.3 The relationship between architecting and financial performance would quantify the market and business value of this approach.**

Enterprises achieving the enterprise goals of performance, integration, consistency and flexibility should have differentiated financial results. An enterprise that integrates across its operation should have higher operating profitability as integration removes operational friction and its associated costs. An architected enterprise would have a greater level of consistency across its operations, requiring less working and investment capital by removing redundant operations and investments. This would give architected enterprises higher returns on invested capital (ROIC) and generate greater economic-value-added (EVA) (Stewart 1991). While Broadbent and Weill have identified connections between technical architecture and infrastructure, this connection can be broadened to include other factors. In addition, an architected enterprise would be expected to sustain and even extend financial performance advantages through actively managing its architecture.

The relationship between the level of architecting and financial returns represents a promising area for future research, as it builds the economic justification for a formal enterprise-design architecture. This dissertation concentrates on the tools, techniques, and rules involved in architecting an enterprise. These tools provide a basis for defining the characteristics of different levels of enterprise architecture.

#### **6.5.4 The relationship between architecting and executive leadership would explore the connection between effective design and implementation.**

Enterprise business architecture is a design methodology and discipline based on both strategic needs and operational realities. Architecture has relevance to executives and enterprise operations when it can be applied simultaneously to both strategic and operational decisions. This requires executive leadership to balance apparent immediate gains from ad hoc or autonomous initiatives against decisions for long-term performance.

Southwest Airlines management's skepticism over introducing alternative aircraft into their business model is a prime example. Other aircraft can provide lower operating costs than the Boeing 737 family that Southwest relies on. However, considering the impact of managing two different aircraft families reverses this local decision in favor of enterprise-wide performance.

An enterprise with a widely understood architecture design would be in a better position to handle changes in the senior leadership team. In fact, CDW, Dell and Wal-mart each have continued to prosper after their founders left. Is this because these companies have architecting characteristics? Understanding the connection between architecting and executive leadership and management success would help explore the role of leadership in enterprise management, the contribution of enterprise architecture in articulating and implementing leadership decisions, and the role of a shared model in building leadership consensus and effective succession and the management of organizational continuity versus disruption in changes in executive leadership.

#### **6.5.5 The opportunities for additional research build upon the definition of enterprise business architecture in this dissertation.**

The relationships between enterprise business architecture, leadership, financial performance and simulation represent interested areas of inquiry about the role, contribution and ability of an enterprise-architecting method to address enterprise goals. A definition of the enterprise-architecting method in terms of its techniques, tools and principles, clarifies the meaning and intent of architecture, improving the power

and value of such further investigations. Building on those lines of inquiry would further strengthen and clarify the propositions and results produced by an enterprise-architecting methodology.

## **6.6 Evaluating the research findings identifies a model for classifying an enterprise's degree of architecting.**

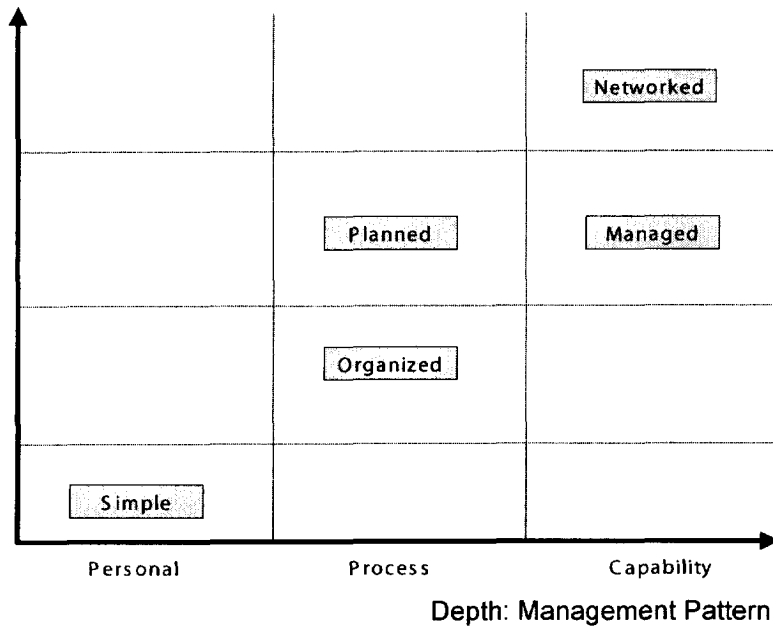
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The diversity of exemplar and evaluation case studies indicates a degree of variance in applying an architecture-based approach. This dissertation has suggested that there are different classifications of architecture based on the scope of the enterprise and its management focus. Given the common use and misuse of the term architecture, constructing a classification model would contribute to clarifying the study of this and other enterprise-wide approaches.

### **6.6.1 Proposing an assessment for architected enterprises.**

An enterprise has either an explicit or an implicit design. An implicit design is commonplace in well-managed firms. The company's architecture simply emerges from becomes the way it does its work over time, rather than the result of a conscious a priori design. An architected enterprise, on the other hand, is the result of deliberate design decisions and guidance on enterprise structure through the careful selection of capabilities, elements and trading partners. An assessment framework for determining the degree of architecture maturity should consider these factors.

There are many classification schemes for assessing organizational maturity. The Software Engineering Institute Capability Maturity Model (SEI-CMM) is a framework based on observing specific processes and practices associated with software engineering best practice. Other frameworks look at the relative performance of cases across multiple dimensions to determine maturity. For example, the dimensions of Reach and Range are used to evaluate different applications of information technology (Keen 1991). By combining elements of process-based and two dimension-based assessments, this study has created a framework for understanding the relative degrees to which an enterprise is architected. That basic framework appears in the Figure 62 on the following page.



*Figure 62. Scope and depth provide a means to classify the degree of enterprise architecting.*

Based on an understanding of the enterprise-architecting method, two criteria form a basis for assessing the relative degree to which an enterprise is explicitly designed or architected. These two factors form the initial classification scheme for architected approaches. The first is an assessment of the depth to which the enterprise architecture is designed. The second is the reach of that architecture in terms of the scope of players incorporated into the design.

### **6.6.2 Architecture levels can be categorized by the depth of the focus.**

A management pattern defines the depth dimension of the assessment tool. A management pattern, for this purpose, is defined as the level at which managed decisions are made and implemented. This dimension is used to distinguish the frame or reference for enterprise design decisions. Executives can manage at these different levels including:

- A management pattern at a personal level occurs where the enterprise is organized around the vision of an individual or small team, often its founder. Management decisions are kept within the leader's team, with little codification or design. The company may have sophisticated technology, processes and other elements; however, their structure and organization is driven by personal decisions not an explicit design. For example, The Virgin Group is largely driven by the personal vision of its founder Richard Branson or Apple, which is driven, by the vision of Steve Jobs. On the other hand, there are companies that have the ability to manage at other levels despite having a strong founder. These include companies founded by Michael Dell, Herb Kelleher and Sam Walton have maintained their successes even after the founders ceded management control.
- A process paradigm manages a business by managing its activities and outcomes. A process-management paradigm places greater emphasis on qualitative and financial measures in decision making. Executives describe enterprise operations in terms of processes not personalities. Dell and General Electric are examples of enterprises using a process paradigm to manage their enterprises. Change initiatives within a process paradigm aim at improving process performance for customers and the enterprise. The factor determining a process level is its concentration on managing activities rather than building people.
- A capability-based management focus manages the enterprise as a portfolio of capabilities located either inside or outside the enterprise. A capability view enables management to segment, source and sell its capabilities in response to its strategy and business model. In this regard, the capability becomes another part of the product/service configuration that needs to be managed. Amazon uses a capability view when it offers to provide the back-office fulfillment capability for handling electronic orders to any other firm, including competitors such as Barnes and Noble.

### **6.6.3 Enterprise scope offers a way to classify the reach of architecture.**

The classification framework for levels of architecting relies on descriptions of the company's basic management units and operational focus. The classifications focus on the extent of architecting within the enterprise rather than their maturity or value. In this way, this classification framework is more akin to the use of Reach and Range to describe different IT corporate platforms (Keen 1991) rather than specific levels of IT maturity like the SEI-CMM model.

The "reach" characteristic refers to how far the architecture extends over enterprise activities. It describes the scope of the architecture design in these terms:

- Local scope concentrates on an individual operation, for example, an individual plant, store or geography. Architectures that reach to the local level exist in a particular location and do not cover operations across multiple locations.
- A functional scope of architecture covers individual functions, departments or business units. At this level, the architecture concentrates on the design and integration of individual functions, not the overall enterprise. Many business process re-engineering projects concentrated at a functional or process level. British Airways' implementation of "one BA" is an example of a functional architecture, as it concentrates only on customer ticketing (McDonald and Rowsell-Jones 2004).
- An enterprise scope concentrates on the enterprise as a whole across business functions, business units and locations. The enterprise scope extends to the activities within a common ownership structure. At the enterprise level, the architecture scope does not extend to customers, suppliers and other trading partners. The McDonald's Made for You initiative is an example of a design at the enterprise level.
- A value network scope extends the notion of architecture beyond the enterprise to involve customers, suppliers and other trading partners (Afuah 2003; Aruajo, Dubois and Gadde 2003; Keen and McDonald 2000). The scope of a value network architecture encompasses the activities required to deliver the customer value

proposition. The AARP, a nonprofit, nonpartisan membership with over 35 million members, operates a network of referral services through its AARP services subsidiary that represents a value network. Li and Fung, the Chinese apparel company, manages a network of suppliers and customers that enables it to offer a broader range of products and services than it could on its own (Hagel and Seely Brown 2005).

#### **6.6.4 Five types describe different applications of an enterprise-architecting method.**

The combination of management paradigm and scope creates a wide range of possible architecture types, and each type is possible. However, based on the exemplar cases and experience, five types of architected enterprises are prevalent. These architecting types represent different styles for applying the architecting principles. These types represent different applications of an enterprise-architecting method. They include the following:

- A Simple architectural model is common among individual enterprises operating in local markets. Simple organizations are often implicitly-designed based on the personal goals and knowledge of its leadership. The simple enterprise has few, if any, architectural artifacts and the design knowledge is dependent on the owner or the individuals in the leadership team. The Boy Scouts of America, which allows a high degree of autonomy to its chartered organizations, provides an example of a simple architecture model.
- An Organized representing an architectural model focuses on individual business functions or business units. Often based on optimizing business process, a typical example of this architecture is an accounts payable department within a company. Organized businesses are implicitly designed in terms of having defined processes, an organizational model, job descriptions and supporting information technology. These are all artifacts of a design process that often becomes formal through the application of business process re-engineering techniques. Berkshire-Hathaway, which allows its individual companies operational autonomy but retains an integrated financial management, is an example of an organized architecture.



- A Planned architectural model occurs when an enterprise extends the reach of its architecture from individual processes to enterprise processes. When this occurs, it re-organizes the operation, consolidating redundant processes, often through establishing a shared service model. Planned architectures are used in strategic and structural decisions. Once determined, the architecture becomes a planning artifact that describes the intended design, but has a limited role in ongoing management decisions. The U.S. FEA, for example, adopted an initiative to reach a planned architecture. McDonald's also uses a planned architecture, as evidenced by its recent turnaround through refocusing on its core business model and operations.
- A Managed architecture reflects the enterprise's strategy, as it actively reflects changes in strategy and operations. The enterprise using a managed architecture incorporates architecture into design and implementation decisions. The distinction between the planned and managed architecture is the degree of authority and influence of the architecture over strategic and operational decisions. The Bank of America and its use of a "model bank" design to consolidate its acquisitions is an example of a planned architecture (Duvall 2004).
- Networked architecture reflects the enterprise designing its position within an ecosystem of customers, suppliers and trading partners. The architecture defines the relationships between these players as well as the operational interfaces and responsibilities required to deliver a customer value proposition. Reliance on the operation of the network to deliver the customer value proposition is a defining characteristic of a networked architecture. Dell in its supplier relationships and eBay both are examples of networked architectures.

The architecture characteristics, summarized in the table on Figure 63, provide a tool for assessing the level or architecture maturity for a given company.

	Simple	Organized	Planned	Managed	Networked
Architecture	Structures follow workforce personalities and tradition.	Structure focuses on reporting relationships and spans of control with limited attention to operations	Structure designed into a static model that is communicated across the organization.	Structure defines a model/blueprint that is used to manage operations. Identify best practices and drive change through changes in the model.	Structure expanded in scope outside of the organization to engage customers, suppliers, others as a dynamic system.
Consistency	Local standards with contradictions allowed at each level to accommodate personalities, customers and markets needs.	Local standards within executive spans of control. Contradictions allowed in the name of local autonomy.	Standards at the BU or functional level, cross functional across geography, collaboration in the form of service level agreements	Standards across the organization, common capabilities for common activities. Contradictions are not allowed within the company.	Standards across trading partners in a value network, defining the rules for participation. Contradictions not allowed in these markets.
Integration	Integration based on local understanding of operations and "what works here" Little interest in linking to groups outside of location.	Integration defined through functional descriptions and responsibilities created to manage competencies. Investment in functional efficiency.	Integration defined by delineation of business process activities and responsibilities. Investments in process outcomes.	Integration defined by across people, process and technology that are managed together. Investment in integration and innovation.	Integration defined in terms of the operational fit between capabilities across organizations.
Flexibility	Higher for minor changes as the lack of structure and tools enables rapid reconfiguration. Lower for larger changes that clash with individual culture.	Higher for changes within specific spans of control. Lower at the organizational level as functions seen as independent. Relies on functions to manage change.	Higher for changes in strategic importance and prioritization of processes. Lower in terms of changes to supporting elements (e.g. skills) Relies on process change to change the rest.	Higher for strategic and operational changes that impact the model. Moderate for improvement of capabilities. Lower for non-strategic changes.	Higher for large significant change through a changing capabilities and interfaces. Relies on players to make changes within their organization
Change Management	Change led by local leaders and their force of personality to optimize local working conditions.	Change is defined according to annual goals (MBO) with achieving these goals left to the discretion of individual functions and Business Units.	Change is dictated through changes in business process or technology, requiring the other elements and operations to change in conformance to processes and systems	Change is made in context of operation and business model context that enables local action aligned with enterprise goals.	Change is made through adjustments in the distribution of responsibilities in the network -- new improved capability. Co-develop capabilities to improve the network is common.
Information Technology	IT systems provide routine task automation with standard data structures	IT systems automate potentially complex functions using individual data sets tuned to the particular function. Limited application of information generated across functions.	IT systems enforce business processes through embedded rules and integrated data structures. Information viewed in the context of end-to-end processes.	IT systems support capabilities through embedded business rules, attuned to workforce skills and facilitates. Data standardization through standard set of systems for all instances of the capability.	IT systems support straight through processing across multiple organizations through defined business/technical interfaces. Fully enable remote access to company IT systems.

Figure 63. The different types of architecture describe different approaches to the enterprise management and design goals.

These characteristics provide a method for classifying the example case studies found in Chapter two as well as provide a basis for evaluating the test cases presented in Chapter four. Figure 64 summarizes the companies discussed into the different categories. The majority of cases reviewed in this research fall into the planned or managed level. This is not surprising, since they were chosen in order to illustrate different architectural principles.

Simple	Organized	Planned	Managed	Networked
<ul style="list-style-type: none"> <li>• Boy Scouts of America</li> </ul>	<ul style="list-style-type: none"> <li>• AT&amp;T</li> <li>• British Airways</li> <li>• Berkshire Hathaway</li> <li>• Virgin Group</li> </ul>	<ul style="list-style-type: none"> <li>• Best Buy</li> <li>• Federal Enterprise Architecture</li> <li>• McDonald's</li> </ul>	<ul style="list-style-type: none"> <li>• Accenture</li> <li>• Bank of America</li> <li>• CDW</li> <li>• CEMEX</li> <li>• Southwest Airlines</li> </ul>	<ul style="list-style-type: none"> <li>• AARP</li> <li>• Amazon</li> <li>• eBay</li> <li>• Li &amp; Fung</li> </ul>

*Figure 64. Enterprises including the example and test case studies largely fall into the planned and managed categories.*

Architecting the enterprise, like architecting a building, involves a myriad of decisions, trade-offs and compromises. While there are many possible combinations of scope and reach, identifying a few styles helps organize different applications of the architecting principles.

## **6.7 Reflecting on the research process identifies lessons for defining emerging management practices and techniques.**

Conducting a research study to identify and capture emerging enterprise-design techniques presents many challenges in terms of the research process and interpretation of its results. The subject area of enterprise design is broad and diverse with different management theories and principles at play. This research seeks a narrow focus on the translation of enterprise strategy into operational decisions in the form of enterprise architecture. Separating these into a broadly applicable approach poses a challenge, since; differences across industries and among companies within industries make it difficult to create a broadly applicable approach. Identifying relevant and practical models, tools and techniques requires a compilation of practices and activities rather than a single definitive approach. In reflecting on the research process and its results, a number of observations emerge that can provide guidance for conducting this type of research in the future.

### **6.7.1 Developing general principles from enterprises seeking competitive advantage could negate the advantage of architecting.**

Competitive advantage is based on enterprises creating value through exploiting opportunities and creating differentiation that cannot be duplicated or substituted (Barney 1999). This presents a particular challenge for this study, as it seeks to define generally applicable principles, tools and techniques from the case studies and research literature. Identifying general principles would undermine, by its very nature, the potential competitive advantage from architecting.

In reflecting on this challenge, two points arise. First, there is a distinction between having knowledge and acting upon it. That distinction forms a basis for enterprise competitive advantage (Pfeffer and Sutton 2000). While architecting may become a standard management practice, in 2005 it is not common practice. Execution of an architecting process represents a current source of competitive advantage. Secondly, competitive advantage rests not only in the execution of the process but, more importantly, in the capabilities created by the architecting process. Architecting connects enterprise strategy with operations, promoting the realization of the competitive value of that strategy clearly and consistently.

### **6.7.2 Architecting suggests guidelines rather than a methodology for enterprise design.**

The architecting process described in Chapter three and the appendix I organizes the models, techniques and tools used in enterprise design. The architecting process is prescriptive in terms of treating the design issues associated with defining value networks, capabilities and elements. Architecting describes an important part of the strategy-implementation process, but it does not cover the full process. Defining a single and comprehensive approach may not be possible, given the diversity of enterprise strategies, market dynamics and technologies. However, this does not limit the value of defining guidelines for achieving the enterprise design goals.

Organizing models, rules and techniques into an explanatory structure enables readers to extract and tailor the approach to meet their needs.

For example, the element of integration rules provided in Chapter three provide guidelines for designing the fit between people, process and information technology. The same applies for the architecting deliverables, which are ways to represent the trading and operational relationships involved in architecting. The value of these architecting guidelines rests in part on defining a structured approach to enterprise design.

### **6.7.3 The research for defining emerging management practices should include current research and case studies.**

Defining an emerging set of management practices is challenging, as the practices are neither evident nor well formed. Identifying these types of practices is open to misinterpretation. This is a particular challenge as the research value of identifying emerging practices is high during the transition from tacit to explicit knowledge (Pfeffer and Sutton 2000; Leonard-Barton 1995).

The research process sought to address this issue through combining research literature with case studies to define architecting propositions. A review of the research conducted to date provides definitions and frameworks to help organize the case studies. This included expanding sources beyond the academic journals to include the thoughts and experience of practitioners who have developed responses to market and technology change (Bossidy and Charan 2003; Gerstner 2004; Sloan 1963). The research structures the forces influencing executive and enterprise behavior. Combining this information with the case studies brings current thinking and current practice into focus. Case studies capture the actions, decisions and artifacts of managers currently responding to market and technology forces.

Insight comes from bringing together these two sources of information. The concept of dynamic capability provides a research-based categorization for architecting activities in terms of a resource-based view of the firm (Stalk, Evans, and Shulman 1992; Galunic and Eisenhardt 2001). The case studies provide models, processes and rules that form such a dynamic capability. Combining prior research findings with such studies provides a method to evaluate and describe potential emerging practices.

### **6.8     Enterprise architecting is an emerging practice for managing in a complex and dynamic environment.**

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Enterprises face an environment of increasing competition, change and options for change. This increases the importance of the ability of leaders to translate strategic decisions into operational actions. Enterprise-wide strategic decisions require making changes across the enterprise, business unit and operational levels. The ability to change successfully is becoming one of the required dynamic capabilities.

The environment defines the goals and requirements for successful change. Designing the enterprise to meet these goals involves achieving the right level of integration and consistency to deliver current performance while maintaining flexibility. Finding the right combination is the task of enterprise management, and architecting the enterprise to these propositions is the goal of enterprise architecture. The tools, techniques, processes and approaches for developing this architecture involve exploratory case studies, literature review and the testing of one against the other.

Translating strategic decisions into operational change is a persistent policy and management issue. Improving management ability to mobilize the enterprise to achieve greater performance, integration, consistency and flexibility is the goal of enterprise architecture. This dissertation defines architecting as a way to manage enterprise complexity in an environment of increasing competition and the need for change.

# A1

## Appendix 1 – The Architecting Process

Architecting an enterprise fits the description of a dynamic capability in its focus and result (Teece 2005; Eisenhardt and Martin 2001). As a capability, it is a configuration of business elements to achieve a specific result. The tools used to define enterprise capabilities can be used to define the architecting capability. This appendix provides a description of the architecting capability organized along its processes to illustrate the sequence of activities involved.

### **A1.0 Architecting represents a dynamic capability.**

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Assuming that architecting is a capability, then there are a set of common elements that describe this capability. The architecting capability contains an integrated set of elements including processes, organization structures, competencies and technologies for enterprise design. Figure 65 below is a capability blueprint outlining the elements necessary for an architecting capability.

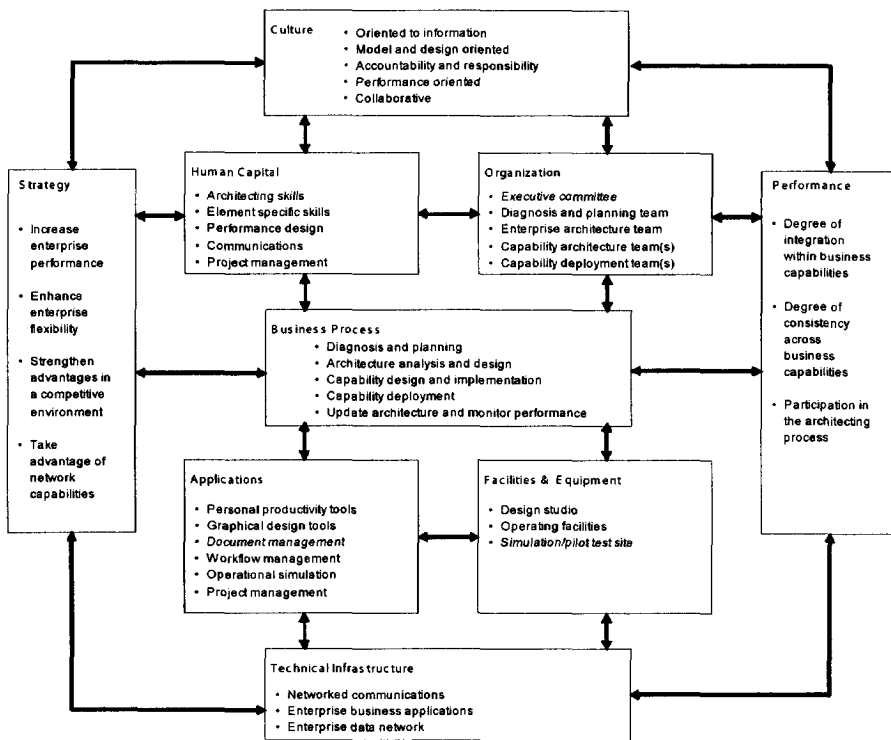


Figure 65. Architecting is a capability that can be described by its business elements.

This description organizes the capability in terms of its major processes. The way of working described in Chapter three examined the activities and decisions at a high level. The process described in this appendix represents observations and experience working with enterprise-level change. The architecting process exists in the context of strategic management and daily management processes that form a strategic and operational alignment and execution. Figure 66 below shows the relationship between these processes and the actions that trigger their execution.



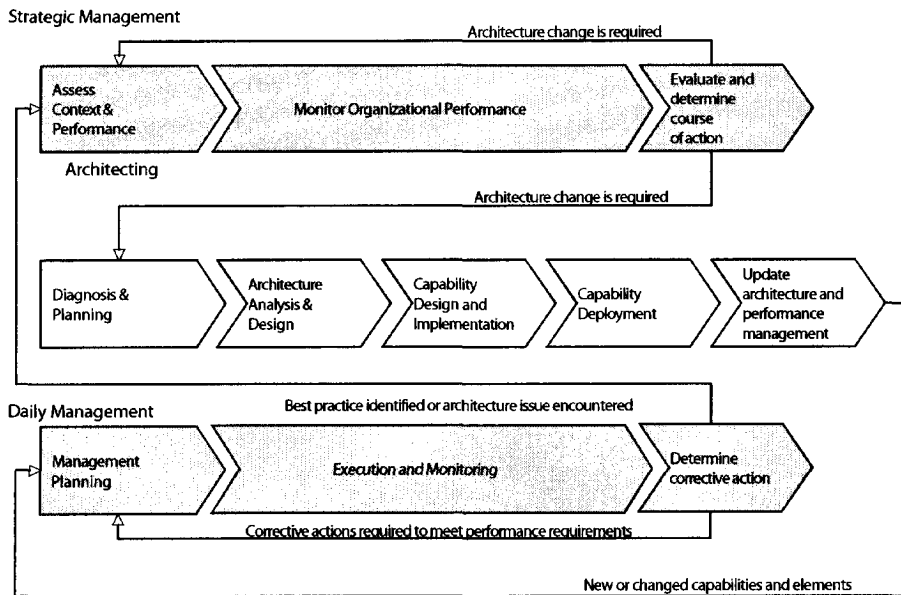


Figure 66. The architecting process exists within the context of strategic and daily management.

The architecting process exists within the context of strategic and daily management processes. Architecting blends design methods, including the systems development lifecycle waterfall iterative design approaches and spiral development approaches (Yourdon 1989; Gain 1987 and Boehm 1986). Blending is required to address the need to handle the breadth associated with designing at the enterprise level: managing multiple capabilities, elements, and their combinations.

The architecting process consists of five top-level processes that concentrate on the activities required to identify the actions necessary to achieve the enterprise strategy (see Figure 67 below).

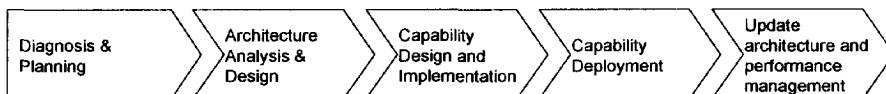
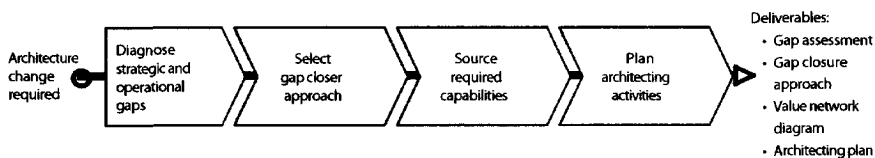


Figure 67. An architecting process consists of five steps from diagnosis to maintaining architecture models.

## **A1.1 Diagnosis and planning establishes the connections between strategy, operations and architecture.**

A need to change enterprise capabilities triggers the architecting process. The need to change comes from exogenous sources such as changes in the industry context or endogenous sources such as operational relationships within the enterprise, changes in executive leadership, or changes in operational performance (Galunic and Eisenhardt 2001). These forces influence the competitive value of enterprise capabilities and therefore require a change in those capabilities to maintain or extend enterprise advantage.

The first process in the proposed architecting process concentrates on understanding the context for change, the intent of strategy and the realities of current operations. The diagnosis and planning step achieves these goals through three sub-steps that result in a revised value network diagram that defines the distribution of capabilities required to realize the strategy and to secure its competitive advantage (see Figure 68 below).



*Figure 68. Architecting diagnosis and planning begins with the need to make an architectural change to the enterprise.*

### **A1.1.1 Diagnosing strategic and operational gaps establishes the scope of architecting activities.**

The first step in diagnosis involves defining the gaps between the current capabilities and those required by the strategic direction. While a form of gap analysis is done as part of the strategy formulation process, it is often at a high level and used to assess different strategic options. During diagnosis and planning, architects conduct this assessment from an operational perspective looking for operational gaps.

The architecture team uses the gap assessment to determine the operational feasibility of the strategy. The team uses these gaps when

estimating the time and resources required for implementing the strategy. With this information, the team has two options: it can select an approach for closing the gap, or it can raise issues regarding the operational feasibility of strategic outcomes. The latter course of action occurs when the changes required to close the gaps are prohibitive from a financial, operational, customer/market or cultural perspective. Assuming that the gaps can be covered, diagnosis moves to its next phase – selecting the gap-closure approach.

#### **A1.1.2 Selecting the gap-closure approach establishes a pattern for sourcing and design decisions.**

Gap-closure decisions set the performance profile of an enterprise in terms of the decisions on how best to modify existing capabilities or source new capabilities. The gaps identified in the prior step bind the scope of gap-closure activities. This is in contrast to a gap-closure approach that starts with identifying and classifying the gaps in order to seek a common pattern. A conventional approach for closing gaps would be to work down the list sequentially, closing individual gaps until the list is complete. While this addresses the gaps, it does not promote a consistency in the architecture that would come from identifying common patterns in gap closure – a goal of architecting an enterprise.

The range of potential closure approaches has expanded as new technologies and business arrangements have come into acceptance. This gives the architecture team several options beyond buying or building new capabilities. Many of these new approaches were used to great effect by enterprises based on Internet technologies that used communications technologies and innovative business relationships to gain operational scale at unprecedented rates. Companies such as EBay, Amazon, Lending Tree and others demonstrated the business innovation possible through expanded sourcing options. These gap closure approaches include the following:

- Inventing by building or improving capabilities using internal resources and making direct investments in enterprise operations and assets.
- Improving by buying the capability or improved elements from a vendor and installing it within the enterprise;

- Leasing the capability as a service from a trading partner in the form of a value-network relationship;
- Partnering or venturing with a trading partner to provide the capability under a revenue/risk sharing arrangement;
- Divesting or discontinuing the capability and have customers served by another enterprise.

The gap-closure approach gives the architect a bounded set of executive decisions for distributing the required capabilities across the value network. The approach sets the high-level pattern for implementation based on the nature of the actions required for making the strategy operational. Structuring architecting decisions in this way at this stage facilitates the involvement and commitment of senior leadership in enterprise design. Executive involvement in the approval of gap-closure approaches harnesses their immediate understanding of the strategic direction, translates that understanding into actionable decisions and enables them to play an informed sponsorship and oversight role throughout the architecting process.

**Lending Tree provides an example of the operational implications of closing gaps.**

An example of the relationship between the gap-closure approach and operational impact is the architecture of Lending Tree – an online loan broker in the United States. Lending Tree’s value proposition is to give prospective borrowers a choice of lenders in the form of up to four different loan proposals. Lending Tree built a network of lending institutions – what they call the “vortex” – to attract increasing numbers of borrowers. This made its website attractive to lenders generating increased commission rates for Lending Tree.

Lending Tree faced a number of operational challenges in setting up its architecture, among them, discrimination in lending regulations. Lending Tree was, in effect, originating loan proposals and could have fallen under the relevant regulations and reporting requirements. However, Lending Tree specifically sourced the loan origination responsibility to the member lending institutions. Lending Tree avoided these regulatory and reporting requirements by choosing how it sourced the capability.

### **A1.1.3 Sourcing required capabilities through a value network establishes enterprise scope and external interfaces.**

The high-level architecting decisions come from identifying capability gaps and the approaches used to close these gaps. The value network reflects these designs. The value-network diagram represents the primary deliverable of the diagnosis and planning process. It captures the players, their capabilities and their sourcing. Creating the value-network diagram involves applying the gap-closure approaches to the current set of capabilities. The resulting decisions call for the following actions:

- For capabilities sourced outside of the enterprise – defining or refining the interface and performance requirements for these capabilities sourced through trading partners
- For new capabilities – defining their interfaces, resources and performance requirements. Capabilities moving in-house from a trading partner represent new capabilities.
- For capabilities remaining in the enterprise – defining the new performance requirements and resources.
- For capabilities, being divested from the enterprise – defining the resources being retired, the decommissioning approach and the impact on the interfacing capabilities.

#### **The value network diagram should define capabilities consistently.**

A value network consists of the capabilities involved in creating strategic outcomes and meeting performance requirements. During diagnosis and planning, architects identify the capabilities in terms of their outcomes, performance requirements and interfaces. In operational terms, a capability is the collection of business processes, jobs, applications, facilities and information operated together to create a business outcome. This makes the capability larger than an individual business process and smaller than a business unit.

In many ways, a capability is a large-grain design object and follows many of the conditions that apply to object-oriented thinking. Test conditions used in determining what constitutes a capability in architecting include the following:

- The outcome of a capability has economic value. The capability produces an outcome that could be offered for sale as a product or service.
- The capability has definable performance targets that are strategically important. Capability performance influences the enterprise performance profile – capability performance matters.
- The capability has defined boundaries and interfaces. The enterprise can readily identify what is part of the capability and what is outside its boundary.
- The capability is modular and operationally complete. It contains the end-to-end processes, skills, facilities and information required to produce all of its outcomes.
- The capability is operationally independent. A capability can be removed from within the enterprise and, instead, provided by a trading partner without significantly changing the enterprise operations or performance requirements.

The industry and enterprise environment influence what constitutes a capability for a specific company or an industry. Credit underwriting, the process of determining customer creditworthiness, is an example. In the financial services industry, underwriting is a capability in its own right with distinct processes, skill requirements, information and facilities. In other organizations, underwriting is part of the customer sales capability. The distinction between the two rests on the industry and its business fundamentals.

#### **A1.1.4 The architecting plan builds off the scope defined in the value network diagram.**

Architecting activities involve changing capability structures and their relationships. Coordination and time constraints make planning an essential element of an architecting process. The architecting plan should take into consideration the scope of the architecting effort by matching the degree of architecture change with the appropriate planning construct to deliver that change. Planning constructs fall into three general categories: change program, release and project. These constructs are organized hierarchically with a change program consisting of one or more releases and a release consisting of one or more projects.

- The change program represents the broadest construct and its focus is on realizing and sustaining the changes necessary to implement the strategy. The change program is considered complete when the enterprise reaches its performance objectives.
- A change program consists of one or more release. If the change program focuses on achieving performance objectives, then the release is concerned with giving the enterprise an operationally stable set of capabilities. At the end of a release, the enterprise is operationally stable, so that it can be run effectively without further changes to the architecture.
- A project is the basic building block of the planning effort. Projects exist within a release and achieve operational stability by creating models that introduce new configurations of enterprise capability by introducing new, or modifying existing, business elements and their configurations.

The resulting architecting plan uses the techniques found in program and project management, including scope, estimate, exit criteria, and resources associated with planning programs, releases and projects. Figure 69 below shows the nested relationship between these planning levels.

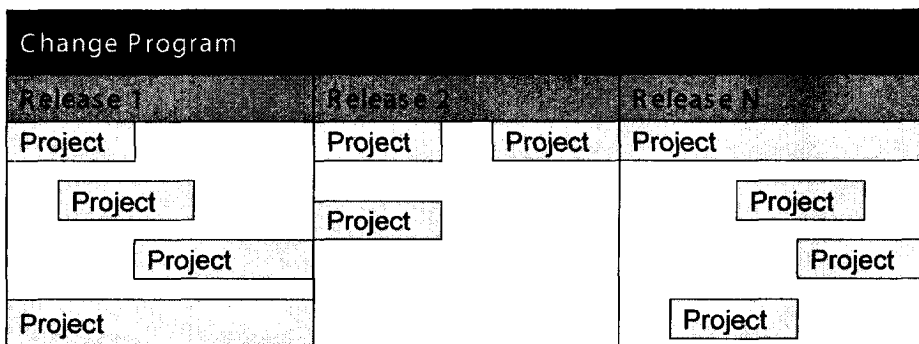


Figure 69. An architecture plan breaks down into change programs, releases and projects.

**Planning activities match the scope of change to the proper planning scope.**

Architecture planning aligns the scope of architecture change with the scope of planning construct. Properly matching the two gives the architecting process the proper management resources and context. Using these planning constructs, the architecture team plans out the course of action required to implement the strategy based on the scope of change implied by the value network diagram, gaps and gap-closure approach.

Based on the case studies and experience in planning and managing enterprise change, Figure 70 below provides guidelines based upon the enterprise objective, the scope of architecting required to achieve those objectives and the planning construct needed to manage the achieving of these objectives.



Enterprise objective	Architecting activity	Planning construct
Transform the enterprise by changing its sources of competitive advantage.	Create a new value network addressing new customers and markets with new trading partners and internal capabilities.	Multiple change programs
Increasing competitive advantage by bringing new capabilities to market.	Create a new capability within a modified value network	Single change program with multiple releases
Improving current performance to extend or retain competitive advantage.	Creating new business elements within a capability	Multiple release change program for complex capabilities. Single release of a change program for lower complexity capabilities.
Improving current performance without changing existing capabilities.	Modifying an existing capability	Single release of a change program with multiple projects.
Improving current performance within the context of current strategies and plans.	Introducing new elements or replacing elements within an existing capability.	Multiple projects for large or complex changes. A single project for less complex changes.
Achieve current plans and strategies through incremental improvements to integration and consistency.	Modifying the elements or their relationships within an existing capability.	An individual project for continuous improvement activities.

Figure 70. The architecture plan should match the enterprise objectives and scope of architecture change.

### **A1.1.5 The diagnosis and planning team draws upon leadership, strategy and financial resources.**

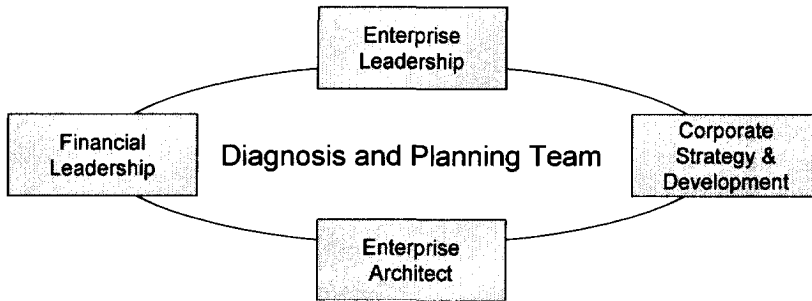
The understanding, information and skills required to set the context of the enterprise requires a team of senior personnel. This team is a bridge between strategy formulation and enterprise architecture. The team works to resolve the following issues in defining the overall plan and approach for implementing the strategy through architecture:

- What are the gaps between the current operations and the future direction called for in the strategy?
- What are the approaches for closing those gaps?
- What is the impact of the gap-closure approach on the enterprise and its capabilities?
- What is the distribution of capabilities across the value network?

Architecting teams require a blend of functional and technical skills and experience. Architecting involves addressing enterprise structure and dynamics with no single team or team member having the breadth or depth of experience required in making architecting decisions on their own.

An effective architecting team is organized and managed in a way to produce cross-functional results, not just have cross-functional skills. The organizational structure of architecting teams tends to be flat and non-hierarchical for these reasons. This approach to team dynamics supports a dialog and consideration of alternatives that take advantage of different design and implementation options.

While each team has clear leadership, its activities and operations are collaborative and guided by the strategic and performance goals that define the exit criteria for each process. Figure 71 below shows the roles that make up the team responsible for diagnosis and planning in the form of a circle rather than a hierarchy.



*Figure 71. Diagnosis and Planning Team roles bring together strategic, financial and enterprise resources to evaluation issues and develop plans.*

Combining the team roles and planning issues creates a role-definition matrix that describes the contribution of each role to the team (see Figure 72 below). This matrix provides a guideline on the minimal number of roles involved in diagnosis and planning work. This matrix provides a guideline on the roles involved in diagnosis and planning work. For example, enterprises with a heavy investment in their brand may include brand and marketing leadership in diagnosis and planning activities.

Diagnosis and planning Issue	Executive Leadership	Financial Leadership	Strategy and Development	Enterprise Architect
What is the gap between current operations and the future direction?	Understanding the degree to which the enterprise must change to meet competitive threats and achieve its objectives	Model the financial impact of the gap in terms of benefit streams from the strategy and the cost of implementation.	Communicating and clarifying the strategic intent and forces creating the need for change.	Defining the scope and scale of changes required to achieve the strategy
What are the approaches for closing those gaps?	Assess the fit between a gap closure approach, leadership preferences, brand, and market position.	Model the financial implications of close approach options	Assess the market viability of the gap closure approaches, availability of trading partners, and the impact on the strategy.	Assess the operational and structural impact of various gap closure approaches including the enterprise ability to partner effectively and the systemic impact of sourcing decisions on other capabilities.
What is the impact of the closure approach?	Understand the leadership challenges and actions required implementing the chosen gap closure approach.	Understanding the level of investment and revenue impact involved in implementing the chosen gap closure approach.	Refine the strategy based on the selected gap closure approaches	Assess the impact of the selected gap closure approach on the enterprise portfolio of capabilities and elements.
What is the distribution of capabilities across the value network	Understand the new scope of enterprise and trading partner relationships that require management	Revise the economic and financial models based on the distribution of capabilities.	Understand the strategic implications of the value network and its capabilities	Define the interfaces between the enterprise and its trading partners; ensure the enterprise can operate the retained capabilities.

*Figure 72. Each role in the diagnosis and planning team reflects a particular perspective on the enterprise, its strategy and operations.*

#### **A1.1.6 Diagnosis and planning establishes the content and course of action for the architecting process.**

Achieving improved performance and flexibility – the goals of effective enterprise management – involves understanding the intent, scope and plan for architecting the enterprise. This first step of the architecting process translates strategic objectives into changes in current and new capabilities as defined by a new value network. Those changes and additions define the scope of change in terms of both what will change and, more importantly, the capabilities and trading relationships that will remain unchanged. Both are required to improve performance and flexibility. Diagnosis and planning set the context and content for architecting individual capabilities and elements. That work occurs during architecting analysis and design.

## A1.2 Architecting analysis and design revises enterprise capabilities and elements.

Architecting analysis and design translates the capabilities identified in the value-network diagram into specific capability blueprints for implementation. This involves understanding the behavior of the capabilities as a whole and their internal operations through two activities: architecture analysis and architecture design. These activities follow an iterative design enabling architects to balance the needs of the enterprise with individual capabilities. Figure 73 illustrates how the architecture team iterates between the two tasks, completing the capabilities diagram during architecture analysis and design.

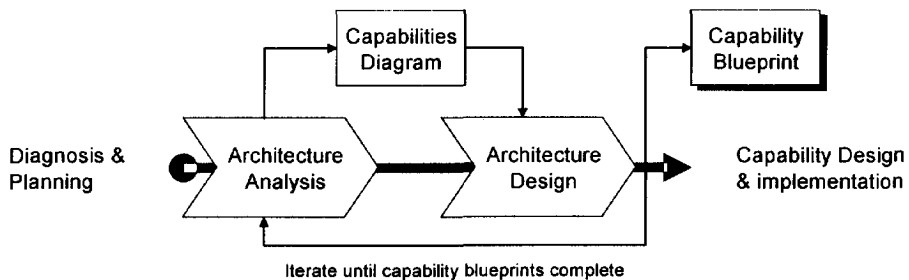


Figure 73. Capability analysis and design activities use an iterative process to integrate elements within each capability.

Iteration enables the architecture team to redistribute responsibilities and outcomes to meet strategic and operational performance requirements. The design process involves combining like-capabilities or specializing capabilities based on strategic, performance and operational needs. The distinctions between order fulfillment and service fulfillment in the CDW architecture offer an example of the iterative process. Initially, there would be a single capability called fulfillment. Order fulfillment is a common capability with a defined order interface and outcome. However, fulfilling product orders and service orders involves different trading partners and economics. CDW's business rules for the warehouse and supplier management involved in product fulfillment are sufficiently different to warrant separate capabilities. This is important to recognize, as CDW experienced mixed results when, at first, it packaging and fulfilling services using a product model. The analysis and design process concludes when the new or revised capabilities are completed.

**A1.2.1 Architecture analysis concentrates on the interactions and relationships required to achieve targeted performance levels.**

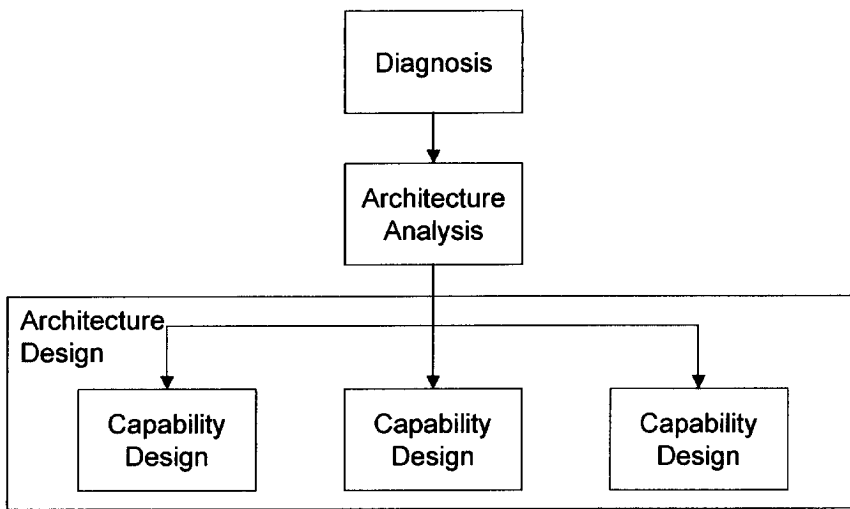
Architecture analysis defines the scope of the enterprise in terms of the capabilities it contributes to the value network. A capabilities diagram is the result of architecture analysis. This diagram maps the internal capabilities, their relationships and the interfaces with external capabilities across the value network. This information describes the requirements for each capability by documenting its external behavior.

The enterprise should invest in capabilities that deliver competitive advantage. Architecting analysis evaluates the enterprise capability against the strategy and architecture requirements to determine their fit and strategic relevance. The criteria for a strategic relevant capability include:

- It generates value for the enterprise by resolving an issue, enabling an opportunity, or neutralizing a threat
- It is unique to the enterprise, its customers and markets
- It cannot be perfectly duplicated by others
- It does not have a strategically equivalent substitute.

Capabilities that meet these criteria should contribute to enterprise competitive advantage (Barney 1991). Capabilities that do not meet these criteria are re-evaluated to determine if they can be acquired in the market.

Architecture analysis creates a partitioned model of enterprise scope in terms of the individual capabilities, their relationships and interfaces. Each capability is defined as modular. The independence between capabilities makes the architecture-design process scaleable, as the capabilities defined in architecture analysis support the concurrent design of these capabilities. (See figure 74 for an example)



*Figure 74. Capability analysis identifies the individual capabilities that are the focus of architecture design.*

### **A1.2.2 Architecture design creates the capability blueprints that guide implementation.**

The architecture design is a statement of the elements, their interrelationships and patterns. The architecture design comes together in the definition of the capability blueprints that provides the basis for capability design and implementation. Blueprinting establishes the requirements for integration and consistent. Completing the capability blueprint involves a structured design process that looks to define and integrate elements to meet strategic outcomes and targeted performance requirements. Using the capability blueprint deliverable, the process breaks down into three distinct paths shown in the Figure 75 below.

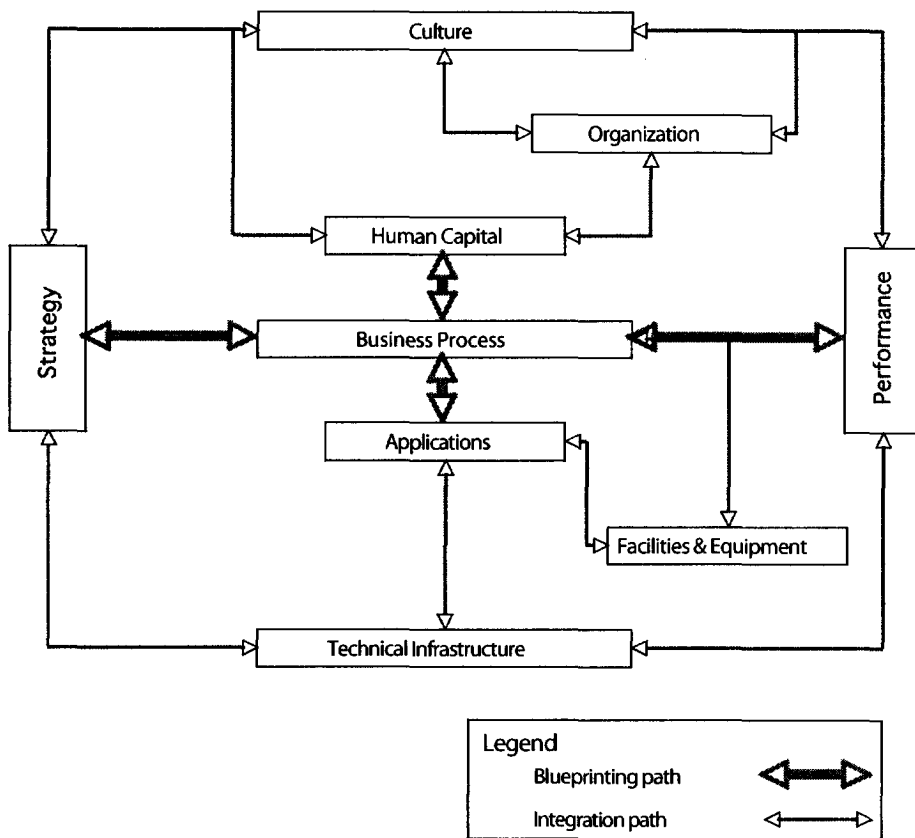


Figure 75. Capability blueprinting paths begin with business processes and integrate across elements to achieve strategic outcomes within performance requirements.

**The blueprinting path connects the elements to achieve performance goals.**

The blueprinting establishes the capability scope, the performance requirements, the processes used to deliver the scope, the human capital requirements and the applications. This establishes the design for the capability specific elements. The steps in this process include:

- Starting with the scope of the capability in terms of its strategic outcomes and objectives. The strategic outcome should come from the capability definition found in the value-network diagram.



- Clarifying the performance requirements for the capability in terms of its cycle-time, quality, cost and resource requirements. Performance requirements define the exit criteria for architecting the capability.

The strategy and performance elements define the operational and performance scope that drives blueprinting tasks. Capability blueprinting is complete once it delivers its strategic outcomes within these performance targets. The next set of tasks involved in blueprinting focus on the capability-centric elements in terms of the business process, human capital and application designs.

These architecting decisions iterate within the context of the strategic outcomes and performance requirements. Architects make decisions regarding these elements in the context and under constraints established by the enterprise-level elements: culture and technical infrastructure. The activities completing the primary blueprinting path include the following:

- Defining the business process activities required for delivering the strategic outcomes. In the first pass, the process definition starts as a set of activities and business rules independent of implementation.
- Completing the application element involves determining the parts of the business process handled through automation in the form of information applications. This involves designing and implementing the functions, rules and information required to produce the outcomes defined in the process design.
- Human capital requirements, in terms of the skills, knowledge and competencies required to perform the processes and complete the primary blueprinting path. The human capital must account for the portion of the business process performance not supported through application automation. This includes building the right skills in the workforce, giving the required knowledge, and organizing them in the right jobs and roles.

The blueprinting path defines the operational characteristics for the capability in terms of its strategic outcomes and performance targets. The integration of these elements forms the core of the capability and its performance characteristics.

Mismatches between these elements will compromise the strategy and performance objectives. For example, McDonald's Made-for-You™ defined new restaurant processes and their related technologies, but ignored the inadequacy of its current workforce to execute these new processes. As a consequence, many McDonald's stores had to reassign some of their highest performance personnel to the grill in order to meet performance requirements.

**The integration path removes friction and redundancies between elements.**

The integration path iterates between the business processes, applications and human capital within the context of the enterprise and technical infrastructure. This first-level integration seeks to find the fit between the capability centric and enterprise centric elements within the blueprint. The integration path addresses the following issues:

- Will the capability work within the context of the organization, culture and technical infrastructure? Does it adhere and support the standards and patterns for the enterprise? Does the capability design solve similar problems in the same way?
- What portion of the capability design can and should be handled by these enterprise-wide elements? Can we simplify and improve consistency by handling requirements via enterprise-level elements?
- What enhancements to these enterprise elements does the capability suggest or require? What parts of the enterprise elements are no longer needed? What capability-based services should they assume? What changes to measurements should occur?

Answering these questions, helps identify opportunities for re-use by having capability-specific tasks handled by enterprise-wide elements. It also helps identify mismatches between the work that has to be

done – the capability and the context in which that work is performed – and the enterprise. Discovering the connection, or more importantly, the disconnect, between the two identifies short cuts or additional requirements for successful implementation.

The goal of the primary integration path is to test the fit between capability-specific and enterprise-specific elements. Simply put, is the capability consistent with the enterprise context or such a poor fit that the business should consider another sourcing option? The primary integration path is complete once the architecting analysis and design team understands the relationships between the capability-specific and enterprise elements. These relationships must meet the following exit criteria before moving to capability implementation:

- The capability design produces the outcomes called for in the strategy.
- The outcomes produced fall within the enterprise performance requirements.
- The capability and its activities are consistent with the human capital requirements, the enterprise and culture
- The capability and its activities are supported with the proper information, software applications and technical infrastructure.

#### **A1.2.3 Architecting analysis and design teams work with the support of the executive committee and the guidance of the enterprise architecture team.**

Analysis and design represents the first scaling of the architecting project as the team branches from a small diagnosis and planning team into multiple teams based on the scale and scope of change required. In Figure 76 below, the architecting analysis and design teams are shown at their largest scale with the creation of an enterprise-architecture team and individual capability-architecture teams—one per capability undergoing change.

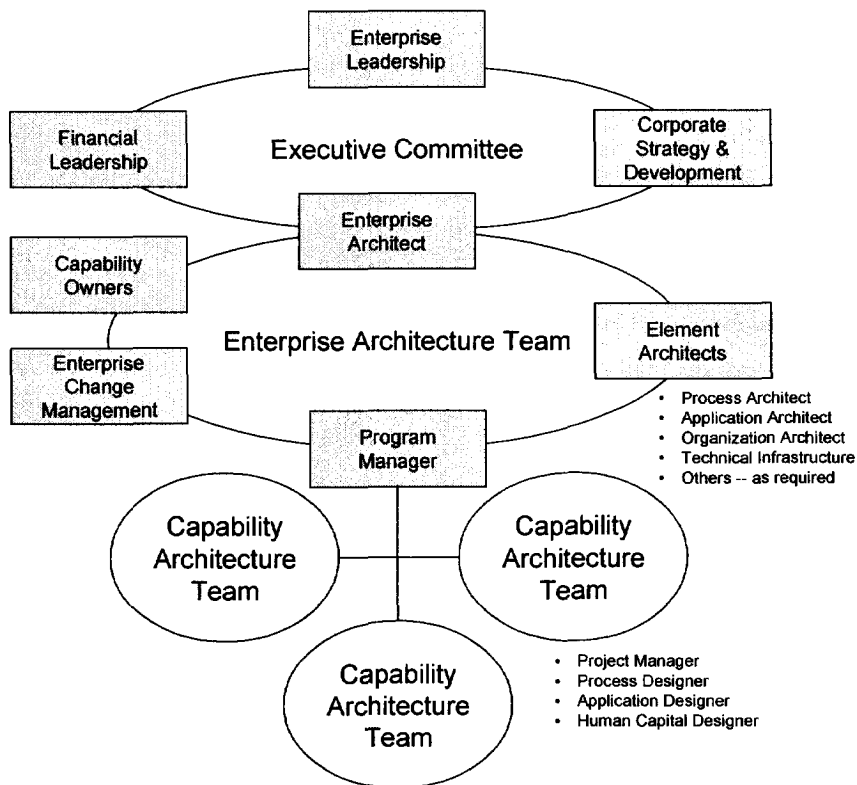


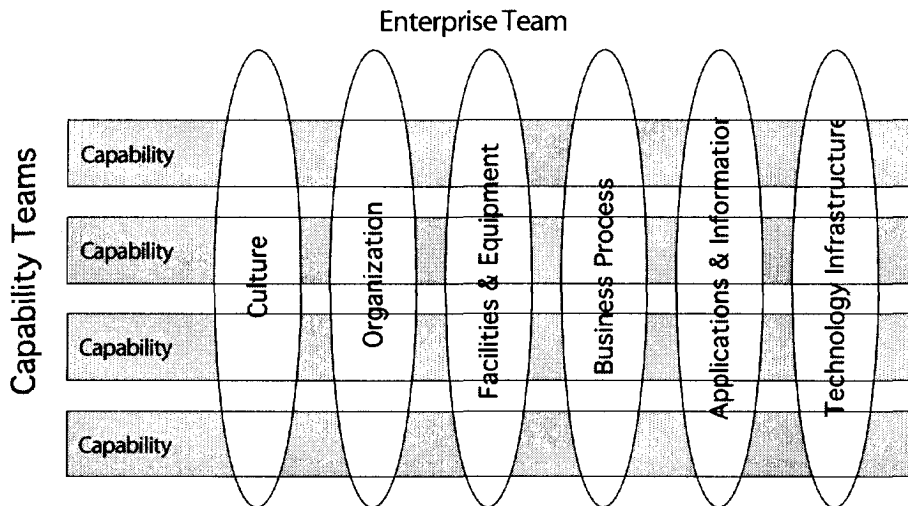
Figure 76. Architecture analysis and design teams leverage executive leadership and provide a scaleable approach to architecting capabilities.

The analysis and design teams are governed by decisions made by an executive committee. This committee contains the members of the diagnosis and planning team. During analysis and design, they make a move from creating models to being the architecture executive committee. This committee has responsible for maintaining alignment between the architecture and strategy. This committee has decision rights over the scope, budget and feasibility of the architecture. It also serves as the senior body addressing architecture exceptions.

An enterprise-architecture team may be necessary in situations where the architecting project involves multiple capabilities within and across the value network. An enterprise architecture team establishes the standards, design patterns and rules supporting consistent treatment within a particular business element. The first implementation of a

formal architecture requires an enterprise architecture team. It is possible that this team will not be required when the enterprise is evolving or extending a portion of this architecture as the enterprise-wide standards govern those activities.

Architecting analysis and design entails making the transition between an overall architecture and individual capability blueprints. The team structure supports this effort though organizing the design portion of this step into individual capability architecture teams. These teams bear responsibility for creating the capability blueprints, following the patterns outlined in the gap-closure approach and standard enterprise architecture components. Each team has a project manager responsible for planning and controlling the work done in the team. Individual blueprint designs are reviewed and approved by the enterprise architecture team. Figure 77 below illustrates the different perspectives of the enterprise team and capability teams.



*Figure 77. Enterprise and capability teams balance operational needs of capabilities with enterprise expertise.*

### A1.3 Capability design and implementation transfers focuses on the elements within the capability.

Capability design and implementation involves making design decisions on the transformation of the blueprint into specific process, technology and organizational changes. The capability design and implementation process creates the detailed processes, job descriptions, competencies, etc. required to implement or improve enterprise capability to achieve the strategy and meet performance requirements. The capability-design process uses the blueprint as the conceptual design with the design team iterating between the business process, human capital and applications within the constraints of the enterprise culture and technical infrastructure. This iterative process, shown in Figure 78 below, continues until the capability produces the required strategic outcomes and meets the capability performance targets.

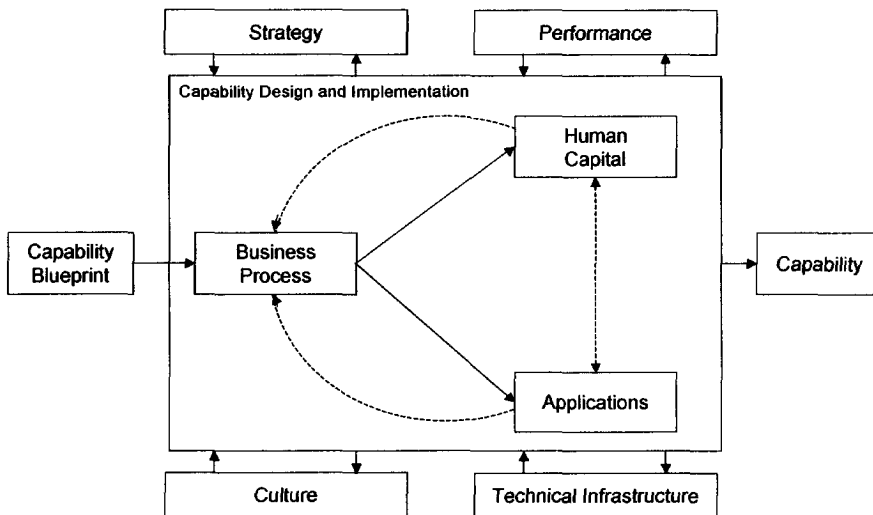


Figure 78. The capability design and implementation model looks to integrate business process, human capital and applications in the context of the other elements within the capability.

Providing a conceptual design in the form of the capability blueprint with specific strategic outcomes and performance targets provides a degree of autonomy to tailor individual capabilities and elements to local conditions. This enables the capability designers to define, model

and test different combinations of business processes, human capital and application software to achieve the required outcome and performance levels.

Capability implementation links architecting with detailed element-building disciplines and techniques such as process engineering and information-systems design. Similar to construction, where the architect hands off the models and blueprints for a building, the enterprise architect transitions the capability designs and blueprints to implementation teams. These teams use the blueprint as the context and high-level requirements for their work. In this way, the architecture guides detailed design and implementation activities through defining outcome requirements and patterns that illustrate the operational intent of the strategy.

#### **A1.4 Capability deployment transitions new capabilities to begin benefits realization.**

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The capability deployment process implements new capabilities and business-element changes into the enterprise operations. Deployment occurs following construction and testing of capabilities and their elements. During deployment, the focus of capability deployment shifts from capabilities in a value network to the deployment unit and the range of change it is expected to handle.

The deployment of architected capabilities depends on deployment releases and releases to implement new and revised capabilities. A deployment unit is the operational collection of people and facilities expected to operate the capability. Enterprise scope and operational structure determine the specific definition of a deployment unit. The defining characteristic for a deployment unit is that it is defined and managed as a collective group. For example, the introduction of Service Lines at Accenture involved the following deployment units: global Market Units, global Service Lines, global human resources, regional Market Units and regional human resources. Each unit was the focus of a separate but coordinated deployment process.

A deployment unit may be an entire business function; for example, the finance department would be the deployment unit for a new general-ledger capability. A deployment unit can also be a specific physical location, such as an individual plant. A release is an internally consistent configuration of current, revised and new capabilities that are managed and operated together.

New and updated capabilities are organized into releases, which are deployed as an integrated whole into each unit. A deployment unit operates with a specific release of its capabilities until that release is changed through the deployment process.

Figure 79 below illustrates the relationship between these concepts: a deployment unit moves from operating under one release of the architecture (release  $n$ ) to the next release ( $n+1$ ) that introduces a new capability (D), updates another capability (B''), and removes a capability (A).



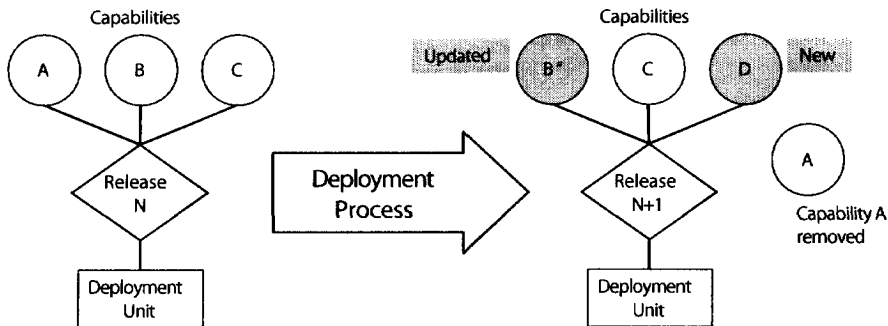


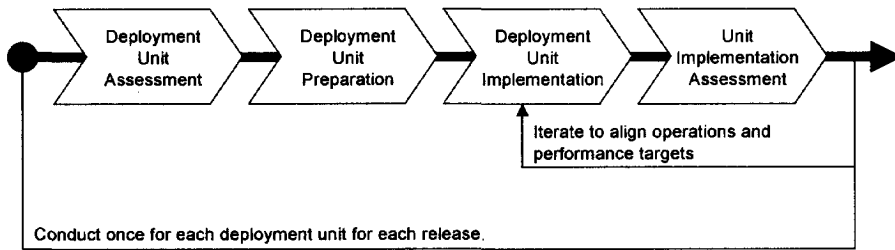
Figure 79. Capability deployment changes the frame of reference from individual capabilities to the deployment unit.

This example illustrates how an architected approach helps manage the change process to increase consistency and integration of operations. The three changes are deployed as a single release and a single change effort. The unit of work in this deployment approach is the deployment unit, not the individual capabilities as they are designed and tested.

This contrasts with approaches that deploy new capabilities as they become available from the production process. In that situation, project production schedules drive deployment rather than the enterprise operations responsible for achieving performance benefits. In a product-based deployment strategy, each capability invokes its own deployment process with the following impact (see also Figure 79 above):

- Change effort 1 – update capability B while operating capabilities A and C
- Change effort 2 – implement capability D while operating capabilities A, B'' and C
- Change effort 3 – remove capability A while operating capabilities B'', C and D

Delivering an integrated release of architected capabilities involves a process which transitions individual capabilities into an integrated release. The steps of this process concentrate on the deployment unit as the point of operation for current, revised and new capabilities. Figure 80 below illustrates the steps in the deployment process.



*Figure 80. Capability deployment implements change at the local level.*

The deployment process concentrates on the deployment unit and provides the opportunity to tailor and improve the fit between the architecture as designed and built with operational reality. This fine-tuning occurs in the iteration between deployment unit implementation and implementation assessment. In the interaction between these steps, the implementation is tailored to fit the specific circumstances at the deployment unit while still supporting the overall consistency of the architecture. The ability to tailor the architecture to implementation realities reconciles the gap between locally unique situations and an enterprise-wide architected solution.

A successful deployment process seeks to implement change to achieve the desired level of performance. That means changing the processes people follow, the skills and knowledge they use, and the facilities and systems. The deployment process involves the following issues:

- What is the actual state of the operational environment?
- What is its readiness to adopt the new capabilities to achieve required performance levels?
- What changes are required to make the environment ready to accept new capabilities?
- What specific adjustments are required to achieve the unit performance targets?
- What adjustments are required for the architecture based on the experience of deployment units?

**A1.4.1 Deployment activities begin once capability design is complete with the assessment of deployment unit readiness.**

A deployment assessment is necessary as each deployment unit has its unique characteristics that may not be addressed in the architecting design and implementation. A deployment assessment concentrates on understanding the fit between the capability designs and the reality at the individual deployment unit. An assessment is conducted for each deployment unit to identify requirements to prepare the deployment unit.

The elements of the capability design form the criteria for the deployment assessment. Using capability-design requirements enables the architecting team to evaluate the fit between the architecture and the operational environment. For this reason, deployment assessments should be concurrent with the completion of the capability design and implementation process.

Deployment assessment initiates the change process at each deployment unit. Deployment-unit assessments give operational managers a tangible understanding of the degree and direction of change anticipated by implementing the architecture. This gives local managers greater lead-time to prepare for the new capabilities and to incorporate those capabilities into longer lead-time activities such as workforce training, and changes in contractual relationships and facilities. This “early warning” involves local management in the change process and builds its knowledge of the new architecture and its capabilities.

**A1.4.2 Deployment-unit preparation establishes a consistent environment for accepting the release.**

The deployment-unit assessment defines the actions required to prepare the unit to accept the release of new and updated capabilities. Although preparation is important, it is often bypassed because it is assumed that operational units are homogenous. The assessment from the prior step often demonstrates that this is not the case. Preparation can include activities such as training and skills development, upgrades to facilities and reorganization of job responsibilities.

The goal is to bring the deployment unit up to a common standard prior to implementation. Standardization prior to implementation increases the effectiveness of the repeatable implementation processes and establishes a standard starting point for performance measurement. The preparation and standardization give each deployment unit a consistent starting point. For example, the deployment of McDonald's MFY initiative required a standard starting configuration for the stores and their kitchens. In some cases, it required extensive remodeling of the kitchens prior to implementation.

The deployment process recognizes the need for local-unit customization, particularly in the setting of performance targets. However, that process occurs post-implementation rather than during implementation. This reduces the risk of deployment, as operating units concentrate first on gaining competence in the new capabilities before tailoring them. The alternative, doing both at the same time, adds a level of complexity that is not necessary to the deployment process.

**A1.4.3 Capability unit implementation installs the release, removes redundant parts and establishes new performance and management measures.**

The implementation step begins with a prepared deployment unit and ends with the installation of the release and removal of elements and capabilities that are no longer necessary. Specific implementation activities are determined by the scope of the release but they frequently include the following:

- Re-organization of job and role responsibilities;
- Introducing new skills and knowledge to the workforce;
- Installing and reconfiguring facilities and equipment;
- Implementing new information systems including equipment, data conversion and systems training;
- Implementing new management objectives and performance measures.

The implementation step makes the conversion from current operations to the new capabilities and elements contained in the release. For example, the implementation of Accenture's Service Lines involved upgrading global information systems, the company's knowledge management system, workforce competency standards and the like. An important part of implementation is the removal of business elements that are no longer necessary. Removing equipment, processes, information systems and performance measures not only removes organizational clutter but also reinforces the change process. The implementation step is complete when the release is installed in the deployment unit and that unit is managed to its new or revised performance measures.

**A1.4.4 A unit implementation assessment tailors capabilities and resets management targets.**

Deployment does not end with the installation of new systems, processes, jobs and skills. A post-implementation assessment concludes deployment. This assessment reviews the effectiveness of the capability and refines its performance targets. The implementation assessment is based on capability design and performance requirements with many being the

same as used in the initial deployment assessment. The implementation assessment team conducts their observations after the unit has had sufficient time to gain a measure of proficiency with the new capabilities. Often the assessment occurs 60 to 90 days following implementation.

The implementation assessment concentrates on the progress the deployment unit has made toward gaining proficiency with the new capabilities. The assessment does not grade operating performance, as this is the responsibility of enterprise management. By assessing progress, the architecting team looks to identify the following types of issues:

- Gaps in the deployment process or the effectiveness of deployment activities such as education, data conversion or systems conversion;
- Gaps in the functioning of individual capabilities and the interrelationships between capabilities;
- Gaps in performance due to local unit conditions or constraints.

The implementation assessment provides information on the deployment process, the effectiveness of the architecture and local unit requirements. This information forms the basis for management and improvement activities at both the enterprise-architecture and local-unit level. That information is captured in a local-unit improvement plan that concentrates on the changes necessary to achieve the performance capabilities designed by the architecture.

At the enterprise-architecture level, implementation assessments provide data on the fit between architecture design and implementation assumptions and enterprise operational realities. This can lead to refining the architecture design. This was the case with McDonald's MFY and CDW's initial implementation of technical specialists. Such changes are re-deployed to the rest of the enterprise.

An implementation assessment provides local units with improvement requirements at the local level. These improvements can include tailoring

the capability to fit local units; for example, several local Market Unit organizations in Accenture did not have a critical mass of personnel across the full complement of Service Lines. This required local units to consolidate their implementation of Service Lines to fit local-market conditions.

Local-unit customization concentrates on improving the fit between local units and the performance requirements of the enterprise architecture. Making an allowance for local units recognizes the operational reality of many enterprises and supports delivering an enterprise-wide solution in a local context. While customization is supported in the deployment approach, redesign of the capabilities is not, as each local unit should remain measured by a consistent set of performance measures. Unit customization in terms of performance is made through setting unit-specific performance targets to maintain consistency between operations across the enterprise. The implementation assessment and improvement plan represents the end of the deployment process and the beginning of management responsibility for operating the new capability.

#### **A1.4.5 Capability deployment shifts the focus of architecting from the capability to the operation.**

The capability deployment process connects the enterprise strategy and architecture to enterprise operations. An effective deployment process requires implementing new capabilities and reducing the risk and cycle-time to achieve strategic results. Meeting these requirements maintains the connection between strategy, architecture and operations. The deployment process concentrates on the local deployment unit rather than the enterprise, as enterprise benefits build from improved performance across the enterprise locations. This perspective supports translating an enterprise-wide view of the architecting into the specific changes at the local level to achieve enterprise-level strategies and goals.

The deployment process implements new capabilities across the enterprise and establishes a consistent definition of capability and performance requirements. An enterprise architecting process includes more than the steps required to analyze, design, build and deploy new capability. An architected enterprise needs to manage the architecture by connecting it with strategic and local management processes. The relationship between architecting and these processes is the final subject for discussion.

### A1.5 Managing the enterprise, its architecture and performance is an ongoing process.

The way of managing describes the processes and decisions required to achieve and sustain integration and flexibility through enterprise architecture. Managing addresses how architecting fits into the management processes at a strategic and day-to-day level. Architecting an enterprise involves manage the enterprise from three perspectives: that of strategy, that of architecture, and that of daily operations. These three processes work together to define and maintain integration and consistency across business capabilities and elements. The three processes are shown in Figure 81 below:

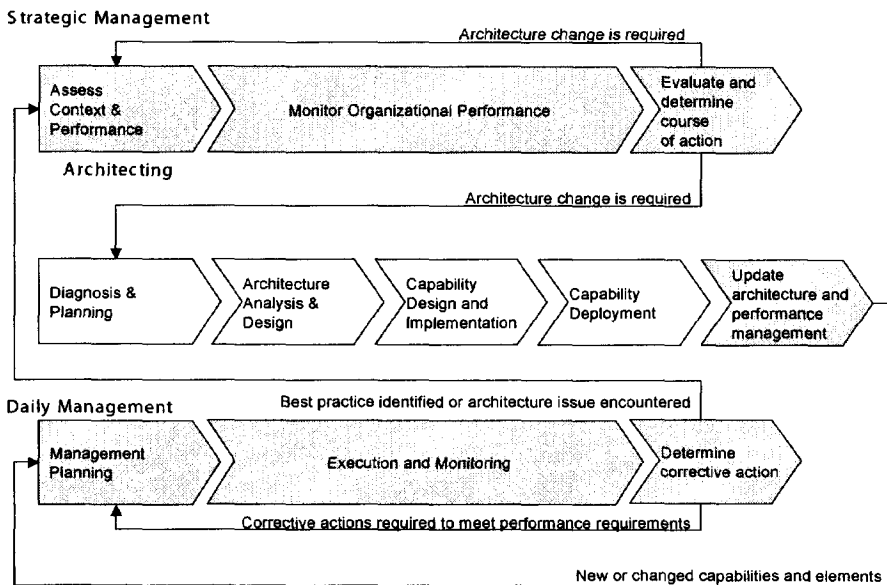


Figure 81. Architecting connects with strategic and daily management to remain current with changes in context and strategy.



**A1.5.1 Strategic management processes evaluate the competitive value of current capabilities.**

Strategic management processes are the responsibility of the senior management. These processes provide a structure for assessing the performance of the organizational and the particular value networks relative to their strategy, financial and non-financial measures. This process monitors the customer and external market to understand changes in the business context such as new entrants, changing business conditions or market preferences. Managing the strategy includes evaluating the impact of context and performance changes. This evaluation results in one of three different decisions based on the nature of the context or performance issue:

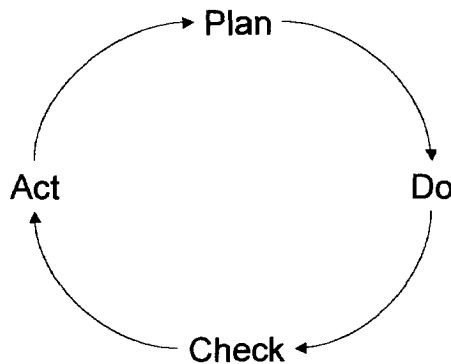
- Update performance and continue monitoring – when the change in context is not seen as a threat to the strategy or performance. Updating the performance model to incorporate the change maintains the relevance of the model to changing customer and market conditions.
- Architecture change is not required – occurs when the architecture is stable but improvements are needed to improve performance or respond to context changes. For example, an adjustment in product or service configuration would be carried out through daily management processes.
- Architecture change required – initiates the architecture management processes. This occurs when the change in context or performance cannot be ignored or handled through an adjustment made through daily management processes.

The strategic management process is ongoing and should be part of standard executive management assessments and operations. Detailed evaluations should be triggered by internal or external events to respond to the situation. The enterprise architecture defines the context for strategic management processes and its significant decisions. An example is Southwest Airlines evaluation and consideration of a new aircraft from Embraer, a Brazilian aircraft manufacturer, tailored for Southwest's short-haul market. In response to a question concerning adding Embraer's aircraft, Southwest CEO Jim Parker commented

that while it always looks at new aircraft, adding another aircraft to its Boeing 737 platform would not fit with the company's model

**A1.5.2 Daily management performs the continuous improvement required to achieve and sustain results.**

Daily management makes operational decisions throughout the enterprise on an ongoing basis. It is the process for making adjustments and addressing specific situations based on the architecture and its principles. While many organizations do not have a formal daily management process, those that do rely on versions of Deming's "Plan, Do, Check, Act (PDCA)" cycle, shown in Figure 82 below:



*Figure 82. The process by which daily management makes continuous improvements of current capabilities.*

A daily management process is important in translating the strategy and architecture into operational decisions that determine organizational performance. The strategy defines the direction and performance requirements for its operations. The architecture defines the tools to achieve this performance level in terms of the capabilities and elements that are designed to deliver the strategy and performance levels. Daily management makes decisions in the context of the architecture in addressing day-to-day issues. In this context, the architecture defines a pattern managers can use as a guide to make decisions that increase the integration within their operation and consistency across the other operations.

**Daily management addresses completeness and complexity**

A top-down approach faces two shortcomings – completeness and complexity. Any top-down approach should ideally define a complete model for the entire organization, covering the full suite of organizational

roles, process decisions, tools, facilities and technologies in order to tell the operation exactly what it needs to do. That level of completeness would create a top-down plan that was very complex to develop, release and manage. Top-down approaches, such as central strategic planning, have not been successful, as the time, cost and complexity associated with a top-down approach cannot respond to competitive and environmental changes.

An architecture-based approach is a top-down approach and could suffer from these same challenges if it were not linked to a mechanism that allows for local tailoring and decision making. The link to daily management provides the means to address this challenge allowing the architecture to provide a pattern of decisions on integration and relationships that enable local decision making by informing front line managers of what is directionally correct and consistent rather than directing them specifically on what to do. This reduces the complexity of the architecture models, as they do not have to deal with every potential permutation and combination but just enough to establish the pattern and enable operational managers to make the right decisions based on their local context and the direction of the architecture.

An architected approach that provides this directional pattern communicates the expectations for capabilities, processes and systems. This enables local flexibility with global consistency. Managers and the workforce recognize the inconsistencies in their operation and seek to gain better alignment based on the direction set by the architecture. The process of alignment at the local level is left to daily management.

### **A1.6 Architecting provides a structure for managing enterprise change.**

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Architecting is a dynamic capability concerned with the enterprise's structure, internal and external relationships. The architecting process provides a structured approach to understand strategic requirements and translate those requirements into operational changes. In this way, the architecting process provides a bridge between strategic intent and operational execution.

This discussion focuses on the architecting process that sits at the center of an architecting capability that supports the architecting goals of performance, integration, consistency and flexibility through its constituent business elements. Architecting exists within a cultural context that supports the design and use of models to structure the enterprise, a performance measurement orientation to management and collaboration across the enterprise. Organizationally, architecting uses cross-functional teams linked with the enterprise leadership to bring together enterprise design and enterprise change teams. The architecting process leverages modeling and simulation tools in production of the architecting deliverables. Combined, these elements form a dynamic capability for architecting the enterprise.

# A2

## *Appendix Two – Architecting Patterns*

Patterns offer a repeatable approach to addressing a recurring issue. In architecting, patterns provide templates for addressing design issues across the enterprise. These patterns, when communicated by the architecture team, provide a powerful tool for supporting consistency across the design and implementation of enterprise capabilities.

Patterns provide a way to address complex problems through focusing on specific relationships rather than decomposing the problem-space by problem type. Patterns capture the decisions and designs for living; this approach addresses the problem-space through an interlocking set of patterns (Alexander 1964). Starting from broad concepts and narrowing to individual design elements, patterns address design issues in context.

### **A.2.1 Defining patterns in a common structure supports their application to enterprise design decisions.**

---

Applying design patterns to the architecting enterprise captures the design decisions and templates required to manage effectively the complexity in a consistent fashion. The patterns provided in this appendix provide a representative sample of those involved in architecting an enterprise. These patterns borrow their format from Alexander and include the following:

- Summary of the pattern – providing an overview of the pattern;
- Essence of the problem – capturing the problem or opportunity that the pattern addresses;
- Diagram – presenting a graphical representation of the solution state;

- Solution – describing the approach or application of the pattern to address the essence of the problem;
- Related patterns – defining the other patterns involved or influencing this particular solution.

Defining the patterns involved in architecting an enterprise captures the design decisions and approaches involved in managing complexity, improving integration and fostering consistency in approach. The patterns presented in this appendix offer a representative sample to demonstrate the fit between this approach and the challenges of architecting an organization.

### **A.2.2 A pattern for defining an enterprise as a set of capabilities.**

---

An enterprise can be defined operationally in terms of the set of capabilities it uses to attract and serve customers, implement its strategy and support its internal operations. A capability is the collection of business processes, applications, workforce, culture and infrastructure elements that are operated as a distinct part of the enterprise. An enterprise consists of one or more capabilities.

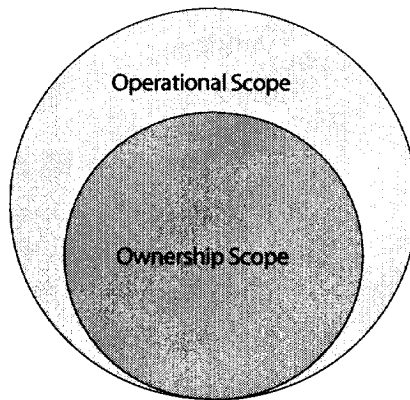
#### **Essence of the Problem**

The definition of an enterprise establishes biases for its design and development. For example, an organizational chart captures the distribution of responsibilities and resources but it fails to capture the ways in which responsibilities and resources collaborate to create value. The enterprise cannot be accurately defined as a set of organizational structures as they fail to capture fully customer outcomes, resource usage and collaboration with other parties. How does one define the scope of an enterprise in an increasingly networked environment?

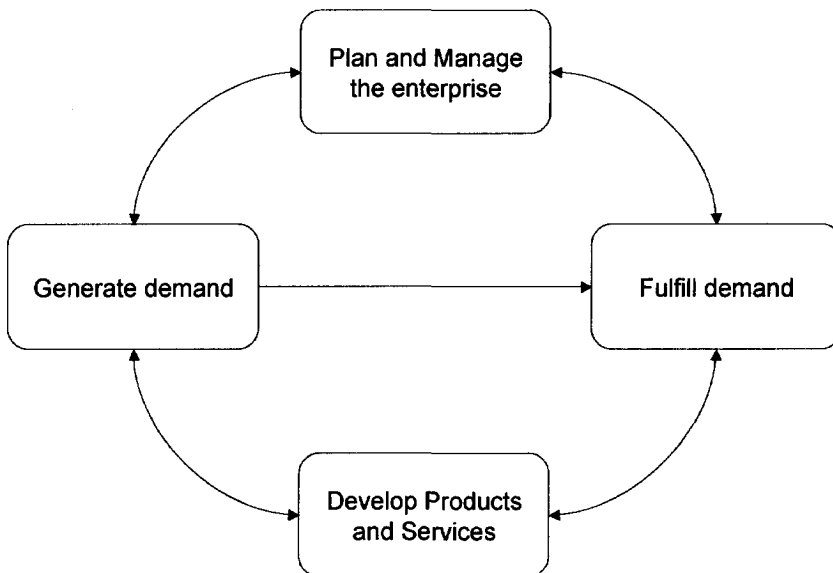
\* \* \*

There are many ways to define the scope of an enterprise and the notion of the “firm” is central to economics. The definition of an enterprise differs based on the business discipline and perspective of the organization. Systems theory looks at an enterprise as a set of outcomes and dynamics with a view to optimizing the system rather than its constituent parts (Senge 1990; Checkland 1981). The process engineer’s view describes the enterprise based on activities and outcomes (Davenport 1993; Hammer and Champy 1993; Rummler and Brache 1995). The organizational design discipline looks at the scope and distribution of responsibility and authority to describe an enterprise (Mintzberg 1993; Pfeffer 1977). These approaches capture an aspect of the organization scope. They imply enterprise scope in terms of its ownership structure. This boundary is important from an accounting and financial standpoint but it places unnecessarily limits on the enterprise.





### Diagram



### Solution

A capability view provides a representation of the enterprise and its dynamics: a set of capabilities that, in the aggregate, define the products, services, operations and financial scope of the enterprise. This enables a view that captures the full economic and operational scope of the enterprise. A capability view reflects an increasingly networked environment enabling an enterprise definition independent of its ownership structure.

A capability consists of business elements that define the processes, organizational units, facilities, information and technology used to produce a defined set of outcomes laid out in the strategy.

- Can the capability operate independently from others in the organization? Is it possible to operate it as a stand-alone entity or source the outcomes to others in the value network?
- Can you distinguish where one capability starts and the other one ends? Are there clearly defined interfaces (technical, organizational, social, process or contractual) that separate one from the other?
- Can you identify and manage the capability as a unique entity with its own independent performance measures.

At a basic level, four generic capabilities exist within every organization. Individual organizations specialize in these capabilities based on the particular industry or strategy. Based on the core processes provided by the International Benchmark Clearinghouse, these capabilities offer a starting point for identification and refinement:

- Plan and manage the enterprise: the capability that defines the processes tools and approaches for making strategic and resource allocation decisions;
- Develop products and services: how the enterprise creates and updates its offerings;
- Generate demand: how the enterprise markets and sells its products and services;
- Fulfill demand: how the enterprise meets customer needs and requests. This can include operation of the supply chain, service chain, manufacturing and other operational activities.

View the enterprise as the set of capabilities regardless of their ownership structure. To define a capability, look for the collection of significant outcomes produced for customers and/or provided by suppliers that together deliver results to customers. Use this capability definition to

describe the enterprise in terms of what it does rather than how it divides responsibilities, or its ownership structure.

Viewing an enterprise as a set of capabilities enables a clearer picture of its operational activities and value potential, as not all capabilities applied by an enterprise are owned by that enterprise. The capabilities view models an enterprise working in a network where it provides and uses capabilities across all network players to deliver products and services to customers.

### **A.2.3 A pattern for distributing capabilities across a value network**

---

Few organizations are completely vertically integrated, owning and controlling all aspects of product from raw materials to after-market sales and service. Organizations operate in a network including suppliers, intermediaries, customers and other trading partners supporting the enterprise value proposition. In this environment, the enterprise acts as a hub, distributing capabilities across a network of trading partners – a value network.

#### **Essence of the Problem**

The cost and time required to build capabilities can be prohibitive to achieve strategic goals and maintain flexibility. Current economics and the demand for strategic flexibility limit the value of vertical integration in favor of a more networked approach to strategy and operations (Hamel 2000). The challenge is how an enterprise gains a blend of capabilities from within its own operations and the value network. In effect, how do organizations distribute capabilities across the value network to realize their strategy?

\* \* \*

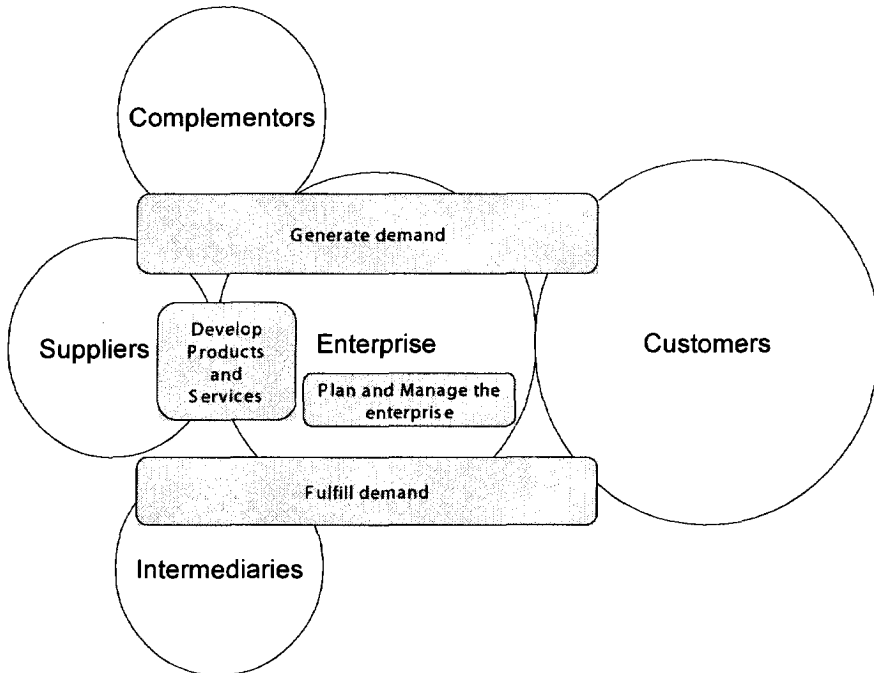
The need for strategic agility, increased performance of global logistics, enhanced communications and the widespread adoption of quality standards creates an environment involving multiple trading partners providing different strategic options and relationships. Traditional notions of strategy envision a linear relationship from raw material supplier to end customer – a value chain (Porter 1980). Each link in this chain contributes to the final product and garners an additional premium. However, in a networked environment these relationships are not linear, with suppliers and service providers frequently providing the customer touch point.

Standard purchase and re-sale arrangements break down in this non-linear exchange of products and services, requiring new techniques and approaches for defining the interactions of value network players. Organizations that are able to build successful value networks, such as CISCO, Amazon.com and the Virgin Group, can enter markets quickly

with quality services at scale. For example, Amazon began as a value network through relationships with Bertelsmann and shipping companies. It replicated that value network to extend into other market segments such as hardware and music. In turn, Amazon has positioned itself as a prominent node in other value networks for selling toys (Toys R Us) and other goods.

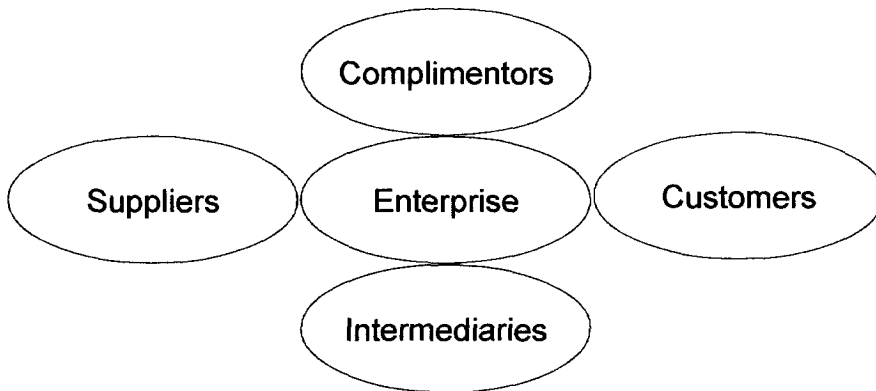
Enterprises need a new way to look at their structure and the structure of their trading partners to create flexible value networks to meet changing market and customer needs.

### **Diagram**



## **Solution**

An enterprise exists as a set of capabilities used to deliver its strategy and value to customers. Those capabilities do not have to be owned or operated to be effective. Sourcing capabilities across suppliers, intermediaries, customers and other organizations provides a way to reduce costs and capital requirements while meeting performance requirements



## **A value network of trading partners**

A value network is a group of enterprises collaborating to provide value to customers along defined roles in meeting a customer value proposition. Value networks contain an enterprise, customer, intermediaries and suppliers. This network represents the trading participants in a particular market. Individual actors in the value network provide the capabilities that collectively enable commerce. Customer self-service via the Internet represents a shifting of customer-service capabilities away from the company and toward its customers.

The enterprise sits at the center of the value network. It is the convening entity responsible for the following tasks:

- bringing the value proposition to market,
- guaranteeing customer fulfillment and satisfaction,

- assembling the trading partners required to deliver the value proposition,
- managing the performance of the network, including trading-partner service levels.

The enterprise is the hub of the value network, consisting of trading partners that play distinct roles.

Suppliers provide products, services and materials that become the basis for enterprise products and services. Their role may be visible to the customer through relationships like co-branding or marketing alliances. Customers do not view themselves as having a relationship with the supplier. The customer distinguishes the enterprise from its suppliers because they do not have a relationship with the supplier. That relationship is with the enterprise who customers view as the guarantor of supplier performance.

Intermediaries provide products and services that reduce the costs and increase the effectiveness of the customer value proposition. Financial services and logistics companies provide intermediary services for payments and shipping.

Complimentors offer products and services that extend the value of the customer value proposition by enhancing the quality, value or performance of the enterprise product or service. Field-service companies providing on-site product support and repair represent a complimentary service.

### **Distributing capabilities in the value network**

An enterprise can be thought of as a set of capabilities. Each trading partner is an enterprise in its own right with its own capabilities. Therefore, a value network represents an assembly of capabilities focused on a particular customer/market and delivering a specific value proposition. Forming a value network involves determining the capabilities required for delivering the customer value proposition and locating the best source of those capabilities from among the enterprise and its trading partners.

In building a value network, each capability/partner relationship requires the right blend of motivation, information and control. These characteristics drive a win-win relationship among the customer, enterprise and trading partner.

Enterprises and trading partners enter value networks for the sake of mutual benefit, and must gain sufficient economic returns to stay in the relationship. The enterprise needs to assess its motivation for sourcing the capability through a trading partner rather than providing it on its own. Motivations include concerns over time-to-market, reach and scale, capital efficiency, and management attention, among other factors.

Information sits at the heart of any trading-partner relationship and is critical to distributing responsibilities. The value network must share operational and dynamic information (e.g., product development and engineering) to enable each party to coordinate and adjust their actions.

Control must rest with the hub player in the value network, the enterprise with direct customer contact, as they bear the economic and customer satisfaction risk of value-network performance. The hub player establishes the network, invests in trading relationships and customer acquisition and therefore should govern the economics of these relationships and earn an appropriate return on its activities.



## **A.2.4 A pattern for process engineering and integration**

---

A business-process design contains the rules, interfaces, tasks, information, metrics and inputs required to create outcomes that customer's value. When well designed, the business process makes the operation intuitive and a natural part of the way business is conducted. This requires a pattern of process engineering and integration that extends beyond the scope of processes to include information systems and human capital aspects.

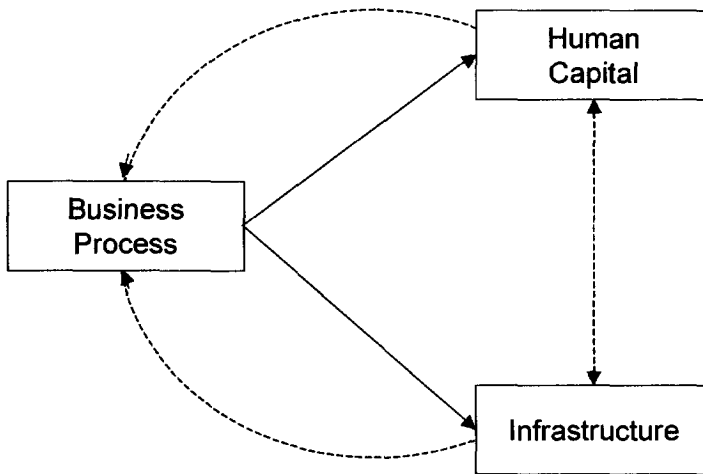
### **The Essence of the Problem**

The discipline of business-process design concentrates on the design and development of business processes as a discrete set of activities. This makes translation of process designs into human capital, information and physical infrastructure difficult. The issue is how to engineer and implement business processes within the full context of an operating enterprise.

\* \* \*

Definitions of business processes distinguish process from other elements within an enterprise. Core definitions of business process involve the notion of a set of activities that create outputs for a particular customer or market (Davenport 1993; Hammer and Champy 1993; Rummler and Brache 1995). However, business process in isolation is a paper diagram or a procedure in a manual. Process is dormant unless it is performed by an individual or application system. Business-process engineering must be arrived at in the context of workforce capabilities and application systems. Achieving this goal involves extending the context of process engineering toward a planned response system initiated by events and producing responses according to defined rules and requirements (McMenamin and Palmer 1984). In this expansion, the business-process engineer must incorporate human capital and information technology considerations into the process design.

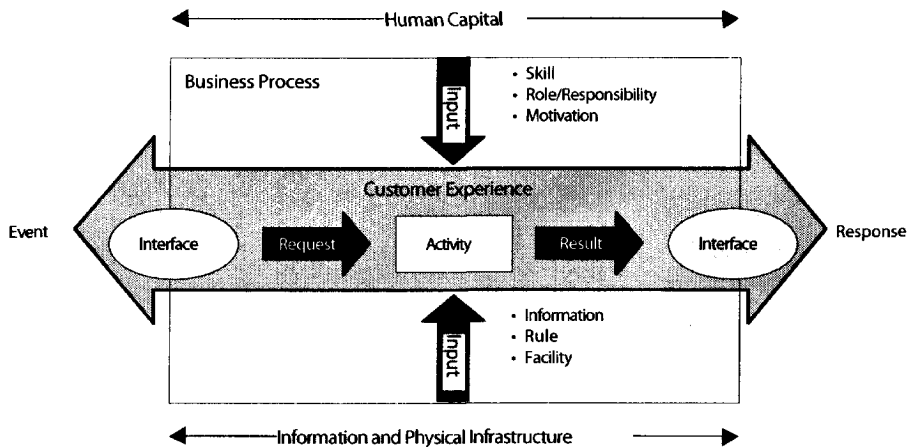
## Diagram



## The Solution

In the context of architecting an enterprise, business process represents one element within a business capability. The business elements within a capability organize themselves around tasks and activities. The performance of those responsibilities is governed by the skills of the workforce (who), the systems and physical tools they use (how), and the activities they perform (what). If these elements are not integrated, the enterprise can fall back into its prior work patterns and not achieve its objectives.

The common approach to process engineering and implementation involves breaking down the design into separate components for processes, application systems and human capital. These design requirements then come back together in a pilot situation after significant investments in new systems, skills and facilities. However, this approach makes it difficult to integrate process activities with performance profiles of the workforce or ability of information systems.



Processes provide the integration point for workforce, information and physical infrastructure elements by defining the tasks, rules, skills and information requirements. Achieving this integration involves extending the definition of business process to include the following aspects:

- **Event** – the customer or externally-defined action initiating the process. If the event does not occur or is not recognized as occurring, then the task is not performed. Events include actions taken outside of the process (external) or the passage of time (temporal);
- **Interface** – the means by which the event is recognized and the result communicated to the environment;
- **Request** – the decision, information or change sought by the event as interpreted by the interface;
- **Activity** – defines the steps required to translate the request into the result through the application of business rules, human judgment and information;
- **Result** – the actual decision, information or change produced from applying the activity to the request;
- **Human Capital** – describes the skills, responsibilities and motivation applied to the activity by personnel involved in the process. These personnel can include customers, employees, trading partners, regulators, and others;

- **Skills** – the abilities of the personnel performing the task in terms of their disposition, knowledge and task defines the abilities, orientation and experience of the workforce conducting the task;
- **Role/Responsibility** – the assignment of resources and accountabilities for task execution and performance;
- **Motivation** – the performance requirements, rewards and context that govern decisions and actions in performing the activity.
- **Information and physical infrastructure** – the environment in which the process tasks executes.
- **Information** – the stored data in information systems or provided by the requestor used to make the decisions and compute the information needed to produce the result.
- **Rules** – the guidelines and terms applied to decisions required in the business activity. Information systems may automate rules through algorithms and conditions. Rules provide the means to enforce operational, service level and performance aspects of process activities.
- **Facilities** – the tools, equipment and location where the business process activity is conducted. Often assumed in process design, changes in facilities such as moving activities to the customer via the Internet or the point of need via wireless technologies have an impact on business rules and performance.

Process engineering needs to work in conjunction with human capital and infrastructure requirements. This creates an executable process producing the proper outcomes at the right performance levels. The matrix below presents a pattern for the proper relationships among these concepts for engineering and integrating a business process into a larger context.

	Business Process	Human Capital	Infrastructure
Business Process	Process designs include the activities, decisions and information and business rules required to create the intended outcomes	The personnel performing the process activities have the skills, roles and motivation to perform the activity properly.	The infrastructure provides the information, supports the business rules, and offers the facilities to deliver the required responses..
Human Capital	The process activities are too complex or run counter to the personnel skills, roles or motivation; creating lower quality, potential fraud and other issues	The personnel have a set skills, roles and motivations that are internally consistent and can be performed repeatedly..	Infrastructure operating requirements are integrated with personnel skills, roles and motivations.
Infrastructure	The information systems and facilities do not support execution of the process activities. They are either in adequate or excessive.	The personnel do not have the skills, roles or motivation to use information systems or facilities properly to create process outcomes.	The infrastructure components work together to create an environment for executing business processes and using infrastructure facilities and information.

The un-shaded cells represent conditions when the business process integrates with human capital and infrastructure elements. The cells shaded in gray provide criteria for evaluating the consistency of design within these elements. The cells shaded in yellow indicate conditions for improving the integration among elements.

Addressing these conditions involves integrating requirements across all three elements in order to achieve the right combination. This gives the process engineer multiple design options to address imbalances between process, human capital and infrastructure requirements.

# A3

## *Appendix Three – Interviews*

### **A.3.1 An interview with Richard Adams**

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Date: July 11, 2003

Interviewer: Mark P. McDonald

Interviewee: Richard Adams, (RA)  
Franchise Equity Group  
P. O. Box 19321  
San Diego, CA 92159-0321  
Phone: 619-593-6553  
Fax: 619-593-0523  
<http://www.fegroup.com>

Richard Adams founded the Franchise Equity Group in 1994. It is a franchisee advocacy organization that raises public and investor awareness of franchise issues. This group exists because many franchisees are either formally or informally required not to criticize their corporate franchiser. Adams's involvement with McDonald began in college working as behind the counter. Adams managed a store then moved into middle management.

In 1978 Adams was McDonald's franchising manager for the western United States. In 1983, Richard left his corporate position and acquired an existing McDonald's franchise in the San Diego area, opening a second location in 1990. In 1994, Adams sold his franchises and began operating the Franchise Equity Group.

*Question: What was the strategy behind McDonald's Made for You?*

RA: Understanding the strategy behind Made for You requires understanding some of McDonald's history. As the 1980s drew to a close many of us in the McDonald's system sensed a slowing in the momentum of the previous thirty-five years. Same-store sales gains became tougher to achieve and new restaurant openings disappointed as often as they met expectations.

It was becoming obvious that the quick service restaurant industry was developing excess capacity. McDonald's corporate management refused to discuss the idea that the chain was no longer the growth engine it had been since 1955. To drive sales in the early 1990s, McDonald's management encouraged and eventually forced franchisees to advertise discounted menu prices.

However, at world headquarters a grander plan was being hatched, something called "The Convenience Strategy". This was a plan to increase the number of new restaurants built in the United States from a few hundred a year in the early 1990s to over one thousand per year by the middle of the decade. What better way to convince Wall Street that McDonald's was still a growth opportunity? The Convenience Strategy resulted in low-volume new restaurants that cannibalized a large portion of their sales from existing locations making it impossible for the domestic system to achieve same-store sales increases. The answer from headquarters? More discounting.

As 1996 progressed McDonald's franchisees were under stress from opening new restaurants, cannibalization of their existing locations, and being forced to drop their menu prices to drive traffic. Wall Street soon started asking about negative same store sales. McDonald's management denied that the problem was overexpansion. Analysts blamed the problem on food quality and a tired menu. Instead of admitting to cannibalization, executives at McDonald's went along with the criticism and began apologizing for their own food.

Management's answer was to introduce "Made for You" in 1998. The original cooking system was becoming antiquated. It supported a standard and somewhat restricted set of menu options and variations. Competitors supported a broader menu and were able to bring out seasonal and regional

specials. This kitchen system was supposed to produce fresher food and allow an expanded, more diverse menu. Made for You was fully implemented by the end of 1999.

*Question: What was the scope of Made for You?*

RA: Made for You was a set of new kitchen technologies intended to expand menu options and support more customized offerings. The MFY system included new point-of-sale terminals, kitchen management software and kitchen systems. The system itself is mostly a copy of what Burger King uses.

The system was designed to capture individual orders at the drive-through or counter and have them assembled individually by the kitchen. MFY had a number of goals: improving the freshness of the food, supporting customer requests for specific orders and supporting greater flexibility in the menu.

The MFY initiative was tied to the upgrade for store systems required for year 2000 compliance. The systems needed to be replaced so management decided to use this as the opportunity to implement a new kitchen system.

Implementing the kitchen system was expensive, costing upwards of \$100,000 per store when its configuration required re-modeling the kitchen. The cost of this mandatory upgrade greatly upset the franchisees as it was coming at the same time many were facing flat to declining store sales. Corporate recognized this to some extent and provided some financial assistance to upgrade the stores.

*Question: What as the impact of MFY on customer service*

RA: Immediately millions of McDonald's consumers found the service at their local McDonald's had become unacceptable. The lines were longer: people voted with their feet and steering wheels. Made for You limited the capacity of McDonald's restaurants to serve large numbers of people quickly. The Made for You systems could not provide the throughput required to deliver the performance required for a quick-service restaurant.



*Question: What were the issues with Made for You?*

RA: Made for You worked in the test kitchens and during times of low demand. It was during the rush hours that the system failed to perform. To start, MFY changed the workflow in the kitchens. Under the old system, menu items were prepared in small batches so that the grill crew performed the same task multiple times before they were asked to switch to another task. With MFY, the orders were made one at a time. This required grill staff to switch tasks quickly and work faster as there was little to no buffer.

Working the MFY kitchen systems to fill orders required the grill staff to be sharp, work fast and make quick decisions. The grill crew is often a place where people start in the store. Finding those skills in entry-level people is challenging.

In order to have the MFY system work effectively, managers needed to put their more experienced staff on the grill. Those people normally work the drive-thru or counter. The drive-thru is where the store makes the majority of its money. Pulling your best people from the drive-thru to work in the grill further increased wait times and reduced sales.

The basic issues with MFY were that in seeking to support more products, corporate provided more technology that made the job too complex for the crew staffing mix at many stores. This upset the economics and operations of the stores.

*Question: What was management's response to the performance issues with Made for You?*

RA: Initially corporate did not acknowledge the need to adjust the kitchen systems. They pointed to the fact that MFY worked in the test kitchens in Oakbrook, IL. Corporate headquarters' guidance to the franchisees was to add more people to the grilling area. However, this only increased cost and created congestion in the kitchen.

Interestingly, part of the solution to the issue was to enable the kitchen to produce small batches – a buffer stock – to support times of high demand such as breakfast and lunch. The MFY software even had the capacity to place predictive orders but using this functionality was not encouraged.

*Question: What is the current state of Made for You?*

RA: Currently, the new leadership (Jim Cantelupo at the time of the interview) is taking steps to address the issue. The menu has stabilized and corporate has placed its focus back on the core values of service, quality and cleanliness. Regarding MFY, a hybrid system is coming online that includes small cabinets to hold menu items as a buffer during peak-order times.

### A.3.2 An interview with Gilberto Garcia

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Interviewer: Mark P. McDonald

Interviewee: Gilberto Garcia, (GG:)  
IT Planning Director, CEMEX  
Monterrey, Mexico

Interviewer: Mark McDonald

Conducted via telephone on November 24, 2003

*Question: How does CEMEX view business process and the relationship with IT?*

GG: The company did a short discovery process in the 1990's and implemented the Business Process Center to make dramatic changes. The center had multiple skills including non-IT people. Their primary activity was the development and delivery of process maps that helped the company understand that "Relevance is in the process not in the systems."

Ready-Mix provides an example

The BP Center looked at other companies. For example, when the company needed to look at the Ready-mix business it looked beyond the practices of other cement companies. In this case, the Ready-mix industry relies on a production schedule that often changed very frequently and was difficult to meet. They need to change this root assumption to be able to get breakthrough performance. That change was to remove the assumption that demand was predictable – via scheduling. This led them to ask following questions: What is the process we are looking at, and who has the same process operating under similar constraints?

They looked for companies that have similar issues such as unpredictable and uneven demand. This led them to look at the Houston 911 center, Dominoes Pizza and FedEx call-centers because they had similar processes. The result was that they found ways to work without a customer schedule and take orders as they came, because they found similar processes for managing

unpredictable demand at these companies. The result is dramatic, with better resource utilization, improved customer service, and a competitive advantage, as they are able to deliver to customer demand.

### **Process and the IT organization**

In 1999, the CIO recognized that if IT was to continue to provide value, then it would need to do something different. The company at that time and since was growing by acquisition and there was a need to establish common processes and practices across companies. CEMEX uses JD Edwards that it installed in 1992. Originally, they had multiple configurations of the software and now they have a single common configuration.

The CIO, through his enterprise-wide role, recognized that there needed to be the same process for the same goals and objectives. That would support unified systems that would reduce the cost of maintenance and support. CEMEX reached these unified systems by 2000. This led to the creation of the CEMEX Way.

### **“The CEMEX Way”**

There are currently eight core processes at CEMEX that are done the same throughout the company – the CEMEX Way. These processes are conducted the same way with the same tools across the organization. Most are supported via the commercial ERP with the exception of Ready Mix, which is a custom application. These processes are:

Procurement	Accounting
Human Resources	Finance (treasury)
Operations	Planning
Ready Mix	Commercial and Logistics (including sales, distribution)

The company reached these core processes by using their current processes and standardizing across the organization: “We did not start from scratch, but from a collection of best practices.”

### **eGroups – organizational support for the CEMEX Way**

The CEMEX Way is supported by eGroups for each of these processes. eGroups are the process owners and are responsible for implementing the changes required in the business. The eGroups report to the CIO and have responsibility for the following:

- Business Process Innovation
- IT prioritization and budgeting for the applications supporting their processes

The eGroups have been a big help to the company's post-merger integration activities, as these standard groups enable the company to bring in an acquired company in six months versus the twenty-four months it used to take.

The eGroups report into the CIO and each has a sponsor who is an Executive Vice President (EVP). The EVP plays the sponsor role for that particular process. The implementation of process-centered approach has led the company to a three-tier organizational model.

Tier A – The single head of major processes, such as the “Chief Procurement Officer,” with responsibility for the process performance on an enterprise-wide basis.

Tier B – Coordinated processes, such as Human Resources, which operate at the regional level with some enterprise-wide standards but also require regional or national customizations.

Tier C – Local workforce, predominately in the sales and logistics areas. These are organized on a country/region level and are responsible for customer sales and service.

### **Process Standardization and Innovation**

The new standardized process and common metrics have actually helped CEMEX accelerate innovation as they have a common platform and benchmark in the core operations from which to prove the worth of the best

practice. That common platform facilitates deployment of best practices as everyone uses the same processes and systems, so they make the same changes with lower risk.

*Question: What has made it easy or hard to move toward process standardization?*

GG: Factors that have made it easier to move toward process standardization:

- A single focus on the needs of the customer is perhaps the biggest factor.
- A unified view of the portfolio of investments, both in the business and in IT.
- Success with establishing the CEMEX Way has created an environment where this type of change is possible.

Factors that made it difficult to move toward process standardization:

- They had 15 data centers when they started – they have now consolidated to three and are potentially moving to one or two.
- The software licensing structures from the different companies around the world.
- Overcoming turf boundaries to establish worldwide standards and processes as everyone thought that they were unique.

*Question: What is the technical and management environment for making this happen?*

GG: The company and its chairman, Mr. Zambrano, are real believers in the use of information. He is tech-savvy and that makes sponsorship of IT initiatives and the application of IT easier.

The company now has a single instance of JD Edwards installed and operational throughout the world.

The quality of the company's data has improved significantly, as there is now ONE set of data, ONE set of metrics, ONE set of reports and ONE interpretation. This enables the company to benchmark plant-to-plant to identify the innovative and best practice plants. This data quality has

enabled CEMEX to automate the creation of information without human intervention.

The management environment concentrates on “clusters of value” that enables the line management and plant managers to focus on the quality of the product and the efficiency of their operation. Managers do not have to worry about the other things as they are handled by others in the company.

*Question: What does the future hold now that you have been process-centric?*

GG: We started with IT and the declaration that there would be a single centralized CIO. As we have grown through acquisition, we are now able to bring new companies up on our systems within a month. This is a source of value as they are able to integrate acquisitions quickly. The cement business is highly fragmented and undergoing consolidation.

They are not fully satisfied with their customer satisfaction measures. They are looking for ways to innovate and become more present in the market.

They are concerned about how they will continue to improve. Process and efficiency improvements are largely facilitated through the eGroups and they have established a track record there. The concern is that radical innovation, like Ready-Mix, also has to happen.

They are confident it will happen, as the level of process standardization achieved to date enables the company to have greater flexibility.

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**Earnings Calls and Investor Presentations**

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## **Summary**

Architecting the enterprise: approaches for achieving performance, integration, consistency and flexibility.

Mark P. McDonald

Managing the enterprise in response to market and technology change is at the core of executive responsibilities and practice. The modern enterprise is increasingly complex, driven by greater market competition, customer segmentation and increasing use of information technology in products and services. These factors raise the level of performance executives must reach to manage responsibly.

Executives are turning to an evolving set of tools, management perspectives and models to manage enterprise challenges. Translating strategic and enterprise-level decisions to management and operational change requires achieving a level of integration and consistency to perform efficiently, while maintaining flexibility for the future. This research focus involves choosing case studies to define the theory, practices, and techniques that describe enterprise architecting.

In defining and evaluating the proposed enterprise-architecting method, this research seeks to address how an enterprise can increase performance without jeopardizing flexibility. It examines whether enterprises can increase performance and flexibility through following a deliberate design process that results in an enterprise architecture that improves integration and consistency. The investigation focused on evaluating a set of architecting propositions developed from a review of current research and case studies

Architecting an enterprise is a design process characterized by its way of thinking about the problem set and its relative priorities. Architecting way of modeling defines the structure and presentation of information generated by architecting activities that form the way of working. These models include a value network to capture trading-partner relationships, capability diagrams to describe the enterprise's operational dynamics and capability blueprints defining the integrated structure of capabilities.

Enterprise architecting experiences at CEMEX and Accenture provide findings for evaluating the architecting deliverable against the research propositions. CEMEX and Accenture each sought to implement large-scale change in response to strategic need and followed a structured approach to design and implement those changes on an enterprise-wide basis. Their experience and the fit of the architecting deliverable to the propositions support the research question. The architecting deliverables and processes provide a guideline for enterprise design.

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