UNIVERSITY OF GOTHENBURG

Developing an integrated conceptual model for portfolio-based IT management

A comparative case study of Volvo Group Portfolio Management Framework

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Summary

The 'Portfolio Approach' to managing Information Technology investments has become best practice for companies wanting to gain more value from IT. However, the relation to the IT management field remains elusive. Many attempts at IT management also appear isolated from the broader enterprise development processes. This thesis addresses this issue by arguing the need for an integrated and holistic view based on a 'soft systems' philosophy. Accordingly, the study aims to create a better understanding of IT management by creating a conceptual portfolio-based model for the development of large enterprises towards a softer and integrated view. The following question is analysed: *What essential aspects should be demonstrated by a portfolio framework for managing the development of an enterprise with respect to its IT investments?* The study therefore defines four critical orientations of interest.

Holistic-oriented enterprise development refers to hard and soft aspects of the enterprise from an information and knowledge perspective.

Proactive outcome-based enterprise development refers to enterprise development that is the result of and driven by outcomes.

Management-oriented enterprise development refers to four ways of carrying out management of enterprise development: planning, negotiating, judging, and inspiring.

Integration-oriented enterprise development refers to integration between approaches within an enterprise development model.

This thesis used a single qualitative case study approach taking a broad high-level perspective on IT management, Enterprise Architecture and IT Governance.

Keywords: Portfolio Management, Framework, Model, Approach, IT Governance, Enterprise Architecture, IT Management, Strategic Information Systems Planning, Volvo Group

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Lastly, to my wife, family, and parents-in-law: Without your support, this work would have not been possible.

"We cannot solve our problems with the same thinking we used when we created them"

- Albert Einstein

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1 Introduction

This section presents the background to this research project, the problem statement leading to the aims and objectives, and the limitation of scope and outline of this study.

1.1 Background

Information technology (IT) has become vital for doing business and has been a major enabler of new business models and collaboration. Today, strategic alliances and networks are commonplace and IT is an inherent part of the value system, in which information plays a key role. As a result, IT is a critical factor in both the running of the business and within its enterprise development initiatives. Gaining value from a company's IT investments has however been difficult due to problems caused by organically grown architectures of often duplicated systems, increasing and inconsistent data, and rudimentary integration. To make matters more complicated, mergers and acquisitions and the ever changing role of IT has also contributed to make the IT landscape and its legacy systems unwieldy and costly (Magoulas & Pessi, 1998; Ward & Peppard, 2002; Ward, 2012). There are also numerous examples of expensive project failures which can be traced back to projects' increasing size and intricacy, lack of retrospective and learning, and the failure to integrate IT into the wider policy and business change programmes (Nelson, 2007; Ward, 2012). Concurrently to these issues, external pressures such as the increasingly competitive environment and pace of change are forcing companies and executives to increase efficiency, decrease cost and truly justify the business value of IT (Maizlish & Handler, 2005; Ward, 2012).

To this end, IT management and its related fields have received growing attention. One broad stream of research and related practices has focused on the process of designing and using models and principles as a means and blueprint for driving enterprise development and IT modernization. Although the field has come to be known as Enterprise Architecture (EA), a uniform interpretation has been lacking and EA has been addressed and used for a variety of purposes (Zachman, 1987; Lapkin, et al., 2008; GAO, 2010). Hence, there are numerous EA-guides or frameworks available falling short on their commonality (Session, 2007; Magoulas, Hadzic, Saarikko, & Pessi, 2012).

IT Governance (ITG) is another stream of research and related practices that addresses the direction and control of IT decisions. ITG is growing in importance and is used for ensuring that IT: (1) is strategically aligned with the business; (2) delivers value; and (3) manages risks, resources and performance (Brown & Grant, 2005; Romero, 2011; Oliver & Lainhart, 2012). ITG also relies on various processes such as 'Strategic Information Systems Planning' (SISP) (Brown, 2006). SISP research has mainly been from an IT-centric perspective and has been subject to a range of different viewpoints, schools of thought and definitions (Chen, Mocker, Preston, & Teubner, 2010). Notwithstanding, many views on SISP involve selection and management of a range of investments, often by aggregating them into collections or portfolios, which share similar characteristics. Markowitz (1952) firstly introduced this concept in the financial field and its adoption is now widespread. For example, centrally managing collections of projects using Project Portfolio Management practices is a common approach to achieving strategic objectives (Project Management Institute, 2006). The ratification of IT Portfolio Management as a 'best practice' for governing the value, risks, costs, useful life, and interrelationships of IT also suggests that it is a critical approach in the current difficult economic times (McFarlan, 1981; Jeffery & Leliveld, 2004; Maizlish & Handler, 2005; Ward, 2012).

1.2 Problem statement, aims, and objectives

Despite the general importance of portfolio management, and in particular the 'Portfolio Approach' to managing IT investments, literature on their relation to IT management is sparse. Additionally, many attempts at IT management have failed to integrate into the much broader enterprise development processes (Ward, 2012). Consequently, the management of the IT portfolio becomes a relatively isolated part of the whole enterprise. This may result in a problematic situation as the challenges inherent in IT and its management clearly stretch beyond the IT unit (Ward & Peppard, 2002). Furthermore, most attempts within IT management lack a holistic view, leaving soft aspects of the enterprise, such as knowledge, goals, culture, norms, and values, outside their scope (Magoulas et al., 2012). Such model of IT management will therefore provide limited opportunities for determining the *real* value of IT investments.

The underlying systemic philosophy and mindset causing this phenomenon can be traced back to the dictum that the whole is *no more* than the sum of its parts (see Simon, 1962). According to Simon's theory, complexity should be sealed off into units within a 'nearly decomposable system'. It follows that IT management would involve describing its processes and its *internal* relationships. Hence, it cannot explain its role from a global perspective. It also follows that each attempt at business development, systems development, or competence development are viewed as independent activities, which each work to their own individual pace (Magoulas & Pessi, 1998). Additionally, the ground for this mindset is artificial and directed by rules. It therefore considers IT investments towards an increase in computerisation, formalisation, bureaucratisation, and therefore dehumanisation of the organisational system (Ackoff R. , 1973; Ackoff & Gharajedaghi, 1996).

The alternative is the case of an integrated mindset that acknowledges that the whole is *more* than the sum of its parts (Churchman, 1968; Ackoff R. , 1973). This mindset is social, participative, and directed by human goals (short-term and long-term) and relationships (see Mintzberg (2009) for contemporary discussion in management literature). It therefore considers IT investments towards support for human information processes, more communication and commitment, more motivation, and therefore the recreation and maintenance of social environments. It follows that only this 'soft' philosophy creates the condition under which integration can occur.

Considering the current issues present within IT management, there is a need for an integrated and holistic view. This urges a new way of thinking that creates a better understanding of IT management as an integrated part of the enterprise and its development. Such model of IT management therefore requires a soft systems approach that acknowledges the requisites for integration, coordination, participation, and commitment. To change current mindset is not an easy task – it is time consuming, full of conflicts, and expensive – yet an apparent necessity for enterprises wanting to gain more value out of their IT investments.

This thesis therefore aims to create a better understanding of IT management by creating a conceptual portfolio-based model for the development of large enterprises towards a softer and integrated view. This will be carried out by focusing on the following problem statement:

What essential aspects should be demonstrated by a portfolio framework for managing the development of an enterprise with respect to its IT investments?

Results should provide a meaningful body of 'know-how' knowledge upon which public and private businesses in general, and large industrial organisations in particular, can manage their portfolio-based development.

1.3 Limitation of scope

Four main areas have been discussed when proposing theory: (1) ‘Strategic Information Systems Planning’; (2) Enterprise Architecture; (3) IT Governance; and (4) IT Portfolio Management. Although important in an IT management context, a discussion on Alignment, Knowledge Management, and IT infrastructure have been excluded. The study is based upon a high-level approach. This means any details, such as tools and methods, are outside scope. The line of reasoning follows the soft systems philosophy.

1.4 Outline

This study is organised as follows: Chapter 2 explains the research methodology of this study, briefly introduces the case company, and presents the selected guiding theory used in theory creation. Chapter 3 is the theoretical framework, which presents a broad view on IT management. Chapter 4 outlines a suggestion for essential aspects in accordance with the purpose and research question of this study, and presents the questions used for analysis. Chapter 5 is the Volvo Group case presentation, reflecting an overview of their approach to managing IT investments. Chapter 6 is a discussion and comparative analysis of proposed theory and the empirical views. It essentially tries to justify the relevance of proposed theory. Lastly, chapter 7 presents the conclusions, quality control of the thesis, and suggestions for further research.

2 Research methodology

This chapter describes the philosophical underpinnings and research design of this study.

2.1 Philosophical underpinnings

This study is based on a hermeneutic and interpretative perspective as it allows the researcher to interact with, and become part of, the situation of interest (Kinsella, 2006; Walsham, 2006). As expressed by Kinsella (2006), hermeneutics: (1) seeks to understand rather than explain; (2) acknowledges the situated location of interpretation; (3) recognises the role of language and historicity in interpretation; (4) views inquiry as conversation; and (5) is comfortable with ambiguity. This makes a hermeneutic approach well suited for interpretative research within social sciences in general and, as recognised by Klein & Meyers (1999), within information systems in particular. Interpretive research within the information systems field is according to Walsham (2006) well established and is typically associated with case studies, ethnographies and action research. These can be separated by the researcher's style of involvement but have in common the ability to potentially produce deep insights in information systems phenomena, such as the management of information systems. It is however important to understand that knowledge within this view is not seen as an objective or final truth, but rather as an understanding of a socially constructed reality consisting of assumptions about the parts that make up the whole (Klein & Myers, 1999).

2.2 Research framework

The rigor and relevance/reliability of the research conducted are two important factors for performing high quality research. To achieve this, this study utilised a modified version of the research framework by Hevner, March, Park & Ram (2006) (see Figure 1). Additionally, this study acknowledges that the results of testing a theory has to be judged by either deciding whether to trust the evidence and revise or reject the theory, or to distrust the evidence and redesign the instrument used for testing (see Hedberg & Jönsson, 1978).

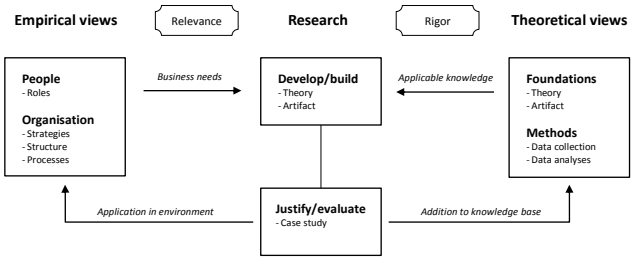


Figure 1: Research framework (adapted from Hevner et al., 2006)

2.3 Research process

This section describes the research process of this study. It includes the research strategy, a literature review, data collection, and data analysis.

2.3.1 Research strategy

The research was conducted according to the process described in Figure 2. A case study methodology was chosen due to its inherent fit with interpretive research in information systems and to the aim of this study (Walsham, 2006). Indeed, case studies are appropriate for examining complex phenomena and give the ability to understand both the context of a system and how the system influences and is influenced by the context (Klein & Myers, 1999). A single case was chosen as it allows close involvement through in-depth access to people, issues, and data, and may also enable relevant contributions to practice (Walsham, 2006). The author recognises that a multi-case approach is more compelling for generalising results and ensuring the relevance of the research contribution. However, a multi-case approach presupposes relevant similarities between two or more cases (see Orlikowski, 1993) and can therefore be hard to attain given the limitation of resources for this study.

The central idea and purpose of this study was to create a better understanding of IT management by creating a conceptual portfolio-based model for the development of large enterprises towards a softer and integrated view. To achieve this, a literature review was conducted. After that, the study entered a theory building stage where essential aspects were suggested and relevant questions for further investigation were designed. These would serve as a foundation for testing the relevancy of the new theory. Data was thereafter collected which was systemised and analysed comparatively. Conclusions could lastly be drawn.

Figure 2: The research process

2.3.2 Literature review

A literature review is an essential first step for research projects and is the means for creating a theoretical framework (Levy & Ellis, 2006; Walsham, 1995). Following the directions provided by Levy & Ellis (2006), systematic keyword searches were made. Gothenburg University Library and Chalmers University of Technology Library search engines and Google Scholar were the primary means for the searches. However, database vendors such as ProQuest, ElSevier, IEEE, ACM, JSTOR, Blackwell, EBSCOhost and Emerald Insight were also used. To further build the theoretical framework, a backward and forward search (see Webster & Watson, 2002) was also conducted reviewing references of the article found and references to the article, in order to finalise a literature overview. Comprehensive searches are important, especially for research within the information systems field, because of the large dispersion of literature.

Where possible, articles were selected from highly respected sources such as MIS Quarterly, Harvard Business Review and Journal of Strategic Information Systems. However, as the IS/IT field is broad and diverse other sources had to be considered. Additionally, practitioner articles and books, and government documentation were also discussed.

2.3.3 Data collection

Several qualitative data collection methods were used. The primary sources were in the form of interviews and conversations, and document collection.

Interviews and conversations
The relevant areas derived from the theoretical contribution of this study served as a foundation for collecting data. These were the lens when interacting with respondents and collecting documents. Most interviews and conversations carried out were however unstructured or semi-structured, being tailored to the language and situation at hand. The first interview was electronically recorded. This would serve as an experiment to find out what would work when taking into account the political environment, personal disposition of interviewees, and the nature of the specific interview environment. Indeed, as Murchison (2010) points out, it is important to carefully consider the feasibility of using a recorder to record interviews or conversations. As most data collected from this case study was based upon informal and unstructured interviews and conversations a recorder was not possible as it was difficult to have at hand and could even risk interfere with and have undesirable effects on the respondent. Instead, field notes were taken both during and immediately after each conversation and/or interview as elements may otherwise have been misinterpreted or not remembered at all (Murchison, 2010). The notes were stored in a computerised ‘research database’ along with relevant documents collected during the research.

2.3.4 Data analysis

A comparative approach for analysis was used. The essential aspects from the theoretical contribution served as a base when creating a table used in the analysis. In this way, theoretical and empirical views could easily be compared and allow for highlighting and discussing gaps between theory and practice.

2.4 Introduction of the case

This section presents the case company, its background, and the respondents of this study.

2.4.1 Volvo Group

Volvo Group was selected as it is a large internationally renowned organisation that has taken an interest in a portfolio-based approach. Volvo Group is a global manufacturer of trucks, buses, construction equipment and marine and industrial engines. The Group also provides solutions for financing and services. Headquartered in Göteborg, Sweden, it employs around 115 000 people, resulting in a diverse workforce with regards to language, culture and ethnicity.

Over the last 18 months, Volvo Group has undertaken large structural changes. Among other things, this has resulted in the establishment of seven corporate management functions responsible for developing standards for the entire organisation through policies, directives and guidelines. The Group's business activities are organised into six business areas: (1) Group Trucks; (2) Construction Equipment; (3) Buses; (4) Volvo Penta; (5) Governmental Sales; and (6) Volvo Financial Services (see Figure 3).

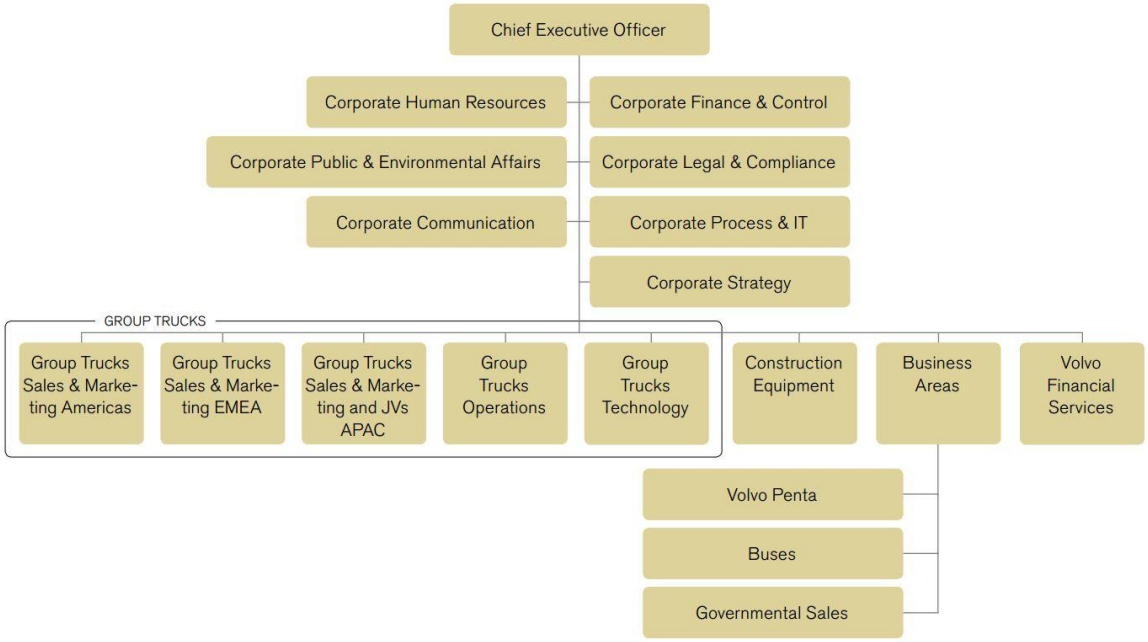


Figure 3: Volvo Group Organisation (Volvo Group)

2.4.2 Portfolio management at Corporate Process & IT

The empirical fieldwork was carried out within the function 'Solution Portfolios' at Corporate Process & IT (CP&IT). Figure 4 presents the organisation of CP&IT.

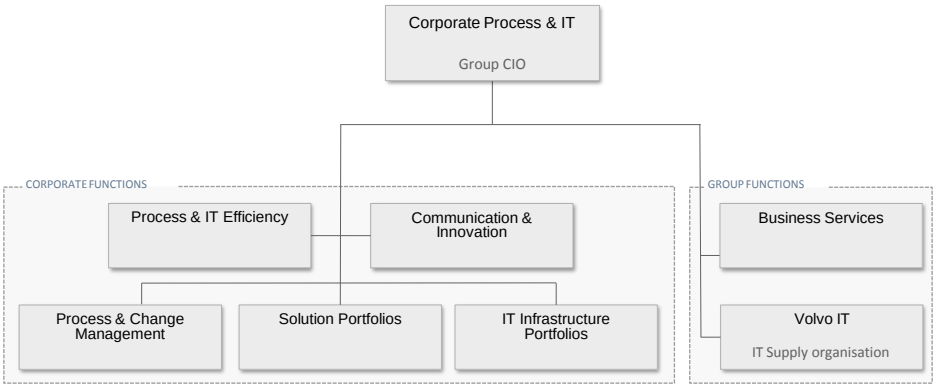


Figure 4: Corporate Process & IT organisational chart (Volvo Group)

The Solution Portfolios function is organised as shown in Figure 5. Apart from a Portfolio Office, there is also an Enterprise Architecture function, and an organisation that reflects four new mega-processes within the Group, namely: (1) Develop Product and Aftermarket (DVP); (2) Market & Sell Total Offer (MAS); (3) Produce & Distribute Products (PRD); (4) Deliver & Develop Customer Loyalty (DCL); and additionally a management and support function.

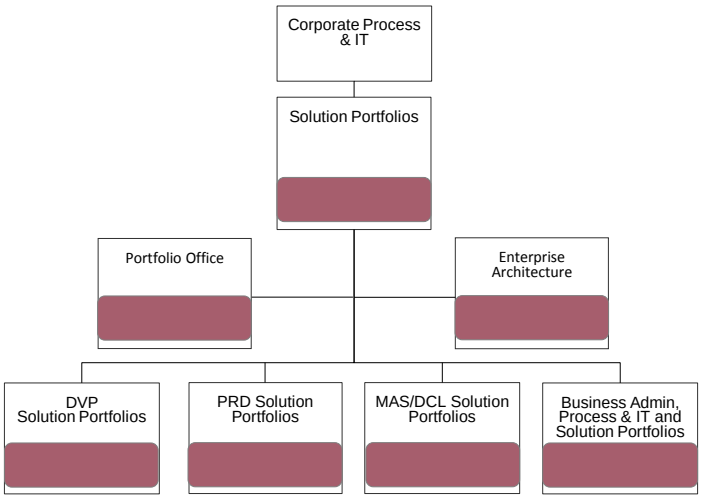


Figure 5: Solution Portfolios organisation chart (Volvo Group)

2.4.3 Respondents

All respondents had a role within CP&IT and were selected mainly from the basis of the scope implied by the questions used in the case study and the respondent's respective area of work. Table 1 presents the respondents by their real names, role, and area of work. Ethical considerations have been made and the Group has allowed publishing of all material in this study.

Respondent	Role	Area of work
1. Berit Alenvik	Director	Portfolio Office (PO)
2. Thomas Klahr	Manager	Application Portfolio Management (APM)
3. Anders Malmsten	Manager	Project Portfolio Management (PPM)
4. Ulrika Gransfors-Wellemets	Manager	Solution Management Process (SMP)
5. Stefan Brunzell	Director	Strategy & Planning (SP)
6. Mats Persson	Enterprise Architect	Enterprise Architecture (EA)
7. Charles Jobson	Director	Enterprise Architecture (EA)
8. Lars Wemme	Manager	P&IT Efficiency
9. Torsten Billing	Manager	Information System Global Development Process(IS-GDP)

Table 1: Respondents in this study

2.5 Selection of guiding theory

Guiding theories are chosen to be able to synthesise theory and create a theoretical contribution (Pan & Tan, 2011). Four existing contributions have been chosen for this study:

1. Thomsons' (1967) decision-making strategies due to their natural fit when discussing management generally and in particular portfolio management.
2. A classification of perceptions within IT management (Magoulas & Pessi, 1998), in order to map out the field and also choose the following two contributions
3. 'Framework for understanding Enterprise Morphology' (FEM) (Svärdström, Magoulas, & Pessi, 2006; Magoulas, Hadzic, Saarikko, & Pessi, 2012) due to its substantial holistic view of the organisation.
4. 'Soft Systems Methodology' (SSM) (Checkland, 1985, 1989) due to its process-based holistic view of development and change.

These theories are imperative when considering informatics as a design and research field, IT management, portfolio management, and the aim of this study.

2.5.1 Thompsons' decision-making strategies

James Thompson is a classic figure in organisation theory. In 1967, he claimed that uncertainty is the fundamental problem for complex organisations (Thompson, 1967). Accordingly, he stated that uncertainty affect decision-making. The preferred way of making decision will therefore depend on the degree of uncertainty. Thompson observed two dimensions: (1) beliefs about the cause/effect relation for producing an outcome; and (2) preferences regarding what outcomes would be most desirable. These, in turn, form a matrix highlighting different decision-making strategies (see Figure 6).

If preferences and how to carry them out are clear, decision makers must merely find out about the requirements of the task and then assure that they are met (computational/planning). If the outcome is agreed but the considered means for getting there are uncertain, it is necessary to exercise judgement in decision-making. When preferences are unclear but the means for producing various outcomes are known it is necessary to compromise in order to focus the efforts. When both outcomes and how to reach them are uncertain, inspiration is needed in order to produce a radically new approach for the opportunity.

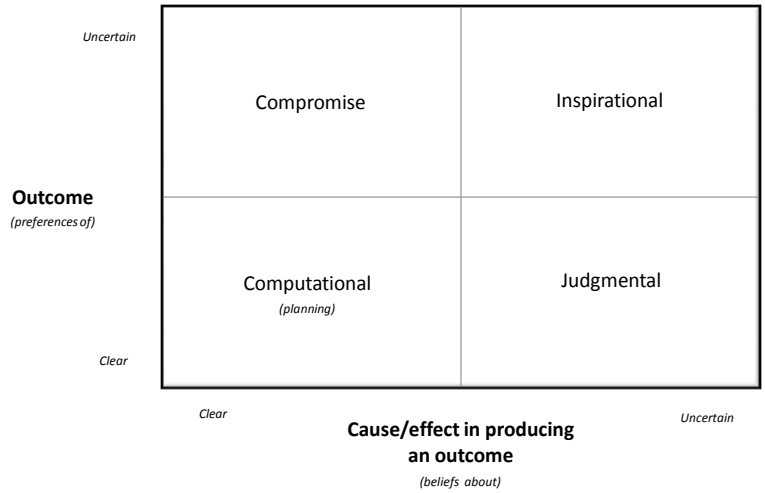


Figure 6: Thompsons' decision-making strategies

2.5.2 A classification of perceptions within IT management

Magoulas & Pessi (1998) observed an uncoordinated structure around existing perceptions and guidance (such as approaches and methods) within the IT management field. They suggested that this could be problematic for creating a requisite understanding for managing IT. A classification scheme was therefore developed in order to enable better coordination of existing knowledge. It consists of four different views (see Figure 7):

1. The 'substantial' is concerned with the product (artefact) and can be used for understanding how something is organised and works.
2. The 'process' refers to a set of activities and how decisions are made – describing how reality changes.
3. The 'descriptive' refers to maintaining and preserving existing views of reality – describing something as it currently is.
4. The 'prescriptive' refers to creating alternative views of reality – describing something as it can become.

While the scheme can make existing guidance within the field more explicit, it can also be used for mapping out the actual knowledge requisite within IT management as a design science. Indeed, as Hevner et al. (2004) pointed out, it is necessary to recognise that design is both a process (set of activities) and a product (artefact). In this way, it supports problem-solving as the two perspectives can be used to reflect the same complex problem.

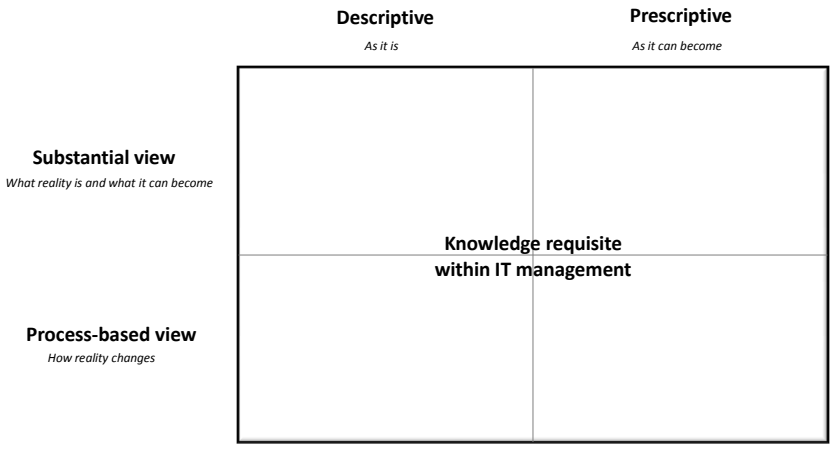


Figure 7: A classification of perceptions within IT management (Magoulas & Pessi, 1998)

2.5.3 Soft Systems Methodology

SSM provides a way of thinking and acting around problems that cannot be easily defined or solved, as they appear in an environment surrounded by and consisting of people. Hence, it is a critique against the engineering tradition, or hard systems thinking. This is based on an assumption that a problem and its associated solution can be rationally solved by seeking to define the objective and then manipulate models of the situation and calculate interdependences within the system of components. The approach has failed many times when dealing with normal management situations. SSM is a further development of hard systems thinking and recognises the social process necessary for taking steps toward changing a problematic situation. Hence, it is based on an assumption that every human being has different backgrounds and ways of perceiving the world. As a result, decision-making must take into account different wills and perceptions as well as considering the interdependence of components. This makes the 'soft systems approach' well suited for issues within enterprise development. It has been defined by seven general steps (see Figure 8) (Checkland, 1985; 1989):

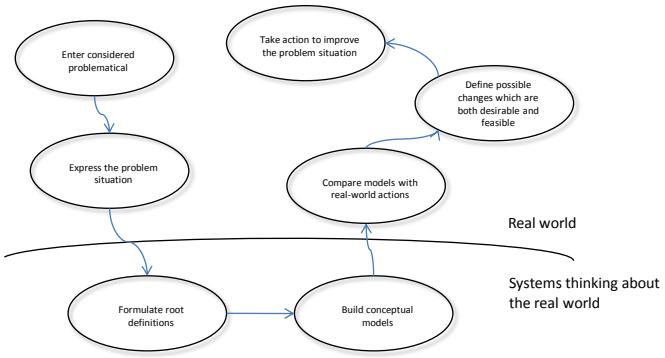


Figure 8: Soft Systems Methodology (Checkland, 1989)

1. People enter a perceived problem area.
2. The problematic situation is expressed in the richest way possible using different techniques depending on situation.
3. Root definitions are determined. These are key as they address the essence and purpose of a situation by defining six key areas as expressed in 'CATWOE'

(Customer, Actor, the Transformation process, Weltanschaung (world view), Owner, and Environmental constraints).
4. Conceptual models are built based upon the root definitions.
5. Comparing the models with reality in order to facilitate debate for the next step.
6. Making decisions on changes that are both desirable and feasible, and therefore bring about improvement to the problem situation. The changes must be coherent with the root definitions.
7. Carry out the decided changes by taking action.

2.5.4 Framework for understanding Enterprise Morphology

FEM is influenced by the MIT90s framework for organisational research. It takes into account and aims at synchronising three well-established dimensions to change, which has been explained by Tichy (1982) as the technical, political, and cultural systems of an organisation. FEM consist of five integrative components defining the architecture of the enterprise from an information and knowledge perspective: (1) domain of current and planned information systems and information technology; (2) domain of power and organisational structure; (3) domain of activities and processes; (4) domain of culture, goals, strategy and values; and (5) domain of actors and their knowledge (see Figure 9). These components make up the whole. Activities and structure form the mechanistic and 'hard' aspects, while actors and culture, goals, strategy and values form the humanistic and 'soft' aspects. The model can be used as a lens when considering a holistic view of the organisation and its development (Svärdström et al., 2006; Magoulas et al., 2012).

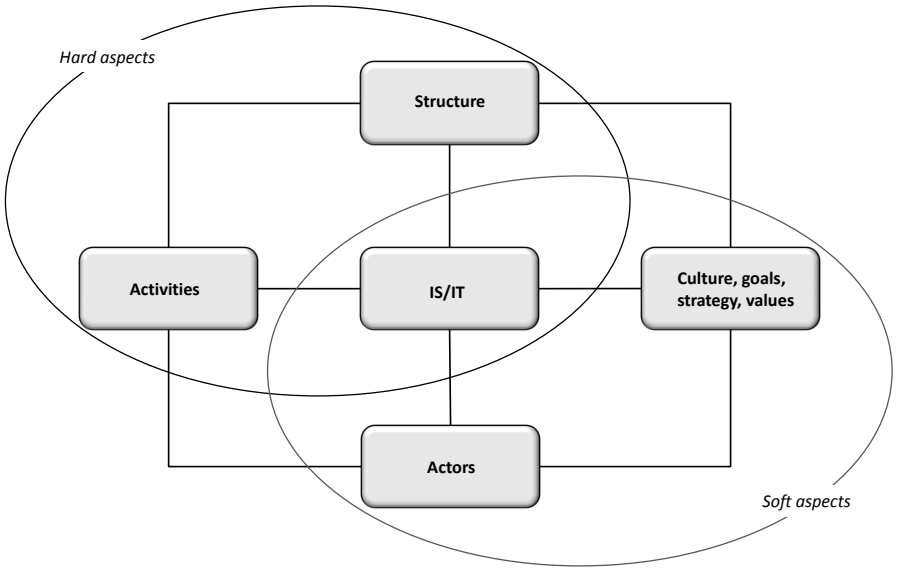


Figure 9: FEM (adapted from Magoulas et al., 2012)

3 Theoretical framework

This chapter is an attempt at reviewing and providing the reader with a basic understanding of the IT management field. Firstly, the term management itself is briefly explored and the planning and strategic perspective of IS and IT are described. Secondly, the term Enterprise Architecture is introduced and explained. Thirdly, the field of IT Governance is presented, including IT Portfolio Management. Lastly, a short summary is provided.

3.1 Management and its relation to information technology

Much of the research into management has been facing issues of ambiguity. What is management? Depending on whom one asks the answer may differ. Historically, the focus pointed strongly towards planning, organising, coordinating and controlling. However, researchers such a Mintzberg (1990) have highlighted that actual managerial work involves tasks and roles suggesting otherwise. Ackoff (1998) defines management as involving the directing of others in the pursuit of ends using means both of which have been selected by the manager. Although management can constitute many things, perhaps more important, as pointed out by Tsoukas (1994), is investigating synergies between different assumptions of management. He suggested that it consists of four interrelated areas of interest: (1) management roles, dealing with observable practises of managers; (2) management tasks to be carried out; (3) management functions, i.e. planning, organising, leading, controlling; and (4) the causal powers of management, referring to the ability to control the transformation of labour power to actual labour, elicit cooperation, and drive towards efficiency and effectiveness of resource use. The difference between efficiency and effectiveness is according to Ackoff (1998) of great concern as the former is a measure of how well resources are used to achieve ends, that is ‘doing things right’, while the latter will depend upon values of the ends achieved, it is a matter of ‘doing the right things’.

What constitutes management of IT? To further investigate this matter, it is necessary to discover the field of information systems (IS) and associated technologies in further depth.

3.2 Strategic Information Systems Planning

Before setting out on exploring IS and IT and its management, it is useful to define what is actually meant by the two terms. Information systems (IS) have existed in organisations long before the introduction of information technology (IT) and are, as Ward & Peppard (2002) point out, still present today with no technology in sight. They are the means used by people and organisations to utilise, gather, process, store, use and disseminate information. The field of IS therefore concerns social aspects such as the human language and communication, and will in turn change as changes occurs in social patterns. IT refers to technology serving, supporting or even automating IS. Examples of such technology are servers, storage, software and networks. Hence, there would be little meaning to IT without existence of IS. Another commonly used term is ‘Application’, which refers to the use of IT to address a business activity or process (Ward & Peppard, 2002).

3.2.1 A historic perspective

Initially, IT was merely a means to solve isolated computational problems. However, it has since the early years become considerably more important taking over activities from the

human worker, and become highly integrated into the business (Aerts, Goossenaerts, Hammer, & Wortmann, 2004). The role of IT is changing. To demonstrate, a classification into eras is a useful exercise. Table 2, based on Ward & Peppard (2002), summarises these and show their basic objectives respectively.

Time	Era	Objective
1960s	Data processing	Improve operational efficiency by automating information-based processes.
1970s-1980s	Management Information Systems	Increase management effectiveness by satisfying their information requirements for decision-making.
1980s-1990s	Strategic Information Systems	Improve competitiveness by changing the nature or conduct of business (i.e. IS/IT investments can be a source of competitive advantage).
2000s	IS capability	Developing organisational competencies to manage IS/IT strategically.

Table 2: Historic development in IS/IT divided into eras (Ward & Peppard, 2002)

Although the eras are stated chronologically in a sequence, it is important to note that each era subsumes the ones before. This therefore demonstrates how the role of IS/IT has changed and grown (Ward & Peppard, 2002). Perhaps it is the result of that which has caused the planning of IS and IT to be a great challenge in many organisations. This challenge becomes apparent when exploring how IS and IT has caused confusion in the IT management field, and how difficulties in managing and leveraging the potential of IT have emerged. Research has even indicated that practice claims academic research to ignore 'the real problems', which may be due to misleading academic assumptions about the role of IT management in practice (Teubner, 2007). The IT management field is indeed problematic.

So what do we know? Recognising the need for a theoretical and practical guidance in planning for IS and IT, Lederer & Salmela (1996) attempted a definition of what has come to be known as 'Strategic Information Systems Planning' (SISP). According to the authors SISP is "*the process of identifying a portfolio of computer-based applications that will assist an organization in executing its business plans and realizing its business goals"* (Lederer & Salmela, 1996, p. 238). However, as noted by McBride (1998), Ward & Peppard (2002) and Ward (2012), there are several definitions of SISP and other related terms such as 'Information Systems Planning' (ISP), 'Information Systems Strategies' (ISS) and 'Information Systems Strategy Planning' (ISSP). Additionally, many definitions share a formal-rational IT-centric perspective and do not take into account the often dynamic and continuous change inherent in many contemporary organisations. The issue of deliberate and emergent strategy brought forward by Mintzberg & Waters (1985) is therefore highly relevant within SISP. In fact, the area of SISP is facing similar problems to the field of 'Strategic Management' regarding viewpoints, schools of thought and definitions. Indeed, as Chen, Mocker, Preston & Teubner (2010) point out, ISS is a term widely used but not fully understood.

3.2.2 Approaches to SISP

Earl (1993) stated that the literature in the field of SISP recommends that it should target the issues of: (1) aligning investments in IS with business goals; (2) exploiting IT for competitive advantage; (3) directing efficient and effective management of IS resources; and (4) developing technology policies and architectures. However, he also noted that SISP cannot be entirely understood without consideration of its three integral parts, namely the formal methods used in planning, the planning process and the implementation of the plans. Viewing these as a whole provides a more complete way of describing SISP, and thus Earl found five different approaches to SISP which was further developed into four distinct approaches by Doherty, Marples & Suhaimi (1999):

- **Organisational**: SISP is based on a common understanding of how IS/IT can achieve overall organisational goals and constitutes continuous decision-making integrated between the IS function and the organisation. The IS function therefore must work in close collaboration with the business. The approach uses methods and techniques such as value analyses, workshops, and vendor visits when needed. Necessarily, it also has a strong focus on implementation and learning. IS/IT-strategies often emerge from ongoing organisational activities, rather than being pre-planned. The approach is rather informal and unstructured, but could become a natural part of the organisation and provide successful implementation.
- **Business-led**: IS/IT is considered a strategic resource and IS/IT plans are derived from the business plan. However, SISP is often substantially delegated to the specialists and top management may therefore be unsure of the recommendations and be hesitant to commit resources. The experts may also find that the business strategies are neither clear nor detailed enough to specify IS needs. A comprehensive strategy may enable strategic alignment, but could also hinder the organisation from seeing new possibilities.
- **Administrative**: Has a strong emphasis on IT-capital, budgets and resource planning, enabling consistent approval and management of IT-investments. The outcome is often a one-year or multi-year development portfolio of approved projects. The approach can produce transparency and a common understanding of the SISP procedure, encouraging application development requests. However, it may not be seen as strategic, suffer from absence of radical change proposals, lack strategic thinking, be dominated by ‘business as usual’ and inertia, subjected to politics in the resource allocation procedure, and may lead to resource-constraining rather than resource planning.
- **Systematic**: Constitutes Earl’s method-driven and technological approach. The method-driven approach is characterised by an understanding that SISP is enhanced by, or depends on, use of a formal technique or method, where choice is often influenced by a vendor or consultant. It can help identify needs and possibilities for IS by analysing business processes and point out shortages in current practices, but may also meet resistance or lose credibility. The technological approach views SISP as the process of producing a detailed plan, model or blueprint of applications, data and communication and is often conducted by IS/IT-experts using formal methods. It has a strong emphasis on activities, processes and data flows and requires considerable effort and resources. Although it may be useful by limiting its scope, its validity has been questioned.

Earl (1993) suggests the organisational approach may be superior for organisations wanting to adopt or further develop its SISP practices. However, as Doherty et al. (1999) point out, success will depend upon an appropriate match of SISP approach and organisational needs.

3.2.3 IS and IT strategies

IS and IT strategies are important components within SISP (Ward & Peppard, 2002). However, as indicated earlier, the area of strategy has been subject to many interpretations and discussions. Mintzberg, Ahlstrand & Lampel (1998) has made an attempt at clarifying the field by setting out on a 'strategy safari' explaining ten different but related strategic schools of thought. This not only shows that strategies are elusive, it also highlights that a 'one best way' is unlikely. If strategies in general are subject to confusions and different interpretations, then IS and IT strategies and what actually constitutes IT Management would be too. This is still an issue as of this day (Chen et al., 2010; Ward, 2012).

According to Ward & Peppard (2002) the IS and IT strategic planning process involves inputs and outputs which defines its scope and areas of interest. The inputs and outputs can be grouped into several important domains according to Table 3 below:

Inputs	Outputs
Internal business environment: • The business strategy and the intended means of achieving the objectives. • Business processes, activities, and the main information entities and how they relate to other entities. • Organisational environment, including its structure, assets and skills, knowledge, competencies, values, style, culture and relationships. **External business environment:** • The economic, industrial and competitive climate in which the organisation operates. **Internal IS/IT environment:** • IS/IT perspective in the business, its maturity, business coverage and contribution, skills, resources, infrastructure, existing, planned, or budgeted systems and systems under development. **External IS/IT environment:** • Trends and opportunities and use of IS/IT among customers, competitors and suppliers.	**IS/IT management strategy** • Common elements of the strategy applicable to the whole organisation. **IS-strategy** • Describes the organisations requirements in terms of what to do with information, systems, technology and applications to achieve its objectives. **IT-strategy** • Describes how technology will be used to deliver information and how the technological resources are managed to meet business needs.

Table 3: Inputs and outputs of an IS/IT strategic planning process

While the guidance from Ward & Peppard (2002) may prove useful, it is important to note that the definitions are only attempts. Planned strategies are after all, arguably, only meaningful if implemented. Ward (2012) point out that many organisations keep focusing on planning and strategy making while little time is given to how to implement the strategy.

Trying to address poor performance in implementing strategies in general, Pellegrinelli & Bowman (1994) suggested that projects are effective mechanisms for strategy execution. Projects are however subject to difficulties and needs clear definitions and boundaries along with suitable learning mechanisms as circumstances change. The authors therefore suggest a programme approach for managing these issues. A programme is according to the authors a framework for grouping existing projects and defining new ones. It manages projects in a

coordinated way in order to reach benefits hard to attain if managed independently. Projects and programmes are indeed effective vehicles for change and have been used for this purpose for a considerable time (Project Management Institute, 2006).

3.3 Enterprise Architecture

This section firstly introduces Enterprise Architecture (EA) and its main concerns. Two main architectural principles are thereafter explained, followed by a view of EA as strategy. A section on managing EA is lastly presented.

3.3.1 An overview of Enterprise Architecture

Research and practice of EA is relatively new and was conceived from the desire to manage the increasingly complex landscape of IS and difficulties aligning them to the business (Zachman, 1987; Sowa & Zachman, 1992; Session, 2007; Land, Proper, Waage, Cloo, & Steghuis, 2009). Much has happened since the original 'Zachman Framework' which addresses the definition and capturing of a blueprint describing the IS/IT architecture from several perspectives. With later developments, a different view has emerged. GAO (2010) has accurately explained this new role of EA:

> "*Effective use of enterprise architecture is a hallmark of successful organizations and an essential means to achieving a desired end: having operations and technology environments that maximize institutional mission performance and outcomes. Among other things, this includes realizing cost savings through consolidation and reuse of shared services and elimination of antiquated and redundant mission operations, enhancing information sharing through data standardization and system integration, and optimizing service delivery through streamlining and normalization of business processes and mission operations.*" (GAO, 2010, p. 2)

This view implies that enterprise development ought to be governed by the EA as it helps simplify, streamline, and clarify the interdependencies and relationships within an enterprise. However, the existence of a variety of definitions of EA, ranging from IT-centric to a process for enterprise development, suggests that the field is still maturing (Land et al., 2009). Indeed, a Gartner research report (Lapkin, et al., 2008) highlighted that EA means significantly different things to different organisations, implying numerous conflicting interpretations. Gartner's view puts a strong emphasis on the EA process, which is claimed to deliver business value by producing:

- An articulation of the strategic requirements of the enterprise.
- Models of the future state, which illustrate what the enterprise should look like across all EA viewpoints in support of the business strategy.
- A roadmap of the change initiatives required to reach that future state.
- The requirements, principles, standards and guidelines that will steer the implementation of change initiatives.

Similarly, Land et al. (2009) identify EA as a means to analyse and express: (1) an existing situation; (2) the strategic direction; (3) gaps; (4) tactical plans; (5) operational plans; and (6) future solution architectures. This is expressed in Figure 10 below.

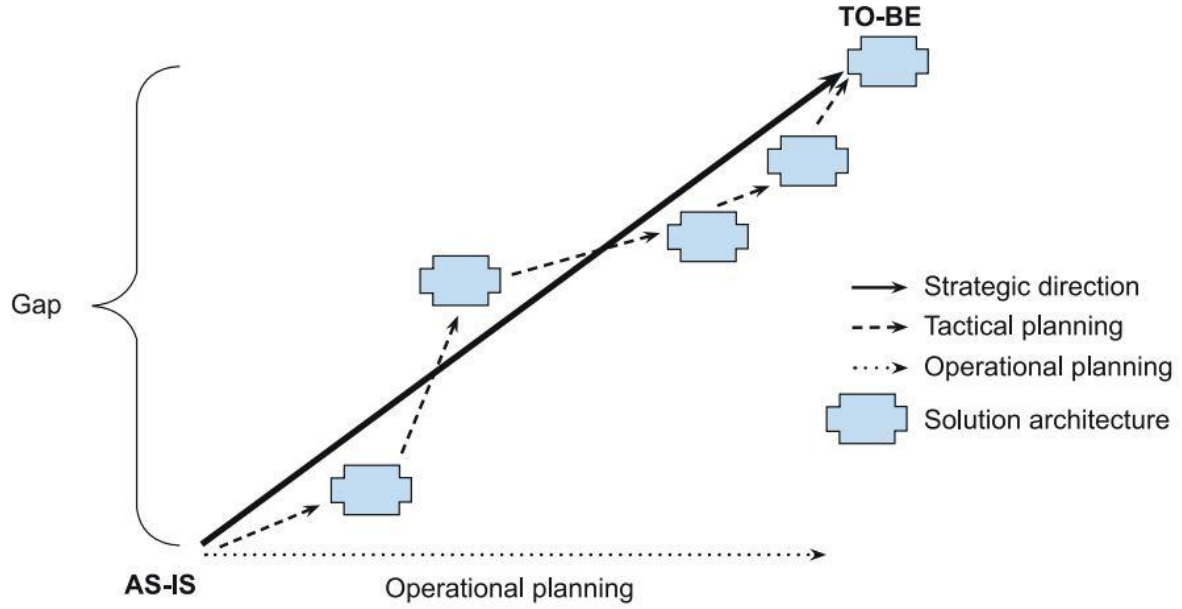


Figure 10: Applications for Enterprise Architecture (Land et al., 2009)

Land et al. (2009) further interpret the role of EA as three important perspectives: (1) regulation-oriented, consisting of regulations governing the design, which are incorporated by principles, leading to rules, guidelines, and standards; (2) design-oriented, emphasising high-level specifications of the enterprise, usually resulting in models describing artefacts and their interrelation; and (3) patterns-oriented, bridging the other two perspectives by applying suitable design patterns.

A common interpretation of what constitutes the components of EA can be found by the CIO Council (2001) and The Open Group (2011). They define four different categories or domains, namely: the business architecture, the data and information architecture, the application architecture, and the technology or infrastructure architecture. However, Aerts et al. (2004) point out that essentially there are three domains where architecture matters, which has been further elaborated on by Hugosson, Magoulas & Pessi (2008). These are:

- **The business architecture:** defines the business system in its environment of suppliers and customers. The business system consists of humans and resources, business processes, and rules. The business architecture is derived from the business vision, goals and strategies.
- **The information systems architecture**: details the information systems components of the business and their interaction.
- **The information technology architecture**: is the architecture of the generic resource layer, which describes the computers, networks, peripherals, operating systems, database management systems, UI frameworks, system service, middleware etc. that will be used as a platform for the construction of the system for the enterprise.

These domains dynamically influence each other, meaning changes in one domain will affect the other (Aerts et al., 2004).

Architectural principles are often key within many guides and frameworks. For example, CIO Council (2001) describes principles as establishing the foundation for a set of rules and

behaviours for an organisation. For example: (1) incremental rather than monolithic architecture development and implementation; (2) optimisation of the whole rather than optimisation of the component parts; and (3) maximisation of shared data and services across the component parts rather than duplication (see GAO, 2010). Ross, Weill & Robertson (2006) describe principles as high-level decisions about the strategic role of IT in the business. These should be derived from strategic plans, the IT vision, requirements and practices, and business needs. They therefore have implications on the EA use, the design and development of IS, as well as the investment process.

In a similar manner, Hugoson, Magoulas & Pessi (2010) describe them as *"...statements that express how your enterprise needs to design and deploy information systems across the enterprise to connect, share and structure information. The value of such principles can be given in terms of decision guidance*" (Hugoson et al., 2010, p. 146). There are according to Hugoson et al. (2011) at least two crucial areas where such principles should give guidelines, namely IS delineation and IS interoperability. Delineation and interoperability has been discussed as differentiation and integration in the management literature since the 1960s (Lawrence & Lorsch, 1967). The authors find the lack of such guidelines in current EA frameworks unfortunate.

3.3.2 Delineation and interoperability principles

Two basic designs with regards to the delineation of IS are 'the information driven principle' and 'the responsibility driven principle' (Hugosson et al., 2010). The former, which is also called 'the high road alternative' by Allen & Boynton (1991), is common within EA frameworks and is widely used by practitioners. Its fundamental assumption is that information is a critical resource and must therefore be centrally controlled by drawing on different information models, which specifies the meaning of data. Information is thus the basis for delineation and the design will produce centralised systems supporting core business activities. Other core systems will be designed to be organisationally independent, and therefore immune to restructuring in business (Hugosson et al., 2010). According to Allen & Boynton (1991) the most critical flaw of the information driven principle is a high risk of causing organisational inertia.

> *"The danger with the high road strategy is that it will freeze the organisation into a fixed structure, culture, decision-making process, and patterns of relationships both inside and outside the business"* (Allen & Boynton, 1991, p. 442)

The latter principle is based upon an area of responsibility, also called 'the low road alternative' by Allen & Boynton (1991). This area should include all resources, including IS. This means that the management of that area is free to choose system, as long as they commit to stated principles and policies. As a result, each information system supports only one area of responsibility and can easily be tailored to business needs. Systems ability to exchange information is crucial under this design as it would otherwise produce stand-alone systems (Hugoson et al., 2010). Allen & Boynton (1991) claim the alternative to involve high risk to the business as they may discover that the structure cannot cope with change. For example, the design may inhibit new strategies such as rationalisation of product lines, manufacturing, and distribution.

As both designs are flawed, it is important to understand that EA should strive for a 'both/and-logic'. This means a balance must be achieved that is appropriate to the organisation (Allen & Boynton, 1991; Magoulas & Pessi, 1998). Architecture is thus a design matter trying to manage these and several other opposing tensions (Magoulas & Pessi, 1998).

Interoperability defined as '*the ability of two or more systems or components to exchange and use information*' is one of the major challenges within EA. There are in essence three different strategies to achieve interoperability, which in turn has significant impact upon business agility (see Figure 11) (Hugoson et al., 2008).

1. **Unification**: Creates a unified information space and can be achieved by merging systems into one (one common system principle) or standardising two or more systems with regards to their inner structure, functions and content (replication principle). Unification is often chosen based upon economic and efficiency reasons.
2. **Intersection**: Creates a shared information space and is used to eliminate redundancies. This means one or more elements are shared between participating IS. This strategy is often used to gain increased quality and availability of information services.
3. **Interlinking**: Computerised interaction between IS takes place by exchanging messages. It can therefore take place without much interference with the structures of participating systems. This strategy preserves independence, but relies upon appropriate definitions on required interactions.

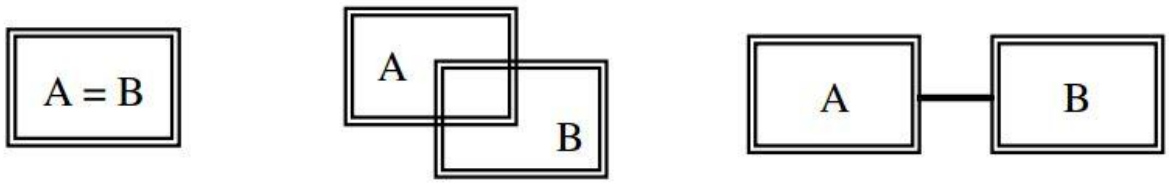


Figure 11: Three strategies for IS interoperability

Regardless of what design is chosen, it is important to understand that delineation and interoperability principles have a considerable effect upon the management of IT investments. This is an issue that especially large organisations must learn to manage (Hugoson, et al., 2011).

> *"If large organisations do not succeed in managing architectural issues, there is a clear risk that considerable resources and efforts will be invested without achieving desirable effects."* (Hugoson et al., 2011, p. 61)

3.3.3 Enterprise Architecture as strategy

Ross, Weill & Robertson (2006), who claim that the level of analysis of many attempts at EA has been all wrong, draws on a similar line of reasoning. The author's state that EA has often been confused with one of its components such as IS or IT architecture. While those are also important, what EA actually comes down to is, according to the authors, business process integration and business process standardisation. Essentially, three key disciplines must be mastered and aligned to implement EA:

1. **Operating model**: The necessary level of business process integration (sharing of data within and between processes) and business process standardisation. There are only four general types: (1) Diversification, through low standardisation and low integration; (2) Coordination, through low standardisation and high integration; (3) Replication, through high standardisation and low integration; and (4) Unification, through high standardisation and high integration. This model will guide decisions on the EA (see Figure 12).

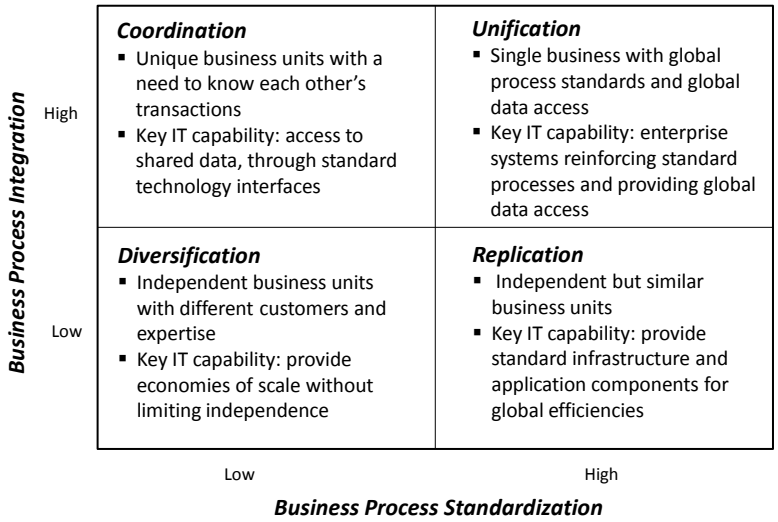


Figure 12: Four operating models (adapted from Ross et al., 2006)

2. **Enterprise Architecture**: Reflects the requirements of the operating model and provides a long-term view of a company's processes, systems, and technologies. Individual projects use these as guidance for building towards the desired architecture. The elements of the EA will depend upon the operating model.
3. **IT engagement model**: System of governance mechanisms assuring that business- and IT-projects achieves both local and company-wide objectives. It influences project decisions, coordinates IT and business process decisions, and establishes a link between senior-level decisions, such as project prioritisation and process design, and project-level implementation decisions.

Ross et al. (2006) strongly points out that EA is essentially a business challenge, not an IT challenge. IT-experts must be involved to develop architectures of applications, data and information, and technology. It is an important element. However, the requirements on business process standardisation and integration has to be defined by the business.

3.3.4 Managing Enterprise Architecture

There is perhaps no one best way of managing EA. However, several attempts have been made. This often results in guides or frameworks, which establishes a common language and a common way of working with the EA. They do however differ in their approach (see Session, 2007; Magoulas et al., 2012). The United States public sector has come far in their EA management developments. For example, the Government Accountability Office (2010) has provided a maturity assessment framework for establishing EA management. The framework rests upon an assumption that "*the ability to effectively manage any activity, including developing, maintaining, and using an EA, depends upon having meaningful measures of that activity in relation to some benchmark or standard*" (GAO, 2010, p. 14).

This is why the framework is expressed as stages of maturity, where criteria for each stage must be fulfilled in order to climb the maturity ladder. Their newest addition is 'The Common Approach to Federal EA' (OMB, 2012), which a comprehensive approach aiming at standardising the EA practises between Federal Agencies in the U.S. Among other things, it lays out a 'Collaborative Planning Methodology' which entails defining what benefits will be achieved, when those benefits will be achieved, and how those benefits will be measured, as well as measuring performance outcomes against identified metrics.

The U.S. Office of Management and Budget (OMB) have provided the Performance Reference Model Framework to support this (OMB, 2007). It is concerned with the cause-and-effect relationship between inputs, outputs and outcomes in order to assure value generation (see Figure 13). The framework therefore incorporates various measurement techniques. For example, (1) financial, productivity, and quality measures for processes and activities (outputs); and (2) cost, quality, efficiency, reliability and availability, and effectiveness measures for IT (inputs). As expressed by OMB, this is critical in order to create an understanding of how, and to the extent, key inputs are enabling progress toward outputs and outcomes.

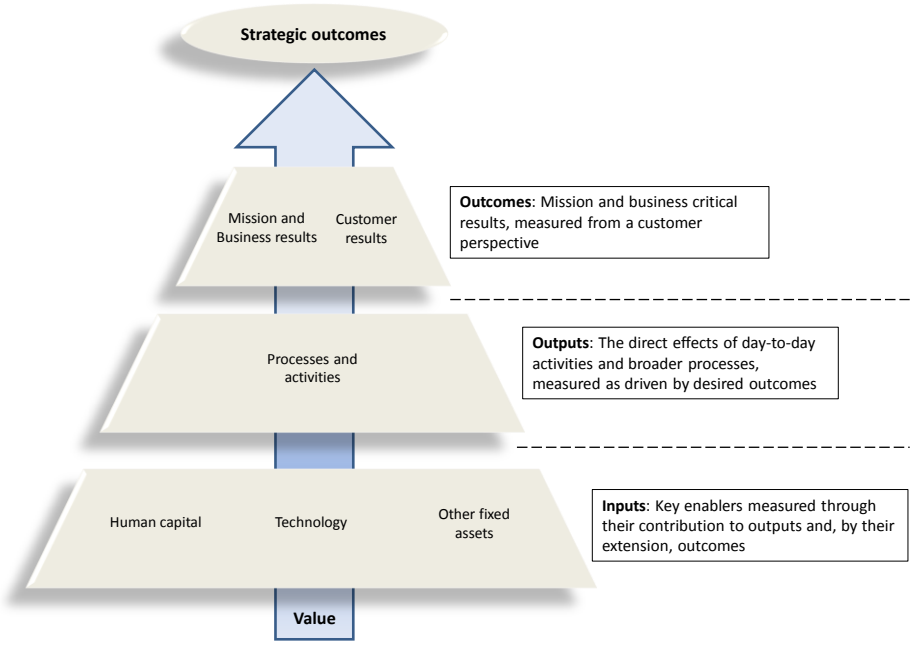


Figure 13: Performance Reference Model Framework (adapted from OMB, 2007)

Another interesting approach to manage EA has been suggested by Hoffman (1988) when discussing a 'reference environment' as a repertoire and tool for formulating and implementing a corporate IS/IT strategy. This is according to the author especially needed if a company consists of several business units operating in different markets. The reference environment described by Hoffman should consist of an ideal state of the company in which IS/IT would be most effectively used. This will serve as a foundation for maximising the value of IT investments.

> *"The basic purpose of a reference environment is to link business strategy, information technology, and organisational planning so that the organisation obtains maximum strategic advantage from its IS investments"* (Hoffman, 1988, p 38-39)

To practically do this Hoffman adds three levels of architecture and management to the relevant components of a business (much like EA components) in an attempt at linking the business and IS/IT vision with the strategic and tactical plans and their implementation:

1. The **meta-architecture** defines the concepts and serves to establish a common language and create a vision of an ideal IS/IT environment.
2. The **macro-architecture** provides a realistic reference environment to where the company aims when selecting tactical plans;
3. The **micro-architecture** is operational and defines guidelines and boundaries, and projects are scheduled and carried out.

Hoffman (1988) argues that the link between the short-term micro-architecture and the business vision may not be clear to stakeholders. Appropriate training and support must therefore provide this understanding. Complete management has however not been achieved until certain control-mechanisms are in place. These should: (1) monitor the IS strategy as a whole; (2) ensure that IS/IT goals, management strategies and reference environment remain consistent and that projects are selected and implemented consistently with these; and (3) ensure that projects and budgets are consistent with the tactical plans.

This approach is argued to link tensions between strategic schools of thought as it forms a 'deliberate incremental' or 'architectural' approach to IS/IT planning and implementation.

3.4 IT Governance

This section firstly introduces IT Governance (ITG) and its main concern. Secondly, an emerging view of ITG is presented. Thirdly, portfolio management and related approaches are explained. Lastly, two common ITG frameworks and a new conceptualisation of ITG are briefly presented.

3.4.1 Decision rights and accountabilities

A prerequisite of value creation, risk mitigation and the optimisation of resource use is a set of actively designed governance mechanisms (Ward & Peppard, 2002; Weill, 2004; Maizlish & Handler, 2005). Weill (2004) defines ITG as "*specifying the framework for decision rights and accountabilities to encourage desirable behaviour in the use of IT*". In essence, this involves managing the tension between centralisation versus decentralisation of decision rights and accountabilities (Ward & Peppard, 2002; Weill, 2004; Maizlish & Handler, 2005). The extremes of centralisation versus decentralisation can be thought of as a spectrum consisting of: (1) decision-making; (2) management models (central versus autonomous); (3) information imperatives (access versus sharing); and (4) planning focus (entire enterprise versus line of business). Each end represents either anarchy or dictatorship (Weill, 2004; Maizlish & Handler, 2005). Finding a balance is complex. However, clear structures and distinct roles and responsibilities must be defined. If not, the result may be confusion, conflict and/or duplication of effort (Ward & Peppard, 2002).

A useful way to understand different ways of designing decision rights and accountabilities has been provided by Weill (2004) who draws on the perspective brought forward by Davenport, Eccles & Prusak (1992) on information politics. His framework is built upon six different archetypes that are briefly presented in Table 4 below.

Archetype	IS/IT-related decision-making
Business monarchy	Senior business executives
IT monarchy	IT professionals
Feudal	Business units or functions, based on their own needs
Federal	Coordinated, involving both a centre and its business units on two or more levels of the business hierarchy
IT duopoly	Two parties, IT executives and a business group
Anarchy	Individuals or small groups, based on their own needs

Table 4: Archetypes and IS/IT-related decision-making (Weill, 2004)

The archetypes, in turn, may be used differently for each specified decision area. It is according to the author important to understand that every organisation uses archetypes. However, top performing organisations actively design them, rather than letting them emerge. Figure 14 below is an example of a framework for decision rights and accountabilities, which also includes important decision areas.

	IT principles	Enterprise architecture	IT infrastructure	Business application needs	IT investment and prioritisation
	High-level decisions about the strategic role of IT in the business	The organising logic for business processes and IT infrastructure	Centrally coordinated, shared IT services	Business requirements for purchased or internally developed IT applications	Decisions about how much and where to invest in IT, including project approval and justification techniques
Business monarchy					
IT monarchy					
Feudal					
Federal					
IT duopoly					
Anarchy					
Don't know					

Figure 14: Example of IT Governance framework (Weill, 2004; Ross et al., 2006)

3.4.2 Enterprise governance of IT

Defining decision rights and accountabilities is an important matter within ITG. However, there are several interpretations on what constitute ITG (Romero, 2011; Moeller, 2013). In fact, it appears ITG is a changing field, which started with a strong focus within the IT-domain, but is now emerging into 'Enterprise Governance of IT' (EGIT). Gremberger & De Haes (2009) defines EGIT as:

> *"...an integral part of corporate governance and addresses the definition and implementation of processes, structures and relational mechanisms in the*

> *organization that enable both business and IT people to execute their responsibilities in support of business/IT alignment and the creation of business value from IT-enabled business investments."* (Gremberger & De Haes, 2009, p. 3)

This broader definition is similar to the one provided by the IT Governance Institute (2003) and serves to recognise a greater involvement of the business in achieving value from IT (Gremberger & De Haes, 2009). Key components within EGIT include (IT Governance Institute, 2008; Romero, 2011; Moeller, 2013):

- **Strategic alignment**: ensuring the linkage of business and IT plans.
- **Value delivery**: ensuring that IT delivers expected benefits.
- **Resource management**: ensuring optimal investments in, and the proper management of, IT resources.
- **Risk management**: ensuring awareness and understanding of risks.
- **Performance measurement**: tracks and monitors strategy implementation, project completion, resource usage, process performance and service delivery.

3.4.3 Portfolio management

Many organisations have turned to the 'Portfolio Approach' to address the components within EGIT. In fact, although the approach was firstly introduced in the financial field of study in the 1950's, it continues to be central for planning and maximising value of both business projects and IT investments (Markowitz, 1952; McFarlan, 1981; Jeffery & Leliveld, 2004; Maizlish & Handler, 2005; Project Management Institute, 2006; Romero, 2011; Ward, 2012; Moeller, 2013). However, the term 'portfolio management' remain rather elusive as it may include a number of different sub-disciplines such as Project Portfolio Management (PPM), Application Portfolio Management (APM), and IT Portfolio Management (ITPM) (Maizlish & Handler, 2005; Simon, Fischbach, & Schoder, 2010; Moeller, 2013).

Project Portfolio Management

Projects have been managed as portfolios since the 1990s and PPM has now evolved into a well-recognised approach to achieve strategic objectives. Project Management Institute (2006, p. 5) defines PPM as "*the centralised management of one or more [project] portfolios, which includes identifying, prioritising, authorising, managing, and controlling projects, programmes, and other related work, to achieve specific strategic business objectives*". It essentially seeks to improve performance by providing organisations with an ability to plan and allocate resources according to strategic direction, and the ability to maximise portfolio return within the organisation's predefined desired risk profile (Project Management Institute, 2006). PPM is in other words an enterprise process for 'investment management'. Unfortunately – however – many organisations appear to initiate and foster PPM from an IT perspective, confusing it with an IT process. It may nonetheless be effective in providing the answers to the following four essential questions about project and programme investments: Should we? Can we? Are we? Did we? (Romero, 2011). The Portfolio Management Institute (2006) has provided a standard that tries to specify the PPM processes involved. Figure 15 summarises these.

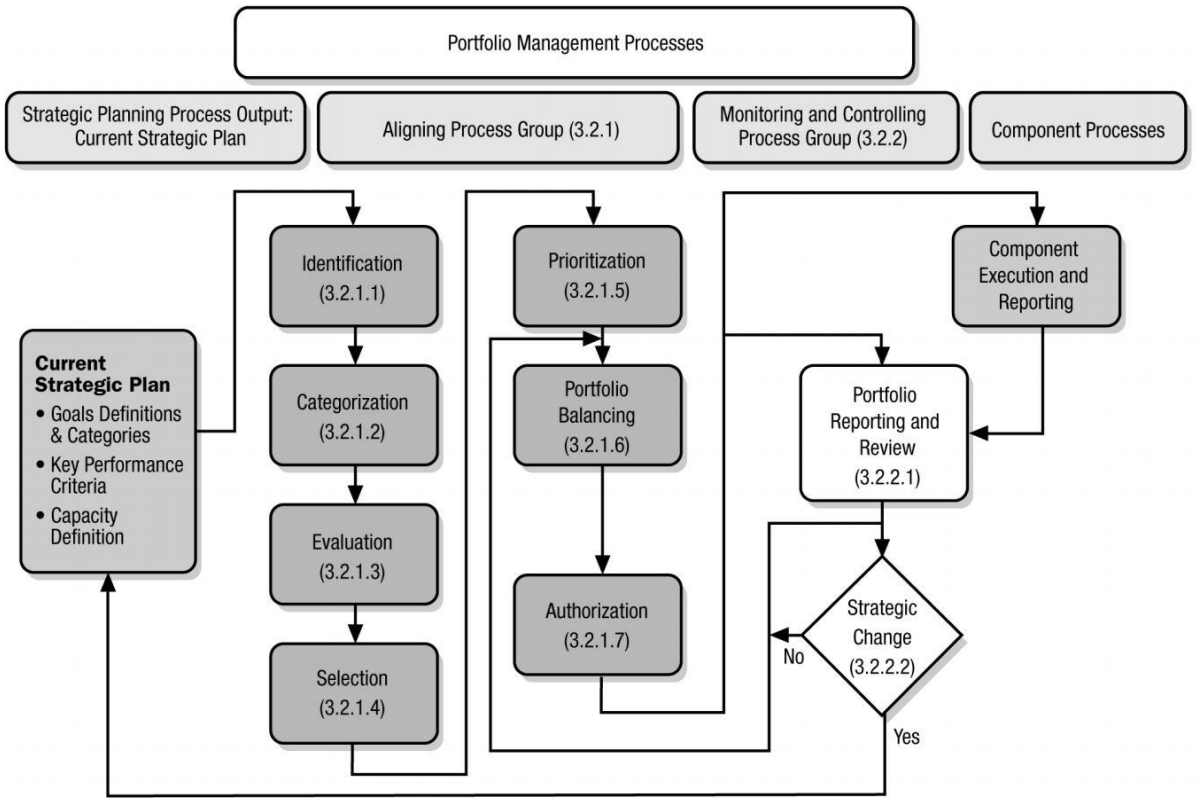


Figure 15: Project Portfolio Management processes (Project Management Institute, 2006)

Application Portfolio Management

In contrast to PPM, APM addresses the size and complexity of a company's application landscape. It has been defined as:

> *"[...] the ongoing application of systematic and structured decision-making processes to evaluate an organization's applications along various dimensions (from a business and a technical viewpoint), weigh various actions for the purpose of optimization, and implement appropriate actions to resolve identified issues and meet key enterprise objectives. The promise of Application Portfolio Management lies primarily in reducing the complexity of the application landscape, which is approached from a holistic viewpoint"* (Simon et al., 2010, p. 38)

APM therefore ties closely to the concept of EA, and may even be viewed as an application-oriented viewpoint within it (Simon et al., 2010).

3.4.4 IT portfolio management

To make matters more complicated, ITPM is also a recognised discipline. Gartner defines it as "*the processes, governance and tools used to plan, create, assess, balance and communicate the execution of the IT portfolio*" (Fitzgerald & Apfel, 2009). Hence, ITPM shares strong similarities to the 'Administrative Approach' to SISP (see Earl, 1989). Most companies often share the objectives of ITPM (maximising value while managing risks and costs). However, all too often they also apply simple and straightforward financial models to make investment decisions. These are flawed, misses key criteria, and the entire life cycle of

an IT investment is not accounted for (Maizlish & Handler, 2005). Instead, companies should recognise that IT investments often require considerable effort to measure. They also have a functional relationship to the organisation, which means their importance may be hard to quantify (Moeller, 2013). Nonetheless, ITPM remains integral to many organisations, especially when investment funds are limited and decisions become more complex (Ward, 2012).

Portfolios and sub-portfolios

The IT portfolio can be divided into a range of different sub-portfolios. For example, Moeller (2013) states that many organisations choose three broad areas: the application portfolio, the infrastructure portfolio, and the project portfolio. Maizlish & Handler (2005) has however provided another structure, which also has been adopted by Gartner (Bittler, 2012). According to them, the IT portfolio consists of collections of projects and assets, which can be defined using both a tactical bottom-up approach and a strategic top-down approach. The former, leveraging existing IT assets and IT projects to shape the portfolio, is concerned with the operational and short- to medium-term investments. The latter divides the strategic intent of the organisation into strategic objectives and the IT plan. All IT investments make up the entire IT portfolio as a whole. These investments move through the phases of the IT lifecycle until they are eventually disposed of. This lifecycle, being comprised of three phases as shown in Figure 16: (1) discovery phase; (2) project phase; and (3) asset phase, is a useful way to organise the IT sub-portfolios (Maizlish & Handler, 2005):

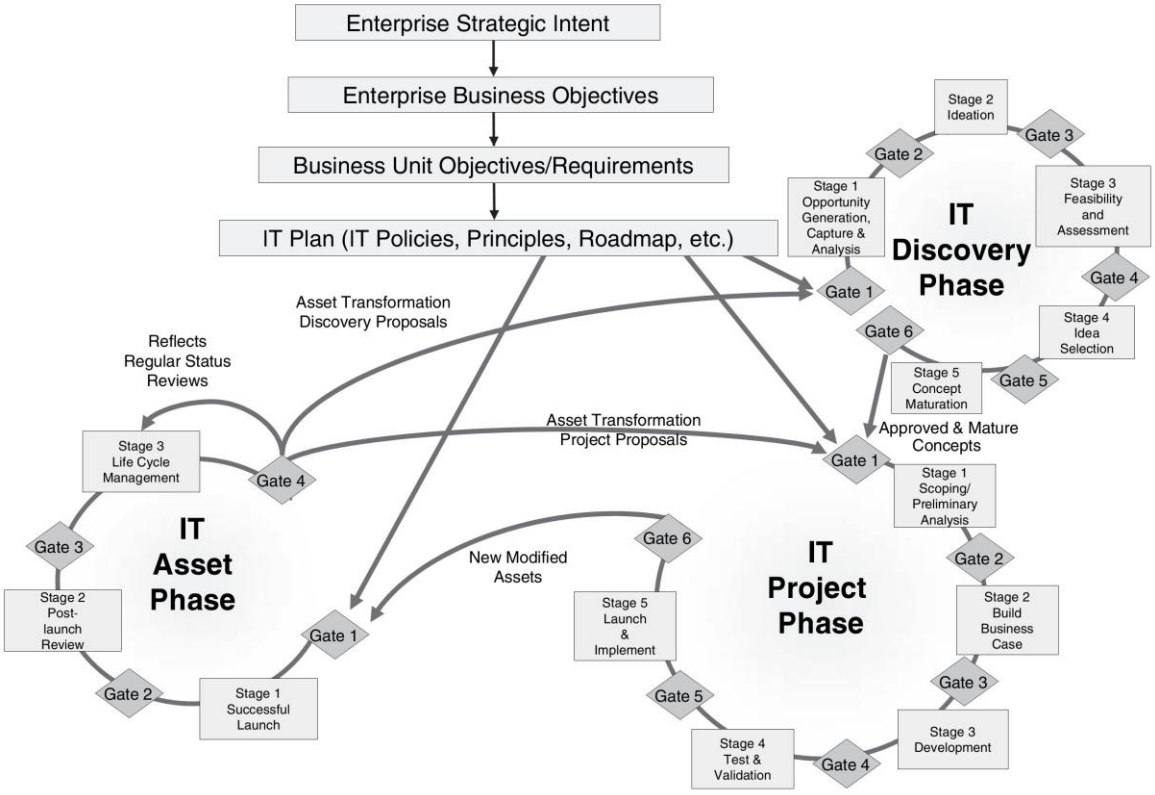


Figure 16: IT Portfolio Lifecycle as sub-portfolios (adapted from Maizlish & Handler, 2005)

- **The IT discovery portfolio**: is characterised by experimenting, uncertainty and speculation. It consists of potential growth and transformative IT investments, cultivated by opportunities, ideas and concepts. The IT discovery portfolio

works as a mechanism to ensure that investments promoting innovation are prioritised in an appropriate manner, without influence of myopic views. What comes out of this portfolio is to be assessed in the project portfolio.

- **The IT project portfolio**: contains both potential and existing projects with assigned resources. These projects will inflict change on the current IT portfolio and/or any related endeavours. Greater control of the change is achieved by project management practices. A project that has completed is prepared to launch into operations or introduced into the marketplace.

- **The IT asset portfolio**: is operational and consists of the investments that already reside within a company. It can be divided into four main elements: (1) information and data; (2) infrastructure and applications; (3) human capital; and (4) processes. The IT asset portfolio serves to maintain, evaluate and change existing investments and is reliant upon developing a clear picture of the current as-is state, a desired future to-be state and a prioritisation of identified gaps. In the same way as projects become assets, assets also become projects if proposal of changes are selected. Figure 17 articulates this relation.

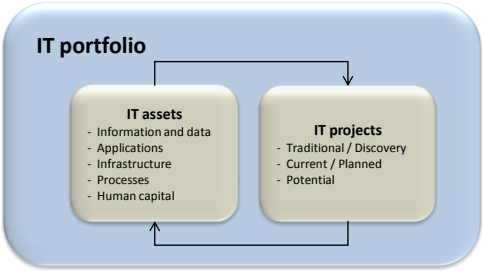


Figure 17: An IT portfolio consisting of projects and assets

Categorisations, classifications, and risks

Categorisation of IT investments is an important and common component in ITPM. This serves to recognise that different categories of investments should be prioritised, evaluated and managed differently (Ross & Beath, 2002; Ward & Peppard, 2002; Jeffery & Leliveld, 2004; Maizlish & Handler, 2005; Aral & Weill, 2007; IT Governance Institute, 2008).

Weill & Aral (2006) identified four broad classifications each linked to different types of business value (see Table 5). These, in turn, have been correlated to risk/return profiles. The authors also point out that "*making a sensible asset allocation requires senior managers to be crystal clear about what they wish to achieve and about who will be held accountable – hardly the stuff of technical specification*" (Weill & Aral, 2006, p. 41).

Classification	Business Value	Associated risks/return
Infrastructure	Business integration, business flexibility, reduced marginal cost of business unit's IT, reduced IT costs, standardisation.	Correlated to increased market value and higher short term cost. Moderate risk due to long life and business and technical uncertainty.
Transactional	Cut costs, increase throughput.	Strongly correlated to lower business costs. Lowest risk with solid return of 25-40%.

Informational	Increased control, better information, better integration, improved quality, faster cycle time.	Correlated to high profit margins. Moderate risk due to difficulty of acting on information to create business value.
Strategic	Product innovation, process innovation, competitive advantage, renewed service delivery, increased sales, market positioning.	Correlated to more sales from customised products. Highest risk with large potential upside and 50% failure rate.

Table 5: Four broad classifications of IT investments (Weill & Aral, 2006)

Similar to APM, IT investments can also be analysed and captured into inventories reflecting their business value, technical condition and risk/reward relationship. Information collected should be analysed according to a set of standardised criteria in order to form categories reflecting what to do (see Figure 18) (Maizlish & Handler, 2005).

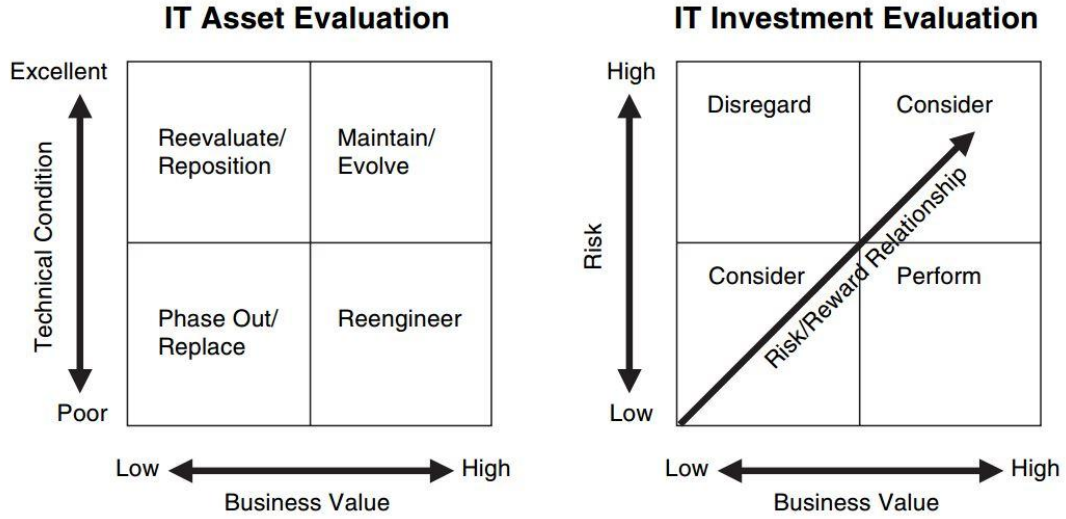


Figure 18: Analysis and categorisations of IT investments (Maizlish & Handler, 2005)

Gartner (Rayner & Van Decker, 2011) has suggested another approach to categorising applications and business processes. It draws on the pace of change of applications and is claimed to be effective in making organisations more responsive to business needs. The application pace layering approach uses three different application segments:

1. **Systems of record**: are either legacy systems or established packaged applications that support core transaction processing. The rate of change is low.
2. **Systems of differentiation**: are applications that enable unique company processes or industry-specific capabilities. They have a medium pace life cycle.
3. **Systems of innovation**: new applications built to address new business requirements or opportunities. They have a short life cycle.

Gartner claim that applications within each layer have vastly different governance and operational characteristics. For example, systems of record deliver business value by being stable, reliable and predictable and investments decisions are characterised by a long-term approach. Systems of differentiation however, must be able to respond to business changes.

IS/IT capabilities

Using categorisations rather than considering IT as an aggregate, uniform asset, is a useful way of understanding the contribution of different IT investments. However, it cannot explain

why certain companies experience above industry average returns on IT. There is therefore another component in existence that influences intelligent use of and accurate alignment of IT investments. Several authors have referred to this component as organisational IS/IT capabilities or simply IT savvy, when drawing on the resource-based view of the firm. Organisational IS/IT capabilities can be thought of as sets of inter-related competencies and practices in managing IT and have been correlated to higher increase in firm performance. In fact, results suggest that organisational IS/IT capabilities mutually reinforce IT assets (see Figure 19) (Peppard & Ward, 2004; Wade & Hulland, 2004; Aral & Weill, 2007).

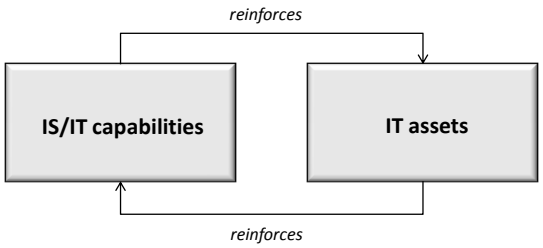


Figure 19: IS/IT capabilities and IT assets

3.4.5 U.S public sector IT investment management

The U.S. Government Accountability Office (GAO) has long recognised the applicability of PPM practices for managing IT investments. They have provided the U.S. public sector with an IT investment management approach that they claim links IT investment decisions to an organisation's strategic objectives and business plans. The approach uses the select-control-evaluate paradigm. This forms a process for IT investment management based upon performance improvements according to the Performance Reference Model Framework (Cady, 2003; GAO, 1997, 2004; Maizlish & Handler, 2005).

- **The select phase**: consists of (1) the identification and analyses of each project's risks and returns before significant resources are spent; and (2) the selection of the projects that will best meet the organisation's needs.

- **The control phase**: consists of recurring reviews that measure and monitor the progress of projects compared against forecasted cost, risk, schedule and expected benefits. Actions to continue, modify or cancel are assessed.

- **The evaluate phase**: compares actual versus expected results after a project has been fully implemented. This assessment will indicate impact on performance, identify any changes needed, and revise the investment management process based on lessons learned.

Figure 20 is an illustration of a general investment decision-making process incorporating the approach. It has included an analysis of the existing portfolio of IT investments. This should contain information regarding current costs, benefits and risks associated with the existing portfolio, and will in turn form the basis for a retirement and replacement strategy. Such a strategy can provide a solid foundation for keeping, stopping, transforming, or replacing IT. GAO (1997) claims that the process is applicable to almost any organisation, even one that is highly de-centralised.

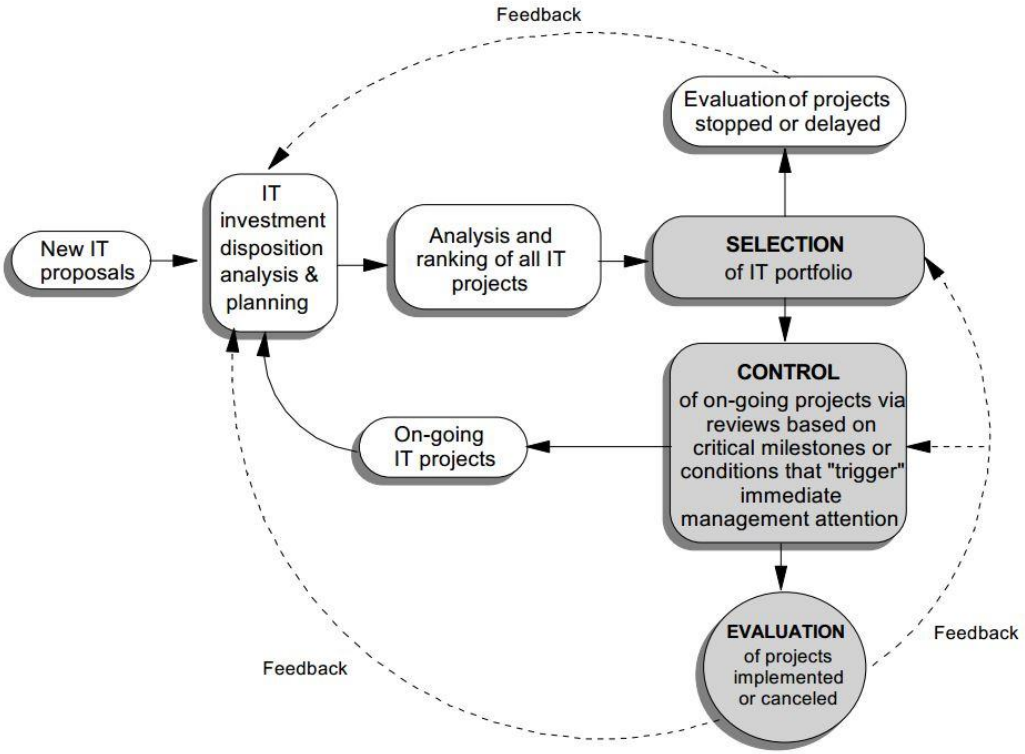


Figure 20: Example of an IT investment process (GAO, 1997)

3.4.6 Enterprise Portfolio Management

Arranging and managing investments and assets into portfolios is not a new phenomenon and has been widely used within the financial and 'product research and development' field (Markowitz, 1952; McFarlan, 1981; Jeffery & Leliveld, 2004; Maizlish & Handler, 2005). Hence, there are other portfolios in a firm competing for organisational resources. Resources available to organisations are however constantly both enabling and limiting an organisations' ability to act. Additionally, internal and external conditions change and forces companies to adjust their strategies. As a result, resource availability fluctuates and portfolio prioritisation may change.

Trying to address this problem, Young, Owen & Connor (2011) coined the term 'whole-of-enterprise portfolio management', suggesting that the portfolios of an organisation need to be managed in an integrative manner. The authors therefore provided a conceptual model that aims to aid a significant mental shift towards an integrated and dynamic approach that recognises the linkage of organisational portfolios, changing organisational priorities and a common pool of resources (see Figure 21).

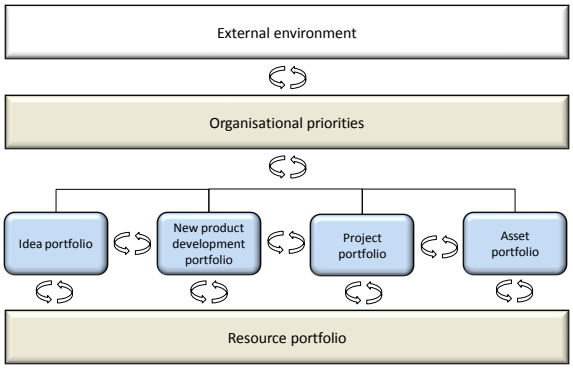


Figure 21: Whole-of-enterprise portfolio management (Young et al., 2011)

The notion of whole-of-enterprise portfolio management is, in fact, not new. Two examples involve Cady's (2003) indication of 'Enterprise Portfolio Management', which is at an evolutionary stage. Enterprises, she argues, consists of an amalgamation of interdependent resources. This implies that "*decision-makers must not only consider the investment options under their control but also take into account how the alternatives they have analyzed affect, and are affected by, other components of the enterprise*" (Cady, 2003, p. 19). Nippa, Pidun & Rubner (2011) has also indicated that 'Corporate Portfolio Management', which comprises key corporate-level strategic decisions such as allocation of resources within multi-business firms, should be appraised and re-established in academic research. Indeed, the management of portfolios appears to receive an increasing attention in both practice and research.

3.4.7 IT Governance frameworks

Much like EA, ITG has also received frameworks that intend to guide practitioners on how to approach the field. Two common frameworks are COBIT (Control Objectives for Information and Related Technologies) and Val IT. The former is developed by ISACA (Information Systems Audit and Control Association) and the latter by the IT Governance Institute which is a research institute formed by ISACA.

COBIT along with Val IT has been developed separately. Up until recently, they have been forming two standpoints where COBIT has provided the IT governance framework from the point of view of the IT function, and Val IT the framework for EGIT with a focus on delivering business value (IT Governance Institute, 2008). Table 6 clarifies this relation.

	Governance focus	**Process focus**	**Portfolio focus**
Val IT	Enterprise governance of IT	- Programme design and initiation - Benefit realisation - Investment and ongoing value management aspects of all processes	- Manage the investment portfolio - Provide the overall view of portfolio performance
COBIT	IT governance	- IT solution delivery - IT operational implementation - IT service delivery	- Manage the IT project portfolio in support of investment programmes - Manage the IT service, asset, and other resource portfolios - Provide information on the performance of the resource portfolios

Table 6: Comparison of Val IT with COBIT (IT Governance Institute, 2008)

As a complement to COBIT and Val IT ISACA has also developed Risk IT, which is a framework for managing all risks associated with IT (Information Systems Audit and Control Association, 2009). As of version 5 of COBIT however, these frameworks are now integrated into one, which form a more comprehensive business framework for the governance and management of enterprise IT. COBIT 5 highlights several key aspects. For example, it clearly states that the framework must have a distinctly defined scope. It must also make explicit, who are involved, how they are involved, and what they do – while maintaining consistency and simplicity. It should also ensure that it is clear whom the benefits are for, who bears the risk, and the resources required in order to meet stakeholder needs and requirements on value (Oliver & Lainhart, 2012).

3.4.8 A new conceptualisation of IT governance

As mentioned earlier, there is not one view of ITG. An interesting attempt at further developing and clarifying the field has been provided by Beachboard, Aytes & Probst (2010). They leverage the work on governance from Weill (2004) and the work on EA from Ross et al. (2006), to create a new conceptualisation of ITG. Their view interprets ITG as three main activities: (1) specification of an IT management structure, which includes decision rights and accountabilities; (2) development of a strategic IT vision, which reflects an organisation's requirements on business process standardisation and integration; and (3) determination of IT investment levels and priorities. The strategic IT vision aligns with the EA-concept expressed by Ross et al. (2006). This means IT principles are explicitly included in the strategic IT vision. These will govern the development of an IS/IT strategy, which is described in three components: (1) IT service architecture policies and standards; (2) policies concerning IT infrastructure standardisation; and (3) IT security and regulatory compliance policies. Figure 22 expresses this view.

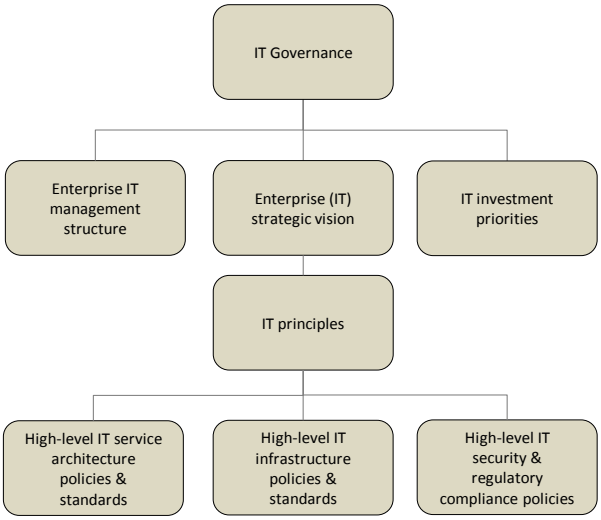


Figure 22: A new conceptualisation of IT Governance (Beachboard et al., 2010)

3.5 Summary

There are no easy or straightforward answers to manage IT investments. There is not even a clear answer as to what constitutes IT Management. Rather, it appears there is a myriad of approaches available. These have emerged from different disciplines, all trying to manage the increasingly complex IS/IT landscape whilst gaining maximum value from it.

Many attempts at IT Management are however from an IT-centric perspective, which focuses strongly on applications, data and information, and infrastructure (Magoulas & Pessi, 1998). While this is applicable to most approaches, later developments in the field reveal a stronger and more coherent view. However, a broader view on IT management, which would be as much concerned with aspects of business collaboration and coordination, stakeholder relationships, power structures, and culture, as it would be with technology, is more or less abundant. Galliers (1991) pointed this out when suggesting a socio-technical approach to IT management.

> *"If one takes a socio-technical perspective of information systems (i.e. a more holistic stance), it can be argued that information systems are as much concerned with human activity and organization as they are with technology – if not more so [...]."* (Galliers, 1991, p 60)

4 Essential aspects in enterprise development

This chapter is concerned with outlining a suggestion for essential aspects that should be demonstrated by a portfolio framework for managing the development of an enterprise with respect to its IT investments. The chapter is organised as follows: Firstly, an introduction presents the basic assumptions of this chapter. Secondly, four essential aspects in enterprise development are developed. Lastly, questions for further investigation are specified.

4.1 Introduction

Although there is a rich knowledge base within IT management, there are several shortages in the current body of knowledge. The lack of commonality between approaches within the field also makes it considerably more difficult to determine their contribution to the enterprise development process. In fact, the only obvious common denominator is enterprise development – they all seek change and to gain more value in the company. This thesis argues that there is a need for a new way of approaching enterprise development, which integrates at least four essential aspects: (1) holistic-oriented enterprise development; (2) proactive outcome-based enterprise development; (3) management-oriented enterprise development; and (4) integration-oriented enterprise development. The following four sections present an elaboration of these areas.

4.2 Holistic-oriented enterprise development

Most approaches and frameworks within IT management treat development from a single or limited amount of dimensions (see Magoulas et al., 2012). The same inherently applies to IT governance in general. This often results in excessive focus on: (1) structure, i.e. decision rights, responsibilities and accountabilities; (2) formalised activities and processes (see Ward & Peppard, 2002; Weill, 2004; Maizlish & Handler, 2005; Magoulas et al., 2012); and (3) systems of objective information rather than customised to the needs of the actors (see Magoulas et al., 2012). These areas represent ‘hard’ aspects of enterprise development.

The scope of IT management – however – has long been recognised to also involve ‘soft’ aspects such as: (1) explicit knowledge; (2) experienced and motivated actors; and (3) common goals, values, and culture (see Galliers, 1991; Magoulas et al., 2012). These latter aspects are often overlooked, resulting in approaches and frameworks without a holistic view on enterprise development, when considering an informational and knowledge perspective.

Frameworks or approaches do however differ on a company basis as requirements of an approach to enterprise development vary. Holistic in one company may not be holistic in the other. Therefore, a holistic framework, approach or model must demonstrate its completeness, i.e. to not be able to add or remove components without affecting its meaningfulness.

FEM (see Svärdström et al., 2006; Magoulas et al., 2012) may be used as a theoretical lens to highlight the above concern. It consists of five essential domains of interest and their relations that together form a whole. The model has been populated with some important areas for each domain (see Figure 23). This shows two things: (1) important elements of a holistic approach; and (2) how each entity within the domains is dependent upon the other, when considering a holistic viewpoint. This is not always specified in approaches to enterprise development. Below is a further elaboration of the domains, their content, and relations.

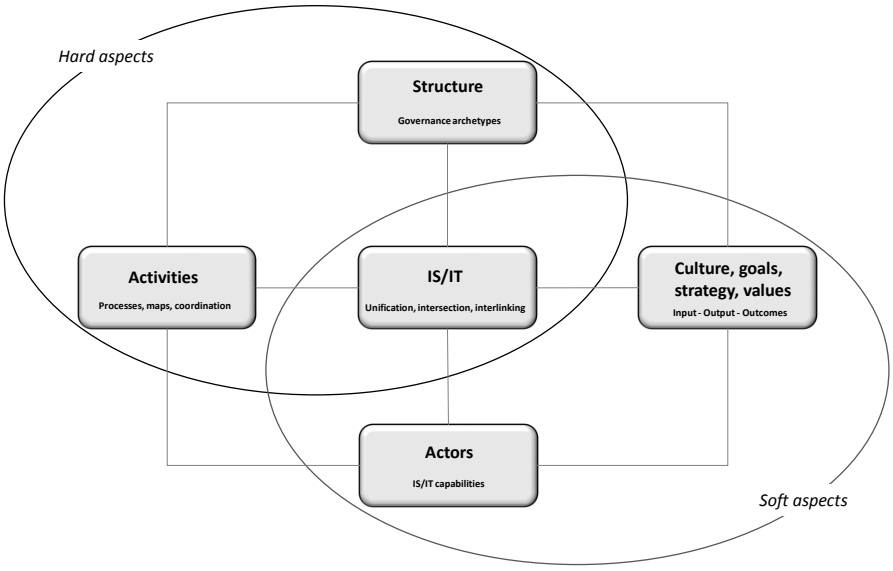


Figure 23: A multi-dimensional view of the enterprise

- **Domain of IS/IT**: Consist of both existing and planned IS/IT (projects i.e. informational, transactional, infrastructural, strategic, legacy maintenance, see Maizlish & Handler (2005) and Weill & Aral (2006)) and can be expressed in terms of both IS and IT architecture. The relation between IS can be designed according to three different strategies (unification, intersection, interlinking). IS may be partially or entirely supported by IT. They may also be entirely human (Ward & Peppard, 2002; Weill & Aral, 2006; Magoulas et al., 2012).
- **Domain of structure**: Decision rights and accountabilities can be designed according to governance archetypes. These are used by all companies, but only some actively design them for every relevant decision domain (Weill, 2004). Frameworks must have a clearly defined scope, and make explicit who are involved, how they are involved, and what they do. It is also important to define whom the benefits are for, who bears the risk, and the resources required in order to meet stakeholder needs and requirements on value (Oliver & Lainhart, 2012).
- **Domain of activities**: Business processes, their standardisation and integration (Ross et al., 2006). Roadmaps and maps (modelling techniques) are used to plan activities and manage their dependencies and necessary coordination (Hoffman, 1988; Lapkin et al., 2008; Land et al., 2009).
- **Domain of actors**: This domain implies that a shared understanding among actors is a prerequisite for any attempt at development. Furthermore, IS/IT capabilities reinforces and increases the value of IS/IT (Aral & Weill, 2007).
- **Domain of culture, goals, strategy and values**: Root definition stating the intrinsic long-term expectations (see Checkland, 1989), as well as goals, objectives and values of performance that represents the short-term expectations of the business. Hence, the direction of enterprise development is determined by short-term and long-term outcome-driven values. In certain cases, there is a need for clearly defined measurement of input, output and outcome. In such cases, measurement may involve aspects such as cost, quality, efficiency, reliability and availability, and effectiveness. In other words, it must be clear how value is created and measured (see OMB, 2007).
- **Internal relations**: These represent and articulate the interdependencies between the domain of IS/IT and the other components of the model. These necessary dimensions should be represented by a holistic approach (see Magoulas et al., 2012).
  - Structural dimension (domain of IS/IT & domain of authority and responsibility)

- Functional dimension (domain of IS/IT & domain purposive activities)
- Infological dimension (domain of IS/IT & domain of actors and participants)
- Socio-cultural dimension (domain of IS/IT & domain of mission, vision, goals, values, strategy)

4.3 Proactive outcome-based enterprise development

Proactive outcome-based enterprise development requires two crucial aspects to be considered:

1. The first aspect concerns what reality is like, and what it should be like after sound enterprise development has taken place. This is represented by a substantial view such as AS-IS and TO-BE descriptions (see Magoulas & Pessi, 1998; Maizlish & Handler, 2005; Land et al., 2009).
2. The second aspect concerns how reality changes from the current state to the desired future state. This is represented by a process-based view (see Magoulas & Pessi, 1998; Land et al., 2009).

Hence, many approaches to enterprise development available today are already recognising the importance of outcome-based development. For example, SSM uses conceptual models for comparison with the real world, EA is grounded upon modelling AS-IS and TO-BE states of the enterprise, and ITPM is dependent upon those models (see Checkland, 1989; Maizlish & Handler, 2005; Land et al., 2009). This aspect is in other words essential.

The 'Performance Reference Model Framework' created by OMB (2007) (see Figure 24) illustrates the significance of this concern. It also shows that outcome-based development can involve different types of outcomes. For example: (1) mission and business results and (2) customer results. Outcomes can also be represented on different time-scales such as the short-term goals, long-term goals, and the more or less permanent vision and mission.

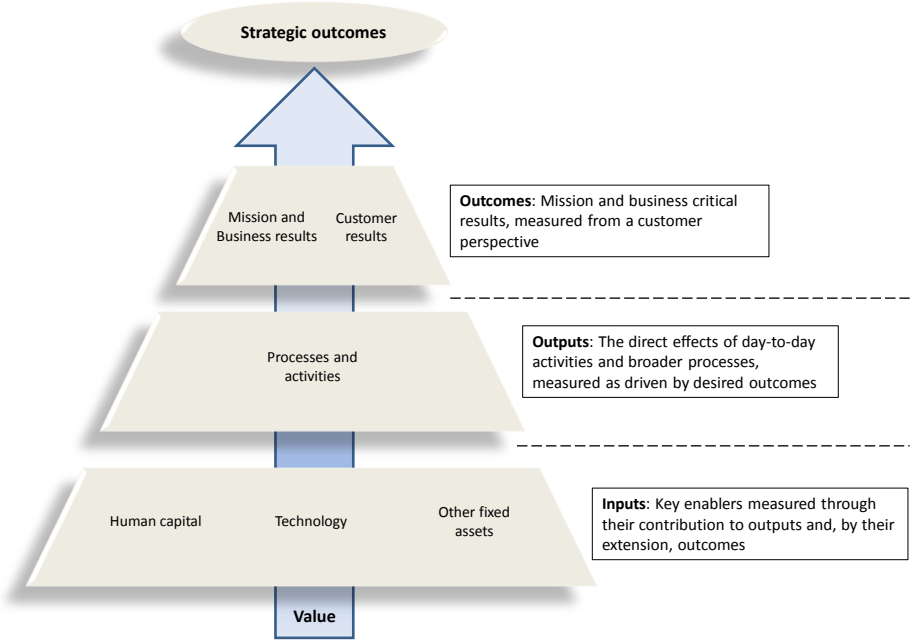


Figure 24: Performance Reference Model Framework (adapted from OMB, 2007)

It is important to understand what makes outcome-based enterprise development such a critical issue. This can be explained by examining the outcome-based approach against development driven by current/immediate demands and needs.

- The former looks ahead – it can be thought of as seeking to create the future by defining a goal/vision, which in turn is the driving force for value creation (see Hoffman, 1988; Ross et al., 2006; OMB, 2007). A vision is *independent of time* – it stays the same as long as the enterprise serves the same purpose. When a company defines this desired outcome, it also gives stakeholders a clear message of what the company perceives as valuable and hence provides a way to determine both efficiency and effectiveness. This does create a solid foundation for development.
- The latter is grounded upon current problems that need solutions. Demand-driven development is based on perceived events and experiences, which is *dependent of time*. Problems are solved just as fires emerge and are extinguished. This latter approach does not prevent problems it merely solves them. For example, a company perceives its IT budget as too high and the board decides to reduce IT costs as the only strategy. While positive results may still be achieved, the company has failed to provide the direction needed to derive *real* value out of IT.

It is easy to see how outcome-based enterprise development is the only approach capable of creating an attractive architecture where actual value can be determined. Demand-driven development may only arrive at the same result by chance.

To elaborate further, there are two common terms describing the same concern: *proactive* and *reactive*. Approaches to enterprise development should in other words be proactive and outcome-based. Proactive outcome-based enterprise development does however subsume at least two things: (1) knowledge 'know-how' about how to approach the development situation; and (2) awareness of the situation. Proactive development is only possible when there is both knowledge and awareness present. When knowledge is absent but awareness present, research-based development will be required. If awareness is absent but knowledge present, then it would involve risks to the business. Reactive development happens when both dimensions are absent – a property hardly desirable within a field with growing complexity. Figure 25 in an illustration of this.

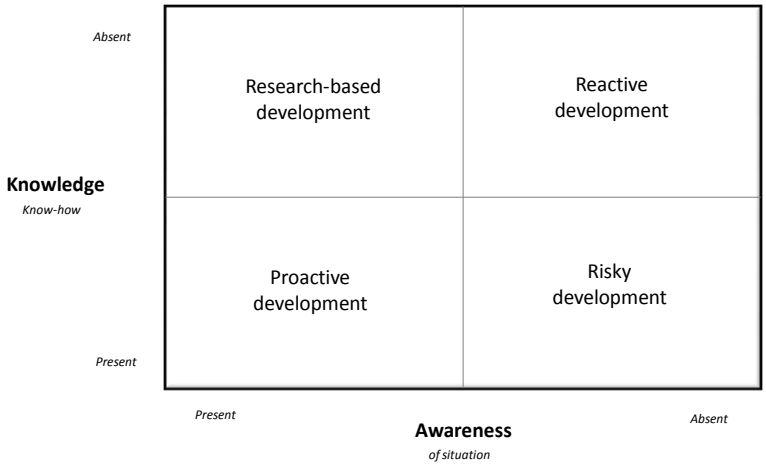


Figure 25: A knowledge/awareness matrix for development

4.4 Management-oriented enterprise development

Enterprise development should be based on a management-oriented view. Although most approaches will claim that it involves 'management', far from all are actually near *real* management. This is because they typically: (1) provide ‘one-size-fits-all’ recipes for complex enterprise development; (2) fall short on ‘soft’ aspects; and (3) are inherently driven by a reactive developmental view. Hence, most approaches are a result or further development of well recognised disciplines such as ‘IBM Business Systems Planning’, ‘Software Engineering’, ‘Continuous improvement’ (TQM) or ‘Business Re-engineering’.

Management is in this thesis interpreted as ensuring efficiency and effectiveness, or simply put, 'doing the right things' and 'doing things right' (see Ackoff, 1998). This involves drawing solid conclusions and making decisions on what to do, how it should be implemented, and evaluated (measured). Undertaking management within enterprise development therefore places high demands on knowledge. Essentially, there are two types of knowledge of significance, hard and soft (Hall, Clegg, & Sillince, 2008). The former involves data and information, its structuring and calculating. Hard knowledge is the means for programming a strategy or weighting options against calculated risks. Soft knowledge, on the contrary, is about opinions, qualitative judgements, facilitating collaboration, or even inspiring leadership. Sound enterprise development would require both aspects of knowledge. However, considering that most practical problems are soft and messy (see Checkland, 1989) management would involve a great deal of sensing and negotiating.

Ensuring efficiency and effectiveness involves several different decision making strategies. Thompson (1967) has provided a way to understand such strategies. They can be solidified into a matrix that is based upon: (1) developing a clear understanding and agreement of desired outcomes (enables the company to do the right things); and (2) understanding the logic and consequences of developmental actions (enables the company to do things right). Appreciating and understanding these two dimensions shape four different decision-making strategies for any 'Portfolio Approach' to enterprise development (see Figure 26). These, in turn, also correlate with the hard and soft knowledge elaborated on earlier and by extension the role of portfolio management, such as to assess risks and balance a portfolio (see Project Management Institute, 2006).

1. Planned (setting goal and organising activities)
2. Negotiated (making trade-offs, balancing, prioritising)
3. Judged (discussing consequences and taking risks)
4. Inspirational (discovering opportunities, leading and leadership)

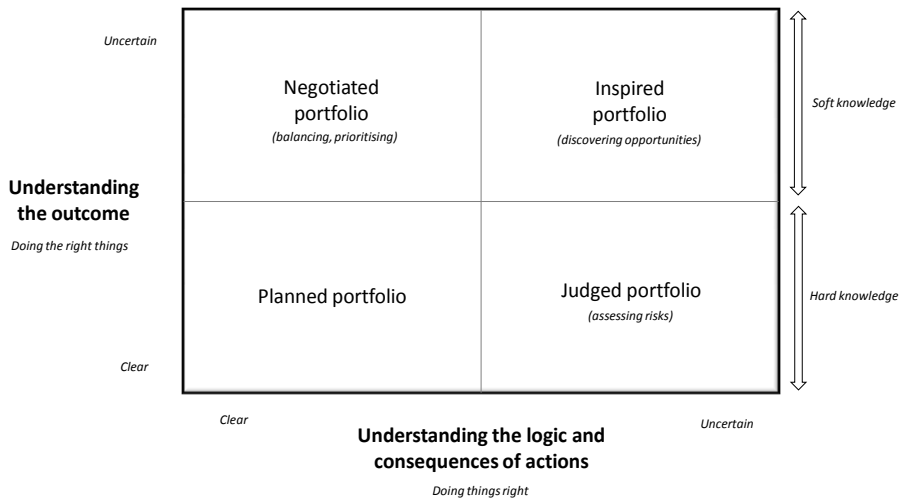


Figure 26: A management taxonomy for a portfolio framework

This is not a 'one-size-fits-all' recipe, it is rather four ways of 'doing management' depending on the current understanding of the two above dimensions. Within IT management, this understanding may be aided by using various methods, tools or techniques such as architectural design (substantial and process-based models).

4.5 Integration-oriented enterprise development

Checkland (1989) has provided a useful and widely acknowledged approach for developmental issues with the creation of Soft Systems Methodology (SSM). It is applicable to many situations and hence provides a way to deal with 'real world' managerial challenges. However, although SSM is a process that leverages architectural design (conceptual models), it does not take into account IT governance or ITPM (see Figure 27). It is in other words incomplete from both an enterprise development and IT management perspective.

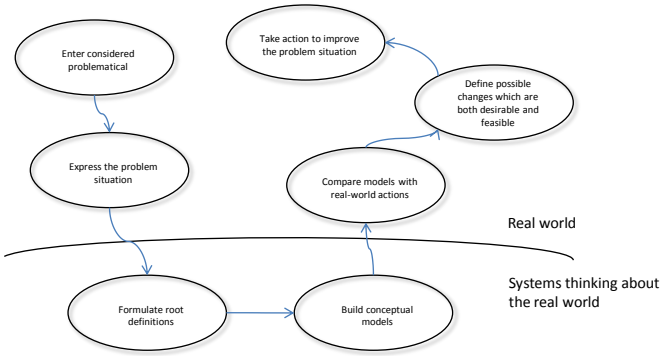


Figure 27: Soft Systems Methodology (Checkland, 1989)

The original SSM starts with trying to express and analyse the problem situation. This may be carried out in a variety of ways depending on the situation. A root definition must thereafter be formulated in order to take steps towards changing the situation. Without this, there is no way of knowing what is desirable. In an organisational context, this is the equivalent to the mission, core values, vision, and expectations among stakeholders. SSM is based upon comparing models of the real world with the real world. This requires a design-process that is governed by the root definition. The root definition brings meaning to the models. Defining possible changes to the situation can only be carried out after this step. Lastly, selected changes are carried out.

The power of SSM does perhaps lie in its simplicity. However, in this thesis, it is argued that this process must be integrated into both IT governance and ITPM. There is little need to treat these as separate approaches when in practice they are not separate entities. Although current approaches and frameworks address most issues within enterprise development (when viewed as a whole) they have emerged from different disciplines, and therefore are fragmented or even completely non-integrated. This way of addressing issues separately may cause inefficiencies, overlaps, confusion, or worse – all three concurrently. There is, in other words, a need to integrate key approaches in order to shape a more comprehensive view. This is also imperative, as it has been suggested that ITPM continues to be a 'best practice' for planning IT investments in organisations (Ward, 2012). Additionally, ITPM is (Ross & Beath, 2002; Ward & Peppard, 2002; Jeffery & Leliveld, 2004; Maizlish & Handler, 2005; Aral & Weill, 2007; IT Governance Institute, 2008):

- inherently linked to projects, assets and capabilities,
- a part of the strategic planning process,
- dependent upon EA,
- and will not provide any value without appropriate decision rights and accountabilities

Given the importance of ITPM and its interrelatedness to other constitutional parts that make up the enterprise development process, ITPM should not be viewed separately. Unfortunately, it does appear rather isolated. This, in turn, leaves practitioners with fragmented approaches as long as they are developed in isolation. There is in other words a need to clearly define and relate approaches – in sum, to articulate an integration-oriented view on enterprise development.

The above concern is neither new nor unique. Other attempts have already highlighted similar issues. For example, Hoffman (1988) when suggesting a meta-architecture in order to articulate and relate the concepts used for corporate IS strategies. Furthermore, ISACA addresses the issue with the new version of COBIT, which integrates several frameworks into one (Oliver & Lainhart, 2012). This illustrates the significance of the concern.

There are however no approaches or frameworks currently available covering the issue in this thesis. Figure 28 is therefore an interpretation and a new way of thinking about an integrated view on enterprise development. Checkland's (1989) SSM inspired the model, but it has been augmented to fit an organisational context and explicitly includes architectural design, IT governance as defined by Weill (2004), and ITPM. Its components are further explained in Table 7. A detailed view is lastly presented in Figure 29.

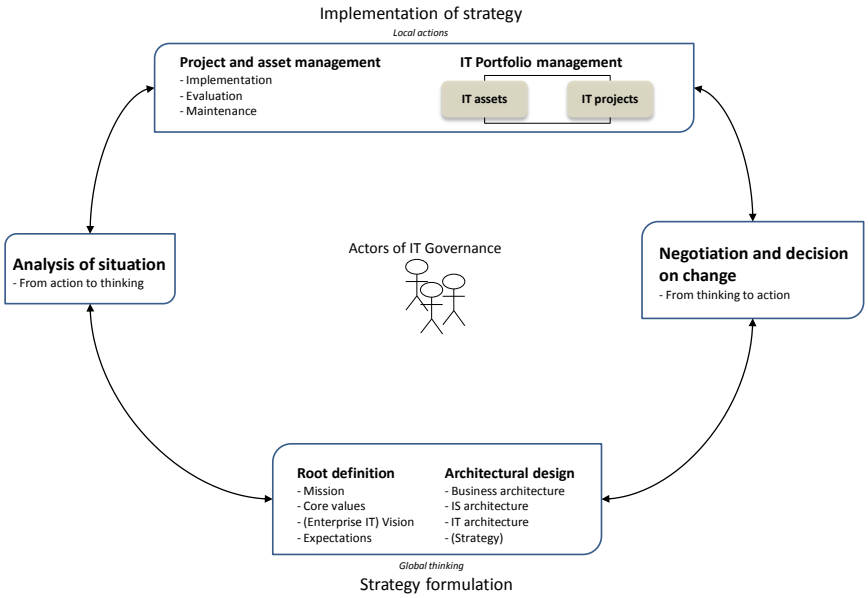


Figure 28: Integrated model for enterprise development

Component	Description
Actors of IT Governance	These are the people participating in any part of the enterprise development process. Several potential decision styles can be used. They should be actively designed. All areas must be governed and it is the governance body that determines who should be involved in making decisions (see Weill, 2004).
Analysis of situation	The current situation is expressed and analysed and a shared understanding is created. The focus should be directed towards outcomes and value generation. An important role for a framework is to enable this analysis. This also subsumes that a framework has been defined in terms of its existence and purpose, its scope and definitions (see OMB, 2007; Oliver & Lainhart, 2012).
Strategy formulation	Strategy formulation means articulating the strategic thinking about the real world. It should remain at global thinking as it involves creating an understanding of desired outcomes – not the necessary local actions to carry out changes. This step involves formulating a root definition and using architectural design to create a coherent and functional whole. The root definition contains mission statement (core purpose), core values, vision, as well as expectations of stakeholders. This will guide design and all decisions (see OMB, 2007; Magoulas et al., 2012). Architectural design involves three architectures: (1) business; (2) IS; and (3) IT. Models of such architectures should support a substantial (AS-IS / TO-BE) and a process-based view. This area subsumes practices within application portfolio management. When needed, a strategy may also be created (see Magoulas & Pessi, 1998; Ward & Peppard, 2002); Aerts et al., 2004; Hugoson et al., 2008; Lapkin et al., 2008; Land et al., 2009; Simon et al., 2010).
Negotiation and decision on change	This is where an understanding of the logic and consequences of actions are created and decisions are made. Decisions should be grounded upon: (1) a comparison of AS-IS and TO-BE models (see Land et al., 2009); (2) short-term performance improvements and long-term contributions towards root definition (see OMB, 2007); (3) consideration of positive and negative effects, and risks. Categorisations can be used for organising investments into groups of similar character. Prioritisations ranks investments based on agreed criteria. Balancing can finally be carried out. This takes into account all elements in the IT Portfolio (see Jeffery & Leliveld, 2004;

	Maizlish & Handler, 2005; Project Management Institute, 2006; Weill & Aral, 2006).
Implementation of strategy	Consists of IT portfolio management and project and asset management. The IT portfolio contains projects and assets. They are part of the architecture. Clear guidelines should be provided for defining projects, their benefits and logic, allocation of resources, estimates of time and costs, evaluation/control and benefits follow-up, and project (asset) maintenance (see Pellegrinelli & Bowman, 1994; GAO, 1997, 2004; Maizlish & Handler, 2005; Project Management Institute, 2006).

Table 7: Components in the integrated model for enterprise development

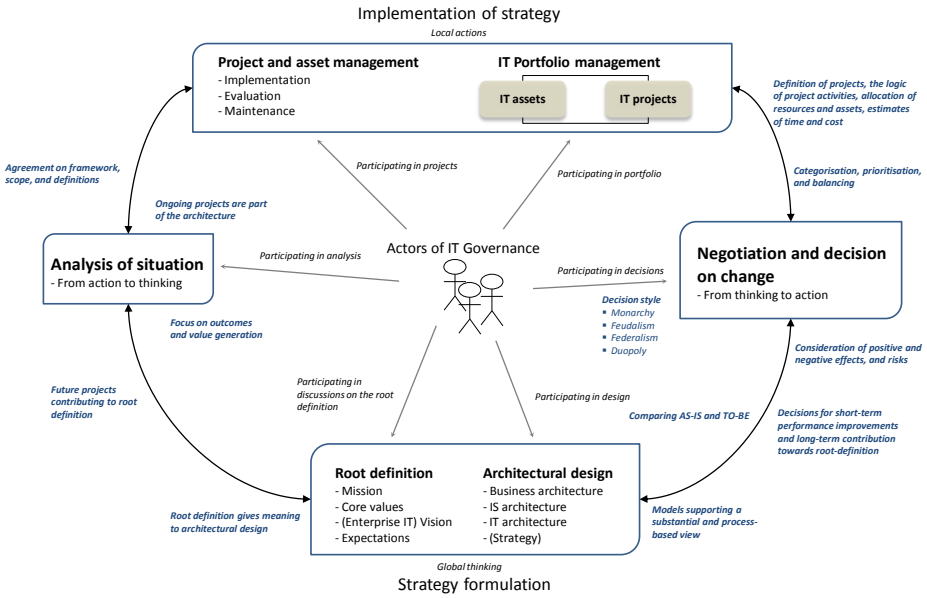


Figure 29: Integrated model for enterprise development (detailed)

4.6 Deriving questions for investigation and comparison

Deriving key questions from the theoretical contribution create the foundation for ensuring its reliability and relevance. Questions also reinforce and clarify the theoretical contribution (Hedberg & Jönsson, 1978). The study utilised the following questions:

Holistic-oriented enterprise development

1. To what extent are the following dimensions represented in the enterprise development model?
   - Structural dimension (domain of IS/IT & domain of authority and responsibility)
   - Functional dimension (domain of IS/IT & domain purposive activities)
   - Infological dimension (domain of IS/IT & domain of actors and participants)
   - Socio-cultural dimension (domain of IS/IT & domain of mission, vision, goals, values, strategy)
2. To what extent are the following values a measurement of short-term performance improvements and long-term expectations (attractiveness)?
   - Cost
   - Quality
   - Efficiency
   - Reliability

- Availability
- Effectiveness

Proactive outcome-based enterprise development

3. To what extent are outcomes of enterprise development associated with the following situations?
   - Demand-driven
   - Time dependent
   - Vision oriented
4. To what extent are outcomes of enterprise development a result of the following categories of development?
   - Proactive development
   - Reactive development
   - Riskful development
   - Research-based development

Management-oriented enterprise development

5. To what extent are the following categories of decision-making representative to management in general and portfolio management in particular?
   - Planned (setting goal and organising activities)
   - Negotiated (making trade-offs, balancing, prioritising)
   - Judged (discussing consequences and taking risks)
   - Inspirational (discovering opportunities, leading and leadership)
6. To what extent are the following measures representative to management in general and portfolio management in particular?
   - Efficiency
   - Effectiveness
   - Short-term performance improvements
   - Long-term attractiveness
7. To what extent is the following knowledge used for decision-making?
   - Hard knowledge (structuring and calculating data and information)
   - Soft knowledge (opinions, qualitative judgements, negotiations)

Integration-oriented enterprise development

8. To what extent are approaches integrated in the enterprise development model?
   - Fully integrated
   - Partially integrated
   - Non-integrated

A basic background of the case company and the framework in use, the desired outcomes of applying the framework, and possible issues with the framework were also considered when collecting empirical evidence, as this would create a more comprehensive view.

5 Volvo Group Portfolio Management

This chapter presents the empirical findings of this study.

5.1 Introduction

Corporate Process & IT (CP&IT) is a management function and head office for all Process & IT functions within Volvo Group. It is responsible for managing and controlling the overall efficiency of processes and IT in the entire Group. Main tasks involve promoting and identifying opportunities for the usage of common processes, shared IT systems and IT infrastructure. It also sets the governance frameworks used by each Process & IT function. The role of each business areas' Process & IT function is to be the link between the business processes and the IT supply organisation. Hence, they develop the processes and define business requirements on IT. These are to be carried out by the IT supply organisation (Volvo IT) by ensuring and providing 'know-how' capabilities and resources (see Figure 30).

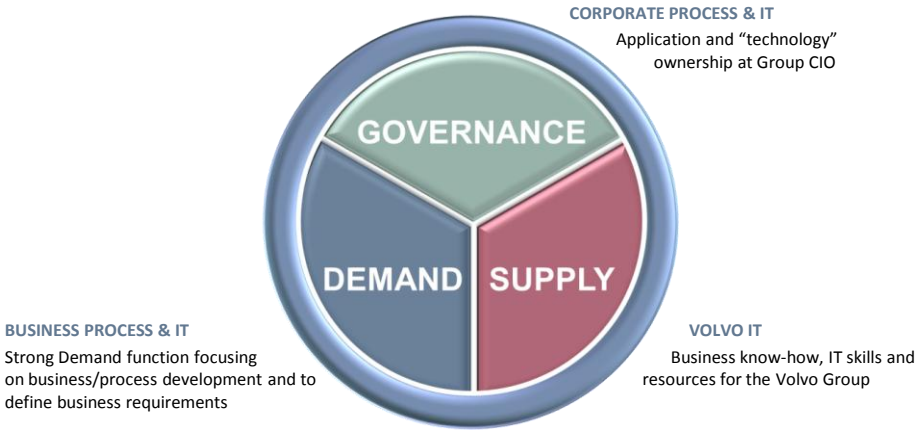


Figure 30: Management structure of IT within Volvo Group

The 'Solution Portfolios' office at CP&IT is responsible for all IT application portfolios, related master data, and application integration. Duties associated with the office involve aligning the development of the portfolios with the business strategies and process development objectives. The main strategy for IT within Volvo Group is currently to make sure the IT costs remains within 2% of the Group's total costs by 2015. In this backdrop, CP&IT decided to introduce Portfolio Management as a new and common way of working for planning, evaluation and optimisation of current and potential IT investments and resources. This resulted in the creation of a framework on a conceptual level. However, it is still under development.

The following desired outcomes are associated with the establishment of Portfolio Management Framework (Director PO, Manager APM, and Manager PPM):

- **Outcome 1**: An ability to prioritise, enabling the organisation to proceed with initiatives maximizing benefits for the entire organisation.
  Rationale: Until now, Volvo Group has only had long-term strategies and then project implementation. These projects have not been prioritized in a structured way from a Group perspective – instead they have mainly been prioritized based on bottom-up needs.

- **Outcome 2**: Projects should be deeply rooted in organisational needs and thus accepted, implemented according to plan, with well managed risks, and include project follow up and benefit realisation, with clear accountabilities.
  Rationale: Projects has had a tendency to grow in scope, size, and budget – and the actual benefits have not been evaluated in a desired manner.

- **Outcome 3**: An ability to work with application rationalisation and optimisation.
  Rationale: There are approximately 3300 registered applications within the Group. Together, they have a high maintenance cost. If applications are removed and/or consolidated, then more resources are made available for developmental purposes (projects).

- **Outcome 4**: Decision transparency.
  Rationale: As a Group, it has been difficult to follow up decisions in approval processes and the information used in decision-making.

5.2 Portfolio management framework 1.0

Portfolio Management Framework at Volvo Group was at the time of research presented on a slide-show presentation only. Hence, the framework was still on a conceptual level providing an overview of Portfolio Management and its components. The framework defines the term Portfolio Management as:

> ”*the use of continuous and consistent evaluation and prioritization, of new investments as well as investments on current solutions, to finally select what to be kept in plan, for the greatest value and contribution to the strategic interests of the organization, and within budget constraints*”.

It also states that the vision for Portfolio Management is to establish a tool/method to optimise IT investments. This tool/method would enable one source for: (1) analysis; (2) prioritisation; (3) planning, short and long term; and (4) investment follow up – within Application / Solution Portfolio Management, Project Portfolio Management, and Infrastructure Portfolio Management, in order to maximize business benefits realisation. Portfolio Management as a whole is thought of as the link between business strategies, various implementation initiatives and realised business value (see Figure 31). This link is also referred to as “tactical planning”.

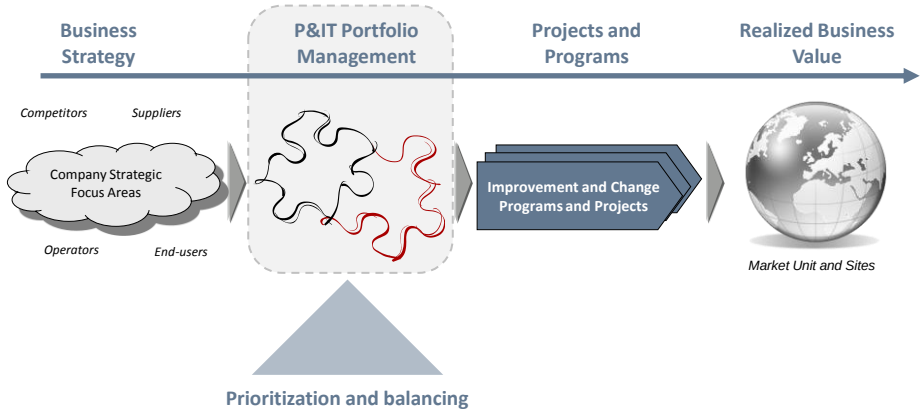


Figure 31: Portfolio management as the missing link (Volvo Group)

The framework also contains a ‘framework palette’. It consists of three different iterative processes (loops) accommodating several management activities (see Figure 32). The framework does not clearly articulate the scope of Portfolio Management. However, according to the PO Director Portfolio Management mainly concerns the tactical loop, *doing the right things*, but also contains some elements within the strategic loop, *right business objectives*, and operational loop, *doing things right*. Main elements, according to the ‘palette’, are a portfolio analysis, IT strategies, change proposals, cost management, resource management, three-year plans and roadmaps, short-term plans, and project execution and solution maintenance. The palette is not explaining its further details, use or function.

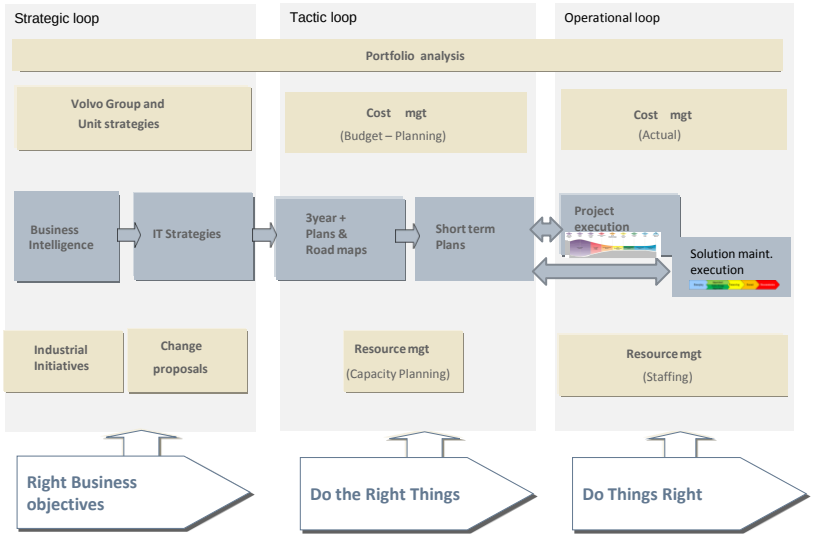


Figure 32: Portfolio framework palette (Volvo Group)

However, the framework presents a range of definitions of important components (see Table 8). It also refers to a set of plans and roadmaps (see Figure 33). More specifically, the framework requires decision-makers to produce city maps (AS-IS, TO-BE) and roadmaps. City maps belong to the Enterprise Architecture discipline, which is located as a separate function within CP&IT. City maps are visualisations of different "layers" of the IT landscape that are used to describe its current and future states (see Figure 34). Furthermore, there are different types of roadmaps.

Figure 33: Required documentation within the framework (Volvo Group)

Figure 33 refer to “Solution Transformation Plans”, “Solution Phase-out Plans” and "Project/Program Roadmaps". The framework has not yet integrated further explanations of these roadmaps and plans.

Maps = a way of presenting either as-is or to-be landscape

In this example a presentation of where to find most similar Applications, and holes

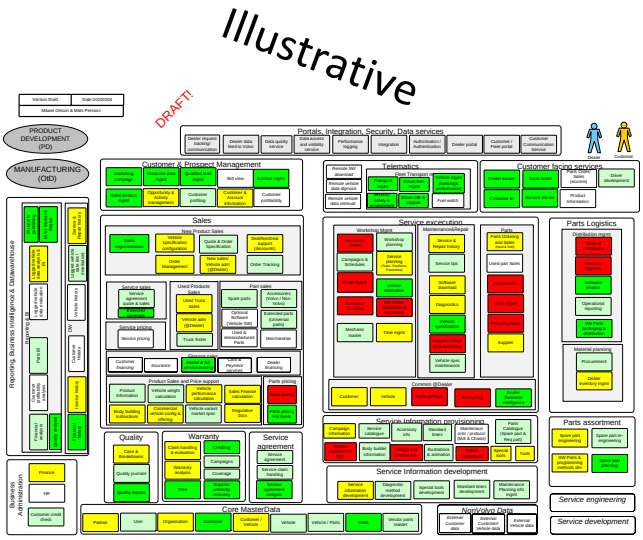


Figure 34: Example of city map (Volvo Group)

However, the framework also states that there are:

- Strategic roadmaps (longer than three years providing policy and strategy, wanted position, the strategic direction)
- Tactical roadmaps (up to three years rolling, focusing on development and implementation)
- Operational roadmaps (from now to twelve months ahead, focusing on maintenance and optimisation)

Additionally, a roadmap should according to the framework be created by deciding on an AS-IS and TO-BE city map used in conjunction with APM and PPM tools and methods (although it is unclear how this is carried out).

Component	**Definition**
Application	Software, in-house developed or built on COTS (Commercial of-the-shelf), which main purpose is to support one or more business functions or business processes as the IT component of a Solution.
Solution	A clearly defined business support-function for a business process. A solution usually contains one or more applications, IT components, and related business components such as: (1) information model; (2) method instructions; (3) support; and (4) training.
Solution Portfolio	The set of Solutions supporting a number of delineated business functions connected in the end-to-end processes.
Application Portfolio	The set of Applications supporting a number of delineated business functions connected in the end-to-end processes.
Application Portfolio Management (APM)	Tools and methods used in assessing how existing solutions contribute to achieving business goals, and what needs to be done to: (1) maximize business value; (2) secure architectural fit; (3) support transformation plans (competence, development); and (4) minimize risk to the business.
Project Portfolio	Existing, planned, or potential projects.
Project Portfolio Management (PPM)	Tools and methods used in assessing how existing, planned and potential projects contribute to achieving business goals to finally select what to be kept in plan, for the greatest value and contribution to the strategic interests of the organization, and within budget constraints, in terms of: (1) Running the business; (2) Growing the business; (3) Transforming the business.
Information System Global Development	The method for management and execution of a project or program all the way from stating the business value to deployment and realization in the user

Process (IS-GDP)	organization.
Solution Management Process (SMP)	The method for management of Solutions and Sub portfolios. It includes: (1) the steering structure (decision/escalating) and decision forums; (2) clarifies the Demand/Governance/Supply functions roles and responsibilities; and (3) includes the solution maintenance.

Table 8: Several framework components and their definition (Volvo Group)

5.3 Solution Management Process

SMP is in fact a governance model rather than a process. It uses a propriety business solution maintenance management model (PM3) that aims to establish a more business like behaviour. Hence, an IT maintenance perspective dominates its assumptions. The manager of SMP is currently incorporating a new way of thinking about IT maintenance by defining the term 'Solution' and designing roles and responsibilities aligned to it. A solution (see Figure 35) currently consists of an IT service component (infrastructure, application, and basic documentation) and a business component (information model, training, support, and method instructions). However, the future beholds an extension that includes the related business process. SMP is in other words continuously developed and aligned to process management. With SMP, the IT demand and IT supply organisation shares responsibilities for a solution. This creates a challenge not only because it is possible to share solutions across organisational borders, but also because it requires a new mindset.

"Viewing the IT service and the business components as a solution requires a change in organisational mindset." (Manager SMP)

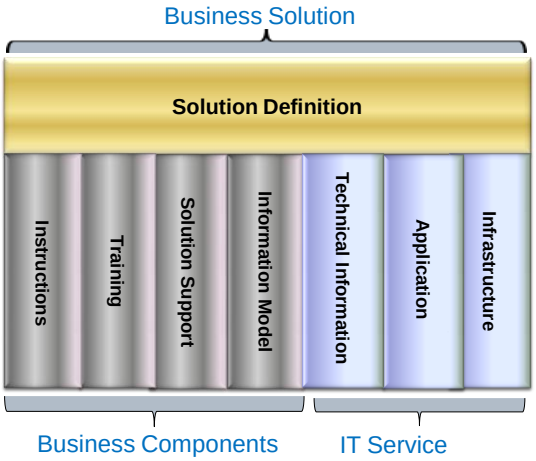


Figure 35: A solution (Volvo Group)

Figure 36 defines the decision structure and key roles in managing solutions. Roles within SMP are responsible for ensuring the efficiency and effectiveness of solutions.

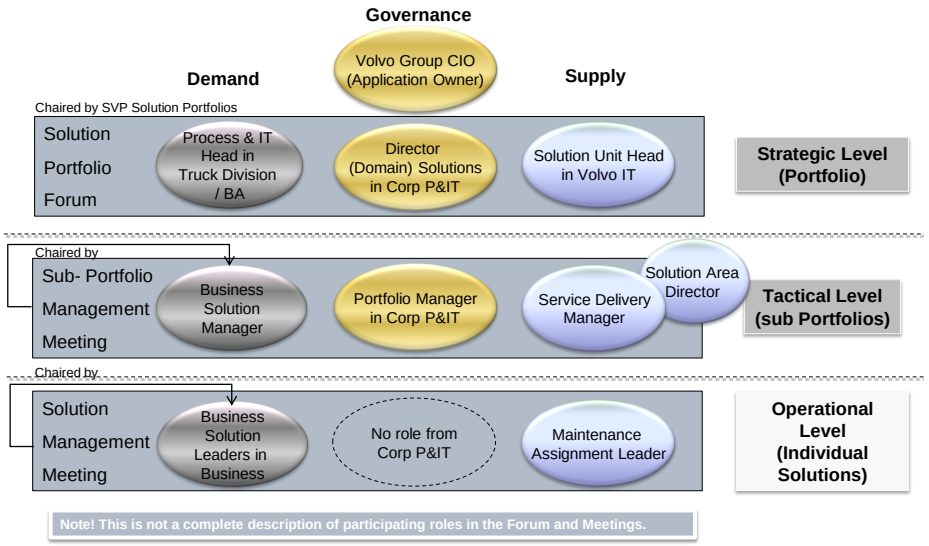


Figure 36: The decision structure in SMP (Volvo Group)

It is important to understand that SMP only considers the governance of IT maintenance – not IT development. Instead, the process management function owns and controls all IT development resources.

5.4 Application Portfolio Management

APM is according to the manager of APM best described as a three-stage maturity scale consisting of three ongoing processes: (1) establish; (2) analyse; and (3) transform. Its essential purpose is to rationalise and optimise the portfolio of applications within Volvo Group.

Establish
The 'establish phase' is all about getting to know the application landscape by registering every single application in a centralised database. For this purpose, a repository named 'Yellow Pages' exists. It lists all applications and a range of relevant attributes, such as a unique application identifier, lead organisation and appointed contacts for management. This discovery process is conducted locally by the business.

Analyse
Stage two, analyse, involves making decisions on what applications to keep or to phase out. This requires, in some areas, a full analysis of the portfolio in terms of fit between business-value, risk, architecture and technology (see Figure 37).

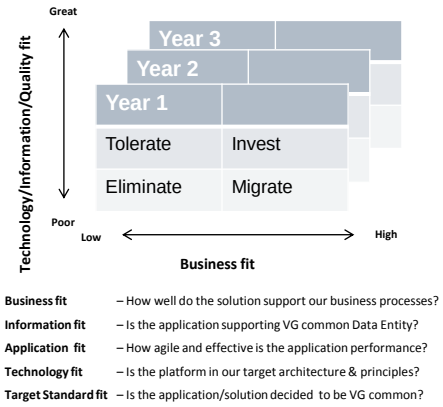


Figure 37: Evaluation of applications (Volvo Group)

As an early step, different types of classifications are used. For example, a categorisation into application lifecycle phase. In essence, according the manager of APM, such a categorisation defines an application as 'invest and develop' or 'minimise and phase out'. However, as shown in Figure 38 several categories are used. Table 9 further explains the categories.

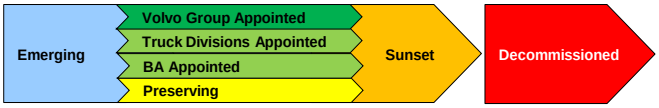


Figure 38: Application Life Cycle Phases (Volvo Group)

Classification	**Definition**
Emerging	Emerging application for a specific process area / functionality area (Application not yet ready for full deployment).
Volvo Group Appointed	The only alternative and default choice for all organisations within a specific process area / functionality area.
Truck Divisions Appointed / BA Appointed	The alternatives to be used in a specific part of the organisation supporting a specific process area / functionality area.
Preserving	Indicates solution/application passed the edge of lifecycle in platform or business support still used for business continuation.
Sunset	Decision has been taken to decommission the application. Sunset applications have withdrawal plans where dates and responsibility is stated.
Decommissioned	The application is no longer operational.

Table 9: Application lifecycle phases and their respective definitions (Volvo Group)

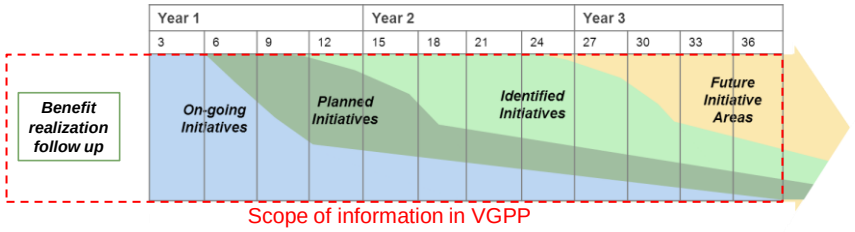
Transform

The third and last stage, transform, is all about executing decisions on transforming the application portfolio. The objective is to: (1) establish roadmaps, covering all the appointed applications in the portfolio; (2) develop phase out plans, covering all sunset applications; and (3) make explicit any dependencies to process roadmaps, master data plans, and projects (planned and ongoing). This is why APM cannot be viewed in isolation, a broad transparent portfolio management approach is needed (Manager APM).

5.5 Project Portfolio Management

A main concern in PPM is according to the manager of PPM to create and maintain a "project funnel". It involves making transparent all ongoing, planned, and identified projects and programs on a three-year horizon (see Figure 39). This will provide decision-makers with the

information needed to prioritise among planned and identified projects, so that the IT budget (IT cap) remains on target.



Key objective
Transparency of all ongoing, planned and identified initiatives cross all organizations
1. Enable view on three year plan
2. Enabling prioritization and trade off in the yearly budget process (defining the IT cap)
3. Transparency in the project approval process
4. Transparancy in the follow up of ongoing projects
5. Transparency in benefit realization follow up after project completion

Figure 39: Project funnel and key PPM objectives (Volvo Group)

The main tool for PPM is currently VGPP (Volvo Group Project Portfolio) which is a centralised database intended to store information on the project funnel, the project approval process, project follow-up, and the benefit realisation. However, the PPM manager is calling for a more comprehensive tool due to his concern with the organisation's ability to do tactical planning. Today, there are only long-term strategies and then an overweight on prioritising projects from a bottom-up perspective (Manager PPM).

> *"Projects have to a large extent been selected on a project-by-project basis. We need to incorporate tactical top-down planning in order to prioritise them."* (Manager PPM)

On a corporate level, there is according to the PPM manager a difference between: (1) prioritising a 'wish list' of projects that will impact and generate the future IT landscape; and (2) to first define the wanted future IT landscape and then see which projects that will be necessary for taking steps towards the wanted position. The former is a reactive way of selecting projects, whilst the latter is a proactive approach generating a list of projects. However, according to the PPM manager most PPM approaches available, such as the current process in Volvo Group (see Figure 40), are flawed on this matter as they do not show the role of enterprise architecture.

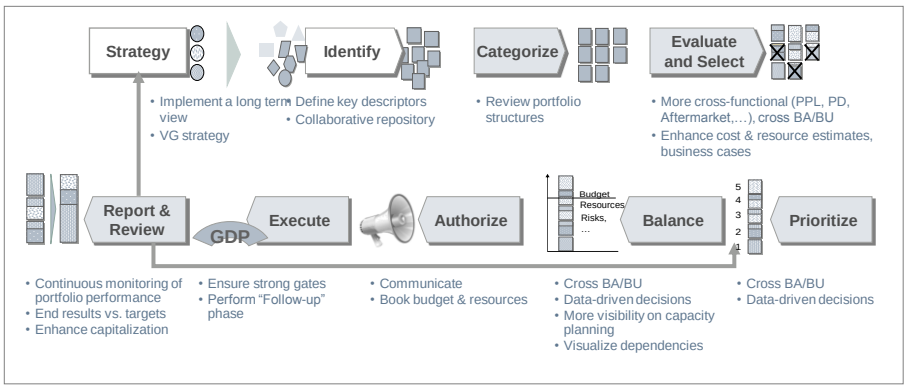


Figure 40: Project Portfolio Management process (Volvo Group)

Tactical planning would, according to the PPM manager, not only involve the ability to manage project information and lifecycle, view and report on project portfolios, support prioritisations, project follow up and benefit realisation, with clear accountabilities. It is also about being able to describe a current state (city map), a future desired state (city map), and a roadmap describing how to move towards the desired state. In sum, the PPM manager is missing a common language for how to plan process and IT. Figure 41 is a visualisation from the PPM manager regarding his concern.

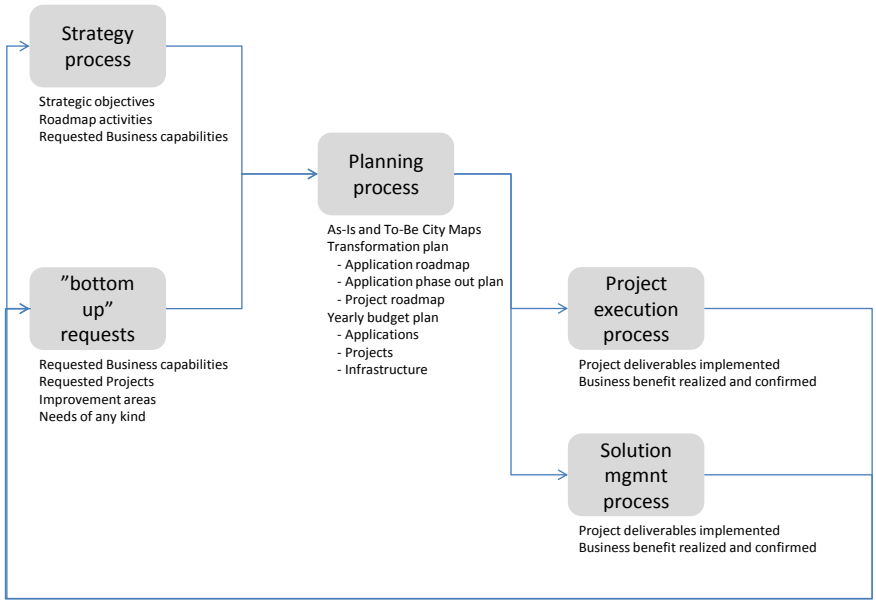


Figure 41: The need for a tactical planning process (Volvo Group)

5.6 Information System Global Development Process

IS-GDP is the control model for projects implementing or changing IT investment and resources. According to the manager of IS-GDP, it is a fundamental enabler of organisational change and is now mandatory to use throughout the Group. IS-GDP was developed from deep knowledge in the corresponding business project methodology over a long period. It therefore holds an incredible value for the Group as it represents many years of experience (Manager PO).

Four main areas need to be managed in the process: (1) business objectives management; (2) solution management; (3) business change management; and (4) project control. To achieve this, the model includes a steering structure (steering committee and gate structure). According to the manager of IS-GDP, it is a method driven by the business, enabling support and quality assurance for two main entities:

- The Steering Committee, to take decisions regarding time, cost, quality and content.
- The project team, to ensure that all key issues have been covered and have an answer / solution at the right time, at the right cost, at expected quality and content.

Figure 42 briefly describes the gate structure and main activities in the IS-GDP methodology.

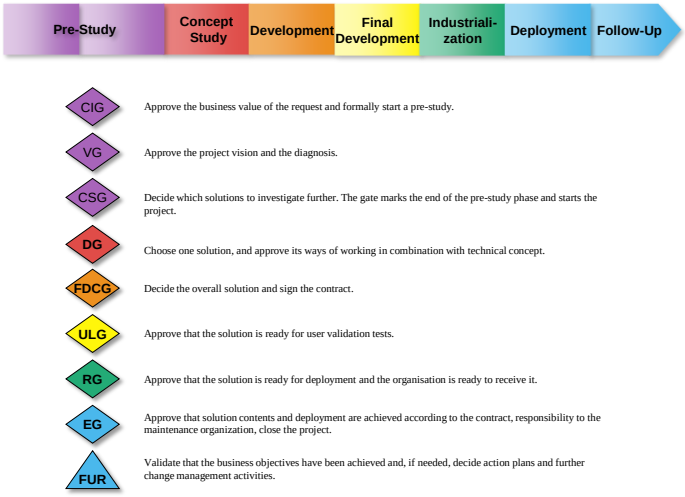


Figure 42: Gates of the Information System Global Development Process (Volvo Group)

5.7 Related approaches

There are at least two approaches related but not included in Volvo Groups' 'Portfolio Approach', the long-term plan and EA. The following sections describe these.

5.7.1 Corporate Process & IT Long-term plan

The director of SP is responsible for "CP&IT Long-term Plan". Unfortunately, it is a company secret and hence is not available to everyone within the Group. However, the director of SP states that it essentially contains three components: (1) strategic direction; (2) main strategic activities aligned with the direction; and (3) consequences on the budget. Developing this plan involves investigating what business capabilities are required in the future (15 years) and needed investments to get there. Hence, this is the plan that should be driving Process & IT development in the Group.

5.7.2 Enterprise Architecture at Volvo Group

The EA framework used at Volvo Group is according to the director of EA partially based upon TOGAF (see The Open Group). The framework defines EA as "*the structure and guiding principles governing the development and implementation of the enterprise's information systems*". To communicate the EA-concept a pyramid is used. It shows the different components and architectures of EA (see Figure 43). The current framework does however not explicitly define these.

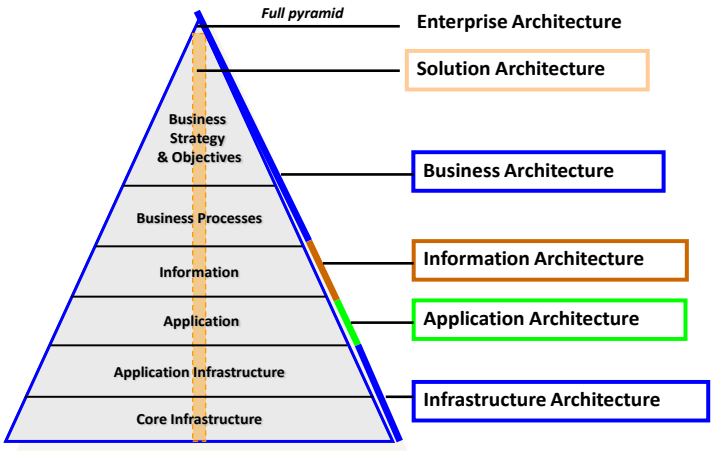


Figure 43: The Enterprise Architecture pyramid (Volvo Group)

It also appears unclear to the director of the PO and the director of EA exactly how EA relates to Portfolio Management.

> "*The relationship between Enterprise Architecture and Portfolio Management is inter-related and perhaps not clear to everyone.*"
> (Director EA)

Notwithstanding, the Group's EA-department has developed a target-architecture, consisting of a model describing a desired structure for the inner and outer environment of applications applicable for new-development or buying "off the shelf" (see Figure 44).

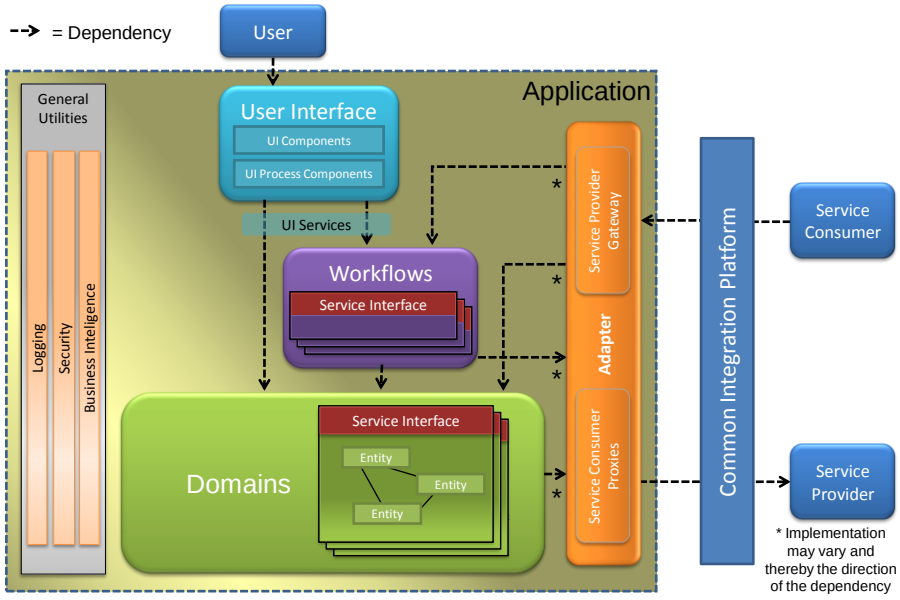


Figure 44: Volvo Group's EA target-architecture (Volvo Group)

The key benefits of using EA at the Group is claimed to be cost reduction and revenue increase, by providing policies and principles for IT investments (see Figure 45). The EA framework provides ten principles, derived from a comprehensive description of a reference environment. It is, according to the director of EA, important to note that the principles are only guidelines to drive conscious architectural decisions. Some represents two ends of a spectrum, meaning applying one may affect another. For example, high level of simplicity may contradict a robust solution.

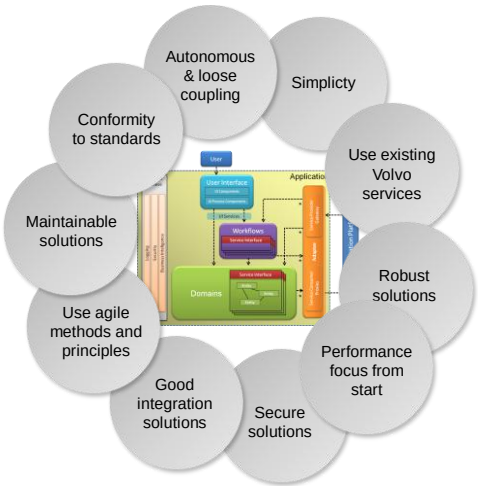


Figure 45: Volvo Group EA principles (Volvo Group)

According to the director of EA, one of the current top priorities within EA is the establishment of: (1) shared, agreed, and controlled information models on the Group level; and (2) shared and consolidated IT solutions. The EA-department is also responsible for quality assurance of projects developing new solutions and maintaining the quality of existing solutions. To achieve the former, the EA-department has created designated integration points within IS-GDP. For example, each project should now have a lead architect and several gates extend to include EA-related issues at Volvo Group, such as requirement breakdown and specification, and prototyping.

Additionally, city maps are important components of the work conducted at the EA-department. There is currently a framework for guidance of "city mapping" under development. However, some of the work has already initiated. According to an enterprise architect, this work involves the ‘mapping’ of applications and their respective link to strategic goals, processes, portfolios and functionality. This will enable the creation of an overview and visualisation (city map) expressing the status of the landscape. City maps rely on up-to-date information, meant to reside in a common management system (VGMS). The implementation of city maps is not complete. However, Figure 46 demonstrates the city map concept.

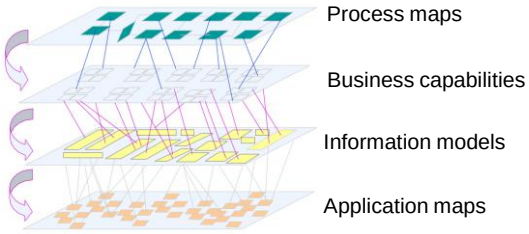


Figure 46: City maps example (Volvo Group)

5.8 An emerging perspective

There is concurrently to the development of portfolio management and EA an initiative to describe the management processes used in delivering process and IT solutions and services in the Group. It has resulted in process descriptions shown in Figure 47.

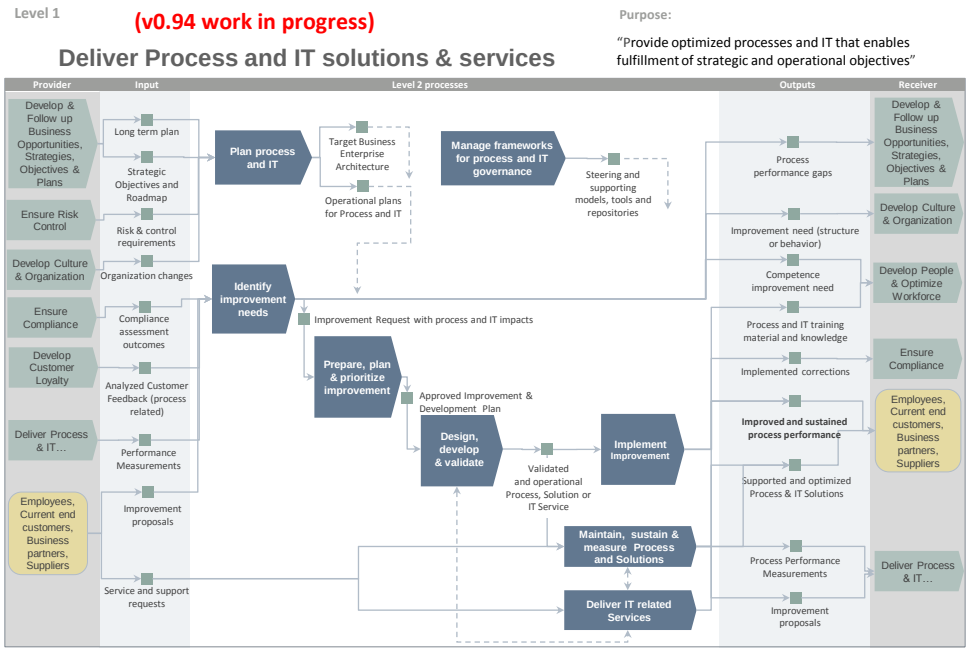


Figure 47: Deliver process and IT solutions and services

Among other things, it shows that the 'Target Business Enterprise Architecture' is central in planning process and IT. This represents a change of the role of EA. According to the manager of P&IT Efficiency, this is imperative as the current EA has too much focus on IT – it is necessary to create a more business-like view.

> *"We have to bring the view of Enterprise Architecture back to the business."* (Manager P&IT Efficiency)

A 'Business Enterprise Architecture' contains, according to manager of P&IT Efficiency, descriptions of the business processes, business location/sites, organisational entities, most important business information, and IT solutions and services to support that architecture. There are descriptions of this available – however – they are dispersed and are not viewed as a whole. Taking a business perspective on EA is, according to the manager, critical as any changes to the application landscape, or any other changes for that matter, have to start with the business process in mind.

> "*Everything must be based upon the business processes. That is the only way.*" (Manager P&IT Efficiency)

Furthermore, the manager of P&IT Efficiency claims that prioritisations must also have taken into account desired effects of any changes. For example, a clear understanding must exists regarding the size of the change, and the implications on the business. City maps are to guide prioritisation decisions to ensure selection of the right initiatives. To make this happen – however – there is a need for a tool more powerful than current VGPP and YP. It must be able to take in everything, including processes and all initiatives (Manager P&IT Efficiency).

The manager of APM also agrees with this new perspective. He believes that a more structured approach to IT management is necessary, where EA plays a leading role taking a clear management position. This is a challenge in Volvo Group as the EA community historically has only provided governance – not allowed full management responsibility (Manager APM).

"Many of the resources at CP&IT used to be part of the old Volvo Group function 'IT Governance', which consisted of experts in governing IT. When we became CP&IT a management perspective was added to our responsibilities. However, many of us are still primarily focused on governance, not enough focused on management." (Manager APM)

6 A comparative analysis

This chapter presents an analysis comparing proposed theory to the empirical views expressed in the previous chapter. It is organised into four main sections in accordance with the proposed aspects. These aspects are then further developed into an integrated conceptual model for portfolio-based IT management.

6.1 Holistic-oriented enterprise development

Holistic-oriented enterprise development refers to the extent models for enterprise development supports different dimensions of the enterprise. More specifically, there are according to the model for FEM (Svärdström et al., 2006; Magoulas et al., 2012) four key dimensions that make up a holistic view of the enterprise (see Figure 48):

Hard dimensions:

1. Structural dimension (domain of IS/IT & domain of authority and responsibility)
2. Functional dimension (domain of IS/IT & domain of purposive activities)

Soft dimensions:

3. Infological dimension (domain of IS/IT & domain of actors and participants)
4. Socio-cultural dimension (domain of IS/IT & domain of mission, vision, goals, values, strategy)

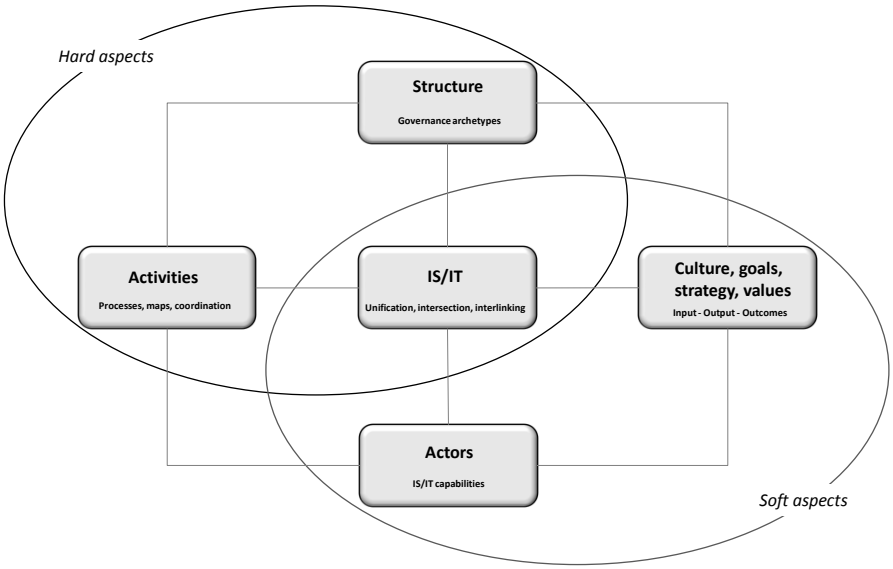


Figure 48: A multi-dimensional view of the enterprise

Most approaches available today focus on the hard dimensions, while little attention has been given to the inclusion of the all-important soft aspects. This may be a problem as these interact closely with: (1) knowledge and capability development (infological); and (2) managing the feature that instigate people to action, i.e. their motivation, their beliefs about the future, i.e. their expectations, and their accepted ideals, i.e. values (socio-cultural). OMB (2007) refers to values such as cost, quality, efficiency, reliability, availability, and effectiveness. There are certainly other values applicable. However, the point is to acknowledge them and find a balance that make up a meaningful body upon which measurements can be applied. This is to ensure that inputs (such as technology) and outputs (such as business processes) are contributing towards desired outcomes. Additionally, while

both hard and soft aspects appear crucial for any approach to enterprise development, it is also important to understand that factors contingent to each organisation determines a models' holistic approach. Therefore, a holistic framework, approach or model must demonstrate its completeness, i.e. to not be able to add or remove components without affecting its meaningfulness.

Portfolio management at Volvo Group demonstrates an interesting approach, which is still under development. It includes some important aspects:

Structural dimension
The framework includes a model for decision rights and accountabilities, the 'Solution Management Process' (SMP). While its scope is not entirely clear, it has been actively designed and ensures a sound linkage between the business and the IT supply function. The project methodology, IS-GDP, also includes a governance body consisting of:

- The Steering Committee, to take decisions regarding time, cost, quality and content.
- The project team, to ensure that all key issues have been covered and have an answer / solution at the right time, at the right cost, at expected quality and content.

Socio-cultural dimension
As can be seen, there are traces of soft aspects (socio-cultural) embedded within the structural dimension. However, these are only measures for short-term performance improvements, not stated values or desired outcomes. The only values that can be found in the case indicate a strong focus on lowering costs and increasing efficiency. This is carried out by seeking to create shared, standardised, and optimised processes and systems. Process and IS/IT measurements are an important input for this. While common values within the specific industry in which Volvo Group operates could explain these values (economies of scale, cost efficiency), it will be wise to refrain from their excessive focus as this may create critical issues related to quality, effectiveness, and innovation.

Infological dimension
The knowledge and capability perspective is elusive and more or less missing. However, capabilities are mentioned in the long-term plan and as a view in city maps. This demonstrates awareness. Additionally, the term 'Solution' incorporates training and support for applications, which appears sound.

Functional dimension
The functional dimension is imperatively present due to the role of the organisational function: Process and IT. The framework contains a large (and a little confusing) amount of plans and roadmaps. These are concerned with activity planning and coordination of IS/IT developmental initiatives. However, some of the concerns within this domain stretch beyond the framework itself. These boundaries are a little unclear. For example, APM, which belongs to the EA-discipline (Simon et al., 2010), is concerned with the functional fit between the domain of IS/IT and the domain of purposive activities. It therefore utilise measures to applications with regards to their business process fit, conformity to information standards, agility and effectiveness of application performance, technical fit, and target standardisation fit. However, the EA-function, which is expected to provide direction in this matter (city maps), is more or less separated from portfolio management – their relation is unclear. Additionally, the EA used is strongly focused on technical aspects within the domain of IS/IT (see Figure 44). Hence, a better more suitable name for these concerns is IS/IT architecture,

not EA (see Ross et al., 2006). However, that would involve effectively managing architectural issues such as complexity in the IS/IT landscape by applying meaningful enterprise architecture principles. This is more of an IT management challenge than a technical challenge (see Hugoson et al., 2008; 2011), when considering the role of CP&IT as a management function.

There is certain empirical support for the hard dimension required in enterprise development. This is also the case when considering much of the IT management literature. Holistic-oriented enterprise development would however require soft aspects to gain equal importance. Leaving these to chance may cause issues related to knowledge and capability ('know-how') development, motivation, expectations, and values. Such aspects are part of IT management (Galliers, 1991; Magoulas et al., 2012). It is interesting to note that the desired outcomes of implementing portfolio management at Volvo Group actually correlate with issues that will (or should) depend upon proper management of soft as well as hard aspects. For example, (1) prioritisation of development initiatives and (2) project success rates (see Nelson, 2007). Although this does not provide sufficient empirical support for holistic-oriented enterprise development, it does illustrate its significance.

Table 10 summarises the discussion on holistic-oriented enterprise development.

	Theoretical views	**Volvo Group**	**Similarities/differences**
Holistic-oriented enterprise development *To what extent are the following dimensions represented in the enterprise deveopment model?* ▪ Structural ▪ Functional ▪ Infological ▪ Socio-cultural	The model for FEM can be regarded as holistic. Accordingly, such model consists of the following hard and soft aspects: - Hard dimensions ▪ Structural dimension (domain of IS/IT & domain of authority and responsibility) ▪ Functional dimension (domain of IS/IT & domain of purposive activities) - Soft dimensions ▪ Infological dimension (domain of IS/IT & domain of actors and participants) ▪ Socio-cultural dimension (domain of IS/IT & domain of mission, vision, goals, values, strategy)	The portfolio management framework is mainly concerned with two dimensions: - Structual ▪ SMP governance model ▪ IS-GDP steering structure - Functional ▪ Activity planning using roadmaps ▪ City maps (outscope scope) Some limited elements within the socio-cultural dimension exists, such as goals and objectives for the performance of IS/IT. There are also traces of the infological dimension. Furthermore, the EA used is strongly focused on technical aspects within the domain of IS/IT.	Similarities involve the hard dimensions of enterprise development. While hard aspects are important, leaving soft aspects may cause issues related to knowledge and capability development (infological) and/or motivation and expectations (socio-cultural). Most literature also focuses on hard aspects. Managing the domain of IS/IT from a technical viewpoint may hinder the organisation to effectively deal with architectural issues such as complexity in the IS/IT landscape.

Holistic-oriented enterprise development *To what extent are the following values a measurement of short-term performance improvements and long-term expectations (attractiveness)?* ▪ Cost ▪ Quality ▪ Efficiency ▪ Reliability ▪ Availability ▪ Effectiveness ▪ ...	The direction of enterprise development is determined by short-term and long-term outcome-driven values. The 'Performance Reference Model Framework' refers to at least: cost, quality, efficiency, reliability, availability, and effectiveness. These values are used as measures in order to determine how and to the extent inputs and outputs are contributing to outcomes.	The main concern involves: - lowering costs - increasing efficiency This is carried out by seeking to create shared, standardised, and optimised processes and systems. Process and IS/IT measurements are an important input for this. APM takes into account measurement of applications with regards to their: - Business process fit - Conformity to information standards - Agility and effectiveness of application performance - Technical fit - Target standardisation fit	There are some similarities in values and it is clear that cost and efficiency is important. Such values are mainly concerned with short-term performance improvements. However, they may also involve long-term expectations considering the industry in which Volvo Group operates. An excessive focus on such values may result in critical issues related to quality and effectiveness.

Table 10: Summation of holistic-oriented enterprise development

6.2 Proactive outcome-based enterprise development

Proactive outcome-based enterprise development refers to: (1) the extent development initiatives are based upon specific and clearly articulated outcomes; and (2) the extent development is the result of these outcomes. Any outcome-based enterprise development requires two crucial aspects (Magoulas & Pessi, 1998; Maizlish & Handler, 2005; Land et al., 2009):

1. The first aspect concerns what reality is like, and what it should be like after sound enterprise development has taken place. This is represented by a substantial view such as AS-IS and TO-BE descriptions.
2. The second aspect concerns how reality changes from the current state to the desired future state. This is represented by a process-based view.

Outcome-driven enterprise development does not refer to a single set of homogenous outcomes, but rather several types. According to the Performance Reference Model Framework (see Figure 49) (OMB, 2007), 'strategic outcomes' represent broad ideals (such as a vision or reference environment) and priorities. While priorities may change, strategic outcomes are generally *independent of time* – they stay the same as long as the enterprise serves the same purpose. When a company defines strategic outcomes, it has created a foundation and driver for other outcomes such as Mission, Business, and Customer results. These are usually identified in a strategic planning process. Strategic outcomes, such as a target EA, fundamentally determine business value. Measures of a company's efficiency, effectiveness, and attractiveness are, in other words, dependent upon meaningful outcomes. Demand-driven outcomes, such as designing 'solutions' to perceived problems, are usually *dependent of time.* Consequently, this type of development never prevents problems and does not enable determination of real value.

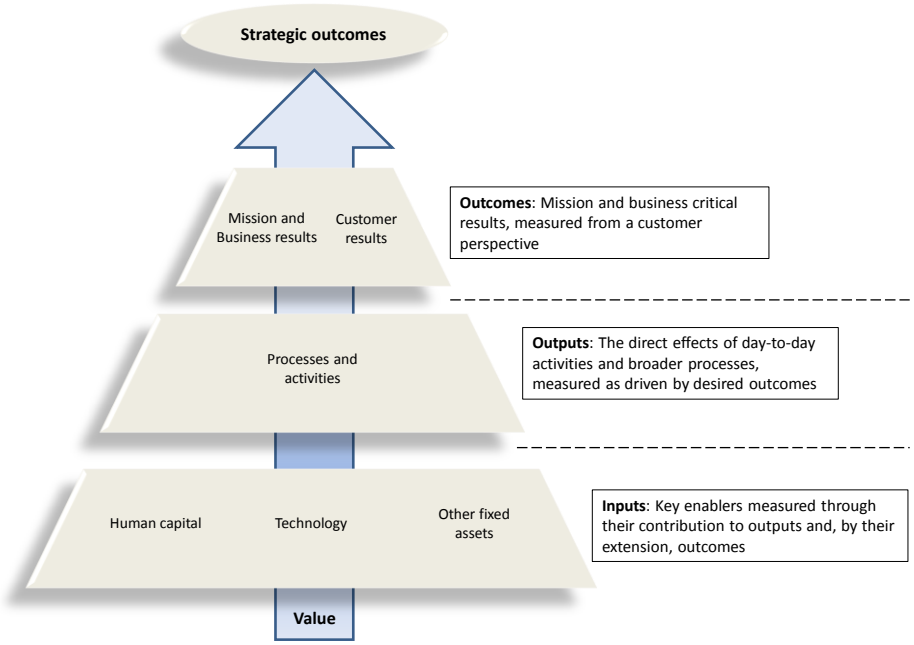


Figure 49: Performance Reference Model Framework (adapted from OMB, 2007)

Furthermore, this thesis argues that outcomes are the product of development grounded upon at least two aspects: (1) knowledge 'know-how' about how to approach the situation; and (2) awareness of the situation. Accordingly, outcomes can be the result of proactive, reactive, risky, or research-based development (see Figure 25). While, proactive outcome-based enterprise development may not always be achievable, it should always be desirable.

The portfolio management framework at Volvo Group contains several types of roadmaps, which illustrate activities and, by extension, enable their coordination. The framework also clearly articulates the need for EA AS-IS and TO-BE maps. While these crucial enablers for outcome-based enterprise development are fulfilled, their adoption has not fully matured. Therefore, it is yet to be seen how well they are used. The EA city map concept appears promising.

However, most empirical evidence points toward a prevailing demand-driven development. This is because the main strategy has created a goal for the IT cost to remain within 2% of total cost by 2015 (*time dependent*). While such goal can create pressure on the IT management function to structure their practices, it does not provide the direction needed to measure value. To this end, there is a long-term plan that claims to set the "strategic direction" by identifying needed business capabilities on a 15-year horizon (*time dependent*). While such plan may be valuable, it is difficult to determine how, and to the extent, it is actually driving the development. Additionally, the role of the IT demand function is to define business requirements for the IT supply function to carry out. This type of strategy will result in IT supply always *reacting* to the requirements set by IT demand. Hence, IT will remain a constant bottleneck. Consequently, the specification of requirements as driver for development may lead to IT designing IT solutions, rather than IT capabilities (see Ross et al., 2006). Given the abundance of strategic outcomes such as an envisioned business, IS and IT architecture, past and future development initiatives could cause undesired negative effects. Additionally, true measures of efficiency, effectiveness, and architectural attractiveness of the IS/IT landscape will be hard to attain.

The empirical evidence provides support for the crucial aspects needed for outcome-based enterprise development. However, while it is difficult to determine the extent to which development is the result of specific and clearly articulated outcomes, the prevailing development category appears reactive rather than proactive.

Table 11 summarises the discussion on proactive outcome-based enterprise development.

	Theoretical views	**Volvo Group**	**Similarities/differences**

Proactive outcome-based enterprise development
To what extent are outcomes of enterprise development associated with the following situations?
▪ Demand-driven
▪ Time dependent
▪ Vision oriented
	It is well recognised within literature that two crucial aspects must be considered in outcome-based development:
	
	- Substantial views
	  ▪ AS-IS and TO-BE descriptions
	- Process-based views
	  ▪ Describing how reality changes over time
	
	The 'Performance Reference Model Framework' refers to different types of outcomes such as Mission, Business, and Customer results, which are driven by broad strategic outcomes.
	
	Hence, this type of outcome-based development is vision oriented and essential outcomes are independent of time.
		The portfolio management framework contain activity roadmaps, and refer to EA AS-IS and TO-BE descriptions. However, these do not currently describe outcomes, only the current situation.
		
		There is a set goal for the IT cost to remain within 2% of total cost by 2015.
		
		The role of the IT-demand function is to define business requirements.
		
		CP&IT Long-term plan sets the "strategic direction" and determines necessary business and IT capabilities (15 years). However, it is difficult to determine how and to the extent this plan is actually driving development.
		
		Most empirical evidence points toward demand-driven development and outcomes dependent of time.
			While similarities involve crucial enablers of outcome-based development, differences are prevailing.
			
			The way Volvo Group carries out IT management may result in building IT solutions rather than IT capabilities.
			
			Developing the enterprise without having a clear idea about the strategic outcomes, (desired enterprise architecture) could cause undesired negative effects, and may hinder determination of its effectiveness and architectural attractiveness.

Proactive outcome-based enterprise development *To what extent are outcomes of enterprise development a result of the following categories of development?* ▪ Proactive development ▪ Reactive development ▪ Riskful development ▪ Research-based development	Outcomes are a product of development grounded upon at least two aspects: - Knowledge 'know-how' about how to approach the development situation - Awareness of the situation Accordingly, outcomes can be the result of proactive, reactive, riskful, or research-based development. Outcome-based development should be proactive. This requires both knowledge and awareness.	It is difficult to determine relevant developmental categories. However, the enterprise development at Volvo Group inherently belongs to a reactive developmental category, as outcome-based development is not predominant and the role of the IT-demand function is to define requirements.	The lack of similarities makes it difficult to determine the extent such categories are present. When IT is always reacting to requirements defined by the IT demand function, IT will always be a constant bottleneck.

Table 11: Summation of proactive outcome-based enterprise development

6.3 Management-oriented enterprise development

Management-oriented enterprise development refers to the extent decision-making is the result of distinct decision-making strategies, management measures, and knowledge. More specifically, there are according to Thompson (1967) at least four decision-making strategies a company can use to conduct management in general and create a portfolio of investments in particular (see Figure 50):

1. Planning (setting goal and organising activities)
2. Negotiating (making trade-offs, balancing, prioritising)
3. Judging (discussing consequences and taking risks)
4. Inspiring (discovering opportunities, leading and leadership)

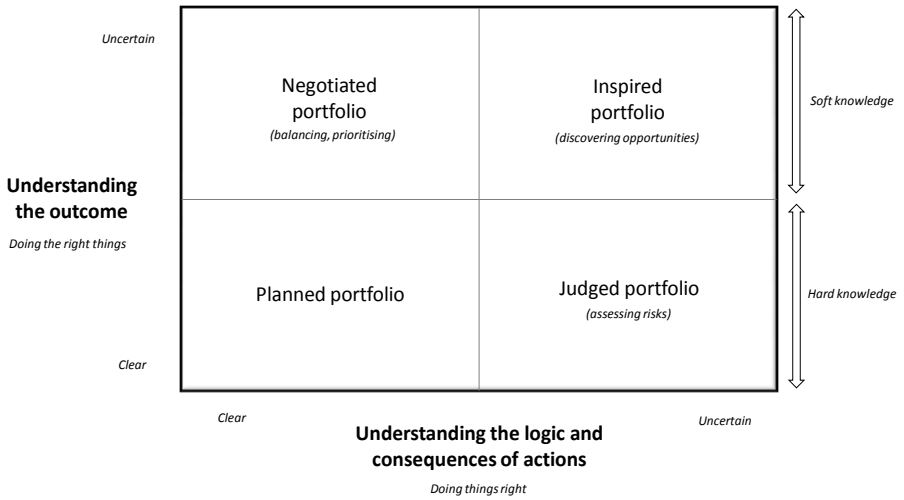


Figure 50: Decision-making strategies

The strategies show that the management of enterprise development depends upon developing a clear understanding and agreement of: (1) desired outcomes; and (2) the logic and consequences of actions. This correlates with an important role for management: to ensure that the company is doing the right things (effectiveness) and is doing things right (efficiency). Such tasks are often implemented by seeking short-term performance improvements while contributing toward the long-term attractiveness of the enterprise (see Ross. et al., 2006; OMB, 2007). It also places high demands on knowledge. More specifically, there is hard and soft knowledge. The former involves data and information, its structuring and calculating. The latter involves opinions, qualitative judgements, facilitating collaboration, or even inspiring leadership.

More or less all decisions in enterprise development are (and should be) negotiated, i.e. participative in nature. This is also imperative as: (1) most practical problems are soft and messy (see Checkland, 1989); and (2) 'development' implies *improvement*, which is highly subjective. Hence, soft knowledge is an important enabler for coming to negotiated agreements about outcomes. Participants must however be governed by desirable design of decision rights and accountabilities. This is also to ensure value generation (see Weill, 2004).

The portfolio management framework at Volvo Group emphasises several forms of planning and a critical activity is to create a balanced portfolio with well-managed risks. Hence, the decision-making is aware of/concerned with planning, negotiating and judging. It is also clearly stated that a main concern is to ensure that Volvo Group is doing the right things

(effectiveness) and are doing things right (efficiency). PPM and APM, which are two important components within the framework, mainly provide decision-makers with hard knowledge. Soft knowledge is not clearly articulated. However, soft knowledge indirectly plays an important role as balancing a portfolio is a main concern within the framework.

While it appears there are strong similarities between theory and practice, it is important to understand that the degree of success in such decision-making actually depends upon understanding desired outcomes (such as desired enterprise architecture) and the logic and consequences of actions. A lack of clearly articulated outcomes and a strong need to prioritise and balance, while only seeking short-term performance improvements could be an indicator of: (1) having too many objectives; and/or (2) counter-productiveness, as measurements of effectiveness is dependent upon long-term strategic outcomes. Consequently, the long-term attractiveness will be difficult to resolve.

The empirical evidence supports management-oriented enterprise development – however – it is unclear how it is implemented.

Table 12 summarises the discussion on management-oriented enterprise development.

	Theoretical views	**Volvo Group**	**Similarities/differences**
Management-oriented enterprise development *To what extent are the following categories of decision-making representative to management in general and portfolio management in particular?* ▪ Planning ▪ Negotiating ▪ Judging ▪ Inspiring	Decision-making within management in general, and portfolio management in particular depend upon understanding at least two aspects: (1) the desired outcome; and (2) the logic and consequences of actions This creates four approaches for decision-making: - Planning ▪ Setting goal and organising activities - Negotiating ▪ Making trade-offs, balancing, prioritising - Judging ▪ Discussing consequences and taking risks - Inspiring ▪ Discovering opportunities, leading and leadership Decision-making must clearly be governed in order to ensure value generation.	The portfolio management framework emphasises several forms of plans and a critical activity is to create a balanced portfolio with well-managed risks. Hence, the decision-making is at least concerned with planning, negotiating and judging.	The similarities between theory and practice indicate that at least three decision-making categories are both valid and relevant. Hence, they are crucial elements in managing enterprise development. However, the degree of success in such decision-making depends upon understanding desired outcomes (such as desired enterprise architecture) and the logic and consequences of actions.

Management-oriented enterprise development *To what extent are the following measures representative to management in general and portfolio management in particular?* ▪ Efficiency ▪ Effectiveness ▪ Short-term performance improvements ▪ Long-term attractiveness	An important role for management in general and portfolio management in particular is to ensure that the company is doing the right things (effectiveness) and doing things right (efficiency). This is achieved by seeking short-term performance improvements while contributing toward the long-term attractiveness of the enterprise.	A main concern in the framework is to ensure that Volvo Group is doing the right things (effectiveness) and are doing things right (efficiency). However, portfolio management is mainly driven by short-term performance improvements.	The strong similarities indicate that seeking efficiency and effectiveness is essential in enterprise development. However, having short-term performance improvements drive both efficiency and effectiveness may be counterproductive, as true effectiveness should be determined by long-term outcomes. Consequently, the long-term attractiveness will be difficult to resolve.
Management-oriented enterprise development *To what extent is the following knowledge used for decision-making?* ▪ Hard knowledge ▪ Soft knowledge	Both types of knowledge are crucial. However, needed knowledge will depend upon the situation, i.e. the current understanding of desired outcomes and the logic and consequences of actions. Considering that most developmental problems are soft and messy, management would involve a great deal of negotiating (soft knowledge).	PPM and APM mainly provides decision-makers with hard knowledge. It is difficult to determine the extent of soft knowledge used. However, the balancing inherent in the approach indirectly involves soft knowledge.	Similarities illustrate the importance of hard knowledge. Soft knowledge is not clearly articulated. It is important to recognise soft knowledge as an enabler for coming to a negotiated agreement about outcomes.

Table 12: Summation of management-oriented enterprise development

6.4 Integration-oriented enterprise development

Integration-oriented enterprise development refers to the extent approaches are integrated in an enterprise development model. This thesis argues that an essential aspect to sound enterprise development is to strive for a fully integrated model. The integrated model for enterprise development presented below (Figure 51) represents a fully integrated enterprise development process consisting of the following main activities:

- **Analysis of situation**: The current situation is identified and analysed and a shared understanding is created.
- **Strategy formulation**: Involves formulating a root definition containing mission statement (core purpose), core values, vision, and stakeholder expectations. This will provide a guide for the architectural design (EA) necessary to form a coherent and functional whole while articulating the desired outcomes.
- **Negotiation and decision on change**: Decisions about changes to the enterprise should be based upon the formulated strategy, together with an understanding of the logic and consequences of actions. Portfolio management practices aid this decision-making by providing information on performance, effects, and risks.
- **Implementation of strategy**: Decided changes are further developed and implemented. This involves defining projects in terms of benefits, scope, logic of project activities, estimates of time and cost, evaluation/control, benefits follow-up, and project (asset) maintenance. The allocation of assets to projects provides the

initiative with necessary resources for implementation. Finished projects turn into assets. Implementation of strategy in its entirety is a primary concern within PPM.

There is additionally a governance body controlling who should participate in decisions and their respective accountability. Such body should be actively designed according to governance archetypes.

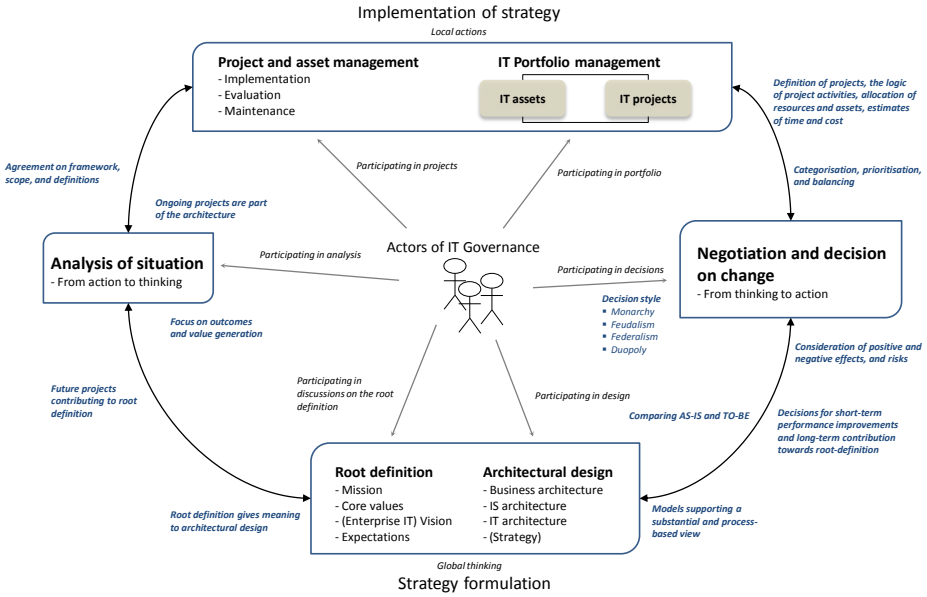


Figure 51: Integrated model for enterprise development (detailed)

It appears this model provides a solution to the apparent dearth of articulated relations among approaches. The model is also interesting as it may be used in almost any developmental situation, not just in an IT context. One merely replaces IT governance with company-wide governance, and the IT portfolio with any other portfolio. This is imperative as there are clearly other portfolios within an enterprise. This follows the much broader enterprise view on portfolio management (see Cady, 2003; Nippa et al., 2011, Young et al., 2001).

It is also important to understand that the IT portfolio contains both projects and assets. Assets comprise of much more than just processes, applications, data and information, and infrastructure – it includes people and knowledge 'know-how'. This means any attempt at enterprise development in general and IT portfolio development in particular involves knowledge development. This follows the underlying assumptions of FEM (Magoulas et al., 2012), which can be explained in terms of synchronous development of the technical, political, and cultural systems of the organisation (see Tichy, 1982). Hence, implementation involves coordinated development of at least the business, its systems, and competences.

Portfolio management at Volvo Group is a good example of the integration issue as it involves several relatively isolated initiatives. Although some awareness about integration was demonstrated among the respondents, it is far from clear how several of the involved approaches relate. The 'framework palette' within their framework (Figure 52) provides an overview – however – it does not correlate well with the actual components within the framework. It has also excluded a key discipline: Enterprise Architecture. This makes it difficult to determine the extent of integration.

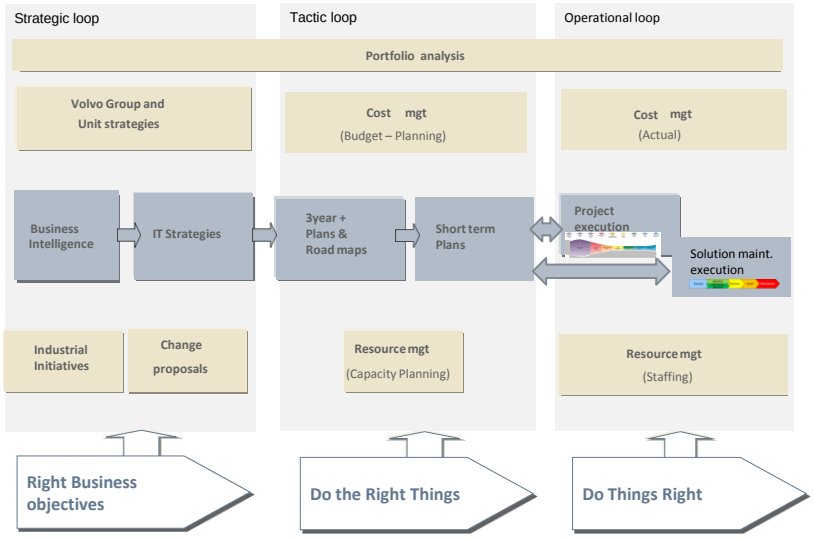


Figure 52: Portfolio framework palette (Volvo Group)

However, evidence does reveal (some) EA practices, a long-term plan, a project methodology, a governance model (SMP), and portfolio management with its integrative components (PPM, APM). Attempts have been made for integration, but they appear sporadic. For example, Volvo Group EA is integrated with the project methodology (IS-GDP) and portfolio management with the governance model. Understanding the bigger picture – however – would require deep knowledge about practices at Volvo Group and of the inter-related components and approaches used at CP&IT. Hence, the models provided in the framework are insufficient if a viewer is not familiar with all involved approaches.

Some of the confusion or ambiguity, such as the variety of plans referred to in the case, can be explained by the fact that portfolio management at Volvo Group is an emerging discipline. Volvo Group is also a company with a long history, providing a complex view of reality. However, partially integrated approaches can and most likely will be difficult to comprehend.

While the case provides weak, if any, support to integration-oriented enterprise development, it illustrates its significance as an essential aspect. This thesis also provides at least two alternative models (Figure 51; Figure 53) that solve the integration issue – both of which could benefit Volvo Group in their framework development.

Table 13 summarises the discussion on integration-oriented enterprise development.

	Theoretical views	**Volvo Group**	**Similarities/differences**
Integration-oriented enterprise development *To what extent are approaches integrated in the enterprise development model?* ▪ Fully integrated ▪ Partially integrated ▪ Non-integrated ▪ ...	The enterprise development process consist of the following main activities: - Analysis of situation - Strategy formulation - Negotiation and determination of changes - Planning the implementation of decided changes with respect to: ▪ Business development ▪ Systems development ▪ Competence development	The current approach to ITPM has emerged from isolated initiatives. It is difficult to determine and comprehend the degree of maturity of ITPM, as well as the type and degree of integration between its constituent and related parts. However, it is clear that the following approaches are within the framework:	The absence of similarities and the dominance of differences make it difficult to determine the nature of integration. Treating EA separately to ITPM creates a critical issue, as they are dependent on each other. This thesis provides at least two alternative models, which solves the essential

	▪ ... However, considering that the model takes into account the entirety of ITPM, the following activities are also integrated: - IT project activity planning - Allocation of IT assets to IT projects - Implementation of IT projects - Post evaluation of IT projects - ... Additionally, the proposed model also includes planning, establishing, and modifying the decisional rights and accountabilities governing the entire enterprise development process.	- PPM - APM - Solution management (governance model) - IS-GDP (project methodology) Outside the framework: - P&IT Long-term planning - EA There is also a clear desire for a sound integration and further developing the current approach to enterprise development.	aspect of integration.

Table 13: Summation of integration-oriented enterprise development

6.6 An integrated conceptual model for portfolio-based IT management

This thesis has presented four essential aspects that should be demonstrated by a portfolio framework for managing the development of an enterprise with respect to its IT investments. However, as Tsoukas (1994) pointed out, it is important to investigate synergies between the different aspects within management, as they are interrelated. Figure 53 puts the four aspects together into a conceptual model for portfolio-based IT management. The aspects identified in Figure 53 are illustrative only. Each organisation should carefully assess how they want to address their approach to enterprise development.

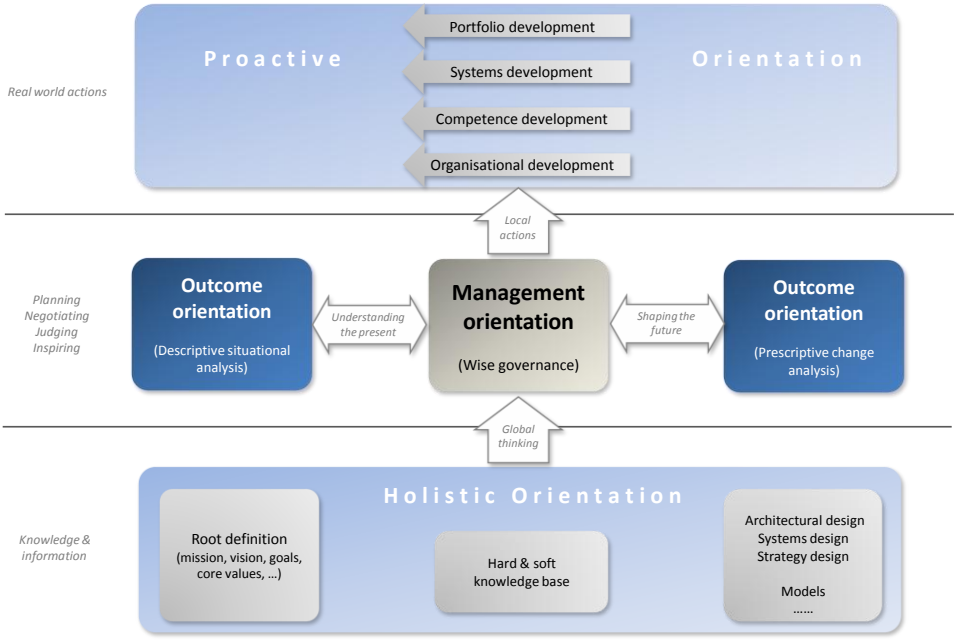


Figure 53: An integrated conceptual model for portfolio-based IT management

One aspect, integration-oriented enterprise development, suggests a fully integrated view hence binding together the other three aspects and any associated approach, framework, model, method, or tool. The second aspect concerns a holistic view taking into account both hard and soft aspects from a knowledge and information perspective. This guides the third aspect; management, which has a central decisional role of planning, negotiating, judging, and inspiring. This, in turn, relies on the last aspect; proactive outcome-based enterprise development, which involves the understanding of the present and the shaping of the future, executed through real world coordinated developmental actions.

Although many authors address issues within IT management separately and from a rather technical viewpoint, the model suggests that IT management is part of the much broader enterprise development process. The four aspects force us to think through essential properties when designing or trying to understand approaches to IT management. The conceptual model can help academics to systemise important issues that must be understood when addressing IT management. It can assist managers in understanding that IT management or any approach within it, such as IT portfolio management, is not separate and distinct from strategic business issues. It is rather, just one part of enterprise development. However, it is important to understand that a model is never complete – this is merely an attempt to address essential aspects within IT value creation and to change the current mindset.

7 Conclusions

This thesis addressed the general failure to integrate IT into the much broader enterprise development processes, and the elusive relation between IT management and the 'Portfolio Approach' to managing IT investments. A specific way of thinking based upon the dictum that the whole is no more than the sum of its parts is causing this phenomenon. It results in detailing IT management processes and their internal relationships, and hence cannot explain their role from a global perspective. To address this, there is a need for a new mindset that acknowledges the requisites for integration, coordination, participation, and commitment. This thesis therefore aimed to create a better understanding of IT management by creating a conceptual portfolio-based model for the development of large enterprises towards a softer and integrated view. The following problem statement was analysed:

What essential aspects should be demonstrated by a portfolio framework for managing the development of an enterprise with respect to its IT investments?

Accordingly, the study defines four critical orientations, i.e. purposive aspects, of interest:

Holistic-oriented enterprise development
Holistic-oriented enterprise development refers to the extent enterprise development models support different dimensions of the enterprise. Four essential dimensions make up a holistic view of the enterprise: (1) structural; (2) functional; (3) infological; and (4) socio-cultural. Most approaches and frameworks available today focus on the former two (hard) aspects, and give little attention to the inclusion of the latter two (soft) aspects. This study suggests that both hard and soft aspects are crucial for any framework for enterprise development. Too strong a focus on technical aspects may cause architectural issues. Leaving soft aspects out of scope could cause issues related to capabilities and/or motivation and expectations. Soft aspects are also especially important as short-term and long-term values determine the direction of enterprise development. The scope of a holistic framework is however contingent to each organisation.

Proactive outcome-based enterprise development
Proactive outcome-based enterprise development refers to: (1) the extent development initiatives are based upon specific and clearly articulated outcomes; and (2) the extent development is the result of these outcomes. Any outcome-based development requires two important views: AS-IS and TO-BE descriptions (substantial) and process-based views describing how reality changes over time. This study suggests that development driven by outcomes (goal/vision) independent of time is crucial, because only these enable a company to apply *meaningful* measures such as efficiency, effectiveness, and attractiveness. Knowing the desired outcomes will also help in building IT capabilities, rather than IT solutions, as IT supply would otherwise keep reacting to the (changing) requirements set by IT demand. The study further suggests that proactive outcome-based enterprise development is desirable, but will depend upon knowledge 'know-how' about how to approach the situation and awareness of the situation.

Management-oriented enterprise development
Management-oriented enterprise development refers to the extent decision-making is the result of distinct decision-making strategies. Two critical dimensions shape decision-making strategies: (1) the level of understanding and agreement of the desired outcomes; and (2) the

level of understanding and agreement of the logic and consequences of development actions. These dimensions shape four ways of carrying out management tasks: planning, negotiating, judging, and inspiring. This study shows that these will require different types of knowledge at hand (hard/soft). Furthermore, this study suggests that management of enterprise development depend upon the ability to carry out these management tasks, rather than taking on 'one-size-fits-all' solutions for complex enterprise development.

Integration-oriented enterprise development
There are several interesting and relevant approaches and frameworks available within IT management. However, most appear disparate and address issues separately. This is due to the difference in developmental discipline. Integration-oriented enterprise development therefore refers to the extent of integration between approaches within an enterprise development model. The study suggests that companies should strive for a fully integrated model as treating key approaches to enterprise development separately could create critical issues and/or sub-optimisations. The study also presents a possible solution by elaborating on an integrated model for enterprise development.

In sum, this thesis has suggested four essential aspects that should be demonstrated by a portfolio framework for managing the development of an enterprise with respect to its IT investments. These were tested in a comparative case study at Volvo Group and were developed further into an integrated conceptual model for portfolio-based IT management.

7.1 Quality control

The aim of the study was to create a better understanding of IT management by creating a conceptual portfolio-based model for the development of large enterprises towards a softer and integrated view. This would provide a meaningful body of 'know-how' knowledge upon which public and private businesses in general, and large industrial organisations in particular, can manage their portfolio-based development.

Following the research framework (chapter 2.2), this aim could not be entirely fulfilled as that would require high validity as well as high reliability/relevance.

7.1.1 Validity

Validity explains the relationship between the theories presented in chapter 4 and published and accepted literature within the field of informatics. The thesis is characterised by high validity. This is due to the use of well-recognised literature as the base for theory construction (Hevner et al., 2006). Deriving questions from the theoretical contribution also support its reinforcement and clarification (Hedberg & Jönsson, 1978).

7.1.2 Reliability/relevance

Reliability/relevance refers to the relation between a developed theory and empirical views. Unfortunately, the theory presented in this thesis received varied and mostly limited support. This limitation is mainly due to time constraints, as studies with high reliability and relevance requires empirical evidence from several people, from different areas of responsibility, organisations, industries, and cultures.

Studies presenting both high validity and high reliability/relevance create the ground for generalisation. This means the formal acceptance of a scientifically constructed theory. The

theory developed in this thesis therefore needs further testing, as the empirical evidence is not sufficient to reject it.

Readers of this thesis should understand that the theory developed in the study remains hypothesises. Anyone who desires may take on the responsibility to create a better and deeper understanding of the relation between isolated IT management approaches. As demonstrated, there are four orientations to consider.

7.2 Further research

Considering that the four contextual decision-making strategies elaborated in this thesis (see Thompson, 1967) refer to the same Enterprise Architecture, it would be interesting to analyse advisable properties and examples of architectures aligning with those strategies. For example, what architecture aligns with uncertain outcomes but clear understanding of logics and consequences of actions? This suggests four possible future research projects investigating several different architectures according to the degree of uncertainty (see Figure 54).

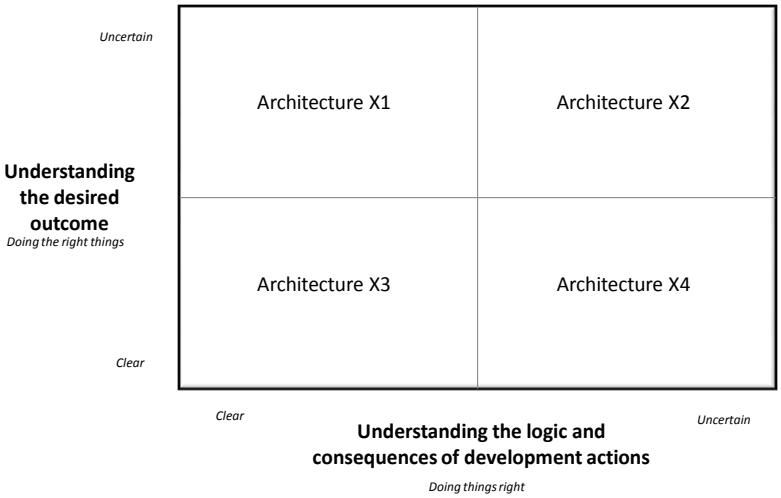


Figure 54: Illustration of potential architectures

Further research could also investigate if the following are relevant aspects of a framework for managing IT investments. Should a framework:

- Provide a clear understanding of scope and definitions.
- Enable a focus on fulfilling stakeholder expectations on value.
- Have a clearly articulated governance body, defining all necessary participants and their decision rights and accountabilities.
- Provide a root definition containing mission statement (core purpose), core values, vision, as well as expectations of stakeholders.
- Enable architectural design of the root definition covering the entire enterprise. It involves three architectures: (1) Business; (2) IS; and (3) IT.
- Provide a substantial view of the AS-IS and TO-BE architecture, and a process-based view of how the architecture change over time.
- Give guidance for making change-decisions that are based upon: (1) a comparison of AS-IS and TO-BE; (2) short-term performance improvements and long-term

contributions towards root definition; (3) consideration of positive and negative effects, and risks.

- Contain a portfolio of projects and assets with clear directions for defining projects and their logic, requisites of resources, estimates of time and costs, necessary evaluation, and project (asset) maintenance.
- Enable an understanding that ongoing projects are part of the architecture, and that future projects should improve organisational operations as well as contribute to the root definition.

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