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## **Developing a Value Management Capability: A Literature Study and Exploratory Case Study**

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### **Short abstract**

The present research identifies and defines value management practices that can help to accommodate and organize IS investments in order to secure and maximize their value creating potential. Drawing on the resource-based view, we developed a conceptual model organizing 25 unique practices as part of three distinct competences (structural, process and relational) that are integrated and mobilized through an overarching Value Management Capability. Findings are based on a literature review and exploratory case study.

**Keywords:** Value Management Capability, Competence, Practices, IS investments, Resource-Based View, Literature review, Exploratory case study research, Grounded theory approach

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# **Developing a Value Management Capability: A Literature Study and Exploratory Case Study**

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## **Abstract**

Modern organizations make enormous investments in information systems (IS) in pursuit of value creation on a strategic and operational level. While many scholars focus on the outcome of such IS investments, the present research focuses on management practices that facilitate this value creation. We identify and define value management practices positioned throughout the organization, which can help to accommodate and organize IS investments in order to secure and maximize their value creating potential. Limited academic research has been oriented towards the identification of such value management practices. Prior literature confirms that preliminary results are fragmented as many scholars investigate one single practice in isolation, and significant ambiguity is demonstrated within their terminology. Although practitioner frameworks emerged in an attempt to integrate multiple value management practices, organizations still struggle to get such practices and frameworks implemented and embedded into their organizations. Drawing on the resource-based view, we developed a conceptual model organizing various value management practices which are considered to be part of three distinct organizational competences (structural, process and relational) that are integrated and mobilized through an overarching Value Management Capability. By way of a literature review, we identified and clearly defined 25 unique value management practices. An exploratory case study at a Swedish manufacturing multinational

justified most of these practices from literature and revealed others that play a central role in the organization of IS investments.

Keywords: Value Management Capability, Competence, Practices, IS investments, Resource-Based View, Literature review, Exploratory case study research, Grounded theory approach

## **1. Introduction**

The importance of information systems (IS) in modern organizations is evident from the continuous growth in global IS spending which has almost doubled during the last eight years (WITSA, 2010). They play a central role on a strategic and operational level as they are employed in the daily processes and routines as well as in the strategic decision-making affecting a large number of internal and external stakeholders (Peppard & Ward, 2005). As a result, investments in IS can support strategic objectives such as organizational growth, and can positively impact process and organizational performance (Bharadwaj, Bharadwaj, & Konsynski, 1999; Oh & Pinsonneault, 2007; Ray, Muhanna, & Barney, 2005).

Despite the importance and increase in IS investments, the study field regarding value creation out of IS investments has always been open to discussion as manifested by contradictory and contesting results (Mukhopadhyay, Kekre, & Kalathur, 1995; Oh & Pinsonneault, 2007; Sircar, Turnbow, & Bordoloi, 2000). A key focus of research has been the productivity paradox, where no clear correlation could be found between IS spending and organizational performance (Brynjolfsson, 1993; Hitt & Brynjolfsson, 1996). In the early twenty-first century, studies continued to challenge the value of IS (Carr, 2003; Lin & Shao, 2006). Yet the same period revealed findings illustrating a positive impact of IS investments on both financial and non-financial performance (Anderson, Banker, & Ravindran, 2006;

Chari, Devaraj, & David, 2008). For instance, Chari et al. (2008) conclude that “increasing IS investments to accompany a firm’s overall diversification may be justified by the greater performance impact of such investments”.

According to Keyes-Pearce (2005), organizations can only achieve this positive impact if they introduce sound value management practices, defined as practices that facilitate and ensure the identification and maximization of value creation from IS investments. Unfortunately, limited academic research has been oriented towards the identification of such value management practices (Cha, Gregor, & Fernandez, 2008). Prior literature confirms that preliminary results are fragmented as many scholars investigate one single practice in isolation, and significant ambiguity is demonstrated within their terminology (Maes, De Haes, & Van Grembergen, 2012). Nevertheless practitioner frameworks emerged in an attempt to integrate multiple value management practices (e.g. Curley, 2009; ITGI, 2008; Thorp, 2003), organizations still struggle to get such practices and frameworks implemented and embedded into their organizations (De Haes & Van Grembergen, 2009; Keyes-Pearce, 2005).

Consequently, the present paper has two objectives. First, in line with prior research by Ashurst, Doherty, & Peppard (2008) we draw on the resource-based view to present and develop a conceptual model. The model facilitates the integration of multiple value management practices into three distinct organizational competences integrated and mobilized through an overarching Value Management Capability. The model is then filled with individual value management practices that are identified and clearly defined by way of a literature review. Second, the findings are examined through an exploratory case study to

explore and understand which value management practices can be utilized in the organization of IS investments.

The present paper therefore makes three contributions. First, an innovative conceptual model grounded in organizational theory facilitates the integration of multiple value management practices to deal with the fragmented literature and to provide a coherent instrument to organizations in addition to the emerged frameworks. Second, it identifies and clearly defines value management practices to address the current literature ambiguity. Third, an exploratory case study is executed to critique the literature findings and to increase practitioners' understanding on how such value management practices can be implemented.

## **2. Resource-Based View: Integrating Capabilities, Competences and Practices**

The development of our conceptual model is inspired by related work of Ashurst et al. (2008). They present an innovative benefits realization capability model that is grounded in the resource-based view (RBV). Drawing on the RBV, the objective of an organization is to maximize its profits in order to outperform direct competitors and to achieve a sustainable competitive advantage (Grant, 1991). Barney (1991) states that the generation of profits can emanate from most organizational resources, but it is only a subset of simultaneously valuable, rare, imperfectly imitable and non-substitutable (VRIN) resources that create a competitive advantage.

While the so-called VRIN resources are still believed to be a core element of the RBV, Bowman & Ambrosini (2000) argue that resources do not create value by themselves. Value can only be created through competences, defined as an organizational ability to deploy resources in order to achieve a desired outcome (Amit & Schoemaker, 1993; Hamel & Prahalad, 1994; McGrath, MacMillan, & Venkataraman, 1995). Transferring the value into a

competitive advantage calls for an organizational capability that supports the strategic application and integration of competences (Moingeon, Ramanantsoa, Métais, & Orton, 1998). Helfat & Peteraf (2003) define a capability as an organizational ability “to perform a set of coordinated tasks, utilizing organizational resources, for the purposes of achieving a particular result.” The sustainable character embodies an ongoing state to maintain this advantage “after efforts to duplicate that advantage have ceased” (Barney, 1991). Capabilities increase the likelihood of this ongoing state as they are able to learn from and to accommodate change through the integration and reconfiguration of competences (Helfat & Peteraf, 2003; Teece, Pisano, & Shuen, 1997). According to Ashurst et al. (2008), further decomposition of competences is necessary to add granularity and increase understanding. Competences can be operationalized through practices defined as “a set of socially defined ways of doing things in a specific domain: a set of common approaches and shared standards that create a basis for action, problem solving, performance and accountability” (Wenger, McDermott, & Snyder, 2002). In conclusion, we argue that in order to create a sustainable competitive advantage, an organization needs to deploy resources through a set of practices that are logically integrated within a competence of which several can be integrated into an organizational capability.

### **3. A Conceptual Model for Value Management Based on the RBV**

Based on the previous section, we understand that organizations need a collection of practices defined by competences and a capability to deploy resources successfully in order to achieve organizational growth, improved process and organizational performance (Bharadwaj et al., 1999; Oh & Pinsonneault, 2007; Ray et al., 2005). The aim of the present research is to identify and define relevant practices throughout the entire organization, which help to accommodate and organize IS investments in order to secure and maximize their value creating potential. Before we can start with the identification and representation of these

practices, we first need to describe the conceptual model that accommodates these practices. In line with the theoretical discussion, Figure 1 displays the conceptual model for Value Management: an overarching Value Management Capability is enacted through a set of competences that can be operationalized by individual practices. The following subsections explain the components of our conceptual model in more detail.

INSERT FIGURE 1 HERE.

### **3.1. Value Management Capability**

The concept of capabilities has been investigated and defined by various IS scholars. An IS capability is recognized as the organization's ability to mobilize and deploy IS resources in combination with other resources and competences (Bharadwaj, 2000), or to enhance competitive agility, and to build a highly skilled, empowered and energized workforce with entrepreneurial orientation (Clark, Cavanaugh, Brown, & Sambamurthy, 1997). A capability can also help to diffuse a wide variety of information, applications, skills and competences, commitments and values within the technical physical base and the human component of the existing IT infrastructure (Byrd & Turner, 2000). Feeny & Willcocks (1998) defined nine core capabilities to effectively execute the IS function.

According to Peppard & Ward (2004), a capability is a meta-level construct that may not be directly detectable. It can integrate competences in different ways across organizations to optimize the utilization of resources in line with the organization's context. Bharadwaj (2000) defines an IS capability as "not so much a specific set of sophisticated technological functionalities as it is an enterprise-wide capability to leverage technology to differentiate from competition". Lentz, Gogan, & Henderson (2002) have a narrower focus on strategic IS planning in their definition of an IT value management capability. In line with our scope to identify practices that facilitate the value creation of IS investments, we define a Value



Management Capability as the organizational ability, in which a set of competences is strategically utilized to organize and deploy IS investments in order to secure and maximize their value creation.

### **3.2. Value Management Competences and Practices**

Competences comprise an integrated set of coordinated tasks or practices to deploy resources in order to achieve a specific desired outcome. Building on the overarching IS capability's aim to deploy IS successfully in pursuit of a competitive advantage, Peppard & Ward (2004) identified 26 competences in six domains: strategy, defining the IS contribution, defining the IT capability, exploitation, delivering solutions and supply. Competences can also enable an organization to effectively acquire, deploy and leverage IS investments to support the execution of business strategies and activities (Bassellier, Reich, & Benbasat, 2001; Sambamurthy & Zmud, 1994). According to Tarafdar & Gordon (2007), an IS competence originates when a set of resources is deployed through processes and structures in an inimitable and non-transparent manner so that organizational activities can be undertaken. However, if an organization pursues the creation of value out of IS investments, structures and processes should be complemented with a third component: culture (Soh & Markus, 1995).

Culture refers to a set of basic assumptions, norms, beliefs and values shared by the organizational members (Denison, 1996; Schein, 1996), and is established through social interaction to promote knowledge creation, shared learning, mentoring, and collaboration (Janz & Prasarnphanich, 2003). In IS literature, Peterson, O'Callaghan, & Ribbers (2000) captured this social interaction through social integration mechanisms. These mechanisms involve socialization and shared beliefs to promote the active participation and shared understanding of key stakeholders in coordination activities and IS decision making. Peterson

(2004) refined this perspective and complemented a structural and process competence with a relational competence, including practices in support of business and IS partnerships, a strategic dialogue and shared learning. Based on Peterson's work, De Haes & Van Grembergen (2009) described a threefold model consisting of structures, processes and relational mechanisms, where the latter referred directly to the relational competence. Similarly, the relational competence is characterized by norms and trust, and the role they play in social interaction, participation and socially embedded relationships (Liu, Luo, & Liu, 2009).

Hence, both culture and a relational competence employ aspects such as norms, values and shared beliefs to accomplish social interaction, collaboration and shared learning. As the relational competence constitutes a collection of practices to achieve social interaction, culture might be better perceived as a component of the relational mechanisms rather than as a substitute. For instance, Powell & Dent-Micallef (1997) identified organizational culture as one of the complementary organizational resources that could contribute to the value creation out of information systems, next to top management commitment, communication and organizational consensus. For this reason, the present research employs the umbrella construct of a relational competence.

The Value Management Capability is thus enacted through three distinct types of competences:

- *Structural Competence*: Structural practices are necessary to support communication and to organize activities among different groups of people (Bharadwaj, 2000). They can take place in various formal and informal forms such as integrating managers, liaison positions, task forces, or committees (Mintzberg, 1980). Therefore, structural practices can also make use of process practices to execute organizational activities.

Peterson (2004) formulates structural practices as “structural (formal) devices and mechanisms for connecting and enabling horizontal, or liaison, contacts between business and IT management.” Hence, a *Structural Competence* refers to an organizational ability to integrate and coordinate a set of structural practices enabling the grouping of tasks and people into smaller groups to formally and informally connect business and IS stakeholders in daily and strategic processes (de Wit & Meyer, 2010; Peterson, 2004).

- *Process Competence*: It is recognized that processes and practices to accommodate processes are key to successfully deploying organizational resources in order to create business value (Amit & Schoemaker, 1993; Ross, Beath, & Goodhue, 1996). Peterson (2004) defines process practices as “the formalization and institutionalization of strategic IT decision making or IT monitoring procedures”. Hence, a *Process Competence* refers to an organizational ability to integrate and coordinate a set of process practices facilitating activities, procedures and routines that coordinate and monitor people and structural practices within the organization (De Haes & Van Grembergen, 2009; de Wit & Meyer, 2010).
- *Relational Competence*: Relational competence addresses the people aspect within the structural and process practices, and focuses on realizing various dimensions such as trust, respect, communication amongst all involved business and IT actors. In other words, relational practices are the glue that seamlessly integrate business and IT within the organization and practices from the structural and process competence. Peterson (2004) defines it as “the active participation of, and collaborative relationship among, corporate executives, IT management, and business management”. Facilitating training and top management engagement are examples of the relational mechanism component. Hence, a *Relational Competence* refers to an

organizational ability to integrate and coordinate a set of practices enabling the establishment of social interaction, active participation and collaboration among internal and external stakeholders through norms, values and shared beliefs (De Haes & Van Grembergen, 2009; Peterson, 2004; Liu et al., 2009).

The implementation of the structural, process and relational competences with corresponding practices takes place throughout the entire organization via a cascaded approach. First, the organization can only achieve value from IS when each IS investment is value creating on the *individual level*. As argued by Melville, Kraemer, & Gurbaxani (2004) and Soh & Markus (1995), this requires a combination of IS and complementary organizational resources together with appropriate practices to guide the investment. Second, the organization can create additional value if multiple IS investments are managed on a *portfolio level*. According to De Reyck et al. (2005), this integrating level is beneficial to maintain an inventory of individual investments, to consolidate individual investment information, to manage investment interdependencies and to align investments to organizational objectives. Finally, the value created on the individual and portfolio level will only be value-creating on the *enterprise level* if these IS investments are in line with the organization's mission, vision and strategy. Here the board of directors plays a crucial role for instance. They are accountable for aligning the business and IS strategy, setting the strategic direction and reviewing the IS investment portfolio as well as facilitating the accommodating enterprise, business and technology architecture, technology infrastructure and technology support (Nolan & McFarlan, 2005). It should be noted that most board of directors are not directly involved with IS and delegate these responsibilities to the executive management committee (Andriole, 2009).

#### **4. Research Methodology**

Now that the conceptual model has been developed, it can be filled with individual value management practices that are identified and clearly defined through a literature review. Following this, these practices are critiqued in an exploratory case study. The implementation of both studies is guided through the conceptual model.

#### **4.1. Literature Review**

A comprehensive description of the literature review process is desirable according to Vom Brocke et al. (2009), so readers can assess the review exhaustiveness and other scholars can more confidently (re)use its findings. Therefore, the literature review is discussed in line with Cooper's (1988) taxonomy using six constituent characteristics, consisting of (1) focus, (2) goal, (3) perspective, (4) organization, (5) audience and (6) coverage. The present literature review is oriented towards (1) theories and methods dealing with value management practices with the goal (2) to critique and integrate findings from an exhaustive literature base (6) in building clear definitions of value management practices making use of a neutral perspective (3). The exhaustive search has been performed in multiple e-databases (EBSCO, JSTOR, WILEY and ScienceDirect) for scholarly peer reviewed journal publications without any date range restriction. The keywords included “value management”, “investment” and “information systems” or “information technology” in the ‘full text’. Each publication has been evaluated for its relevance and applicability. This list of publications is completed with a search on Google Scholar for which we have used the same keywords as in the e-database search, yielding over 2 500 results. However, due to feasibility reasons, more selective keywords were chosen with “IT value management” and “IS value management” producing approximately 200 publications. Each paper was then examined through qualitative content analysis to interpret the context and application of a value management practice (Mingers, 2003). The findings are organized (4) via a conceptual model, and are presented to general and specialized scholars and practitioners (5).

## **4.2. Exploratory case study**

To organize the case study, Eisenhardt's (1989) widely cited case study process has been used. This process constitutes a case study methodology to guide researchers in building theory from case study research, and includes eight steps: getting started, selecting cases, crafting instruments and protocols, entering the field, analyzing data, shaping hypotheses, enfolded literature and reaching closure. As this paper's focus is exploratory rather than hypothesis-testing, the step to shape hypotheses was not implemented (Eisenhardt, 1989).

The case organization under investigation is the Swedish manufacturing multinational Atlas Copco which is active in an attractive sector for empirical research in the field of IS (Chiasson & Davidson, 2005; Peppard & Ward, 2004), and was chosen from within the network of the researchers for its assumed maturity in value management practices and its favorable geographical location. In line with Yin (2005), triangulation is provided between data sources, data types and interviewers. Moreover, to attain a balanced view within the case organization, three senior business people and four IS people were interviewed (see Appendix 1). All interviews were semi-structured and built around an initial set of questions delivering an interview protocol based on the literature review (see appendix 2). Each interview was recorded with the interviewee's permission and transcribed to support careful data analysis.

The data analysis process is performed through the grounded theory approach of Charmaz (2006) and Corbin & Strauss (1990), which is widely believed to be a reliable methodology to investigate organizational phenomena, and is increasingly applied within IS research (Halaweh, Fidler, & McRobb, 2008). The processes of data collection and analysis are interrelated and executed sequentially to capture all potentially relevant aspects. Hence, additional questions could be added to the interview protocol while proceeding with the

research. Concepts are the basic unit of analysis and are identified first in the data analysis process (open coding phase). Afterwards, all concepts evolve into categories and subcategories to provide more explanation on the relationship between concepts (axial coding phase). In this study both phases were guided through the literature review findings. Last, theoretical categories are created from (sub)categories and one core category might be identified to explain all relating categories although this is not necessary and not always possible (selective coding). All three coding phases are executed using Atlas-TI software. Throughout the data analysis process, new data and concepts are continuously compared to guard against bias and increase consistency among findings.

## **5. Findings**

This section describes the literature review findings and the exploratory case study findings on value management practices. Based on the developed conceptual model, value management practices are categorized into a structural competence, process competence and relational competence, and each practice is investigated to define the level on which it can be implemented (enterprise level – portfolio level – individual level).

### **5.1. Literature Findings**

The literature review findings are discussed by means of Table 1. The table shows other scholars' different names attributed to a certain value management practice and the name as used in this paper. Each name has been chosen following a careful literature analysis and comparison between the other scholar's interpretations of the value management practice. Based on the researchers' insights gained through the literature review, the last columns illustrate the level(s) on which the value management practice could be implemented (E – enterprise level / P – portfolio level / I – individual level). Hereafter, some general findings are discussed.

INSERT TABLE 1 HERE.

#### **5.1.1. Number of Practices**

Considerable difference is found in the number of value management practices per competence. Table 2 shows that the structural competence contains eight structural practices, the process competence includes thirteen process practices, and the relational competence comprises only four relational practices. Such a variation might imply that practices from the process competence have been investigated more intensively in contrast to the structural and relational practices. De Haes & Van Grembergen (2009) confirm that “less-detailed knowledge and expertise is available on relational mechanisms which often have a more intangible and informal character.” However, Peterson et al. (2000) argues that in today’s complex, uncertain and dynamic environments practices from the relational competence are very important.

#### **5.1.2. Variety in Practice Terminology**

While focusing on similar activities and responsibilities, Table 1 displays that authors employ different terminology to address value management practices. In total, the literature review resulted in 52 differently named value management practices. After a careful analysis, in which we discussed each practice in detail with respect to its name and content until consensus among researchers was achieved, 25 unique value management practices were identified and categorized into the conceptual model. Most consistency within the practice terminology was found in the process competence with 13 identified value management practices out of 19 practices that were originally found in literature. The structural and relational practices contain much more diversity in practice terminology with respectively 8 structural practices out of 19 and only 4 relational practices out of the 14 identified in literature.



In line with the findings on the number of practices, these findings show that practices from the process competence might be better investigated resulting in more practices with less confusion on practice terminology. In contrast, the structural competence, and especially the relational competence, shows fewer practices with much more diversity in practice terminology. For instance, many authors have named the IS strategy committee and investment decision board differently. This might imply that the research in both categories is less matured and that to this day, scholars are still looking for a greater understanding and agreement on the purpose and the correct terminology of these practices. For instance, whether top management should only be supportive, involved or truly committed remains vague according to the chosen names, whereas most of their described activities and responsibilities promote committed top managers.

### **5.1.3. Value Management Focus**

The value management practices portrayed in Table 1 are identified and selected within the focus of this research, i.e. practices that accommodate and organize IS investment in order to secure and maximize their value creation. Nevertheless, this paper recognizes that many of these practices comprise activities and responsibilities that can be used in the broader context of IT governance as well. In such a context, these practices support the alignment between business and IS strategy, the formulation of policies and procedures, the implementation of internal IS activities and applications, and the general organization of the IS department to meet current and future demands of internal and external stakeholders (De Haes & Van Grembergen, 2009; Peterson, 2004; Weill & Broadbent, 1998). For instance, an IS strategy committee sets the general foundations on how IS should be employed throughout the enterprise, and strategic information systems planning can also be used to define and update the IS strategy. In this literature review, we carefully analyzed IT governance practices and selected only those practices that were compatible with the focus of this research. Therefore,

several IT governance practices were not included such as job-rotation, service level agreements, CIO reporting to CEO, COSO/ERM (De Haes & Van Grembergen, 2009). The definitions developed and presented in Table 2 are also oriented towards the value management of IS investments and should therefore be interpreted within the focus of this research.

INSERT TABLE 2 HERE.

## **5.2. Case Study Findings**

Atlas Copco is a Swedish manufacturing multinational operating with more than 33,000 employees in over 170 countries and has an approximate total revenue of 6 billion euros. It is specialized in various industrial products and services, which are centrally controlled at group level and organized in three business areas including Construction and Mining Technique, Industrial Technique and Compressor Technique (Atlas Copco, 2009). Such a multi-business organization structure is typically installed to share resources, knowledge, competences and capabilities as well as to link activities across strategic business units to achieve economies of scale and a competitive advantage (Robins & Wiersema, 1995). This research has been executed in the Compressor Technique (CT) business area in which development, manufacturing, and assembly are concentrated near Antwerp in Belgium. It accounts for 51 per cent of Atlas Copco's revenue and delivers the development, production, sales and services of air compressor equipment and specialty rental services (Atlas Copco, 2009). The CT business area is organized through a matrix structure consisting of fifteen business processes orchestrated by seven divisions to improve communication and decision-making as well as to take advantage of economies of scale. The organization of IS and IS investments happens through the dark grey colored structural practices both on a group and CT business

area level as portrayed in Figure 2. In total, the CT IS organization employs about 100 full time equivalents of which 40 per cent are internally contracted and 60 per cent externally.

INSERT FIGURE 2 HERE.

### **5.2.1. Structural Practices**

Practices that are included in the structural competence are further explained in Table 3 and discussed hereafter. On Atlas Copco group level, the business technology board is the highest IS structure discussing the IS strategy, alignment, major IS investments and future IS challenges, and communicates directly with the executive management. To fulfill this, it is supported by four structural practices as portrayed in Figure 2. These practices provide guidance and services to the portfolio of IS investments on a group level and can also investigate whether individual IS investments at business area level are in line with the current and future architectural, infrastructural or operational strategy. On a CT business area level, the IS strategy and objectives are defined and guarded by the CT IS/IT board. Herein, the vice-president IS/IT CT reports on the daily operations of the IS organization and on major IS investments individually. He brings the operational results, issues and achievements of IT demand and IT supply together with the IT demand experiences with the business, to the CT IS/IT board meetings. The IT demand experiences result from the communication between business and IS through IT team leaders who have a seat in process councils. In total, eight process councils are responsible for one or more business processes and discuss current and future IS investments with an IT team leader. Per process council, one divisional president is accountable for the council's IS investment portfolio and takes on the role of business sponsor. The project management office provides guidance on the individual level through methodologies, templates and so on. For each individual IS investment, a program or project management team is composed to handle the daily activities of the investment and is

chaired by a program or project manager from the business, assisted or not by a more technical IS program or project manager. According to the vice-president IS/IT CT, *“this approach should be standard to incorporate both business and IS”* Mostly, a program or project management steering committee is established as well, to regularly review the team’s performance. These four structural practices incorporate all external party members (when recruited) which is recognized by the vice-president IS/IT CT *“as a critical success factor of the IS investment. There have been many discussions in the past, but I am in favor.”*

INSERT TABLE 3 HERE.

### **5.2.2. Process Practices**

The description of Atlas Copco’s process practices in support of IS investments is presented in Table 4. The findings show that only one process practice is implemented at the enterprise level. The strategic information systems planning practice supports the identification of current and future IS investment opportunities as well as the alignment of these opportunities with the business and IS strategy. New investment ideas can also arise bottom-up where the process council can decide whether the investment is small enough to implement immediately and to request an initial business case or an extensive one. As chairman of a process council, a business process owner declares that *“not a single project that is highly strategic is approved without a business case.”* Once a year, all investment ideas are integrated and discussed by the process councils. They question whether these investments are in line with the business and IS strategy, prioritize them and compile their wish lists of next year’s IS investment portfolio. This discussion takes place in close consultation with IT team leaders to understand the technological opportunities and resource constraints better. Afterwards, the CT IS/IT board discusses the wish lists and can request further adjustments or give final approval on investment initiatives. The final approval is based on the overall IS

investment budget (i.e. sum of divisions' IS investment budgets) and all individual IS investment payback periods which can be no more than two years. Unfortunately, the latter is only tacitly understood and not formally communicated.

After approval, portfolio management follows a fragmented approach. Each process council is accountable for the management of their IS investment portfolio. They manage investment priorities and discuss running IS investment progress and issues with different key users, field experts and the IT team leader. An overall integration of all process councils' IS investment portfolios is still absent. Across process councils, no priorities have been established and no interdependencies can be managed. Hence, the business cannot provide an integral overview of its current and future IS investment portfolio. This impacts the IS organization too. The IT demand manager collects insights and findings of all IT team leaders, and translates the business needs to IT supply. When an overall prioritization is missing on the business side, IT supply has difficulties in prioritizing its internal activities as well. In the words of the IT demand manager *"it would be a challenge for IT demand to clarify the IS investment prioritization to the IT supply organization. Today, we do too little."*

To execute an IS investment, the project management office provides communication, templates, methodologies and training on a well-documented program/project management process. After the idea and feasibility phase (including business case development), this process continues with the design, building, implementation and aftercare of the IS investment, and comprises the management of scope, benefits, costs, risks, stakeholders and interdependencies. To accommodate change and guide the stakeholders in these phases, a dedicated change manager is part of the program/project management team. Parameters such as benefits, costs and risks have already been estimated in an extensive business case that may serve as a good starting point of an IS investment. Unfortunately, these business cases

all tend to end up on a shelf after development and are not actively managed throughout the investment. Formerly, the IS organization occasionally arranged a post-implementation review of the business case. Yet, *“since these people moved to the business side, which altogether was a good decision, very little has happened. I think eight out of ten times there is no post calculation”*, says the vice-president IS/IT CT. During the IS investment, both internal and external key stakeholders stay closely involved in the daily activities as members of the program/project management team, and in the follow-up and decision-making as members of the program/project management steering committee. Roles and responsibilities are managed and described on the internal communication platform. For instance, the process council’s chairman rotates every six months.

INSERT TABLE 4 HERE.

### **5.2.3. Relational Practices**

Table 5 lists the relational practices in support of the organization of IS investments at Atlas Copco. Communication is effectively organized at Altas Copco through multiple channels. An internal communication platform “The Way We Do Things” functions as an electronic bible to the organizational members by describing the organization’s mission, vision and strategy. Also more detailed information is available on security policies, roles and responsibilities, board memberships, IS strategic sourcing practicalities, and general IS practices. Furthermore, it offers instructions, guidelines, recommendations, tools, templates and methodologies to the individual level. Apart from this general medium, the executive management organizes yearly info sessions and distributes illustrative material (e.g. short movie, book) to communicate the vision and business strategy. The business technology board distributes a white paper on the future IS challenges (e.g. cloud, social networks). Finally, the CT CIO office has a dedicated person to communicate the IS organization’s role

and promote current and future IS investments to the organizational members by way of a magazine named 'Innovation'.

According to the mission statement of the IS organization, IT demand should build a positive relationship with the business by proactively proposing new IS solutions. This implies that the business shows leadership in its willingness to listen and cooperate unreservedly, and that the IT demand manager and IT team leaders demonstrate adequate leadership in their activities. The IT demand manager states *"we should not sit in our chair and wait until the business is telling us what to do."* Today, the IS leadership approach is still very unstructured and IT Team Leaders are self-reliant in their relationship with the business. Consequentially, a business process owner argues that *"we do not possess this IS leadership yet. Nowadays, IS does not come to the business to say hey guys this is a great supplier. I will organize a meeting for you."* Fortunately, the IS organization is working hard on their relationship with the business to change this negative image. For instance, IT Team Leaders work more closely with the business via process councils and present IS investment progress together with the business to act as one voice. An internal development course on leadership and people management has been provided to IT team leaders and if useful, external management courses can be followed as well. The project management office organizes more fundamental courses on project and program management.

In the management and implementation of IS investments, the business takes a clear lead. The process councils collect new investment ideas, request a business case if necessary, follow up the investment progress together with IS, stakeholders and field experts, and defend their future investment portfolio to the CT IS/IT board. As the CEO and divisional presidents have a seat in the CT IS/IT board, they are involved in the discussion on IS strategy, alignment and individual IS investments. Per process council, a divisional president

acts as the business sponsor of the portfolio of IS investments and is ultimately accountable to the CT IS/IT board for the portfolio's progress and value creation. At individual level, top management is committed to IS investments with a great strategic impact. Currently, one investment program is running whose program management team reports directly to the group executive management. In summary, top management seems to be committed at all three levels.

INSERT TABLE 5 HERE.

## **6. Discussion**

This section discusses the literature and empirical findings on value management practices by means of Table 6. The left column of the table shows a total of 25 unique value management practices as found in the literature review of which 23 practices (in bold) are also found in the case study. We can, however, also discern differences between practices identified in literature and the case study. To start with, some practices from the case study are active on a different level compared with the literature findings. First, the business technology board and CT IS/IT board share the IS strategy committee's responsibilities on enterprise level respectively on group level and CT business area level. Second, Atlas Copco's divisional presidents act as the business sponsor for the IS investment portfolio within their process council and not for each individual IS investment. In this matter, it is desirable for a business sponsor to be closely involved with the development and communication of the business case for each individual investment (Benaroch, Lichtenstein, & Robinson, 2006; Mitra, Sambamurthy, & Westerman, 2011). Third, the strategic information systems planning process is adjusted to a multi-business organization. At group level, the overall IS challenges are identified and strategic alignment is foreseen, whereas at CT business area level, a specific IS strategy is developed together with the discussion on future IS investment



opportunities. Earl (1993) categorizes such an approach as administrative, where resource planning and a spending limit are key, and new investment proposals arise bottom-up. Indeed, this case study describes a bottom-up approach regarding new proposals through the decentralized process councils. They make up next year's IS investment portfolio with a significant focus on resources (i.e. investment budget). Fourth, the change management process only exists on the individual level through a change manager in the program/project management team. Here, literature clearly prescribes that change management is about creating a vision and political support, and should happen on all three levels (Grover, Jeong, Kettinger, & Teng, 1995; Pellegrinelli, 2002). Fifth, Atlas Copco communicates effectively on enterprise and individual level. Communication on portfolio level is still absent per process council as well as on the aggregated portfolio level as no integration exists of the process councils' portfolios. Last, training and development is also foreseen on the individual level via program/project management education.

INSERT TABLE 6 HERE.

The practices found in the case study show varied maturity. For instance, the process practice business case management and closely linked practices of benefits, cost and risk management are used to develop an initial or extensive business case. However, these business cases end up on a shelf and are not actively managed throughout the investment which is consistent with Franken, Edwards, & Lambert's (2009, p. 65) experience that most business cases developed "gather dust on the shelf or are lost on someone's hard disk" after the investment is approved. Second, while the CT IS/IT board takes on some of the responsibilities of the investment decision board (e.g. strategic alignment with IS investments), others are still neglected. The CT IS/ IT board should assess the business cases of major investment proposals, integrate the fragmented IS investment portfolios of the process councils and

provide clear value measures and prioritization among the overall portfolio. This way it has a better overview to manage for instance resource constraints and interdependencies, and it can better anticipate complex and dynamic situations such as the current cost cutting decisions caused by the economic crisis (De Reyck et al., 2005). Nowadays, one project manager states, *“especially for inter-divisional projects there is a constant battle for resources and good people due to lack of communication and integration on portfolio level.”* Last, the project management office incorporates functions of the program, project and value management offices as described in literature, though it only operates at the individual level. It supports people in the development of a business case (i.e. value management office function), and provides templates, standards and methodologies to the program and project management team (i.e. program/project management office function). With regard to the portfolio level, it should support the CT IS/IT board and process councils in the evaluation of business cases and track the portfolio performance to act upon value opportunities (Artto, Martinsuo, Gemünden, & Murtoaro, 2009; ITGI, 2008; Letavec, 2006). Interestingly, the integration of three secretariat functions into one raises the question whether all three offices are separately necessary and cannot be combined into one investment management office operating on a portfolio and individual level. In addition, this office can centrally organize the gathering of all information on past, running and future IS investments with regard to lessons learned, best practices and potential pitfalls. Today such a knowledge management process is still in its infancy at Atlas Copco. According to the IT Demand Manager, future improvements lie especially in the *“collection, integration and distribution of all lessons learned from various investments across the organization.”*

The case study also identified nine additional practices, which are apparent from Table 6, as they cannot be matched to any practice identified in the literature review. Remarkably, only additional structural practices and no process nor relational practices have been discovered.

For instance, a CIO Office is installed both at a group and business area level to provide administrative and operational support to the IS organization. The group level incorporates three additional structural practices. The enterprise architecture council, service and operations council, and ASAP IT board (an infrastructure council) are set up by Atlas Copco to harmonize the IS organization and IS investments within the three business areas. When a new IS investment is proposed, the business case is sent to these councils to be investigated whether or not the IS investment is in line with the current technology roadmap, service delivery standards and catalogue, and infrastructure. Meanwhile, potential improvements to these current approaches are well considered and their impact on running applications and infrastructure is investigated. On CT business area level, the IT demand and IT supply are respectively oriented towards the communication, relationship building and alignment between business and IS, and the development and daily support of business applications. Two extra governing committees are found at individual level to monitor the activities and performance of the program/project management team. The program/project management steering committee is responsible for reviewing the planning, status, budget, issues and so on specifically at the individual level.

## **7. Conclusion and Future Research**

As organizations can only create value from IS investments through value management practices but yet still struggle with their implementation, this study attempted to identify and clearly define value management practices for two reasons. First, despite the emerged practitioner frameworks, very limited academic research has been oriented towards the identification of value management practices. Second, these limited results are fragmented as many scholars investigate one single practice in isolation, and significant ambiguity is demonstrated among their terminology. Therefore, a literature review has been executed resulting in 52 practices that were carefully analyzed and reduced to 25 unique value

management practices. Based on the literature analysis, these 25 value management practices are clearly defined. Following this, an exploratory case study was executed at Atlas Copco to investigate whether the literature review findings can be justified. In this case study, 23 practices from the literature review were also identified in the case organization. Consequently, this exploratory paper concludes that the 23 practices that have been found both in literature and in the case study could be used in the organization of IS investments.

Dissimilar and additional findings from this research present opportunities for future research. First, relational practices are very important in complex, uncertain and dynamic environments (Peterson et al., 2000) and should, according to the literature review be employed on all three levels throughout the organization of IS investments. Nevertheless, this literature review could only discern four of these practices, which were characterized by little agreement on their purpose. Therefore, future research should target this understudied category of value management practices. For instance, the relational competence includes aspects that refer to communication, social interaction and trust (Liu et al., 2009), so we would be interested to learn whether trust can be identified as a different and consequently separate practice from top management commitment, and what the relationship could be between both practices in this case. As mentioned earlier in section 5.1.2, it might also be worth exploring if top management should only be supportive, involved or truly committed, because literature remains vague according to our findings summarized in Table 1. Another example involves the existence of politics in an organization. Elbanna & Child (2007) have concluded that a higher level of politics can negatively influence the effectiveness of investment decision-making. Future research can investigate whether the practices identified in this study are able to reduce the role of politics in the investment decision-making process or if new practices should be identified.

Second, Nolan & McFarlan (2005) assign particular decision-making responsibilities regarding IS investments to the board of directors. However, it is interesting to investigate why the board of directors delegates these responsibilities to the executive management committee, as argued by Andriole (2009) and confirmed in this case study. Third, a deeper understanding is desirable on why Atlas Copco has not implemented an overall portfolio management process. Additional exploratory research can be executed to investigate whether the fragmented portfolio management approach of Atlas Copco is also used in other multi-business organizations and what impact this might have on the value creation. Fourth, the case organization's integration of the secretariat functions into one project management office operating at individual and portfolio level could deliver benefits to the organization. The examination of this approach together with its (dis)advantages could be useful to many organizations. Moreover, integrating the secretariat functions might have implications for other value management practices such as role management and stakeholder management, or for the investment decision-making process in structural practices, so this impact should be examined as well. Fifth, IS scholars such as Karimi, Bhattacharjee, Gupta, & Somers (2000) and Torkzadeh & Xia (1992) have positioned steering committees mostly at the portfolio level to discuss the IS direction, prioritize IS investments and review performance. According to Lechler & Cohen (2009), "a surprising research gap [exists] in this structural category of project management [and so ignoring] the importance steering committees might play in the building and sustaining of an organization's project management capability." This case study therefore identifies a program/project management steering committee that confirms this concern and calls for further research.

Sixth, future research might examine why value management practices implemented in practice show varied maturity. For instance, Pellegrinelli, Partington, Hemingway, Mohdzain, & Shah (2007) argue that the business case management process is crucial in the

representation of benefits, costs and risks so the business sponsor clearly understands the IS investment characteristics. Moreover, it is used in the prioritization of multiple IS investments and fulfills a central role in the IS investment value creation (ITGI, 2008). However, business cases in the case organization are simply shelved after development and are of little significance during the continuation of the IS investments. Future research might help IS scholars to understand why such a contradictory phenomenon takes place. It is also recognized that the contribution of business case management is most evident if a business case is used continuously throughout the investment life cycle (Al-Mudimigh, Zairi, Al-Mashari, & others, 2001). It should therefore become a living document that is frequently updated and matures along the investment (Franken et al., 2009). Future research can thus identify how such a structured and continuous approach on business case management can be achieved.

Last, in the case study we identified 9 additional value management practices which were all part of the structural competence. As these practices were not identified in our literature review; this might indicate that their existence and purpose have not yet manifestly been linked to value management. Therefore, we suggest that future research investigates the role of these structural practices in value management and what impact they could have. In 2011 for instance, Enterprise Architecture entered the top ten of the most important IT management concerns for IT executives (Luftman & Ben-Zvi, 2011). Strategic IS Planning on the other hand is also identified as a value management practice in this study, and is consistently incorporated in the same top ten. The latter practice has recurrently served as a research topic for academic scholars. We recognize that Enterprise Architecture as well as other newly identified value management practices should become part of the research agenda in value management research.

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FIGURE 1

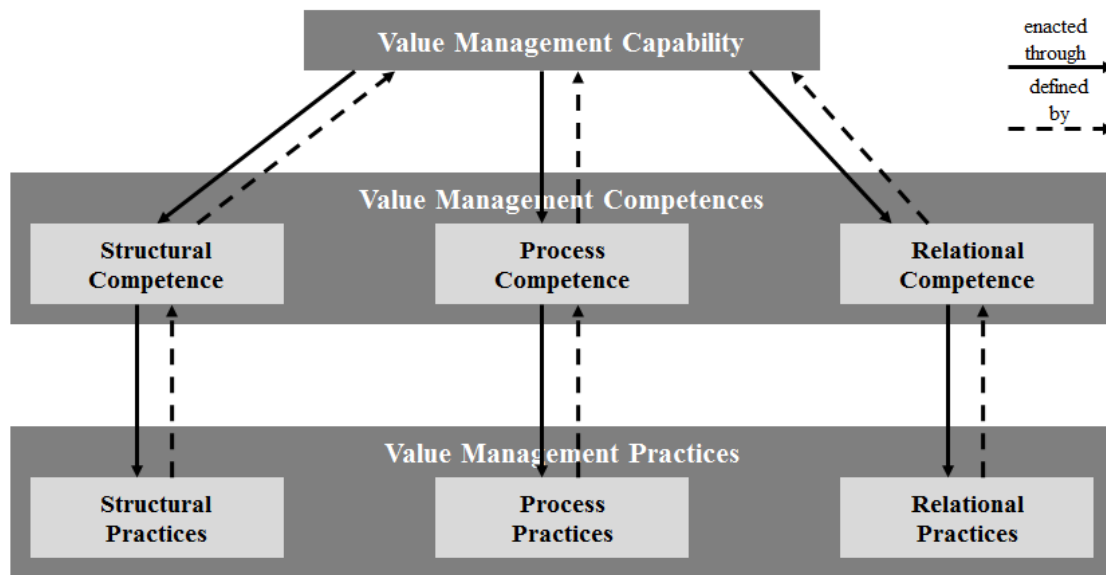


Figure 1. Conceptual model for Value Management

FIGURE 2

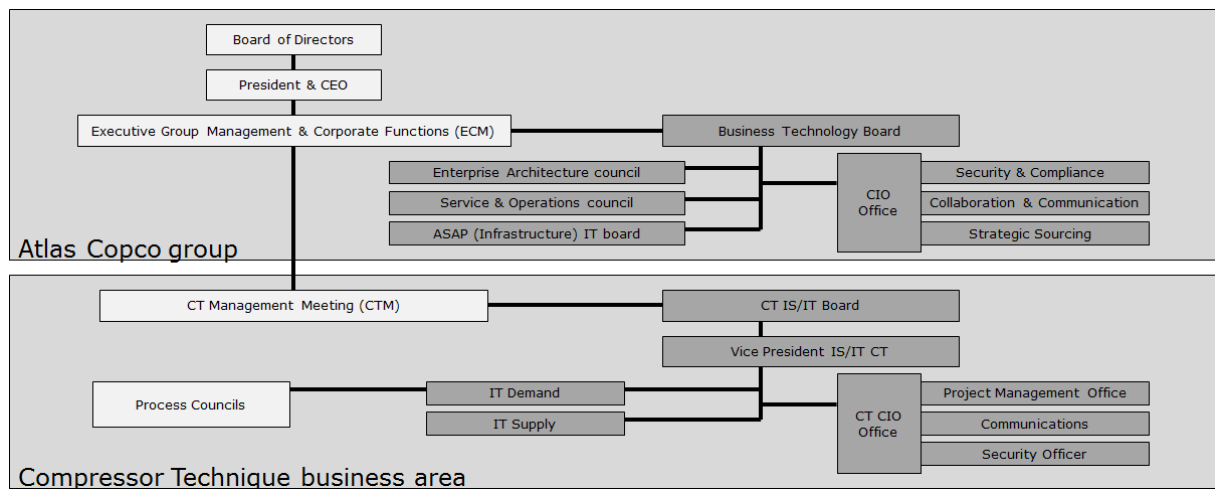


Figure 2. Structural practices at Atlas Copco to organize IS and IS investments (dark grey).

TABLE 1

	<i>Terminology from literature</i>	<i>References</i>	<i>E</i>	<i>P</i>	<i>I</i>
<b>Structural practices</b>					
<b>IS strategy committee</b>	IT strategy committee IT governance committee IT oversight committee IT leadership forum	(ITGI, 2003)(De Haes & Van Grembergen, 2009) (Nolan & McFarlan, 2005) (Posthumusa & Von Solms, 2005) (ITGI, 2008)	x		
<b>Investment decision board</b>	Investment decision board IT steering committee  Investments and services board Portfolio management committee Portfolio review group Project portfolio committee	(Thorp, 2003) (De Haes & Van Grembergen, 2009)(ITGI, 2003) (Karimi et al., 2000)(Torkzadeh & Xia, 1992) (ITGI, 2008) (Kumar, Ajjan, & Niu, 2008) (Lockett, De Reyck, & Sloper, 2008) (De Reyck et al., 2005)		x	x
<b>Value management office</b>	Value management office	(ITGI, 2003)(Thorp, 2003)		x	x
<b>Program management office</b>	Program management office	(Artto et al., 2009)(ITGI, 2008)(Letavec, 2006) (Pellegrinelli & Garagna, 2009)			x
<b>Project management office</b>	Project management office	(Artto, Kulvik, Poskela, & Turkulainen, 2011) (Desouza & Evaristo, 2006)(Lechler & Cohen, 2009) (Martin, Pearson, & Furumo, 2007)			x
<b>Program management team</b>	Program team	(Artto et al., 2011)(OGC, 2010)(Thorp, 2003)			x
<b>Project management team</b>	Project management team Project team Project taskforce	(Labuschagne & Brent, 2005) (OGC, 2010)(Srivannaboon, 2009) (Labuschagne & Brent, 2005)			x
<b>Business sponsor</b>	Business Sponsor Program Sponsor	(ITGI, 2008)(Thorp, 2003) (Pellegrinelli et al., 2007)			x
<b>Process practices</b>					
<b>Strategic information systems planning</b>	Strategic Information Systems Planning	(De Haes & Van Grembergen, 2008)(Earl, 1993)(Grover & Segars, 2005)	x		
<b>IS balanced scorecard</b>	IS Balanced Scorecard	(Martinsons, Davison, & Tse, 1999)(Van Der Zee & De Jong, 1999)	x	x	
<b>Portfolio management</b>	Portfolio management IT Portfolio management Project portfolio management	(OGC, 2010)(ITGI, 2008) Kumar et al. (2008) De Reyck et al. (2005)		x	
<b>Program management</b>	Program management	(Artto et al., 2009)(OGC, 2010)(ITGI, 2008)(Lycett, Rassau, & Danson, 2004)			x
<b>Project management</b>	Project management	(Labuschagne & Brent, 2005)(OGC, 2010)(Srivannaboon, 2009)			x
<b>Business Case management</b>	Business case management Business case Make the business case	(Pellegrinelli et al., 2007) (ITGI, 2008) (Kohli & Devaraj, 2004)		x	x
<b>Benefits management</b>	Benefits management	(De Haes & Van Grembergen, 2009)(ITGI, 2008) (Pellegrinelli et al., 2007)(Ward & Daniel, 2006)		x	x
<b>Cost management</b>	Cost management	(Schwalbe, 2010)		x	x
<b>Risk management</b>	Risk management	(ITGI, 2008)(Kumar, 2002)(Pellegrinelli et al., 2007)		x	x
<b>Knowledge management</b>	Knowledge management	(ITGI, 2008)(Lee & Choi, 2003)		x	x
<b>Stakeholder management</b>	Stakeholder management  Stakeholder inclusion	Pellegrinelli et al. (2007), Gottschalk and Solli-Sæther (2005) (Wheeler & Sillanpää, 1998)		x	x
<b>Change management</b>	Change management Strategic change management	(Grover et al., 1995) (Pellegrinelli, 2002)	x	x	x
<b>Role management</b>	Roles and responsibilities	(ITGI, 2008)		x	
<b>Relational practices</b>					
<b>Top management commitment</b>	Top management commitment Top management involvement Top management support Senior management giving a good example	(Bernroider, 2008)(Marble, 2003) (Marble, 2003) (Akkermans & van Helden, 2002) (Bernroider, 2008) (De Haes & Van Grembergen, 2008)	x	x	x
<b>Business/IS leadership</b>	IS Leadership Team leadership Informed / committed leadership Leadership	(Booth & Philip, 2005) (Srivannaboon, 2009) (ITGI, 2008) (Pellegrinelli et al., 2007)	x	x	x
<b>Effective communication</b>	Effective communication Communication Interdepartmental communication Internal corporate communication addressing IT on a regular basis	(Nah, Lau, & Kuang, 2001) (Kydd, 1989)(Pellegrinelli et al., 2007) (Akkermans & van Helden, 2002) (Bernroider, 2008) (De Haes & Van Grembergen, 2009)	x	x	x
<b>Training and development</b>	Training and development IS/IT staff development	(Dao, Langella, & Carbo, 2011) (Peppard & Ward, 2004)		x	

Table 1. Literature overview on value management practices showing terminology, references and focus levels.

TABLE 2

Structural practices	Definition	References
IS Strategy Committee	The IS Strategy Committee is positioned within the IS organization and responsible to stimulate awareness amongst the board of directors and executive management committee on the potential value and viability of proven and emerging technologies, the measurement and delivery of business value out of IS investments, the sourcing and use of resources and the management of risks. To carry out this responsibility, the committee should provide optimal resources to the management in relation to the organizational risk appetite, to assess the activities of the investment decision board, and to receive updates on both individual as the portfolio of IS investments.	(De Haes & Van Grembergen, 2009) (ITGI, 2003)(ITGI, 2008) (Nolan & McFarlan, 2005) (Posthumusa & Von Solms, 2005)
Investment Decision Board	The Investment Decision Board is a business decision making body made up of business and IS executives that are accountable to the executive management committee for the value delivery across a portfolio of IS investments. Therefore, the Investment Decision Board assigns a business sponsor to each investment idea to develop a business case. It assesses and prioritizes all business cases to select the winners, and facilitates effective investment preparation, implementation, and delivery. Value measures should be defined to reassess the business case on a regular basis as well as after investment delivery. In general, the board is responsible to stimulate Top Management Commitment and Business/IS Leadership.	(De Haes & Van Grembergen, 2009) (ITGI, 2003)(ITGI, 2008) (Karimi et al., 2000) (Kumar et al., 2008) (Lockett et al., 2008) (Thorp, 2003) (Torkzadeh & Xia, 1992)
Value Management Office	The Value Management Office is a business secretariat with experts that are assigned to assist Business Sponsors with best practices in the identification and design of a business case, to support the Investment Decision Board in the evaluation of such business cases, and to track both the individual IS investments as well as the overall portfolio to act upon value opportunities.	(ITGI, 2008) (Thorp, 2003)
Program Management Office	The Program Management Office is a business secretariat with experts that provide a combination of managerial, administrative, consulting and technical services to support the initiation, execution and delivery of IS investment Programs. Therefore, the office provides effective methodologies, standards and tools, helps with the set up of Program structural and process practices, documents and assures meeting minutes and lessons learned, and facilitates training and development.	(Artto et al., 2009) (ITGI, 2008) (Letavec, 2006) (Pellegrinelli & Garagna, 2009)
Project Management Office	The Project Management Office is a business secretariat with experts that provide a combination of managerial, administrative, consulting and technical services to support the initiation, execution and delivery of business and IS projects within an IS investment Program. Therefore, the office provides effective methodologies, standards and tools, helps with the set up of project structural and process practices, documents and assures meeting minutes and lessons learned, and facilitates training and development.	(Artto et al., 2011) (Desouza & Evaristo, 2006) (Lechler & Cohen, 2009) (Martin et al., 2007)
Program Management Team	The Program Management Team constitutes the group of internal (and external) business and IS stakeholders that are concerned with the day-to-day organization of an IS investment Program. Through the full economic life-cycle, their responsibility involves the management of scope, benefits, coordination, stakeholders, risks, time, lessons learned, issues and overall quality on which should be reported regularly.	(Artto et al., 2009) (Lycett et al., 2004) (OGC, 2010)
Project Management Team	The Project Management Team constitutes the group of internal (and external) business and IS stakeholders that are concerned with the day-to-day organization of business and IS projects. Through the full economic life-cycle, their responsibility involves the management of scope, benefits, coordination, stakeholders, risks, time, lessons learned, issues and overall quality on which should be reported regularly.	(Labuschagne & Brent, 2005) (OGC, 2010) (Srivannaboon, 2009)
Business Sponsor	The Business Sponsor acts as the highest accountable individual for the overall success of an IS investment. It is the business sponsor's responsibility to develop an initial investment proposal that meets the overall business objectives followed by a detailed business case to understand the full life-cycle value, to monitor and report on the Program's progress and to administer the Program budget.	(ITGI, 2008) (Pellegrinelli et al., 2007) (Thorp, 2003)

Table 2. Definitions of value management practices (structural, process and relational practices) based on literature.

Process practices	Definition	References
Strategic Information Systems Planning	Strategic Information Systems Planning targets the identification of IS investment opportunities and the alignment of these opportunities with the IS strategy and objectives.	(De Haes & Van Grembergen, 2008) (Earl, 1993) (Grover & Segars, 2005)
IS Balanced Scorecard	IS Balanced Scorecard is a decision-making management process at enterprise and portfolio level that measures and evaluates IS investments from the business value, user orientation, internal process, and future readiness perspective.	(Martinsons et al., 1999) (Van Der Zee & De Jong, 1999)
Portfolio Management	Portfolio Management supports the Investment Decision Board to manage assets that optimize the value creation from an IS investment portfolio. Therefore, it facilitates the business case management process, prioritizes these in terms of strategic fit, value opportunity and risk appetite, manages resources, benefits and risks during the initiation, execution, delivery and closing of investments, guards interdependencies and overlap between investments, terminates investments when necessary, and measures and monitors the overall portfolio performance to report on progress.	(De Reyck et al., 2005) (ITGI, 2008) (Kumar et al., 2008) (OGC, 2010)
Program Management	Program Management supports the Program Management Team to manage related business and IS projects and to assure value creation across projects that could not be realized when managed independently. Between the start and closing of a Program, individual projects should be initiated, prioritized (in line with Program strategy), managed and closed within the Program planning and objectives. This involves the management of scope, benefits, coordination, stakeholders, risks, time, interdependencies, lessons learned, issues and overall quality on which should be reported regularly.	(Arto et al., 2009) (OGC, 2010) (ITGI, 2008) (Lycett et al., 2004)
Project Management	Project Management supports the Project Management Team to manage the overall success of a business or IS project. Within the broader context of an investment Program, the project strategy is executed through a formal project life-cycle (idea generation, pre-feasibility, feasibility, development and execution, commissioning, launch and post-implementation review). This involves the management of scope, benefits, coordination, stakeholders, risks, time, lessons learned, issues and overall quality on which should be reported regularly.	(Labuschagne & Brent, 2005) (OGC, 2010) (Srivannaboon, 2009)
Business Case Management	Business Case Management guides the Business Sponsor to formally structure an initial investment opportunity that offers the Investment Decision Board a standardized business case to select and prioritize effectively, and that induces the Program/Project Management Team in the active management of the business case during the entire investment life cycle.	(ITGI, 2008) (Kohli & Devaraj, 2004) (Pellegrielli et al., 2007)
Benefits Management	Benefits Management facilitates the identification, measurement and (pro)active management of both intermediate and business benefits over the entire life-cycle of an IS investment. After identification, benefits should be structured within a benefits realization plan that will be evaluated on benefits delivery performance and the establishment of future benefit opportunities.	(De Haes & Van Grembergen, 2009) (ITGI, 2008) (Pellegrielli et al., 2007) (Ward & Daniel, 2006)
Cost Management	Cost Management facilitates the identification, measurement and (pro)active management of costs to ensure that an individual IS investment and the overall portfolio is executed within budget.	(Schwalbe, 2010)
Risk Management	Risk Management facilitates the identification, measurement and (pro)active management of risks in order to reduce risks and manage the impact of risks both on individual level and portfolio level.	(ITGI, 2008) (Kumar, 2002) (Pellegrielli et al., 2007)
Knowledge Management	Knowledge Management supports the creation, sharing and utilization of knowledge acquired through the organization and execution of IS investments.	(ITGI, 2008) (Lee & Choi, 2003)
Stakeholder Management	Stakeholder Management facilitates the management and alignment of objectives, values and expectations between different internal (and external) stakeholders on the basis of dialogue-based empowered relationships.	(Gottschalk & Solli-Sæther, 2005) (Pellegrielli et al., 2007) (Wheeler & Sillanpää, 1998)
Change Management	Change Management is employed to motivate change, to create a vision, to develop political support, to manage the transition, and to sustain momentum throughout the organization.	(Grover et al., 1995) (Pellegrielli, 2002)
Role Management	Role Management recommends clear role descriptions among internal (and external) business and IS people throughout the enterprise which are involved in the organization of IS investments. The process should lead to a clear understanding of who is responsible, accountable, consulted and informed according to the activities one performs.	(ITGI, 2008) (Thorp, 2003)

Table 2. Definitions of value management practices (structural, process and relational practices) based on literature (continued).

Relational practices	Definitions	References
Top Management Commitment	Top Management Commitment constitutes the confidence, engagement and commitment that the board of directors and executive management committee show in support of IS investments. This behavior shapes a conducive environment that guarantees sufficient resources and dedicated attention towards IS investments, and that change is understood and accepted by the entire organization.	(Akkermans & van Helden, 2002) (Bernroider, 2008) (De Haes & Van Grembergen, 2008) (Marble, 2003)
Business/IS Leadership	Business/IS Leadership represents the organizational competence exercised by business and IS people to be constantly aware of and open to new ideas, to be on the lookout for new opportunities that drive forward the organization's business objectives, and to take action in close partnership. This capability builds on cooperative and interpersonal relationships outside of the traditional hierarchical structural practices.	(Booth & Philip, 2005) (ITGI, 2008) (Pellegrielli et al., 2007) (Srivannaboon, 2009)
Effective Communication	Effective Communication is a responsibility of each business and IS decision-maker as well as for every internal (and external) stakeholder in order to inform employees on vision, mission and strategic direction, to exchange and agree upon unambiguous goals and objectives, to balance and manage expectations, to assemble insights and potential issues, to promote the investment organization, to update on investment progress and to increase collaboration.	(Akkermans & van Helden, 2002) (Bernroider, 2008) (De Haes & Van Grembergen, 2009) (Pellegrielli et al., 2007) (Kydd, 1989) (Nah et al., 2001)
Training and Development	Training and Development comprises skill development and expertise building of business and IS people to ensure that adequate and quality technical, business, personal and managerial skills are available.	(Dao et al., 2011) (Peppard & Ward, 2004)

Table 2. Definitions of value management practices (structural, process and relational practices) based on literature (continued).



TABLE 3

		<i>Responsibilities</i>	<i>Members</i>	<i>E</i>	<i>P</i>	<i>I</i>
Group level						
<b>Business technology board</b>	Responsible for strategic alignment, promoting IS to executive management, driving IS performance culture, looking for future IS challenges and promoting business area synergies.	CIO, Vice-presidents IS/IT, General manager ASAP, business representatives		x	x	
<b>CIO office</b>	Responsible for security and compliance, collaboration and communication, and strategic sourcing.	CIO, Enterprise architecture manager, Service and operations manager, General manager ASAP, CIO officers			x	x
<b>Enterprise architecture council</b>	Responsible for technology roadmap and architecture direction, follow up of applications and promotion of architectural standards and processes.	Enterprise architecture manager, Architect(s) from IT Demand, subject specific experts			x	x
<b>Service and operations council</b>	Responsible for IS service delivery process standardization and performance, development and harmonization of service catalogue and service levels, and management of service delivery conflicts and pricing.	General managers of customers, Customer services manager ASAP, Strategic sourcing manager, Business technology board represent.			x	x
<b>ASAP IT board (Infrastructure Council)</b>	Responsible for all infrastructure and common applications for the Atlas Copco group as well as for the three business areas.	General manager ASAP, IT service manager ASAP, Business controller ASAP, Vice-presidents IS/IT , business representatives			x	x
CT business area level						
<b>CT IS/IT board</b>	Responsible for CT's IS/IT vision, strategy and objectives, follow up on IS investments and IS organization progress regarding people management, costs, key performance indicators, roadmaps of end-to-end processes and business applications.	Business area executives, Divisional presidents, Vice-presidents finance/logistics, General manager ASAP, Vice-president IS/IT CT		x		x
<b>IT demand</b>	Responsible for communication and alignment with the business, to discuss business needs on current and new IS investments and to build a business and IS/IT partnership.	IT Demand manager, IT team leaders (eight in total), Vice-president IS/IT CT			x	x
<b>IT supply</b>	Responsible for the design, development, implementation and support of business applications, and daily support as back office.	IT Supply manager, Technical analysts, Programmers			x	x
<b>CT CIO Office</b>	Responsible for discussing daily operations, administration, and progress of the IS/IT organization.	CEO, PMO officer, security officer, communications officer, IT Supply manager, IT Demand manager, Vice-president IS/IT CT			x	x
<b>Project management office</b>	Responsible for Program/project management methodologies, templates, standard procedures and approaches, and quality assurance across IS investments.	Project management officer, additional experts when necessary				x
<b>Program management steering committee</b>	Responsible for reviewing planning, status, budget, issues etcetera per Program.	Chairman/woman, key stakeholders of business and IS, Vice-president IS/IT CT, external party.				x
<b>Program management team</b>	Responsible for the Program execution in terms of scope, requirements, benefits, costs, risks, stakeholders, planning and strategic alignment.	Program manager (business and IT), key stakeholders and users, external party, change manager.				x
<b>Project management steering committee</b>	Responsible for reviewing planning, status, budget, issues etcetera per project.	Chairman/woman, key stakeholders of business and IS, Vice-president IS/IT CT, external party.				x
<b>Project management team</b>	Responsible for the project execution in terms of scope, requirements, benefits, costs, risks, stakeholders, planning and strategic alignment.	Project manager (business and IT), key stakeholders and users, external party, change manager.				x
<b>Business sponsor</b>	Responsible for championing the entire IS investment portfolio of one process council and not of one individual IS investment.	Divisional president			x	

Table 3. Structural practices at Atlas Copco: responsibilities, members and focus levels.

TABLE 4

	<i>Description</i>	<i>Implemented by</i>	<i>E</i>	<i>P</i>	<i>I</i>
<b>Strategic information systems planning</b>	To identify current and future IS investment opportunities and align the IS investments with the business and IS strategy.	Business technology board CT IS/IT board IT demand	x		
<b>Portfolio management</b>	The alignment and management of multiple IS investments per process council.	IT demand		x	
<b>Business case management</b>	The estimation of potential benefits, costs and risks to calculate the net present value. The description of ways to finance and responsibility allocation in a formal document.	Project management office IT demand Program management team Project management team		x	x
<b>Benefits management</b>	The estimation and management of benefits in terms of operating cost savings and increased business / profit.	Program management team Project management team		x	x
<b>Cost management</b>	The estimation and management of costs in terms of investment (acquisition, development, process reengineering, consultancy) and operating costs (personnel, infrastructure, licenses, resources).	Program management team Project management team		x	x
<b>Risk management</b>	The estimation and management of risk in terms of country, investment, technology, product risk and environmental impact.	Program management team Project management team		x	x
<b>Stakeholder management</b>	The communication with internal and external stakeholders regarding IS investment decision-making and requirements analysis in order to get their appreciated insights and to manage their expectations.	CT IS/IT board Program management committee Project management committee Program management team Project management team		x	x
<b>Role Management</b>	The description and management of roles and responsibilities.	CT CIO office		x	
<b>Change management</b>	The communication and motivation of business change and transformation out of IS investments and the development of political support.	Program management team Project management team, additional change manager			x
<b>Program management</b>	The management of an individual IS investment Program on scope, benefits, costs, risks, stakeholders and interdependencies.	Program management team			x
<b>Project management</b>	The management of an individual IS investment project on scope, benefits, costs, risks and stakeholders.	Project management team			x

Table 4. Process practices at Atlas Copco: description, structural practices that implement and focus levels.

TABLE 5

	<i>Description</i>	<i>Ways to implement</i>	<i>E</i>	<i>P</i>	<i>I</i>
<b>Top management commitment</b>	Commitment is shown to the portfolio of IS investments by means of a divisional president that acts as business sponsor. Individual IS investments with a great strategic impact receive sufficient commitment as well as dedicated personnel, resources and change communication.	Business sponsor, direct follow up via steering committee	x	x	x
<b>Business / IS leadership</b>	Business leadership is understood as the willingness and openness to communicate with IS people. IS leadership contains the proactive attitude of IS people in proposing new IS solutions and opportunities.	Process council meetings, lunches between IT team leader and business process owner	x	x	x
<b>Effective communication</b>	Effective Communication starts with the sharing of the business' vision and strategy by the executive management. The CT CIO office has a dedication person to communicate IS related news. A general medium for new and archived information is the internal communication platform.	"The Way We Do Things", short movie, book, info sessions, Innovation magazine, white paper	x		x
<b>Training and development</b>	Personal development and training is available via internal and external courses on Program/project management, leadership, people management or more general management themes.	Internal or external management courses, online guidelines and		x	x

Table 5. Relational practices at Atlas Copco: description, ways to implement and focus levels.

TABLE 6

	<i>Practice based on literature</i>	<i>E</i>	<i>P</i>	<i>I</i>	<i>Practice based on case study</i>	<i>E</i>	<i>P</i>	<i>I</i>
<b>Structural practices</b>	<b>IS strategy committee</b>	x			<b>Business technology board</b> <sup>1</sup>	x	x	
	<b>Investment decision board</b>		x	x	<b>CT IS/IT board</b>	x	x	x
	<b>Value management office</b>		x	x	<b>Project management office</b> <sup>2</sup>			
	<b>Program management office</b>			x				x
	<b>Project management office</b>			x				
					<b>CIO office</b>		x	x
					<b>CT CIO Office</b>		x	x
					<b>Enterprise architecture council</b>		x	x
					<b>Service and operations council</b>		x	x
					<b>ASAP IT board (Infrastructure Council)</b>		x	x
					<b>IT demand</b>		x	x
					<b>IT supply</b>		x	x
					<b>Program management steering committee</b>			x
	<b>Program management team</b>			x	<b>Program management team</b>			x
					<b>Project management steering committee</b>			x
	<b>Project management team</b>			x	<b>Project management team</b>			x
	<b>Business sponsor</b>			x	<b>Business sponsor</b>		x	
<b>Process practices</b>	<b>Strategic information systems planning</b>	x			<b>Strategic information systems planning</b>	x	x	
	<b>IS balanced scorecard</b>	x						
	<b>Portfolio management</b>		x		<b>Portfolio management</b>		x	
	<b>Program management</b>			x	<b>Program management</b>			x
	<b>Project management</b>			x	<b>Project management</b>			x
	<b>Business Case management</b>		x	x	<b>Business case management</b>		x	x
	<b>Benefits management</b>		x	x	<b>Benefits management</b>		x	x
	<b>Cost management</b>		x	x	<b>Cost management</b>		x	x
	<b>Risk management</b>		x	x	<b>Risk management</b>		x	x
	<b>Knowledge management</b>		x	x				
	<b>Stakeholder management</b>		x	x	<b>Stakeholder management</b>		x	x
	<b>Change management</b>	x	x	x	<b>Change management</b>			x
	<b>Role management</b>		x		<b>Role management</b>		x	
<b>Relational practices</b>	<b>Top management commitment</b>	x	x	x	<b>Top management commitment</b>	x	x	x
	<b>Business/IS leadership</b>	x	x	x	<b>Business/IS leadership</b>	x	x	x
	<b>Effective communication</b>	x	x	x	<b>Effective communication</b>	x		x
	<b>Training and development</b>		x		<b>Training and development</b>		x	x

Table 6. Overview and comparison of literature and empirical findings.

<sup>1</sup> The business technology board and CT IS/IT board can be seen as an implementation of the IS strategy committee and investment decision board, and therefore count as only two unique practices that are implemented both in literature and in practice.

<sup>2</sup> Atlas Copco's project management office incorporates several functions that are attributed by literature to the program, project and value management office, and is therefore presented as an implementation of all three.

## APPENDIX 1

The format of the case study interviews and the set of initial questions are built on literature findings. We started with questions on the personal information of each interviewee. Then, more general questions were asked to get a better understanding of the IS organization and its operations, the IS budget and distribution, and the relationship between the business and IS. Last, questions were posed with the aim to identify value management practices in each of the three competences: structural, process and relational. The interview protocol was updated while interviews were executed.

<b>Personal information</b>
What is your current position in the organization? In which tasks and activities are you involved? What is your experience in your position at Atlas Copco?
<b>IS function and operations</b>
What is the relationship between business and IS? How is the IS function part of the organization's culture and strategic vision? How important is the IS function in your organization?
<b>IS investments</b>
How is an IS investment initiated, prioritized, executed and value realized? Is there a specific life cycle for such an IS investment? How are ideas captured within the organization? How do they evolve to a business case? Is there a business sponsor for each business case? Who decides upon the execution of a business case? What happens with the business case during the IS investment execution? Do you officially assess the IS investment and business case after the implementation? Do you have a lessons learned approach afterwards?
<b>Structural practices</b>
Do you have any structural practices supporting the decision-making process on IS? Which? What is the exact role of each structural practice? Who is involved in each structural practice? How many times a year do they meet? What topics are typically discussed? What happens with the results, to whom are they distributed?
<b>Process practices</b>
Do you have any process practices supporting the decision-making process on IS? Which? What is the exact function of each process practice? How is this process practice implemented in your organization? Who is involved, responsible, and accountable for each process practice? How are process practices implemented and how are they maintained or improved? What happens with the results, to whom are they distributed?
<b>Relational practices</b>
Do you have any relational practices supporting the decision-making process on IS? Which? Who takes the initiative to launch or install such a relational practice? Who is involved, responsible, and accountable once the relational practice is installed? How are these relational practices implemented and how are they maintained or improved? What happens with the results, to whom are they distributed?

Appendix 1. Interview protocol for case study interviews.