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Adaptive Development of a Model for Managing IT Value with Strategic Flexibility

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AIE	Applied Information Economic method
BVI	Business Value Index
CFO	Chief Financial Officer
CIO	Chief Information Officer
CobiT	Control Objectives for Information and Related Technology
CPU	Central Processing Unit
CRM	Customer Relationship Management
DCF	Discounted Cash-Flow
ERP	Enterprise Resource Planning
FOM	Hochschule für Oekonomie und Management
GDP	Gross Domestic Product
HGB	Handelsgesetzbuch
IFRS	International Financial Reporting Standards
ITSM	IT Service Management
IS	Information Systems
ISACA	Information Systems Audit and Control Association
IT	Information Technology
IT-CMF	IT-Capability Maturity Framework
ITIL	IT Infrastructure Library
IVI	Innovation Value Institute
KPI	Key Performance Indicator
PMO	Project Management Office
REJ	Rapid Economic Justification
ROI	Return on Investment
TCO	Total Cost of Ownership
TEI	Total Economic Impact
U.S.	United States

1 INTRODUCTION

1.1 MOTIVATION

Today, information technology (IT) seems indispensable for business success. As evidence of the growing importance of IT, investments in IT functions have risen steadily for many years. In 2013, International Data Corporation (IDC) expects IT spending to increase by 4.6% (IDC, 2013). Thus, 2013 global IT spending will exceed $2.1 trillion, which is a 5.7% increase from 2012 (IDC, 2012). The engine of this growth is China, with a growth rate of 8.9%. The IT spending of the U.S. is significantly behind China at 6.5% (Bitkom, 2013). By adding media tables to the forecast, global IT spending is expected to be close to $80 billion by 2015 (Gordon, 2011). According to the German High Tech Association Bitkom, the German IT sector is growing annually by 1.4%, which led the turnover in IT products and IT services to increase to €153 billion in Germany across all sectors (Bitkom, 2013). With the southern European countries suffering from the European debt crisis, IT is the mainstay of the German economy.

IT has also become one of the most important resources in firms. Information management as a part of corporate leadership seeks to support the firm in achieving its strategic objectives (Krcmar, 2005). With the help of customer relationship management systems, IT supports firms in structuring and maintaining business relationships through account management, service requests, or complaint management (Krcmar, 2005). Supply chain management systems help firms to plan and control all relevant information flows regarding materials, finances, or services. Enterprise resource planning systems support in managing firms' value chains and in handling their inventories, orders, invoices, and many other aspects (GEFEN, 2004). The most valuable contribution of IT is probably its ability to provide accurate, current data and insights that help sales and marketing functions to identify and focus on higher margin products and customers. More generally, IT contributes to firm performance.

Because of the increasing use of IT, Cron and Sobol investigated the value of what these technologies provide (Cron and Sobol, 1983). They found that although IT has gained significant value within firms, overall confidence in IT is low because IT's value proposition for firm performance is below expectations. This result was confirmed by a 2009 ISACA study (ISACA, 2009), according to which, 67% of the surveyed firms did not know their IT value proposition.[1] A further study conducted by CA Technologies found that only 25% of managers in the firm found the value proposition (König, 2012). In their study, Ardour Consulting (2012a) found that the failure of many IT projects is related to a missing or insufficiently defined IT value.

The results of these surveys are alarming. Especially in dynamic environments, information is the foundation of sound decisions, which enable firms to achieve their growth objectives. Within the economic crises, the dynamics and complexity of environmental change have increased: new technologies, non-industry competitors, volatility of demand, and increasing governmental debts. Therefore, firms' IT must be structured accordingly.[2] Increased organizational flexibility seems to present an adequate means of ensuring a steady IT value proposition, as identified by Tallon and Pinsonneault, who found that firms

> *"are asking how to be more agile in identifying and responding to marked-based threats and opportunities." (Tallon and Pinsonneault, 2011)*

Although this theory is not proven empirically, flexible firms obviously seem to be more than a temporary trend. Firms in highly dynamic industries must be able to constantly exploit new business opportunities effectively. The functions within the firm must remain strategically flexible on the one hand, but on the other, they must still follow the defined strategy. Fulfilling this assignment requires a balancing act of firms and their functions.

To effectively explain IT as an important contribution to firms' performance, diverse research questions require answers:

1. How can the IT value proposition be understood comprehensively?

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[1] This result is re-confirmed regularly by practitioners within the IT community. Cp., e.g., Quack, 2012.

[2] The CIO Executive Board recognizes that the economic downturn and the need to grow in a dynamic environment foster dramatic changes in firms' strategies, organization, and business models. Cp. CIO Executive Board, 2009b.

2. What capabilities must the IT function fulfill to be perceived as an added value to business functions?
3. Which evaluation methods are useful to control the capabilities of the IT value proposition?
4. Which measures (or instruments) must be integrated into the IT function to increase its flexibility to provide an agile IT value proposition?
5. How can researchers derive a comprehensive model that combines evaluation methods to manage IT function capabilities, and which measures are necessary to increase the IT function flexibility?

Although various researchers and practitioners have already examined different perspectives of the IT value proposition (e.g., BearingPoint, 2011; Barnier, 2011; Mithas, Ramasubbu and Sambamurthy, 2011; Muhanna and Stoel, 2010), no clear definition of the IT value proposition exists (Cronk and Fitzgerald, 1997; Bannister and Remenyi, 2000; Clark, 1915). More than 1000 journal articles, papers, and books have been published on the benefits of IT.[3] Their perspectives range from various scientific disciplines to different levels of aggregation (e.g., national and industry economics, firm, or process). Various types of benefits resulting from IT have been discussed, such as the impact on intangible assets or on process performance. Although this list is extensive, the resultant vague understanding has a significant influence on managing the IT value proposition. Without clarity, the understanding of the IT value proposition is often too abstract. But as this understanding is crucial for firms in controlling their IT value proposition, they require a clear understanding of the underlying evaluation object. This was also recognized by Bannister and Remenyi, asserting that current evaluation methods to control the IT value proposition for complex decision-making purposes are often neither credible nor effective when the IT value proposition is not comprehensible (Bannister and Remenyi, 2000). Thus, it seems suitable to approach the IT value proposition by identifying necessary capabilities that the IT function must fulfill. Guillemette and Paré found that the IT function can only be effective when it can fulfill its objectives related to its business requirements (Guillemette and Paré, 2012). This definition may represent a measurable understanding of the IT value proposition.

In light of different business models, new technologies, and statutory compliance requirements, the requirements for IT functions become increasingly het-

[3] This figure has been mentioned by Gammelgard and Ekstedt (2006).

erogeneous and complex. Thus, achieving these requirements is a growing challenge for IT management and employees and requires adequate IT capabilities.

Established approaches in practice and theory often seem unable to cope comprehensively with the increasing requirements. Resulting partly because of rapid technological change and also because of a greatly narrowed focus on individual IT capabilities, the universe of required value-adding capabilities currently seems to defy evaluation. In their survey, Ardour Consulting found that firms often limit their focus to single IT investment evaluations rather than focusing on the IT function as a whole (Ardour Consulting, 2012a).

In their 1992 article in the *Harvard Business Review*, Nortan and Kaplan found that we get what we measure (Kaplan and Norton, 1992). Existing evaluation methods support the controlling of an adequate IT value proposition in the context of a comprehensive understanding of the required IT capabilities. However, although an effective controlling of the IT value proposition is the primary objective of adequate IT governance (Symons, Orlov and Sessions, 2006), many firms do not control their IT investments. On the surface, although the benefits of existing evaluation methods seem obvious, the evaluation methods currently used in both theory and practice have their disadvantages. Practitioners suggest a "chaos within the key performance indicators" (Tesche, 2012), a condition also identified by the Messerschmidt et al. survey that revealed that the quality of the evaluation methods is largely insufficient to achieve value-oriented IT control (Messerschmidt, Schülein and Murnleitner, 2008). Schryen adds that the literature offers many evaluation methods, but few scientific papers provide practical recommendations about the context in which each evaluation method should be used (Schryen, 2010).

Many of the evaluation methods focus on monetary parameters or other traditional metrics, such as IT budget or IT spending as a percentage of turnover (e.g., CIO Insight, 2011; Littkemann et al., 2011; Mitra, Sambamurthy and Westermann, 2011; Murnleitner, 2009). As these parameters and metrics mainly focus on cost-cutting or technical activities, the full spectrum of support for the IT function in regard to the IT function's required capabilities is not included. Other methods—such as discounted cash flow, Tobin's Q, or return on assets—integrate aspects of investments but fall short of considering other necessary IT capabilities as well as the necessary strategic flexibility.

The need for alternative evaluation methods is also demonstrated by the failure of many IT investments, which leads to the question of why so few firms can measure their IT value proposition adequately. The credibility and effectiveness of the existing evaluation methods is also questionable in dynamic environments because of the changing IT function requirements (Neumann, 2011). Thus, Lomerson and Tuten (2005) state that the existing methods are frequently either inappropriate or ineffective, and Gomez and Pather (2012) express their support for a fundamental paradigm shift in IT value evaluation. Kesten et al. (2007) attribute any isolated evaluation method's inability to perform the evaluation to the complexity of the IT value proposition. Consequently, existing evaluation methods must be aligned to the identified IT capabilities. Such capability-targeting methods may generate a comprehensive understanding of the measurements for evaluating the IT value proposition.

In addition to the importance of a suitable correlation between evaluation methods and IT capabilities, the aspect of flexibility must be taken into account. Flexibility means that organizations adapt to changing customer requirements or dynamic market conditions. Events such as political shocks, innovative trends, or economic downturns underscore the need for flexibility, but day-to-day operations may also trigger the need for flexibility: production sites and machines should be able to handle demand fluctuations without increasing costs. To remain competitive, management has only a small window of time for effective responses.

The strong connection between existing processes and IT raises the question of adequate integration of flexibility strategies. The integration of adequate activities to support IT function flexibility enhances their responsiveness to dynamic events. As early as 1991, Evans found that

> *"strategic flexibility is especially critical in high technology arenas because products, manufacturing processes, markets, distribution channels and competitive boundaries are in a state of continuous flux." (Evans, 1991)*

Of course, this observation does not necessarily mean integrating the highest degree of flexibility within the IT function. A high degree of flexibility increases costs. Instead, it means adjusting the IT function balance to improve its level of flexibility.

Formulating the key points in adapting existing methods that support the management of the IT value proposition, its evaluation methods, and necessary flexibility adjustments will support decision makers regarding the optimal choice of alternative IT investments. Further, a significant advantage might be achieved by taking non-monetary parameters and multi-dimensional evaluation methods into account.

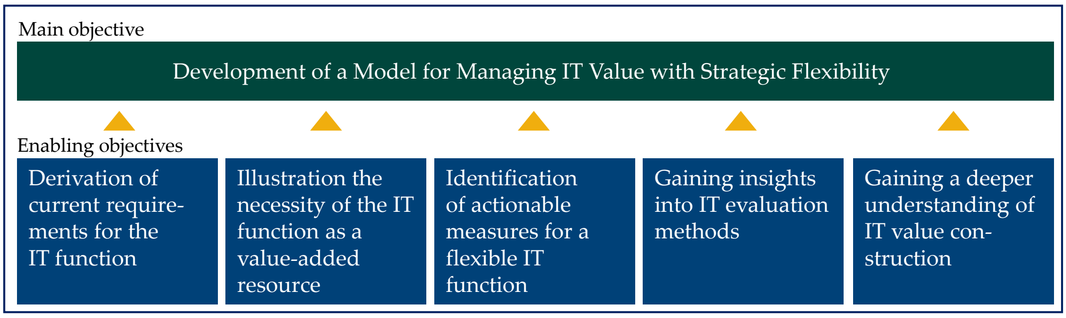
Against this background, the following question arises: What should be the main components of a comprehensive model for managing the IT value proposition? This question can hardly be answered for every conceivable case because a robust specification for IT value reference models does not exist. However, general components and guiding principles may be developed to support IT managers in controlling their IT value proposition. This objective seems important because a study by the consulting firm KPMG clearly demonstrates that IT managers rank IT value highest on their agenda for the coming years. Eighty percent rank it among the top three most important trends for the IT function (KPMG, 2010).

The derivation of such types of components for a reference model represents the core of the present study. The large number of available (one-dimensional) evaluation methods and the consequences of their selection for decision makers re-emphasize the importance of a robust design for a reference model. A reference model is useful for deriving recommendations to enhance the IT value proposition only when it can abstract complexity and represent a functional framework.

1.2 OBJECTIVES

Consistent with the aforementioned research questions, the main objective of this study is the development of a reference model that (1) represents a comprehensive understanding of the IT value proposition, (2) provides recommendations regarding the usage of appropriate evaluation methods to manage the IT value proposition, and (3) describes how the IT value proposition may be supported by strategic flexibility. As shown in Figure 1, enabling objectives support the main objective.

Figure 1: Main and enabling objectives



In coping with economic challenges and dynamic markets, the IT function in organizations must be purposefully aligned to offer significant capabilities enabling firms' business functions to achieve strategic objectives. As changes in technology and organizational environments evolve, the IT function's alignment must be constantly reviewed and adjusted. Recent surveys reveal that CIOs consider IT alignment with corporate strategic objectives a management priority. In line with Guillemette and Paré (2012), it can be stated that if the IT function lacks the ability to adjust its capabilities to current business objectives, IT function's ineffectiveness will cause rapid failure. But what are the specific business requirements for the IT function in the current turbulent environment? Scientific research currently offers no distinct and detailed evidence regarding the requirements that the IT function must fulfill. Therefore, the first enabling objective is to derive current requirements for the IT function. These requirements form the foundation for the development of suitable flexibility measures as well as the selection of adequate evaluation methods.

In the presence of changing requirements and a wide set of possible alternative investment options within the firm, the necessity of the IT function as a value-added resource has to be illustrated. Therefore, the second enabling objective is to incorporate the IT function into the theoretical framework of a capability-oriented theory as a resource-based theory suffers limitations. The capability-oriented theory extends it by highlighting decisive cornerstones regarding how strategic capabilities should be managed to strengthen firms' business success.

The basic assumption of the situational approach of organization theory, which recognizes that organizational efficiency is largely determined by suitable adjustment to environmental conditions, specifies the need for a definition of flexibility requirements (Picot, Reichwald and Wigand, 1998). As the phenomenon of strategic flexibility is characterized by strong complexity (multidimensionality and environmental and firm orientation), it should be examined in the scope of IT value support. Therefore, in contrast to empirical research, this study does not consider compression of a few explanatory variables for strategic flexibility. Instead, in light of current requirements for the IT function, different design principles for strategic flexibility should be developed. On the basis of these design principles as well as the previously derived IT requirements, the third enabling objective is to identify and integrate actionable measures for a flexible IT function into the to-be reference model. This development and integration is structured in alignment with the pre-determined IT requirements.

Utilizing a critical assessment, the study examines the advantages and disadvantages of existing evaluation methods. This critical assessment should be supported by an easy-to-manage catalogue that contains the requirements for the selected evaluation methods. To assess the usefulness of these evaluation methods in managing IT value of flexibility, the full range of requirements must be taken into account: (1) general requirements, (2) flexibility, and (3) IT coverage requirements. Supported by an empirical survey, the fourth enabling objective is to use this catalogue of requirements to gain insights into these evaluation methods.[4]

As the IT value proposition is the main focus of this study, its construction should be within the research scope. Thus, the fifth enabling objective is to gain a deeper understanding of IT value construction as well as its associated perspectives. The study derives an adequate definition of IT value, which it then uses consistently and which serves as the basis for the proposed reference model (hereinafter, model).

Finally, to achieve the main objective, the study crafts a model that applies all the results, following an object-oriented approach to apply and integrate the individual components. Thus, the model provides a comprehensive understanding of the necessary capabilities, suitable evaluation methods, and flexibility recommendations. With these three components, the proposed model supports IT

[4] Popper (1972) distinguishes between two forms of conducting empirical research: the bucket and the searchlight. In the searchlight theory, reality is explored as though with a searchlight, whereby hypotheses are crafted and then investigated. Popper mainly criticizes the bucket theory, which holds that empirical evidence represents an accumulation of facts collected in a bucket. Hypotheses are then defined on the basis of all the evidence.

managers in constructing the IT function to increase its IT value proposition. On the basis of best practices and literature sources, the proposed model provides recommendations for adapting the flexibility measures and evaluation methods to real-life situations. Finally, the study examines the model's quality and usefulness.[5]

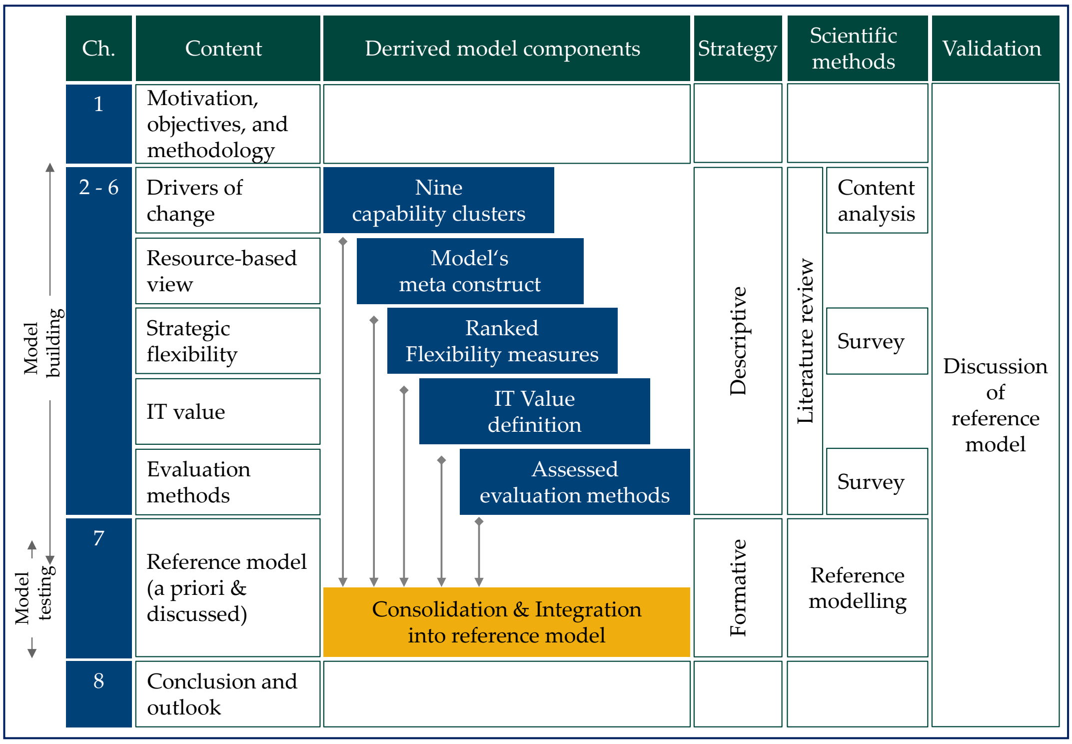
The study concludes with a summary of all findings and identification of further research questions.

1.3 METHOD

The present study is divided into eight chapters. Figure 2 depicts its structure and the associated scientific concepts. Letch and Song found in their literature review of evaluation methods that only 7% of the studies identified use multiple analytical methods (Song and Letch, 2012). Therefore, this study combines several analytical methods to increase the degree of knowledge gained regarding the research questions.

[5] In their literature review of evaluation methods, Song and Letch note that only 11.9% of the identified studies examined the reliability and validity of the developed instruments and methods. Cp. Song and Letch, 2012. The present study does not follow this trend.

Figure 2: Study structure and concepts



Despite numerous attempts, no one has developed an adequate definition of the IT value proposition that is accepted in both theory and practice (Witte, 2009). Therefore, to achieve a comprehensive understanding of the IT value proposition, this study outlines IT function requirements on the basis of a literature review of current drivers of change in firms' IT functions. After performing a qualitative content analysis of existing studies, literature, and social media sources, Chapter 2 briefly describes these drivers of change.[6] It identifies market and corporate challenges that underlie IT function requirements. Flexibility plays an important role in handling such market challenges. For a more consolidated overview, the corporate requirements are grouped into nine capability clusters, each describing one category of current business requirements for IT functions and together representing an "ideal" IT function. As these requirements comprehensively describe the IT value proposition of an ideal IT function, they later serve as the base components of the proposed model to control the IT value proposition.

Chapter 3 provides a theoretical basis for business behavior in markets, which is developed through discussion of the resource-oriented firm theory.

[6] For a detailed description of this methodology, cp. Chapter A.1, p. 239.

Chapter 3's objective is to depict the IT function as an added value and a driving resource for achieving competitive advantages. Regarding resource-based theory, firms' existence is described from the perspective of effective resource allocation and the theoretical deficits of the resource-based theory will be described. Considering these deficits, the capability-oriented theory will be explored, which extends the fundamental resource-based theory through adequate IT capabilities. To subsequently construct a model, a construct will be explored that applies the capability-oriented theory and serves as the underlying meta-construct for the proposed model.[7] Existing literature and scientific models will be used to support this chapter's objective.

Chapter 4 explains the need for strategic flexibility to overcome growing uncertainty in markets and the existing pressure for change.[8] Because the IT function is an integral component in achieving competitive advantages, it should be comprehensively presented as a potential medium of strategic flexibility. An exploration of strategic flexibility in the existing literature yields the necessary requirements for enabling the IT function to achieve a high degree of flexibility, which, in turn, results in the opportunity to achieve an increased IT value proposition. This exploration also reveals the properties of flexibility. Redundancy, modularity, organizational learning, and reconfiguration capability, which are the principles of designing measures that support IT function flexibility, will be observed. Furthermore, Chapter 4 transfers these flexibility design principles to the previously derived nine capability clusters. Thus, Chapter 4 identifies measures that support flexibility in each capability cluster. The identification of these measures centers on the drivers of change and the associated requirements described in Chapter 2. In an empirical survey, IT managers assess and rate the benefit of these flexibility measures. The flexibility measures and the associated capability clusters represent further components of the proposed reference model.

The objective of Chapter 5 is the definition of the IT value proposition to achieve a consistent evaluation object. Here, "evaluation object" is used, in the parlance of object-oriented modeling, as an object defined by its attributes in con-

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[7] This practice is often used in science. For example, DeLone and McLean (2003) indicated that they found 285 articles referencing their IT/IS model. Furthermore, Pescholl (2010) used a variety of meta-constructs in his paper, and Neumann (2011) used the model of Peppard and Ward 2004 as a meta-construct.

[8] For an overview of the identified drivers of change see Chapter 2.

junction with its evaluation methods. As the definition of the IT value proposition is crafted on the findings of previous research, this chapter describes the development as well as the current state of research. A precise definition of IT value is necessary to support the construct validity of the proponed model. However, the definition of the IT value proposition would not be comprehensive without a discussion of the current problems of this definition and its related constructs, which Chapter 5 presents.

To gain a broader understanding of evaluation methods' limitations, Chan (2000) recommends reviewing existing evaluation methods individually. Thus, the objective of Chapter 6 is to discuss alternative methods to evaluate IT value. Accordingly, it first describes existing evaluation methods and then critically analyzes them. To have a manageable assessment object, the evaluation objects are grouped into five categories of evaluation methods: accounting-oriented, market-oriented, process, multi-dimensional, and surrogate. The selection of considered evaluation methods is based on an empirical study by Ardour Consulting that represents evaluation methods used most widely within German firms to control the IT value proposition (Ardour Consulting, 2012c).

The prerequisite to analyzing the selected evaluation methods is the definition of a manageable catalog of requirements based on the consolidated results of Chapters 2 and 4. On one hand, this catalog should include flexibility requirements, and on the other, it should include general requirements that evaluation methods must fulfill. To extend the discussion of these evaluation methods, I integrate an external perspective by using an online survey. The participating IT managers, as practitioners using these evaluation methods, assess the evaluation methods and their correlation to capability clusters. The chapter ends with a discussion of the advantages and disadvantages of the selected evaluation methods combined with the results of the online survey.

Built on the discussion of the evaluation methods as well as the flexibility measures, Chapter 7 consolidates all components for a proposed reference model that combines the derived capability clusters with the empirically assessed evaluation methods and flexibility measures. The reference model provides recommendations of how IT functions within firms should structure and control the IT value proposition for flexibility. It was developed to be adaptable to a firm's specific needs.[9]

As the model must remain at a certain level of abstraction, Chapter 7 demonstrates how to achieve the model's recommendations in a practical manner, using examples that demonstrate how to implement certain measures in each area of the model. This chapter also discusses the model on the basis of the predefined quality criteria.

Therefore, this study's methodology follows an analytical, conceptual, and integrative strategy. In the theoretical consideration of IT value contribution, strategic flexibility, and suitable evaluation methods, the objective is to provide concrete recommendations and to identify descriptive and explanatory approaches for the proposed design of the IT function.

The thesis concludes with a summary of the main results as well as the outlook for further research. The appendix contains detailed descriptions of all scientific instruments used.

[9] The concept of crafting reuse-oriented models results in having to drop the unlimited claim of science for reference models. Cp. Fettke and vom Brocke, 2011.

2 INCREASING ENVIRONMENTAL INFLUENCES

Reviewing events of the past few years, the steadily increasing rate of change in the global economic environment can be observed. It seems obvious that the economic turmoil of recent months has little in common with the cyclical trends of recent decades. The crisis has created a turning point at which these influences were suddenly not long-term conditions, but immediate challenges (Ernst & Young, 2010). Thus, dynamic change is "business as usual."[10]

The increasing globalization, shorter innovation cycles, increasing digitization, and the impact of natural disasters have fundamentally changed business models. All these factors are hardly new, but their impact on firms has now increased. Expanding competition, increasing market volatility, dispersing market-specific differences, demographic changes, and microeconomic impacts on people and organization, risk and security, project management, and misleading controlling and financial instruments constitute challenges for firms.

In the context of these market and corporate challenges, firms around the world must address questions regarding their strategic direction, level of liquidity, cost-cutting measures, and greater corporate flexibility (Ernst & Young, 2009b).

All these questions directly affect firms' overall organization, especially the design of their IT functions (Ernst & Young, 2009c). Firms and IT functions no longer operate in a secure environment. To design an organization capable of managing the aforementioned market and corporate challenges, firms must un-

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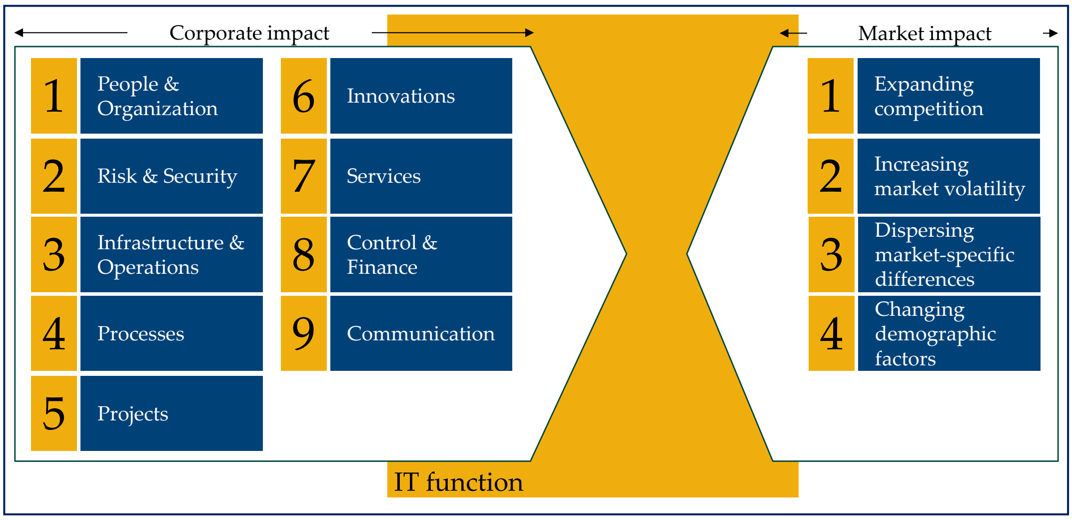
[10] Hagel III also emphasizes that "at the same time, most of us would acknowledge we are also in the midst of a much longer-term, more pervasive shift in how we do business and how we build relationships, one that cuts across both our professional and personal lives. Many observers have sought to profile facets and slices of this Big Shift—everything from open innovation to offshoring—but few have attempted to describe, much less quantify, the full scope of this profound shift." Cp. Hagel III, Brown and Davison, 2009.

derstand business requirements for their IT function. Figure 3 depicts the results of the study's qualitative content analysis, with the challenges grouped by market and corporate influences. The IT function must address these challenges.[11] As they indicate capabilities required of the IT function, the grouped challenges are called capability clusters.[12]

Figure 3: Capability clusters affecting firms



The remaining sections of this chapter describe the challenges that market and corporate structures influences pose for the IT function. Each capability cluster explanation describes several challenges for the IT function. Furthermore, each section derives requirements for the IT function's response to the challenges. The wide variety of market challenges found explains the important role of flexibility in IT functions today.

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[11] For an explanation of the used method to identify these capability clusters, cp. Chapter A.1.

[12] A survey-like presentation of the capability clusters may also be found in Wiedenhofer, 2013.

2.1 MARKET INFLUENCES

2.1.1 EXPANDING COMPETITION

A 2010 Ernst & Young survey found that 70% of the managers interviewed felt increasing competitive pressure within their industry and market during the previous two years. Even in emerging markets that experienced only a small economic slowdown, the respondents noted increasing competitive pressure resulting from new entrants in emerging markets seeking further growth opportunities (Ernst & Young, 2010).

A 2009 Boston Consulting Group survey emphasized the variety of new emerging-market based firms that have successfully entered developed markets and thus increased the pressure on well-established firms (The Boston Consulting Group, 2009). Most of the new entrants are from countries like China, India, Brazil, Mexico, and Russia, followed by Argentina, Chile, and Hungary (The Boston Consulting Group, 2009).[13]

The favorable starting position, large number of natural resources, low wages, and absence of the burdens of resource-intensive and aging assets, which are typical of firms in developed markets, represent key characteristics of firms in emerging markets (The Boston Consulting Group, 2009).

The requirements for success in this competitive environment are obvious.[14] Only firms that are flexible in the face of competitive threats from emerging market-oriented firms will gain a competitive advantage to strengthen their global leadership position. The capacity for flexibility changes the business model; the organizational and the procedural structure become important for success, given increasing market competition.

[13] Underlying this finding, more than 60% of telecom and technology firms had to face new entrants in their markets. Cp. n.a., 2008.

[14] For further information about competition and corporate governance and the selection in emerging markets cp. Singh, 2002.

2.1.2 INCREASING MARKET VOLATILITY

The speed at which market conditions evolve has been increasing in recent years, and this rapid change is no longer exhibited only by emerging countries (Ernst & Young, 2010). The innovation and lifecycles[15] of services and products have become shorter with the steady increase in the rapid development of technological requirements.[16]

As a firm is embedded in an "ecosystem" of suppliers, employees, and customers, the aforementioned volatile market conditions have an obvious impact. Firms find themselves in a confusing position amid increasing risks, changing laws, regulations, and nervous stakeholders that have suffered cost-cutting measures.

Because of having fewer alternatives and the predictability[17] of volatile markets, decision-makers find it difficult to make rational and binding decisions in their competitive environment.[18] Therefore, making long-term decisions becomes extraordinarily difficult, resulting in firms' shift toward short-term planning horizons.[19] Thus, firms must increase their flexibility potential.

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[15] Bayus retorts that the perception of shorter lifecycles is especially evident in technologically dynamic industries. He also counters that product lifecycles have not accelerated and manufacturers have not systematically decreased the lifecycles of their products. Cp. Bayus, 1998.

[16] KPMG sees rapid technological development as a key driver for business change. Cp. KPMG, 2010. The establishment of new entrants into specific technology segments has also increased over the last few years. More than 60% of telecom and technology firms have had new competitors enter their market. Cp. n.a., 2008.

[17] In the context of financial decision-making processes, Arora et al. notes that the predictability of volatility is important in designing optimal asset allocation decisions. Cp. Arora, Das and Jain, 2009.

[18] Because of this increasing uncertainty in the globalization process, paradoxically, local or regional traditions, routines, and norms provide helpful guidance for individuals' actions. Cp. Blossfeld and Hofmeister, 2005.

[19] Blossfeld provides the example that stock market-listed firms must publish their operating results in ever shorter intervals. Cp. Ibid., p. 2.

2.1.3 EXPANDING MARKET-SPECIFIC DIFFERENCES

The global economic crises affected many countries, different markets, segments, and organizations. However, the crisis has also revealed that markets and segments in various countries behave differently.[20] Some emerging countries have coped with the economic crises more successfully and more confidently than others. The economic performance of emerging countries has increased, whereas the economic performance of developed countries has decreased. Although an economic slowdown is in sight, the economic performance of China[21] and India during the turbulent times of the current crisis has developed much faster than that of other industrialized countries.

During 2007–2011, the real GDP change of the Indian economy decreased from 9.8% to 6.8%. Nevertheless, during the 2008–2009 crisis, the Indian economy increased from 4.9% to 9.1%. The export of Indian goods has increased by 86% (IHS Global Insight, 2011b). IT investments there have increased by 14.5% and therefore represent the sixth largest increase in IT investments worldwide (n.a., 2011).

In comparison to China and India, the annual growth of Spain's real GDP has been 0.2% on average between 2007 and 2011. Germany's average annual real GDP growth was 1.1% in the same period. Spain's exports have increased by almost 15% to $302.1 billion USD during 2007–2011, and Germany's exports have increased by 10% during the same period.

These market-specific differences inevitably have a strong impact on well-established firms in the market—sales markets are globalizing, strategic decisions must be reviewed in short-term intervals, and rising uncertainties must be integrated into firms' forecasts.

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[20] Gros argues that "the present crisis was caused by a combination of asset price bubbles, mainly in the real estate sector, and a credit bubble that led to excessive leverage." Cp. Gros and Alcidi, 2010.

[21] HIS Global Insight forecasts that the Chinese province of Shanghai-Jiangsu will be the third largest economy of Asia by 2017, closely followed by India and Japan. Shanghai-Jiangsu will surpass Australia and Brazil in 2014, Korea in 2017, Canada in 2019, and Spain in 2023. Cp. IHS Global Insight, 2011a.

2.1.4 CHANGING DEMOGRAPHIC FACTORS

Demographic factors are significantly changing worldwide and influence business in the European countries. Given this demographic change, van Nimwegen (2010) observes two major challenges confronting the European countries: population decline and aging.

The European countries, except for Iceland and Ireland, are among the low-fertility countries (United Nations, 2011). Although international migration to Europe is the foundation of current population growth, observers question whether this migration can halt the European population decline (van Nimwegen and van der Erf, 2010). Thus, Europe must suffer population decline as well as its impacts on social, economic, and political factors.

This increasing population decline has heightened the competition for highly skilled talent. Firms must face more difficult conditions to find well trained employees. Despite high unemployment, the shortage of skills needed in medium-sized firms has already become a problem (Chamber of industry and commerce, 2011). In fact, the competition for talent transcends the national level (van Nimwegen and van der Erf, 2010) and includes increasing international competition for highly skilled migrants.

An aging population also has manifold effects. At all levels of the enterprise—organizational, procedural, and technological—firms must take into account their aging employees.

2.2 CORPORATE INFLUENCES

2.2.1 PEOPLE AND ORGANIZATION

2.2.1.1 CURRENT CHALLENGES

Firms face diverse challenges in the domains of people and organization. As this capability cluster consolidates people and organizational challenges, it is essential to describe the challenges separately.

For employees, the challenges can be further divided into (1) attracting employees and (2) work structure for productivity.

Attracting employees: Empirical data demonstrates that attracting and retaining the workforce presented a major challenge in 2011 (McDonald and Aron, 2011).[22] This challenge closely relates to the changing demographics,[23] which cause a shortage in the labor pool. Fifty-six percent of IT firms state that they have encountered a shortage of IT professionals (Berchtold, 2007). Because of this predicted shortage, firms will neither be able to strengthen their capabilities nor readjust them to react to the dynamic environment.

Work structure productivity: In addition to the requirement to overcome the shortage of skilled IT professionals, firms must adjust their internal workforce structures. To achieve the desired output with fewer employees, the working conditions must be designed to support various aspects of productivity improvement. First, people must be empowered to handle their tasks effectively. This includes having the relevant knowledge, adequate task allocation, competitive wages, and appropriate management (CIO Executive Board, 2009a; Ernst & Young, 2011c; Herrmann, 2011; CIO Executive Board, 2010).

In addition to meeting the challenges regarding people, the IT function must cope with organizational challenges: (1) business alignment, (2) adequate roles, and (3) operational effectiveness.

Business alignment: The internal organization must reflect the requirements of the fast changing market conditions; therefore, the IT function must be aligned with the firm's strategic direction (Ernst & Young, 2009a). Previous research examines the requirement for the IT function to increase its familiarity with the business strategy (CIO Executive Board, 2011). The implications for other functional areas within the firm must also be taken into account. As the IT must provide the IT infrastructure to support business priorities, the IT function must reflect any requirement originating in other functions as a response to the changing environment.[24]

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[22] Also cp. Ernst & Young, 2011c.

[23] Cp. Chapter 2.1.4, p. 21.

[24] Gartner emphasizes the business priority of revenue growth that must be supported. Cp. Gartner, 2007b, as does McDonald and Aron. Cp. McDonald and Aron, 2011.

Adequate roles: In addition to the adaption of the business strategy, the firm must cope with missing or miscast roles within the organization. Often the responsibility of the CIO is not clearly defined, although it determines the agenda of firms' information technology (KPMG, 2010 and Ernst & Young, 2012). Furthermore, roles and responsibilities are often not institutionalized.[25]

Operational effectiveness: On the basis of the requirements for defined roles, firms must also consider the enhancement of their internal operational effectiveness as a key challenge (Ernst & Young, 2011c). As business and the IT function interact more closely and rapidly, focus on solely technology-centric operating models is insufficient. Instead, the challenge of integrating the business requirements within the operating model must be addressed (Mahoney and Kitzia, 2009). The structure of fundamental day-to-day operations as well as general administration and back office activities must be considered (Ernst & Young, 2009a).

2.2.1.2 REQUIREMENTS IDENTIFIED

To address the aforementioned challenges, what could be the key requirements for designing the structure of the proposed IT function in the domain of people and organization?

Managing the talent shortfall is a key challenge for the IT function and for the firm as a whole. Because all functions are affected by the talent shortfall, effective talent management is needed (Colman, 2007). This will identify, recruit, hire, and develop people to reach their greatest potential within the organization (Swapna and Raja, 2012).[26]

Along with effective talent management, workforce improvement may also be accelerated by improving the internal structures and working conditions of IT employees. Investment in knowledge, knowledge sharing, and knowledge crea-

[25] According to Cameron, 40% of the participants who were surveyed stated that instituted or re-formed business IT-steering committees contributed to more positive operations of the IT function. Cp. Cameron, 2009. The introduction of relationship managers increased other departments' awareness of the IT function. Cp. Ibid., p. 29.

[26] Lewis and Heckman review the problem of the number of different definitions of talent management by theorists and practitioners. Cp. Lewis and Heckman, 2006.

tion enables IT employees to build networks across teams and departments to increase employees' connection with their colleagues (CIO Executive Board, 2010).[27] Multiple organizational requirements also exist.

As the execution of strategies across business functions becomes more vital for firms, IT business alignment grows increasingly important (Ernst & Young, 2011e). IT alignment remains a top priority for business and IT functions (Tallon and Pinsonneault, 2011).[28] To create a strong alignment, IT must be deeply embedded in business activities.[29] If the IT function is embedded in these activities, it can respond with agility to environmental change. This integration also provides additional capability for firms to respond rapidly to strategic change (Tallon and Pinsonneault, 2011).[30]

To support an effective business alignment, it is important to implement adequate roles and responsibilities. The incomplete definition of profiles for key executives makes adequate business alignment difficult to achieve; therefore, key executives' roles, responsibilities, and key tasks should be fully described.

To increase internal effectiveness, firms may also concentrate on internal measures to improve productivity. To establish a rigorous standard process to manage improvements in operational effectiveness and to interconnect the business and IT transformations, an architecture management will provide insights.[31] Firms may also consider sourcing issues to improve productivity.

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[27] Lopez outlines one of the strongest conflicts: high tension between the team that is focused on business opportunities and the team that is focused solely on running the business. Cp. Lopez, 2010.

[28] The CIO Executive Board recommends integrating the IT function with marketing, sales, and other stakeholders to identify the firm's unique benefits to the customer. Cp. CIO Executive Board, 2010.

[29] Mahoney and Kitzis recommend education and practice in combined business/technology skills for business decision makers and the IT executive team. Cp. Mahoney and Kitzia, 2009.

[30] Tallon and Pinsonneault emphasize that embedding information technology can paradoxically lead to automated, routinized, simplified, and rigid activities that inhibit flexibility by limiting firms' strategic choices. Cp. Tallon and Pinsonneault, 2011.

[31] Mahoney and Kitzis recommend identifying the "hot spots" for the integrated transformation of business and IT. Cp. Mahoney and Kitzia, 2009.

2.2.2 RISK AND SECURITY

2.2.2.1 CURRENT CHALLENGES

Currently, IT functions face security threats as well as regulatory requirements imposed by national governments or by the European Union.[32] Kroll's Global Fraud Report found that the relative cost of fraud is 23% of revenue (survey average) (Kroll, 2011).

Compliance and security issues are considered major challenges because they may directly affect firm performance, corporate liability, and loss of credibility,[33] or inflict monetary damage (Bulgurcu, Cavusoglu and Benbasat, 2010).[34] Possible security and compliance issues are manifold, ranging from data governance to compliance issues.[35] As firms must rely heavily on their IT infrastructures to address these challenges, a risk-oriented IT function is a managerial priority (Bulgurcu, Cavusoglu and Benbasat, 2010).[36]

Corporate social responsibility issues have also increased.[37] An accurate definition of corporate social responsibly was given by the Norwegian Prime Minister Gro Harlem Brundtland:

"Meeting the needs of the present without compromising the ability of future generations to meet their own needs."[38]

[32] E.g., Sarbanes-oxley Act and health insurance policies. These regulations make executives of public companies explicitly responsible for evaluating and monitoring an effective internal control environment for financial reporting and disclosure. Cp. Damianides, 2005.

[33] Alter emphasizes that CIOs do not want their firms to make embarrassing headlines for becoming the next Gawker, whose website had been hacked and published on an illegal website, or as a victim of Julian Assange's Wikileaks. Cp. Alter, 2011.

[34] Anderson and Moore emphasize that managing information security has recently become a fast-moving field. Cp. Anderson and Moore, 2006.

[35] According to KPMG's categorization. Cp. KPMG, 2010.

[36] Cp. also PriceWaterhouseCoopers, 2011a. The PriceWaterhouseCoopers survey reports that security is on the CFO's "protect" list. Further surveys agree. Cp., e.g., Ernst & Young, 2011c.

[37] For a historical overview of the concept of corporate social responsibility, cp. Carroll, 1999.

The need to design principles for corporate social responsibility arose suddenly as firms had to respond to public issues they had not previously considered.[39]

Internal compliance issues also strongly affect firms. The financial scandals and misdeeds that ravaged several major firms (e.g., Enron, Worldcom) in the early 2000s spawned new regulations such as the Sarbanes-Oxley Act.[40] Its objective is to rebuild confidence and trust by enhancing firms' governance structures through checks and balances (Damianides, 2005). In the United Kingdom, the Bribery Act required more rigorous regulation. These governmental regulations must be implemented in firms' internal controls system, but firms are unsure about how to combine existing regulations with new technology.[41]

2.2.2.2 *REQUIREMENTS IDENTIFIED*

As the IT function's saturation and ubiquity pose significant risks, managing IT risks and compliance issues is a very difficult endeavor (ISACA, 2011). Which structures must be implemented to reduce the probability of risk and security issues occurring?

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[38] In 1970, Milton Friedman proposed that firms should not engage in any form of social activities that would risk their interests and profits. He went to the extreme and labeled executives who did engage in social responsibility "thieves." Cp. Friedman, 1970.

[39] Porter and Kramer (2006) describe the examples of Nike, which faced an extensive consumer boycott after the report of abusive labor practices, and Shell Oil's decision to sink their obsolete oil rig Brent Spar, which led to Greenpeace protests and to international headlines.

[40] Further regulations may include the German "Kontroll und Transparenzgesetz," which extends the requirements regarding the duties and responsibilities of the board. Stronger reporting requirements and control by the Supervisory Board and the General Assembly should produce greater transparency. In 2002, Germany's "Transparency and Disclosure Act" included further requirements for firms' reporting obligations. Cp. Taeger, 2007.

[41] "Everything should be within the cloud" is one theory of cloud technology. This new requirement must also be integrated within the existing compliance structures. Cp. Gründerszene, 2011. In addition to cloud computing, integration with social media must also be taken into account. Cp. CFOworld, 2011.

Implementing effective security management is one of the main requirements for avoiding such risks and challenges.[42] Spears and Barki define a security management system as a continuous process of identifying and prioritizing information security risks and implementing and monitoring controls that address those risks, such as countermeasures and safeguards (Spears and Barki, 2010). ISACA recommends implementing multiple components in the risk and security management system (e.g., mobile device management, business continuity, vulnerability) (ISACA, 2011).

In addition to the ISACA recommendations, further actions may be taken to reduce the probability of security issues arising:

- Data governance: Incorrectness of data leads to data issues. Griffin (2011) emphasizes the requirement to instill a culture of accountability and adds that data governance is about changing how firms perceive their data.
- Privacy frameworks: Privacy frameworks support firms in coping with and preventing privacy issues. These conceptual frameworks provide a set of actionable principles for protecting information privacy.[43]
- Social responsibility approaches: To reduce the probability of negative social responsibility effects, Porter and Kramer suggest using two tools. By mapping social opportunities to the value chain, the firm can target its activities to the best effect. In addition, they suggest analyzing the social ramifications of the value chain and then linking them to productivity and strategy. Porter and Kramer call this framework the "diamond framework" (Porter and Kramer, 2006).

For security issues, Bulgurcu et al. found that many firms realize that their employees are the key to strengthening the security rules and regulations. The focus on information security shifts from a purely technical perspective to an in-

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[42] Cp. also McDonald and Aron, who emphasize improving business continuity, risk, and security management. Cp. McDonald and Aron, 2011.

[43] Kotz et al., who crafted a privacy framework to protect patients' health information. Cp. Kotz, Avancha and Baxi, 2009. Several privacy frameworks have been established to date, such as the ONC National Framework, Health Privacy Project Framework, and the user-centric privacy framework for pervasive environments.

dividual and organizational perspective (Bulgurcu, Cavusoglu and Benbasat, 2010). Here, Siponen suggests identifying, quantifying, and analyzing the background and underlying reasons for "human errors." He states that this process should be performed systematically by using a solid organizational security framework (Siponen, 2000).

2.2.3 INFRASTRUCTURE AND OPERATIONS

2.2.3.1 CURRENT CHALLENGES

The IT infrastructure is a critical component of IT functions (Weill, 1993). Through the IT infrastructure, IT functions can prioritize demand, deliver services, and capture value for business functions (CIO Executive Board, 2011). The IT infrastructure includes the hardware, software, communications, and other equipment required to support business applications.[44] Because of the close relationship between IT infrastructure and IT operations, their requirements are consolidated within this capability cluster.

Currently, most firms have employees who are primarily knowledge workers; social media, collaboration, and data management therefore present new challenges to firms (CIO Executive Board, 2011). IT functions must address these challenges by adjusting the IT infrastructure, including development of, or alignment to, new technologies (e.g., cloud computing, collaboration, mobility, and data management).

As the IT infrastructure cannot exist without regular operation and maintenance support, IT operations are an important component of the IT function.[45] IT operations must maintain and monitor the numerous IT infrastructure technologies. Fulfilling these tasks and improving systems, storage, processes, and business support present a variety of requirements that must be met (McDonald and Aron, 2011):

[44] Weill also emphasizes that the mortar binding all the IT components into robust and functional services also belongs in the IT infrastructure. Cp. Weill, 1993.

[45] Often, IT operations are considered to be only a cost driver. Cp. Intel Corporation, 2002.

- User help desk:
  - Employees' day-to-day work is affected by the changing IT. This changing technology results in reliance on help desks to support employees in handling a wide range of related problems such as hardware, software, and telecommunications.[46] User help desk support must cover a variety of products and services (Leung and Sim Kim Lau, 2007). Thus, firms realize the importance of the user help desk as a single point of contact (Ernst & Young, 2011c).
- Quality of systems, data, and networks:
  - One major requirement for IT infrastructure operation is quality (Ernst & Young, 2011c). Quality requirements affect many aspects of IT infrastructure operation. Cameron (2009) identifies the reliability of systems and networks as a major concern for IT executives, closely followed by the consistency and quality of IT processes. Data accuracy and data deduplication are also requirements for overall IT infrastructure quality (Ernst & Young, 2011c). Redman has concisely described the impact of poor data quality (Redman, 1998).

2.2.3.2 REQUIREMENTS IDENTIFIED

Given the requirements for the IT infrastructure and for IT operations, what type of structures must the IT function implement to fulfill these requirements?

IT infrastructure is considered a unique differentiator in the competition between firms (Broadbent, Weill and Neo, 1999). As new competitive strategies require effective IT infrastructures, up-to-date requirements are essential (Boynton, Victor and Pine, 1993). Cloud computing, the mobile Internet, and other requirements affect the design and structure of the IT infrastructure. Other trends may follow, further affecting the IT infrastructure. To respond to these upcoming challenges flexibly, Hanschke recommends implementing architecture management.[47]

[46] Benda (2004) considers technological evolution as one of the most important factors of change in the help desk industry.

[47] Byrd and Turner emphasize the need for flexibility as a unique characteristic of a valuable IT infrastructure. Cp. Byrd and Turner, 2000. Although the importance of the IT infrastructure has been identified, Byrd and Turner found that few valid and reliable instruments exist for measuring it. Cp. Ibid., p. 167. Weill,

According to Hanschke, strategic planning[48] of the proposed IT infrastructure and continuous control[49] of its development comprise two parts of the necessary architecture management (Hanschke, 2009).

In addition to the integration of architecture management to control the IT infrastructure, the requirement to manage big data is evident. Big data may include master data, stored data, transactional data, metadata, and other data residing in large files. Media, healthcare data, and social media or smart-phone data are well-known examples of new segments in data growth (IDC, 2011b). Brynjolfsson et al. find that big data creates new opportunities as well as new threats (Brynjolfsson, Hammerbacher and Stevens, 2011), as do Greengard, who emphasizes that big data can unlock value (Ggreengard, 2012). However, to cope with this new challenge, big data management requires a shift in computing, storage, and network architecture (IDC, 2011a).

As part of IT operations, quality aspects introduce requirements for the IT function. By ensuring the quality management of systems, data, and networks, the IT function can improve their structures, provide services effectively, and remain flexible (Ernst & Young, 2011c). For steady improvement, McDonald and Aron also emphasize updating business applications (McDonald and Aron, 2011). As quality requirements address a range of issues, individual analyses and implementations must be performed. System quality measures technical success[50] whereas data quality describes the extent to which data is considered true and credible.[51] The measures of network quality, in turn, are described as network

for example, had expressed the importance of the IT infrastructure in 1993. Cp. Weill, 1993.

[48] Strategic planning of the IT infrastructure provides the guiding principles for its further development. The major components are the IT-landscape management and guidelines for technical standardization.

[49] According to Hanschke, continuous control of the IT landscape enables firms to achieve the planned strategic objectives in the context of technical standards.

[50] Cp. DeLone and McLean, 2003. DeLone and McLean specify their definition of system quality to include aspects of ease-of-use, functionality, and reliability. Cp. Ibid., p. 13.

[51] Pipino et al. emphasize that data quality is a multi-dimensional concept comprising subjective perceptions as well as objective measurements. Cp. Pipino, Lee and Wang, 2002.

latency, network delay variation, or network loss rate by Chen et al. (Chen, Huang and Lei, 2006).

In addition to the importance of quality management, ensuring an effective single point of contact for the business is vital. Thus, the user help desk should be transformed into a reliable point of contact. As help desks evolve into support centers, their effective implementation must focus on much larger issues such as building the user help desk, maintaining the support center, and aligning with and supporting larger business objectives (Benda, 2004).

2.2.4 PROCESSES

2.2.4.1 CURRENT CHALLENGES

The dynamic environment forces firms to constantly review their internal structure for rapid response capability to external requirements. Thus, processes are influenced by key external impacts. More than ever, firms must be able to establish processes that can adapt flexibly to current changes (PriceWaterhouse-Coopers, 2011b). As processes[52] support a variety of different functions, overlaps with the other capability clusters inevitably occur.

Firms agree that processes form the foundation for enhancing their strategic position and strongly affect their performance (PriceWaterhouseCoopers, 2011b). Therefore, firms must address challenges affecting their process design. Lee emphasizes that process design is a critical business problem (Lee, Wyner and Pentland, 2008).[53] The processes that are considered relevant include business continuity and disaster recovery (Balaouras, McClean and Koetzle, 2010), sales, production planning, production processes, logistics, and support for financial and accounting areas (Ernst & Young, 2011c and Balaouras, McClean and Koetzle, 2010).

[52] Krcmar defines a process as an interconnected sequence of logical individual functions. Processes handle inputs by performing a variety of single functions to produce one or more output factors. Cp. Krcmar, 2005.

[53] The IT infrastructure figures strongly in process management as processes are often supported by information technology. See Ibid., p. 119.

A major challenge of adequate process design is the efficiency of the implemented processes.[54] Efficient processes are considered instrumental in firms' success by both theorists and practitioners.[55] This efficiency need is not focused on single processes but on the entire process universe within the firm.[56] This demand also justifies the requirement for process improvements (Gartner, 2007b; KPMG, 2010; and McDonald and Aron, 2011).

In addition to the demand for efficiency, there is also a need for processes that react flexibly[57] to the dynamic environment.[58] For several years, the importance of flexibility for firms' success has been indisputable. The ability to establish flexible processes is thus a major objective of process management.

2.2.4.2 REQUIREMENTS IDENTIFIED

Because, as observers agree, process design is a critical business task, this capability cluster's requirements serve a crucial function. In addition to critical process design itself, requirements regarding both the integration of compliance standards and flexibility extend this requirement.[59]

For monitoring the implemented process lifecycle, a pure concentration of the critical process design is not sufficient. Rather, it requires a comprehensive process controlling that is able to monitor the aspects, which have been discussed,

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[54] This requirement includes all processes within the firm. The surveyed firms identified the process efficiency of personnel management, among others. Cp. Ernst & Young, 2011c.

[55] Cp., e.g., CIO Executive Board, 2011; Ernst & Young, 2009a; McDonald and Aron, 2011.

[56] Areas for process efficiency include financial areas, back office processes, marketing, and IT processes. Efficiency improvements may include the electronic exchange of documents, invoices, and orders. Cp. Ernst & Young, 2011c.

[57] Depending on market conditions, there might be a need to export 5–30% of the production. This implies changes of processes, which become idle and which result in investments. Cp. Ibid.

[58] Ansoff categorized this flexibility into operating responsiveness, strategic responsiveness, or structural responsiveness. Cp. Ansoff and Brandenburg, 1971.

[59] Lafferty provides insights into methods for adjusting compliance structures. Cp. Lafferty, 2010.

such as process efficiency and process quality[60]. Such control may be part of process management. This comprehensive process control should monitor the adjustment of all processes to the firm's current situation (Ernst & Young, 2011c). The results of this monitoring may trigger activities to improve existing processes.[61]

Process management consists of methods and instruments that support the design, enablement, analysis, and management of process lifecycles (van der AAlst, ter Hofstede and Weske, 2003). The integrated process management must address the questions regarding the aforementioned requirements. The process management structure may take various forms. For IT, process management may also be supported by further standards such as CMMI, ITIL, and Cobit.[62]

2.2.5 PROJECTS

2.2.5.1 CURRENT CHALLENGES

Successful project completion[63] remains a challenge for firms because they often cannot learn lessons from past projects and from these experiences improve their upcoming projects (Alter, 2011). A clear project strategy is often missing (Pütter, 2012) because of the firm's insufficiently mature methodological framework for project management.[64] One study highlights this assumption and demonstrates that firms experience difficulties in handling the present level of project complexity: after the money has been spent, the methodology contains no instruments for recovering it if the projected payoffs do not materialize (Huchzermeier and Loch, 2001).

[60] Cp. also Gadatsch and Mayer, 2006.

[61] Practitioners assert that the IT function must support process management by identifying process improvements systematically. Cp. CIO Executive Board, 2011.

[62] ISACA recommends that the IT function design, maintain, and support systems that comply with these legislative and regulatory requirements. Cp. ISACA, 2011.

[63] The Project Management Institute (2008a) defines a project as "a temporary endeavor undertaken to create a unique product, service, or result."

[64] A critical assessment of traditional project management can be found in Saynisch, 2010.

One factor of inadequate project management capabilities is firms' inability to control their desired project outcome. Often, they apply no standardized definition for success in IT projects (Gartner, 2007a), nor do they commonly prioritize IT projects.[65] A missing prioritization may cause resource misallocation. Thus, firms have difficulty in performing successful projects. Cameron found that only 33% of IT executives measure the project success achieved against the business case's projected numbers (requirements) (Cameron, 2009).

2.2.5.2 REQUIREMENTS IDENTIFIED

Regarding the current challenges of the IT function, strengthening project management capabilities is one of the most pressing issues. The installation of a consistent project management framework or a consistent methodology helps to align the project management task within the organization.

This system should be concentrated on one consistent framework or methodology. The implementation of firm-wide project management standards would also support the CIO's governance requirements. Gartner recommends regular assessment of the project governance structure (Gartner, 2007a). In addition to adequate governance processes, the implementation of project, program, or portfolio management offices (PMO) may strengthen firms' project management capabilities. PMOs may deliver a variety of services to support projects,[66] including focused resources, project planning capacity, and project execution support.

In addition to the implementation of project management capabilities, the "right" prioritization of projects within the IT function is critical. Because resource availability is critical to success in most firms, resources allocation must always focus primarily on value adding projects. Projects with a lower value addition must be postponed in the order of investment necessary. Due to the usually high

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[65] Cp. Ernst & Young, 2011c. Müller et al. highlights this argument and emphasizes the assertion that prioritization is a success factors in multi-project management. Cp. Müller, Martinsuo and Blomquist, 2008. Davies-Cooke also outlines the importance of the alignment among resources and the corporate strategy and business objectives. Cp. Davies-Cooke, 2002.

[66] This phenomenon has also been identified by the participants in the survey regarding optimization potential. Cp. Ernst & Young, 2011c.

number of concurrent projects, such prioritization is appropriate[67] and requires firms to establish functional control instruments that cover such tasks, such as cross-functional project portfolio management.[68] Rad emphasizes that a project portfolio management system is an essential element of enlightened organizations (Rad and Levin, 2008).

[67] Müller et al. find that single projects cannot be treated as isolated entities because they affect or are influenced by their uncertain environment. Cp. Müller, Martinsuo and Blomquist, 2008.

[68] A project portfolio describes a group of projects that compete for the same resources and are conducted under a firm's management. Cp. Ibid., p. 28. The standard of the Project Management Institute defines a project portfolio as "a collection of projects or programs and other work that are grouped together to facilitate effective management of that work to meet strategic business objectives." Cp. Project Management Institute, 2008b.

2.2.6 INNOVATIONS

2.2.6.1 CURRENT CHALLENGES

"Innovating in products, services, and operations" (Ernst & Young, 2011c), "IT must reignite its dormant innovation engine" (CIO Executive Board, 2011), and "Faster innovation" (Gartner, 2007b) express but a few innovation requirements for the IT function.

In addition to these requirements, diverse risks and challenges arise in implementing innovations within organizations. Pisano and Teece assert that innovations present a dilemma for managers. Although innovations are assumed to drive performance, there is no guarantee that innovators will be fully rewarded for their efforts and resources expended (Pisano and Teece, 2007). The rewards for firms like Google or Apple seem obvious, but other firms have failed despite their products' innovative quality (Pisano and Teece, 2007).

Chesbrough and Teece describe another challenge to innovation—organizational virtuality does more harm than good. As innovations are always complex and need a systematic approach, loose partnerships or outsourced elements of firms may produce transaction costs or conflicts of interests. However, Chesbrough and Teece (2002) also acknowledge that virtuality may make sense under specific conditions, contending that firms must tailor their organization to its "unique sources of innovations".[69]

Stratopoulos and Lim (2010) suggest another risk and focuses on the disadvantages of a second mover in the market. They argue that competitors who try to imitate and adopt innovations may encounter difficulty. They refer particularly to IT investments that may have been integrated within the firms' organization and processes over time.[70]

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[69] Chesbrough and Teece (2002) also emphasize that blindly following any trends will not lead to any success.

[70] Pisano and Teece (2007) provide examples on first and second movers: although Apple invented the Personal Digital Assistant (PDA), Palm became one of the dominant market players in PDAs. Netscape developed the first internet browser, but Microsoft captured more of the market. And although the iPod was not the first MP3 players, Apple now holds a commanding position in this category. Cp. Ibid., p. 280.

2.2.6.2 REQUIREMENTS IDENTIFIED

Considering the aforementioned issues in innovations, what are the requirements for the design of the IT function? Which design principles can be derived?[71]

As innovations can be understood as a "process of introducing new ideas," the procedural requirements regarding inputs and controlling are at the center of successful innovation implementations (Rogers, 1998). Innovations are complex and difficult to measure, and thus the process of innovation must be controlled as a series of changes within the firm. The controlling and measurement cannot be reduced to hard- or software, production facilities or knowledge assets (Kline and Rosenberg, 1986). In literature, a variety of measures regarding the innovation process has been evaluated and discussed (Rogers, 1998).

Stratopoulos and Jee-Hae Lim (2010) offer further recommendations, emphasizing avoidance of investments made only under high market pressure. Instead, the firms' IT capabilities should be the center of focus. IT innovations should always align with the overall firm strategy.[72]

This recommendation is also followed by Kohli and Melville, who point out once again that developing a specialized set of competencies figures strongly in innovation integration.[73] To achieve this goal, they recommend performing innovation management along the dimensions of customers, people (individual creativity),[74] and processes.

For the people dimension, Kohli and Melville identify the necessity of recruiting employees who are problem solvers and can work in cross-functional

[71] A similar question is also asked by Kohli and Melville (2009): "What separates successful IT innovators from others? Is luck a primary driver, or are there deliberate actions that management can take to raise the odds of success?".

[72] Brown and Hagel III also support this argument that IT requires innovation to extract its business value. Cp. Stewart et al., 2003.

[73] Kohli and Melville (2009) call these innovation capabilities the "IT innovation platform." They emphasize that these competencies, their development, and interaction, may strongly influence growth and performance.

[74] This dimension is fully supported by Mansfeld et al., who describe the specific personal characteristics of roles within innovation management processes. Cp. Mansfeld, Hölzle and Gemünden, 2010.

teams.[75] This approach enables the inclusion of new perspectives, the generation of unforeseen solutions, and the anticipation of new products and services (Kohli and Melville, 2009).

2.2.7 SERVICES

2.2.7.1 CURRENT CHALLENGES

In the current turbulent environment, the IT function is under pressure to increase its service delivery while their resources remain constant or even decrease (Beachboard et al., 2007).[76] In the last two to three years, IT budgets have significantly decreased, constraining refurbishment. Many necessary replacements, innovations,[77] and upgrades have not been implemented, although IT executives ranked the improvement of IT services and IT service levels as their highest priority business strategies. In comparison to 2010, this issue has gained even more relevance. IT executives highly value the fundamental functions, as well as helpdesk support or infrastructure management (Ernst & Young, 2011c).[78] A 2011 Ernst & Young study found that participants recognize the need for key processes and services to be adjusted and reorganized for success in the market (Ernst & Young, 2011c). Marketwire supported this thought and added that the need for flexible IT services has grown (Marketwire, 2012).

[75] The aspect of cross-functional teams is also highlighted by Kaafarani and Stevenson (2011), who has defined operational characteristics for innovation.

[76] Computer Economics found that half of IT executives believe their budgets are inadequate and that the IT budgets do not keep pace with corporate revenues. Only 1% of IT executives surveyed feel that their IT budgets are more than adequate. These numbers are nearly identical with the 2010 report. Cp. Computer Economics, 2011.

[77] Participants in the Ernst & Young study answered that internal services must be adjusted innovatively. Cp. Ernst & Young, 2011c.

[78] Cp. Herrmann, 2011. Also see the participant responses to the survey regarding the necessary processes that should be reorganized to cope with increasing market competition. Cp. Ernst & Young, 2011c.

2.2.7.2 REQUIREMENTS IDENTIFIED

The IT function's general objective is the resource-effective contribution of required IT services aligned with the organizational business strategy (Beachboard et al., 2007). IT services provide a set of functions that support the service customers[79] and that must be defined and executed end-to-end across organizational and technological silos.[80] Diverse IT services are described by the IT Infrastructure Library (ITIL). At a high level, these ITIL processes include service strategy, service design, service transition, service operation, and continual service improvement (Office of Government Commerce, 2010). In addition to ITIL, other concepts describe the handling of IT services, including Service Level Management (Cp., e.g., Wustenhoff, 2002), Business Service Management (Cp., e.g., Emmet and Williams, 2010; Settle, 2010), IT Governance, and ISO/IEC 20000.[81]

On the basis of the aforementioned challenges, it seems obvious that IT functions need to implement IT service management, as recognized by Computer Economics: many organizations find that ITIL can serve as a powerful instrument in building overall IT service management (Computer Economics, 2005). Potgieter et al. support this statement and found empirical evidence that both customer satisfaction and operational performance improve as activities in the ITIL framework increase (Potgieter, Botha and Lew, 2005). In aligning the IT function to a framework, Settle recommended a comprehensive approach instead of beginning in only one or two areas so that the entire organization would obtain greater benefits (Settle, 2010). In addition to a comprehensive approach by IT service management, the respondents of a study by Winniford et al. responded that the most important IT services are quality metrics, such as availability, access, stability, and support. Winniford et al. correctly explain that quality metrics are not IT services but are the means of determining the success of IT services. Furthermore, the re-

[79] OGC defines the means of a service as delivering "value to customers by facilitating outcomes customers want to achieve without the ownership of specific costs and risks." Cp. Office of Government Commerce, 2010.

[80] Cp. Beachboard et al., 2007. The management of these activities is called Information Technology Service Management. It defines, manages, and delivers IT services that support business objectives. Cp. Winniford, Conger and Erickson-Harris, 2009.

[81] A detailed description of the concepts exceeds the scope of the present thesis.

spondents indicated that services like email and collaboration services, vertical services like clinical support, manufacturing services, and transaction services figure strongly in that success.[82]

2.2.8 CONTROL AND FINANCE

2.2.8.1 CURRENT CHALLENGES

After years of "e-business hype," which were strongly characterized by a largely unreflective investment in the IT function, firms realized that they needed increasing awareness of reasonable IT profitability (Kesten, Müller and Schröder, 2007). This profitability awareness leads to an adequate design of controlling and financial structures within the firm, where manifold challenges arise.

Considering the literature review, the challenges in this capability cluster can be further divided into aspects of cost reduction, IT investments, IT budget, and associated control capabilities.

Since the "great recession" of 2007–2009, firms have struggled to survive and to sustain their market position. Reducing costs has been the constant focus of IT functions (Ernst & Young, 2011a). McDonald and Aron found that reducing enterprise costs was ranked third among major business strategies (McDonald and Aron, 2011). There has also been a rising demand to decrease energy costs, software maintenance, and hardware spending (Computer Economics, 2008; Herrmann, 2011). Because of the strong globalization trend, regional competition also affects firm cost structures (Ernst & Young, 2011a).

In addition to the necessity of dealing with cost reduction activities, concerns about IT investments are evident. Considered the third-highest opportunity, investments in the IT function can provide a variety of strategic and operational advantages (Ernst & Young, 2011e), but IT investments also represent concerns, which may include accessing capital. Although this concern has declined, it remained ranked 10th among such issues (Ernst & Young, 2011e).

Closely connected to the requirements of cost reduction and IT investments, IT budgeting also figures strongly (Ernst & Young, 2011d) as it represents a major

[82] Winniford et al. found quality metrics related to availability, access, stability, and support. Cp. Ibid., p. 159.

subset of the overall firm budget. Decisions about IT budget may significantly affect the business (Kobelsky et al., 2008). Acknowledging this issue, questions regarding an adequate IT budget set-up continue to present a major concern for IT executives, especially in the wake of a crisis where firms were forced to cut IT budgets (Forrester, 2010).

2.2.8.2 REQUIREMENTS IDENTIFIED

Considering these concerns, what kind of adequate structures must the IT function implement for control and finance? Structures are required that are sufficiently broad to adequately assist at all concerns identified but are also sufficiently specific to provide rapid solutions with reasonable effort.

Many firms consider IT as costs as opposed to investments. Bonfante notes that it is not effective to ask whether the costs are too high or the overall budget decreases or increases. Instead, the important question is what impact these costs and IT investments have in supporting the firm's objectives (Bonfante, 2011b). Reducing costs can obviously improve profit, but the challenge lies in identifying useful cost reductions without reducing quality. Thus, cost competition is not only about reducing costs but also about embedding it into the overall business strategy. Practitioners also demand achieving cost competition (Ernst & Young, 2011b).

Kesten et al. apply this concept to the available set of methods within the firm. Although many firms still focus on internal cost accounting, a comprehensive IT control should align with the firm's objectives (Kesten, Müller and Schröder, 2007). This control comprises many elements, and Gadatsch and Mayer assert that there is no exhaustive list of these elements. Despite different perceptions of which elements belong in proper control capabilities, IT control is considered a control instrument for decision support[83] regarding IT usage (Gadatsch and Mayer, 2006). IT control should also support the management of IT investments, credit, and working capital control.

[83] Gartner (2007c) emphasizes that the success of decision making in firms requires people who understand both technology and business.

2.2.9 COMMUNICATION

2.2.9.1 CURRENT CHALLENGES

Many studies examine communications in general as well as specific aspects of communication.[84] Preston identified aspects such as communication failure, communication overload, perception, and distortion are identified as "Topic A" in journals (Preston, 1976). Erickson et al. defined communication as a goal-directed activity that involves a purpose. They add that one of the firm's central goal for communication is to maintain a positive image (Erickson, Weber and Segovia, 2011). Settle recognized that communication in IT has shifted from "talking less about projects on an individual basis" or "about assets as a stand-alone initiative" to focusing more on "delivering services" to the business functions (Settle, 2010). However, often the communication does not relate to service delivery. Business functions receive information they do not need. For example, a marketing manager is unlikely to be interested in why he can now make parallel statements according to HGB and IFRS international accounting standard with the new general ledger ERP software. Also, sales staff or call center agents do not need to know the full description of important updates and changes in the production planning system (Schaffry, 2007).

However, the system of communication within firms is complex and uses many instruments. Modern technology changes the means of communication constantly. Publicists claim that "e-mail is dying," (Enterprise 2.0 Blogspot, 2011 and Vaske, 2012), and being replaced by modern instruments of communication like wikis, chats, communities, blogs, or video conferences.

In addition to the different instruments, the organizational system of communication includes both internal and external message receivers and senders.

External receivers may be customers, government agencies, or investors, each with their own objectives and agendas. Therefore, the information commu-

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[84] E.g., Johnson compares three explanations of internal and external innovation communication in a new organizational form. Cp. Johnson and Chang, 2000. Also cp. Dean and Webb, 2011. Dean and Webb discuss information and communication overload and its impact on executives' time management. Erickson et al. analyzed financial disclosures using communication theory. Cp. Erickson, Weber and Segovia, 2011.

nicated to customers must be prepared differently from that provided to government agencies. The content, the abstraction level, and form of presentation must be adjusted.

The communication for government agencies differs from other forms of communication. The governmental recipient defines the content, structure, and terminology of the messages, thus limiting the scope of the communication.

Internal communication recipients such as employees, business departments, and the IT function[85] are as important as those outside the firm.

As the communication system is omnipresent, it bears a variety of risks that can arise from multiple sources. Individual communicator's incomprehensible information or inaccurate data may lead the communication to be wrongly interpreted or misunderstood.[86] Variations across the communication of the same information may cause confusion and inappropriate follow-up activities.

One study found that half the responding firms never or rarely discuss IT function concerns at board level and that the IT function management is never or rarely engaged in board meetings (Deloitte, 2009). As a result, the business cannot accurately internally perceive the value that IT produces. Leading IT executives should therefore communicate IT value in all their activities (Cameron, 2009).

In addition to the risk of failed roles in internal communication, Johnson and Chang (2000) argued that roles in external communication are explicitly important as organizations must adapt to dynamic environments. These roles (e.g., function heads, sales representatives) are responsible for communication with external information sources and supplying their internal information sources with accurate and relevant information (Johnson and Chang, 2000).

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[85] The receivers of internal communication can also be considered internal customers. These are members of other departments that an internal supplier serves. The collaboration among departments, internal suppliers, and customers affect the firms' ability to achieve their strategic objectives. Cp. Minjoon Jun and Shaohan Cai, 2010.

[86] Smillie and Blissett (2010) assert that such errors may create strong social amplification in risk communication.

2.2.9.2 *REQUIREMENTS IDENTIFIED*

Given the aforementioned challenges, how should the IT function be set up to increase the value of its communication capabilities? The derived requirements for communication are diverse. On one hand, the IT function must support the technical abilities that enable communication between the firm and external receivers (e.g., marketing channels). On the other hand, the IT function's own communication must be aligned with firm business objective. To achieve these goals, the IT function must use the upward, downward, and lateral directions of communication.

The content of the communication, whether internal or external, must be tailored to the specific needs of the target-group and consider the recipients' communication style.[87] The IT function should initiate regular value reporting to increase the perception of its value. Not only must the communication content be adjusted, but also the communication medium must be adapted to the target group. The most effective instrument must be chosen for that group's communication style, which might prefer wikis, blogs, or chats. Finally, effective metrics for communication must be used to increase the internal business perception of IT value (Cameron, 2009).

[87] To tailor communications, Hanke suggests that it is important to know the message's receiver, and especially his communication and listening styles. See Hanke, 2009.

3 IT AS A COMPETENCY FOR FIRMS' COMPETITIVE ADVANTAGE

3.1 RESOURCE-BASED THEORY AS UNDERLYING THEORY

Described in management literature, the resource-based theory postulates that firms compete on the basis of their internal resources.[88] First thoughts about the usage of firms' inherent resources are traced to Penrose, who focused on management skills as a specific resource (Penrose, 1955). On the basis of the analysis of Porters' structure–conduct–performance model and Prahalad and Hamel's explanation of how NEC became a "world leader," the resource-based theory became more popular. Porter described a "Five Forces Model of Competition" that suggested that firms can choose the most effective strategy specific to their environment (Porter, 2006). The resource-based approach evolved from this market environment analysis within the market-oriented approach and focused on firms' internal resources. In comparison to the assumptions of the market-oriented approach, the resource-based approach provides firms a wider range of variance, which may be controlled by the firms' investment in specific resources. Thus, the firm's market position may be ultimately defined by its resources. Firms increase their performance by selecting and using the "right" resources, and the perspective of the resource-based approach asserts that an investment in resources is effective.

In 1991, Barney used the definition by Daft (1983) and explained that

"firm resources include all assets, capabilities, organizational processes, firm attributes, information, knowledge, etc. controlled by a firm that enable the firm to conceive of and implement strategies that improve its efficiency and effectiveness." (Barney, 1991)

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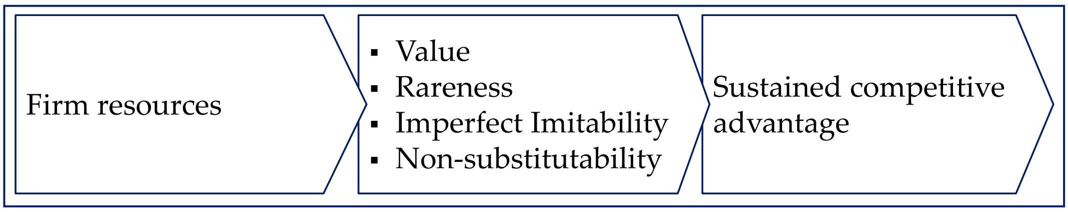
[88] For an overview of the resource-based view, cp. e.g., Brahma and Chakraborty, 2011.

Figure 4 illustrates the overall relationship between firm resources and competitive advantage proposed by Barney's definition.

Figure 4: Relationship between resources and competitive advantage



Source: Barney, 1991

In his framework, Barney describes four resource attributes:

(1) Resources must be strategically valuable, where "valuable" means that resources

"enable a firm to conceive of or implement strategies that improve its efficiency and effectiveness." (Barney, 1991)

(2) Resources should be rare. Barney asserts that a resource lacks value if many firms possess it. Firms that possess the resource can exploit it in the same manner. Thus, strategy implementation adds value by using rare resources.

(3) Resources should be imperfectly imitable. Valuable resources can serve as a source of competitive advantage only if competing firms can neither obtain nor imitate them. Barney offers three characteristics of imperfectly imitable resources:

- they depend on historical conditions that cannot be emulated by other firms,
- they link firms' competitive advantages and are causally ambiguous, or
- their resource generation is socially complex.

(4) Resources should be non-substitutable. A resource can be a source of competitive advantage if there are no strategically equivalent valuable resources, which are either not imitable or rare.

Considering all aspects, the resource-based theory seems to appropriately explain firm performance and resource investment. Porter's market-oriented approach may provide additional information regarding the industry's environment.

As the resource-based theory fully shifts the perspective from the industry to the firm level, its focus reflects the perspective of this study. Thus, this study uses the resource-based theory as the foundation of the model that it develops.

3.2 COMPETENCIES AS EXTRAPOLATION OF RESOURCE-BASED THEORY

3.2.1 EXISTING DEFICITS OF THE RESOURCE-BASED THEORY

The resource-based theory has currently become a dominant framework for describing the main determinants of firm performance (Brahma and Chakraborty, 2011).[89] As this theory is in the early phase of its evolution, critics do exist. For example, Priem and Butler published their concerns about resource-based theory (see Priem and Butler, 2001a and Priem and Butler, 2001b), asserting that Barney's theory includes multiple issues, especially that it is tautological. They find tautology in the attributes of valuable and rare organizational resources being a source of competitive advantage because competitive advantage is always defined as a rarity and value.[90] Thus, they argue that statements found in the resource-based theory are logically synthetic and self-verifying, and therefore not subject to disproof.

However, Priem and Butler continue their critique and state that there are generalized conditional "if/then" statements. Proponents of the resource-based theory acknowledge that if a resource is rare, valuable, difficult to imitate, and non-substitutable, then it provides competitive advantage. These statements are generalized conditionals and profess to be "law-like generalizations" (Priem and Butler, 2001a).

In addition to these arguments, other researchers found further issues in the resource-based theory (e.g., Annacker, 2001; Müller, 2002). They argue that the

[89] To express the relevance of the resource-based view, Brahma and Chakraborty illustrate the resource-based view as a new era in strategic management.

[90] In 2001, Barney responded to Priem and Butler's criticism. Addressing the focus of their arguments, Barney argued that at this definitional level many strategic management theories may be tautological. Cp. Barney, 2001.

identification of relevant resources is weakened by the specification of "value." The value of resources cannot be evaluated ex ante because at that point they lack the external market factor. Thus, the value of the resources can be evaluated only ex post.[91] Furthermore, the resource-based theory includes only a static view of currently existing resources. Priem and Butler emphasize this static argument and assert that

"it identifies generic characteristics of rent-generating resources without much attention to differing situations or resource comparisons." (Priem and Butler, 2001a)

The question is why certain heterogeneous resources generate value whereas others do not.

In their critique, Reed and DeFillippi focus on causal ambiguity. The postulated causal ambiguity may be, on one hand, an enabler of competitive advantage as competitors are unaware of relevant interdependencies between resources used and firms' performance increase. On the other hand, this ambiguity

"may be so great that not even managers within the firms understand the relationship between actions and outcomes." (Reed and DeFillippi, 1990)

Resource management may concentrate only on resources for which the management understands simply their most obvious relationship to firm performance. At the extreme, causal ambiguity may strongly compromise the achievement of competitive advantage.

3.2.2 COMPETENCIES AS A SPECIAL TYPE OF RESOURCES

Having acknowledged the existing deficits of the resource-based theory, there is a growing acceptance that resources do not create value on their own. The competence-oriented theory represents an extension of the resource-based theory. As the competence-oriented approach derives from the resource-based theory, both approaches may be rooted in the same historical origin. Competencies[92] may

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[91] Here, ex post may be understood as the period after firms' performance increase.

[92] In the extension of the resource-based theory, the term "capabilities" can also be found in the literature. A specific distinction regarding the term "competence" is not evident. Cp., e.g., Prahalad and Hamel, 1990; Helfat and Peteraf, 2003; Teece, Pisano and Shuen, 1997; Prahalad and Hamel, 1990. An exception is made

be understood as a special type of resources, which are rare, valuable, non-substitutable, and imperfectly imitable. In the resource-based theory, many empirical studies assert that an increase in competitive advantage results from the usage of organizational competencies rather than solely from resource allocation (Verdin and Williamson, 1994; Markides and Williamson, 1996; Walsh and Linton, 2002; Duysters and Hagedoorn, 2000). Prahalad and Hamel defined competencies as

> *"the collective learning in the organization, especially how to coordinate diverse production skills and integrate multiple streams of technologies." (Prahalad and Hamel, 1990)*

This more product-oriented definition has been widely extended within the literature (e.g., Müller, 2002). To explain the competence-oriented theory, Prahalad and Hamel (1990) used the image of a tree. The tree trunk and thick branches represent the main products, the smaller branches depict the organizational functions, the leaves are the end products, and the roots represent the competencies. With the tree, Prahalad and Hamel characterized competencies as follows:

- Competencies are "the glue that binds existing businesses." Core products link competencies to the end products.
- Competencies represent communication and commitment and involve many people across firms. They enable new business.
- As competencies consist of diverse skills and resources, they are difficult to imitate.

Prahalad and Hamel recognized that competence does not diminish with use. Unlike physical assets, which wear out over time, competencies improve as they are applied and shared (Prahalad and Hamel, 1990). Consequently, firms gain a strong competitive advantage only if they can develop a set of competencies that can be applied and are difficult to imitate (Ashurst, Doherty and Peppard, 2008).

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by Peppard and Hamel, who delimit organizational capabilities as the "highest organizing level and as being outward-oriented." Cp. Peppard and Lambert, 2000.

3.2.3 CLASSIFICATION OF COMPETENCIES

Competencies arise from different organizational levels and from diverse processes and activities. Sanchez classified "five modes of competencies" (Sanchez, 2004),[93] asserting that the competence modes result from a distinctive type of flexibility that responds to environmental changes. Thus, he examined flexibility in great detail.

3.2.3.1 COMPETENCE MODES I AND II: COGNITIVE FLEXIBILITY

Competence modes I and II reside at the cognitive level of the competence owner. Competence mode I describes the cognitive flexibility necessary to imagine alternative strategic logics, and competence mode II explains the cognitive flexibility to develop alternative management processes. Both describe a firm's flexibility in conceiving of alternative methods for action in dynamic markets, including identifying market opportunities, deriving product changes, designing adequate supply chains, and selecting efficient distribution channels. This competence mode also includes the ability to identify and control the necessary resources (assets, competencies) to adjust the firm organizationally.

As a necessary prerequisite for this competence mode, Teece and Pisano recognized the ability to learn (Teece and Pisano, 1994), thus equating cognitive flexibility and the ability to learn.

3.2.3.2 COMPETENCE MODE III: COORDINATION FLEXIBILITY

Sanchez asserted that competence mode III builds on competence modes I and II, with coordination flexibility executing the firm's strategic logics and processes. Sanchez explored coordination flexibility within flexible resource reconfiguration. Thus, coordination flexibility describes the firm's ability to plan, configure, and organize resources to support value-adding activities.

This competence supports firms' reconfiguration capability (Wycisk, 2009). Burmann found that this reconfiguration capability enables an overall change in a firm's resource capacity (Burmann, 2005).

[93] The following explanations are based on Sanchez (2004).

3.2.3.3 COMPETENCE MODE IV: RESOURCE FLEXIBILITY

To support the firm's reconfiguration capability, resources must be acquired, adapted, and used. Competence mode IV describes the ability to use resources in alternative ways. The quality of resource flexibility depends on a firm's ability to use internal and external resources in other processes or to structure the demand of resources alternatively (Wycisk, 2009). The breadth of various work domains and the costs for reconfiguration influence the quality of resource flexibility. However, Sanchez also described another aspect of the quality of resource flexibility: the value of the potential to increase a resource's flexibility. This increase may rely on new technology that enhances a machine's output, its range of application, or degree of modularity.[94]

3.2.3.4 COMPETENCE MODE V: OPERATING FLEXIBILITY

Competence mode IV describes resources' intrinsic flexibility, whereas competence mode V comprises the firm's overall ability to use its resources efficiently in a wide range of working areas. Burmann, following Teece et al., called this capability "the capability to replicate." Operating flexibility enhances firms' ability to increase their speed of action. It represents a meta-capability for multiplying process capabilities within ongoing business operations (Burmann, 2005 and Teece, Pisano and Shuen, 1997).

The quality of operating flexibility results from the firm's ability to adapt its firm-specific resources effectively and efficiently across multiple working places with varying conditions and changing environmental demands (Wycisk, 2009).

3.3 IT RESOURCES AS AN IT COMPETENCY CONSTRUCT

As shown in Chapter 3.1 the resource-based theory and the extended competence-based theory provide a helpful underlying theory for evaluating the critical success factors for competitive advantages. However, this theoretical foundation has received little attention in the information technology field (Wade and Hulland, 2004). Literature regarding information technology

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[94] For this statement, cp. also Wycisk, 2009. Modularity will be used as a design parameter for flexibility.

"suffers from ambiguity in the definition and conceptualization of IT resources." (Aral and Weill, 2007)

This situation has improved recently.[95] Bharadwaj was one of the first authors who developed an understanding of IT resources and IT competencies:

"Extending the traditional notion of organizational capabilities for a firm's IT function, a firm's IT capability is defined here as its ability to mobilize and deploy IT-based resources in combination or copresent with other resources and capabilities." (Bharadwaj, 2000)

In his empirical work, Bharadwaj's results indicated that firms with a high IT capability tend to increase their overall performance in profits and costs. However, Neumann found that there is no uniform understanding of how the components of the IT capability construct fit together and interact. This uniform understanding is, Neumann asserts, an important prerequisite for deriving recommendations regarding the organization of IT competencies and IT functions within firms (Neumann, 2011).

Considerable scientific research has been published in an attempt to define this prerequisite:

(1) Peppard and Ward (2004) developed a framework for positioning IT competencies. Their framework consists of six domains: strategy, defining the IS contribution, defining the IT capability, exploitation, delivering solutions, and supply.
(2) Bhatt and Grover (2005) investigated the impact of IT capabilities empirically and conceptualized a model with six entities: intensity of organizational learning, relationship infrastructure, IT business expertise, IT infrastructure quality, and the associated competitive advantage and its size.
(3) Bartsch and Schlagwein (2010) developed a conceptual framework consisting of firm objectives and their associated relationship to other objectives and content.
(4) The IT capability construct developed by Neumann (2011) comprises three main entities that affect each other: IT/IS capability, competence area, and best practices. Best practices are in turn a set of processes, structures, and skills.

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[95] Liang et al. found that IT has been increasingly considered a complementary resource, enhancing the value of associated resources within the firm. Cp. Liang, You and Liu, 2010.

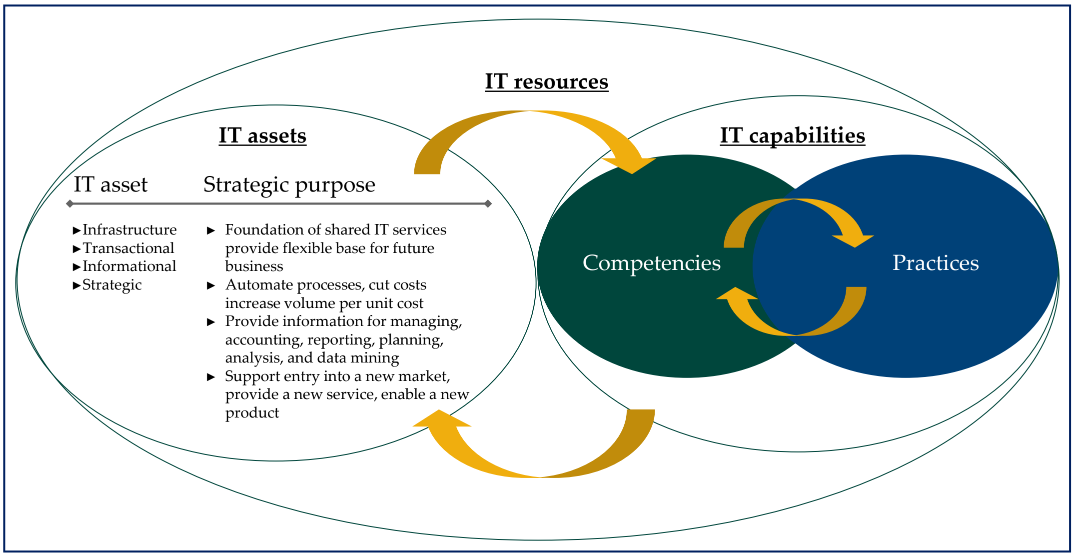
(5) In 2012, Grover and Kohli found that the IT value proposition is also affected by IT investments made by multiple, cooperating firms. Reflecting this finding, they framed the discussion of a co-created IT value proposition with four layers of relational arrangements (governance, knowledge sharing, complementary capability, and assets) among firms (Grover and Kohli, 2012).

(6) Hallikainen and Chen developed a holistic framework focusing on IT projects in detail (Hallikainen and Chen, 2005). Their basic idea is the integration of the IT evaluation process into the business and IT development process. These processes have several inputs (e.g., IT project resources) and outputs (e.g., success of IT investments).

Considering this prior research, it can be observed that the majority of all research papers treat IT capability as a multi-dimensional construct, consisting of multiple components that reflect the IT value proposition.

On the basis of a literature review, qualitative case studies, and a quantitative analysis, Aral and Weill combined all necessary components in one comprehensive model. Figure 5 depicts their model, which has been empirically explored (Aral and Weill, 2007).

Figure 5: Aral and Weill IT capability construct



Source: Aral and Weill, 2007

Aral and Weill's objective for this model was to "sharpen the theoretical characterization of IT resources." This characterization should be performed by analyzing two major sources: IT investments and organizational IT capabilities. They define IT resources as a combination of investment allocations into IT assets, a system of competencies, and a set of supporting practices. The underlying assumption of this relationship is clear. Firms allocate investments aligned with their strategic objectives (e.g., thought leadership in innovations, cost leadership). These strategic objectives produce a varying IT landscape integrating IT resources: firms with innovation strategies likely allocate their monetary investments toward IT systems that support this strategy. Firms with cost leadership strategies likely integrate IT systems for cost reduction effects. Thus, Aral and Weill asserted that this heterogeneity in investment allocation and capabilities increases firm performance as the resultant IT resources are difficult to imitate.

In their model, Aral and Weill disaggregated firms' IT investments into four asset types: infrastructure, transactional, informational, and strategic. In addition to the representation of four asset types, Aral and Weill considered that IT capabilities, consisting of individual competencies and practices, complement IT resources. They expected this combination to enable a greater IT value proposition.

The Aral and Weill model does not use capability and competence synonymously, but in a hierarchical relationship. Competencies are skills "embodied in individuals or groups that actively manage or accomplish organizational tasks" (Aral and Weill, 2007). Capabilities, in contrast, are a higher level construct than competencies. More precisely,

"capabilities refer to the ability of an organization to perform a coordinated set of tasks, utilizing organizational resource, for the purpose of achieving a particular end result" (Helfat and Peteraf, 2003).

Furthermore, Aral and Weill defined practices as a recurring

"set of activities or routines that serve both as a means of accomplishing organizational tasks and as mechanisms for socially storing and accessing knowledge about the most effective ways to accomplish those tasks." (Aral and Weill, 2007)

The present study uses the Aral and Weill model as a general meta-construct for reference for the following reasons:

- The perspective of the resource- and competency-based theories that Aral and Weill model uses is also reflected by the present study's application of these underlying theories.
- The model of Aral and Weill reflects their empirical results. They have empirically demonstrated that an effective combination of IT assets and IT capabilities lead to improvements in firm's performance.
- Aral and Weill's research and reference model are highly respected within academic community. Their research paper explaining the model has been cited 52 times according to Thomson Reuters's Web of Knowledge (see wokinfo.com). In comparison, Nicholas Carr's letter to the editor, "IT Doesn't Matter," was cited only six more times. Google Scholar reports that the Aral and Weill research paper was cited over 240 times (cp. scholar.google.de).
- The nine capability clusters that describe the necessary IT capabilities to cope with business requirements are used within this model because the Aral and Weill model supports a common understanding of IT capabilities.

- The same concurrence applies to the understanding of practices. Aral and Weill defined practices as recurring sets of activities or routines that accomplish tasks. Practices that support competencies are necessary to define specific methods of working. As evaluation methods and flexibility measures, which are the main focus of this study, define methods of working related to IT value measurement, the Aral and Weill practices definition seems to be suitable here.
- By using the Aral and Weill model as a meta-construct, the present study can use the established definition of the IT value proposition. Their model does not restrict its usage (e.g., for IT projects only).

4 FLEXIBILITY AS RESPONSE TO ENVIRONMENTAL INFLUENCES

4.1 FLEXIBILITY AS SCIENTIFIC ARTIFACT

4.1.1 UNCERTAINTY

The market-oriented effects discussed in Chapter 2 have emphasized that firms cannot predict conditions easily. Dynamic conditions and uncertainty muddle their planning and forecasting capabilities.[96] However, a perfect world with perfect information and infallible predictions about future conditions of business activity does not exist. Imperfect information circulates because of the large number of participants and their interdependencies.

This effect is reinforced by incomplete statements or deficiencies in the development of circulating information. Uncertainty affects these decisions at all levels of an organization—from functional to corporate levels—and might add layers of complexity to the decision-making process.[97] Thus, neither the business environment nor the internal scope of action is easy to describe. Executives do not seem equipped to make beneficial decisions for their firms. After all, without knowing which value will be added by investing in IT, decision makers can decide only at random.

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[96] With this increasing uncertainty, Blossfeld and Hofmeister commented, it is also difficult to build and maintain trusting relationships. In general, a trusting relationship is based on agreeing to bind oneself to someone or something for the long term. However, in the context of increasing uncertainty, such promises are always challenging as unpredictable issues often arise that make the promised return-service impossible to provide. Cp. Blossfeld and Hofmeister, 2005.

[97] Rahman and Feis organized existing models and methods into one coherent matrix by using two relevant axes: (1) complexity (high to low) and (2) time pressure (high to low). Cp. Rahman and Feis, 2010.

Nevertheless, executives must make decisions regarding their day-to-day challenges (Harrison, 1977), and thus they have only two options: (1) decide nothing or (2) decide under uncertainty. A decision under uncertainty always incurs additional risks, and risks imply a deviation from expectation value. These risks may have small, medium, or large monetary impacts.

The theoretical construct of uncertainty has long been discussed in academic literature, yielding a wide range of attributes and descriptions to characterize uncertainty. Sommer et al. (2009) describe the "inability to recognize and articulate all relevant variables affecting performance" as unforeseeable uncertainty. Sterman (1989) also specifies uncertainties as "nonlinerarities". McCann and Selsky (1984) refer to the condition of complexity and dynamic change as "hyperturbulence". Daft and Legel (1986) use the terms ambiguity and equivocality. Considering all these perspectives and dimensions, it can be observed that uncertainty forces firms to establish the capability to quickly respond to unpredictable impacts in dynamic environments.[98]

In addition to uncertainty, irreversibility must be taken into account. Previous decisions may not, or only partially, be revised. In their day-to-day business, executives must also consider this constraint. Once locked-in, a previous solution may be difficult to change. With increasing investments in the "wrong" decision, reversing this decision (switching costs) requires even more power.

4.1.2 DEFINITION OF FLEXIBILITY

4.1.2.1 FLEXIBILITY WITHIN SCIENTIFIC RESEARCH

For a long time, flexibility has been considered an important characteristic for firms. Abbott and Banerji found that "flexibility matters" (Abbott and Banerji, 2003). Ansoff, who identified flexibility as one possible strategy in responding to "strategic surprises," further noted that flexibility

"is concerned with positioning the firm in the environment in a way that satisfies two criteria: satisfactory average potential for profitability over the long term and adequate diversification of the firm's position to assure coping with deviations from the expected average." (Ansoff, 1975)

[98] See Ansoff and Brandenburg (1971), who notes that rapidly changing customer needs and technology require organizations to be flexible and responsive.

Although flexibility as a critical success factor for firms is almost universally accepted within the literature, no unique definition of the flexibility concept itself can be found. The conceptual frame of flexibility has been explored in various academic disciplines, including macroeconomics (e.g., Chen, Kacperczyk and Ortiz-Molina, 2011), decision analysis (e.g., Wadhwa, Madaan and Verma, 2009 and Biller, Muriel and Yongmei Zhang, 2006), organizational design (e.g., Ansoff and Brandenburg, 1971; Kinkel, Lay and Jäger, 2007; Wimmer, undated; Wolff, 2005), strategic management (e.g., Ansoff, 1975), and information technology (e.g., Tallon and Pinsonneault, 2011).

Table 1 reports a selection of scientific papers that investigated strategic flexibility for rapid response to dynamic markets and their definition.

Table 1: Flexibility definitions within the literature

Source	Definition
Sanchez, 1997	A condition of having strategic options that are created through the combined effects of an organization's coordination flexibility in acquiring and using flexible resources.
Ansoff, 1975	A capability for effective crisis management—fast and efficient, after-the-fact responsiveness—to sudden discontinuities.
Abbott and Banerji, 2003	Ability to adapt, in a reversible manner, to an existing situation as opposed to evolution, which is irreversible.
Nadkarni and Narayanan, 2004	Ability to initiate changes and to adapt to environmental changes with the help of a continuous rethinking of the current situation in terms of strategies, investments, or asset deployment.
Bahrami and Evans, 2011	Being able to move quickly and change direction to take advantage of an opportunity. Ability to do different things and to establish a variety of capabilities depending on the specific needs of a situation.
Evans, 1991	Capability to manage capricious settings (e.g., those confronted in technology-intensive arenas)

Thus it can be observed that the literature uses a variety of definitions, but it lacks a comprehensive, accepted framework describing flexibility. Studies concentrate on single aspects such as logistics, manufacturing, finance, or production, which has produced various definitions that cannot be compared. The flexibility research field was formed within the context of this differentiation (Horstmann, 2011).

The present study follows Burmann's definition of flexibility: strategic flexibility is the action potential of a firm for active-aggressive exploitation of future growth potential by changes in the production and performance program (Burmann, 2005).

4.1.2.2 SYNONYMOUS TERMS

The term "flexibility" is an essential part of everyday language, wherein general flexibility means the capability to adapt and respond quickly to new situations. In research literature, however, the term has diverse definitions.[99]

Often flexibility is defined with a variety of terms such as agility, flexibility, elasticity, versatility, robustness, or combinations of these terms. Properties such as bendability, maneuverability, and nimbleness are also attributed to flexible objects. All the usages and terms have the subject's adaptability in common (Horstmann, 2006).

In his article about strategic flexibility, Evans developed a listing of terms related to flexibility (Evans, 1991). This list (Table 2) exhibits slight overlapping, which Evans explained by stating that the flexibility concept is complex and polymorphic.

[99] Cp. Section 4.1.2.1.

Table 2: Evans's conceptual analysis of flexibility

Related terms	Yielding to pressure	Capacity for new solutions	Susceptibility of modification
Adaptability	β	α	
Agility		α	β
Corrigibility		β	α
Elasticity	α		β
Hedging		β	α
Malleability	β		β
Resilience	α		
Robustness	α	β	
Versatility		α	β

Source: According to Evans (1991)

4.1.3 NEGATIVE IMPACT OF FLEXIBILITY

An overemphasis on the potential of flexibility with the help of defined principles also poses significant challenges to the IT function. The organizational implementation of enhanced flexibility requires the commitment of resources with a high flexibility potential.

This tension between the commitment, investment, and costs on the one hand and the essential flexibility on the other is known as the flexibility dilemma (Picot and Wolff, 2005). This contradiction must be balanced appropriately within the IT function. As flexibility is often related to resource redundancy, the financial impact on cost structures must be taken into account. Because of this strong impact, maximizing the flexibility in all cases does not seem suitable, as Allen and Boynton (1991) also assert. Allen and Boynton note that the development of IT capabilities necessary to increase IT function flexibility often incurs higher costs.

Horstmann (2006) also notes that the benefit of flexibility is usually directly compared to the costs. The benefit of flexibility is difficult to quantify because of its future-oriented focus. Flexibility costs, in contrast, are recognized in the present. Thus, the dilemma appears as the delayed benefit measurement worsens the perception of currently rising flexibility costs.

Additionally, opportunity costs must also be integrated in the calculation. Opportunity costs represent the potential loss of profits. Because of the (financial) commitment of flexibility potentials, the IT function may not be able to support the value-adding processes within the firm. Horstmann adds that these committed flexibility potentials may "fizzle out" if they are ineffective. Until the flexibility potentials actually arise, committed resources remain in permanent legitimation (Horstmann, 2006).

Tallon and Kraemer (2003) also found negative impacts of flexibility, emphasizing that flexibility does not have an equal value for all firms. In their analysis, the value of IT flexibility strongly depends on the dynamics of the specific industry. Thus, the (financial) development of IT capabilities to increase flexibility in a stable environment can be a financial burden for IT functions. In a highly dynamic environment, however, these capabilities may generate greater value. They found that the tradeoff between IT alignment with the business strategy and IT flexibility must vary from firm to firm.

4.2 MULTIPLE DIMENSIONS OF FLEXIBILITY

In his article on strategic flexibility, Burmann (2005) categorizes four dimensions of flexibility, following Kaluza (1993). Figure 6 depicts Burmann's flexibility dimensions.[100] The first dimension, object, integrates objective and resource flexibility. The second dimension, time, represents flexibility in the speed of the adaptability of processes and inventory. The third dimension, set up, includes built-in and development flexibility. The fourth dimension, impact, represents the direction of the flexibility impact, which may be either external or internal.[101]

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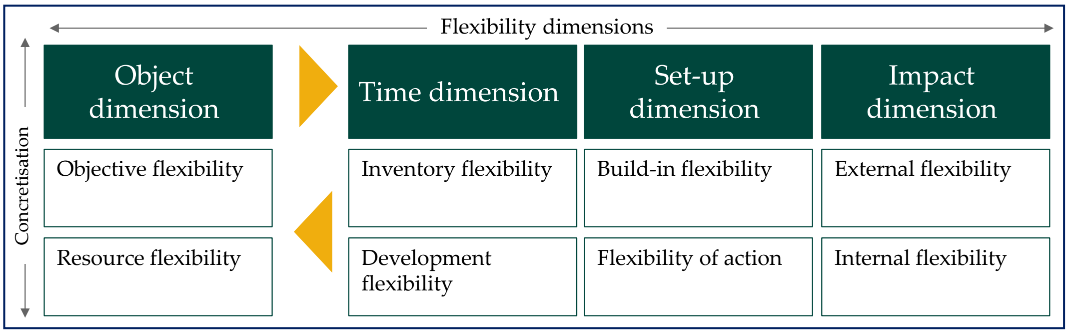
[100] The descriptions follow Burmann, 2005.

[101] For example, Evans does not separate the flexibility dimensions by direction but considers external influences as an initiator of the need for flexibility. Cp. Evans, 1991.

Figure 6: Categorization of flexibility dimensions



4.2.1.1 OBJECT DIMENSION

The object dimension may be separated into the objective and resource aspects. Firms are characterized by their activities following a comprehensive system of objectives. The objective flexibility describes the firm's ability to change its objectives, and that change may be either the rejection of objectives or the inclusion of new objectives. Objective flexibility also includes a change in achievement or prioritization.

Another aspect of the object dimension is resource flexibility. Resource flexibility characterizes the flexibility in selecting adequate resources to achieve objectives, and it refers primarily to the necessary production factors. The dispositive resource flexibility describes the capability to adjust in planning, decision making, organization, and control.

4.2.1.2 TIME DIMENSION

The time dimension comprises inventory and development flexibility. Inventory flexibility characterizes the ability to react on short notice by using existing resources, especially constant production capacities. Development flexibility denotes the long-term ability to adapt to unforeseen future changes in the business environment. Contrary to inventory flexibility, development flexibility focuses on a firm's variable capacity.[102]

[102] Burmann indicates that resource flexibility (object dimension) refers to the firm's constant allocation. Therefore, in his opinion, the time dimension could be eliminated in the classification of the dimensions. Cp. Burmann, 2005.

4.2.1.3 SET-UP DIMENSION

In the set-up dimension, Burmann separates built-in flexibility from flexibility of action. Burmann characterizes the built-in flexibility as a defensive and passive precautionary measure to mitigate future risks. Risks of employment may be mitigated by using built-in flexibility. This strategy contrasts with the flexibility of action, which takes the offensive, is active, and focuses on action options and on the speed of action. Finally, Horstmann (2011) describes built-in flexibility as purely pro-active whereas flexibility of action is reactive. This differentiation means that the flexibility potential of built-in flexibility exists before environmental changes occur. As flexibility of action is reactive, its flexibility potential becomes manifest afterwards.

4.2.1.4 IMPACT DIMENSION

Burmann also identifies the direction of flexibility impact as a dimension, distinguishing between internal and external flexibility. External flexibility refers to the firm's ability to react to its environment by introducing new products or innovations. Internal flexibility describes the firm's ability to change its internal structures on short notice. Burmann mentioned optimization programs as an example of reaction to declining prices. However, internal and external flexibility may not always be mutually exclusive. In many cases, they affect each other reciprocally as external influences elicit internal restructuring activities.[103]

[103] Horstmann (2011) expresses the same opinion.

4.3 DESIGN PRINCIPLES TO DEFINE FLEXIBILITY MEASURES

4.3.1 OVERVIEW AND BASIC STRUCTURE

The IT function within the firm must address the demand for flexibility. IT functions often focus only on individual areas of flexibility (e.g., agile project management of software development), but the flexibility of the IT function must address all required capabilities.[104] Thus, flexibility is a prerequisite to establish the necessary IT capabilities that reflect the business requirements. Only through flexible enhancement of these required capabilities, can the IT function support the business function to achieve competitive advantages. Teece et al. define this ability

"as the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments (…) Hence organizational processes, shaped by the firm's asset positions and molded by its evolutionary and co-evolutionary paths, explain the essence of the firm's dynamic capabilities." (Teece, Pisano and Shuen, 1997)

This organizational change, described by Teece et al. as initiated by rapidly changing environments, can be understood as a path-dependent change process. As a result, this path-dependency must be taken into account when developing new flexible IT capabilities. Because of this path-dependency, the development of new IT capabilities may only operate through the preservation and further development of existing capabilities (Burmann, 2005).

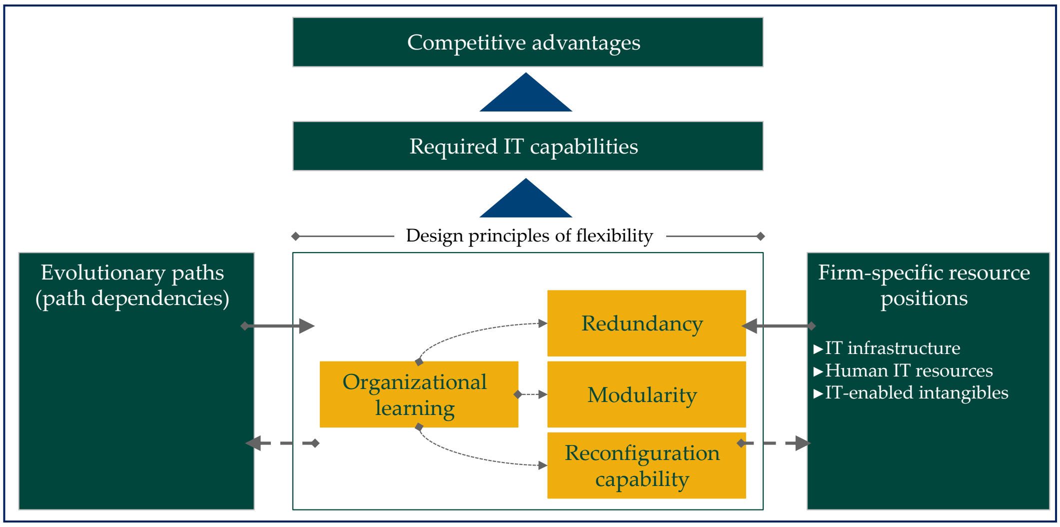
It is obvious that the capability to perform organizational changes is grounded in the ability to change the IT function's existing processes. A process can be understood as a sequence of logically connected steps (Krcmar, 2005). Processes may be found at all levels of the firm in general and the IT functions in particular. Appropriate process control depends on firm maturity.

Burmann (2005) explains that the opportunity to enhance firm flexibility resides in the connection of these processes with the firm's historical development as well as its specific resource position. He notes that the firm's existing patterns

[104] An overview of these requirements may be found in Chapter 2.

of activity[105] ("evolutionary paths") strongly influence the development of solutions for new problems. As these patterns of activity comprise individual processes, they are in turn strongly influenced by the existing resources ("firm-specific resource positions") (Burmann, 2005). Figure 7 illustrates this relationship.

Figure 7: Overview of design principles



Source: According to Burmann, 2005 and Teece, Pisano and Shuen, 1997

The development of this flexibility potential relies heavily on flexibility design principles: (1) redundancy, (2) modularity, (3) reconfiguration capability, and (4) organizational learning (Horstmann, 2006). These are also acknowledged by Teece et al. (1997), Burmann (2005), and Wycisk (2009).[106] Sections 4.3.2 through 4.3.5 describe in detail these flexibility design principles.

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[105] Teece et al. use the term "routines." According to Teece et al., routines may be referred to the way things are done in the firm. They represent patterns of current practice and learning. Cp. Teece, Pisano and Shuen, 1997.

[106] Teece et al. also use replication capability as a flexibility design principle. The objective of the replication capability is the development and multiplication of existing processes to fulfill flexibility needs. The present study does not use replication as a separate design principle because it is an element of redundancy, modularity, and organizational learning. Similarly, Horstmann (2006) did not use this design principle.

4.3.2 REDUNDANCY

The German foreign language dictionary from the Duden publishing house defines redundancy as the presence of unnecessary elements or an excessive amount of things (Duden, 2012).

According to this definition, redundancy in the IT function reflects IT resources that are unproductive or currently limited utilization. Redundancies in IT resources may occur unforeseen: for example, past fluctuations in demand for IT services may have affected the planned capacity (e.g., storage, employees). As these kinds of unproductive redundancies strongly affect the IT function cost structures, their legitimacy must be validated periodically.

Regarding redundancy as a design principle for IT functions, redundancy can be interpreted more positively as a consciously planned surplus. Horstmann (2006) states that redundant resources have equal or similar abilities. Among the flexibility dimensions, redundancy affects the time and object dimension and may influence resource flexibility (object dimension). Redundancy in resources flexibility is based on substitutable resources. Here, it may be distinguished between qualitative and quantitative effects (Burmann, 2005): *quantitative effects* occur in underutilized employees or available machine capacity. *Developing qualitative flexibility* through redundancy describes the adaptability of firms to react to external influences, including, for example, unused employee skill sets that enable the firm to react to specific predicted scenarios. Additionally, redundancy affects the temporal (time) dimension. Rapid response to various external situations requires both qualitative and quantitative redundant resources that can be allocated in a timely and situation-specific manner to meet the situation's requirements (e.g., the short-term need for greater storage capacity).

Case study:

Amazon provides IT-services built upon the principle of redundancy. Amazon S3 is an Internet-accessible storage designed for software developers to facilitate their processing power through web scaling. This service stores and retrieves data of any amount at anytime from anywhere on the Internet. Using Amazon S3 software gives developers access to the same highly scalable data storage infrastructure used by the Amazon global network for its own purposes. Thus, developers can benefit from the advantages of flexible scalability. Cp. Amazon, 2012.

4.3.3 MODULARITY

One design principle currently discussed for improving IT function flexibility is modularity.[107] Aier et al. (2004b) define modularity as the structuring of a system in relatively small, semi-autonomous, and manageable subsystems (modules, segments, fractals, units of action).

If firms or systems are designed with individual modules, they obtain an advantage as the modules are manageable "islands of complexity" that can be edited more or less independently. The individual modules and their mutual relationships reduce system complexity (Göpfert and Steinbrecher, 2000), which in turn enhances the capability to respond quickly to environmental disturbances or to new requirements. Modularity offers the advantage that these modules are not destroyed by redesign but may be re-combined in other configurations.

Let us take a software product as an example of a modular system. As the organization of software is inherently complex, many arbitrary details must be precise. Software design techniques use the principal of modularity to enable information hiding, abstraction, and a hierarchically method of software development (Parnas, Clements and Weiss, 1985). The principal of modularity also applies to service-oriented architectures. A service-oriented architecture can be explained as a paradigm that describes how modular software components in a distributed application communicate and offer services (Krcmar, 2005). In other manufacturing industries such as the automotive, aerospace, and chemical industries, the principal of modularity applies broadly. Even professional services may be offered modularly (Brusoni and Prencipe, 2001). Göpfert and Steinbrecher (2000) describe the flexibility-enhancing effect of modular subsystems as comprising the attributes discussed in Sections 4.3.3.1–4.3.3.5.

4.3.3.1 DECOUPLED MODULES

The objective of autonomous modules is to reduce interfaces and their interrelated dependencies. Autonomous modules encapsulate information, data, and activities within the module core. On pre-defined interfaces, only the planned module data are provided. The smaller number of interfaces requires little devel-

[107] For a discussion of modularity, cp. e.g., Aier and Schönherr, 2004a; Göpfert and Steinbrecher, 2000; and Sanchez and Mahoney, 1996.

opment effort. De-coupled modules can be developed in parallel and independently, and modules can be added or duplicated as needed. Object-oriented language Java uses the principle of decoupled modules.

4.3.3.2 STANDARDIZED INTERFACES

Standardized module interfaces allow easier coupling to other modules, including connection to third-party modules. The ability to connect to third-party modules through a standardized interface enhances individual modules' range of applications. Thus, for example, firms offer programming frameworks whose objects include standardized interfaces.[108] The restriction of the variety of interfaces also enables greater availability and lower prices by competing third-parties.

4.3.3.3 REUSABILITY

The reusability of standardized, individual modules helps developers create new systems in a timely manner. As individual modules have demonstrated their capabilities, they can be used quickly in a different context. The high degree of reuse may significantly reduce the number of modules that must be newly developed.

4.3.3.4 INTERCHANGEABILITY

Interchangeability enables quick changes to single modules or to the combination of modules by replacing individual modules. Faulty modules can be replaced easily, thus simplifying and hastening the repair of composite modules. Standardized interface elements may also be replaced easily. Additionally, interchangeability supports extensibility because new functionalities may be inserted simply by replacing individual modules.

4.3.3.5 EXTENSIBILITY

The use of standardized interfaces and the loose coupling of individual modules enhance the capability to extend sub-systems or modules with individual functions easily and quickly. The extensibility of a module or a set of modules

[108] See, for example, Oracle's AD Framework.

can be achieved easily with no technical changes in the production process. Module extension can also occur at any time after set up.

Case study:

SmartTec GmbH is a firm that provides equipment, accessories, and services for manufacturing processes. The firm is confident that it can strengthen its position as a leading systems supplier. Since early 2012, there has been growing interest in the SmartFlex product line. Unlike almost any other product, this product line meets the demand for high quality and flexible modules that support each step in the manufacturer's production process. The SmartFlex line's modularity ensures a high degree of extensibility and interchangeability. The CEO Uwe Geisler points out that flexible solutions are currently in high demand. Cp. n.a., 2010.

4.3.4 RECONFIGURATION CAPABILITY

The ability to reconfigure structures is another design principle for reacting to dynamic environments. Wycisk (2009) considers this reconfiguration capability as the foundation of the greatest possible freedom of action. Teece et al. explain the reconfiguration capability as

> *"the ability to sense the need to reconfigure the firm's asset structure, and to accomplish the necessary internal and external transformation. This requires constant surveillance of markets and technologies and the willingness to adopt best practice." (Teece, Pisano and Shuen, 1997)*

Process reconfiguration thus generates a stronger change in the allocation and availability of resources within the firm. The basis for this change, however, is the early identification of need for change. Burmann (2005) asserts that the costs are lower if the firm detects the need for change earlier. Teece et al. (1997) note that the more reconfigurations are carried out within a firm, the more easily they are accomplished. Sanchez (2004) summarizes reconfiguration in competence modes I and II, where this ability is described as cognitive flexibility, but the employees' ability to coordinate important changes is also important.

For reconfiguration capability, Horstmann (2006) focuses on the aspect of self-regulation. For self-regulation, decision and design authority are transferred to the employee. In addition to the day-to-day work, employees are empowered to take responsibility for planning and controlling their work. To achieve this goal, employees must be granted sufficient scope in their work execution (Kieser and Walgenbach, 2003).

In conclusion, the reconfiguration design principle may be considered a valuable instrument for increasing IT flexibility. Increased reconfiguration capability in the IT function enables the prompt adaptation of decentralized processes without prior coordination. Consequently, reconfiguration capability improves the time required to identify flexibility needs as well as to initiate adequate countermeasures. Hierarchical coordination processes, however, may be necessary only for exceptional cases requiring escalation. Pongartz and Voss (1997) confirmed this advantage of reconfiguration capability, indicating that employees may react to unforeseen influences on the basis of their experience and can assess practical strategies professionally.

Case study:

Iris Jana Magdowski, deputy mayor for education, culture, and sport, said in a press conference that the Potsdam museum should become a non-profit firm with limited liability. Thus, the museum would not be subject to management by the city government, but can operate with greater employee responsibility and planning opportunities. Two years ago, the city government commissioned a study to determine whether the Potsdam museum could operate more flexibly in a new legal form: a public foundation. The commissioned institute of the Humboldt University in Berlin stated in their conclusion that the current legal form of a non-profit limited liability firm provides more freedom for decision making than a public foundation. As Iris Jana Magdowski emphasized, the planning and execution of activities would be much easier as a non-profit limited liability firm because it eliminates the need for lengthy coordination processes. Cp. Becker, 2012.

4.3.5 ORGANIZATIONAL LEARNING

The principle of organizational learning is closely related to reconfiguration capability;[109] thus, it plays a central role in the flexibility design principles. Organizational learning supports early identification of cause–effect relationships and analysis of alternative action options. By using learning curve effects, employees' individual experiences are applied to new challenges in dynamic markets.

The ability to enhance organizational development requires an institutional process for organizational learning. Although individual employees' learning ability does not constitute the firm's learning ability, individual learning processes are required to enable organizational learning. Therefore, let us first address individual learning (Klimecki, Probst and Eberl, 1991). Shrivastava found that most research on individual learning relates to psychological studies, and diverse theories exist about the source of individual learning. The neo-behaviorists considered individual learning as the changing probability of responses, and they derived stochastic models for individual learning processes. The general behavior theory in psychology views learning

"as the acquisition of associations, conditioned reflexes, and stimulus-response bonds." (Shrivastava, 1983)

Another approach to individual learning regarding the rote verbal learning was developed in the late 1950s. This research produced the analysis of paired-associate learning and basic concept identification (Shrivastava, 1983).

The core concept of organizational learning is that firms may also act as the initiator of a learning process. Theorists provide diverse definitions and sources of organizational learning. Shrivastava (1983) describes the four main conceptualizations of the organizational learning phenomenon[110] described in Sections 4.3.5.1–4.3.5.4.

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[109] As an element of reconfiguration capability, organizational learning can be understood as more experimental (doing-before-doing). Cp. Burmann, 2005.

[110] The following description is based on explanations by Shrivastava (1983).

4.3.5.1 ORGANIZATIONAL LEARNING AS ADAPTION

Organizations adapt their behavior to environmental changes over time by adapting their objectives, their attention rules, and their search rules. Organization learning may considered

"a function of organizations' experience with the knowledge base that underlies decision processes." (Shrivastava, 1983)

Representatives of this approach include Levitt and March (1988).

4.3.5.2 ORGANIZATIONAL LEARNING AS ASSUMPTION SHARING

The members of an organization respond to internal or external environmental influences by changing their collectively applied theories ("theories-in-use") based on collective assumptions shared by all members of the organization. Thus, learning means changes in these theories. Shrivastava acknowledges major contributing authors to this perspective, including Mitroff and Emshoff (1979).

4.3.5.3 ORGANIZATIONAL LEARNING AS DEVELOPING A KNOWLEDGE BASE

Organizational learning may be described as a process of expanding the institutional knowledge among organizational units, thus increasing the organization's effectiveness, strategic choices, and selection of transformation processes. As organizational effectiveness may be determined by the quality of the available knowledge base, learning is the process that develops an organization's knowledge base. Dutton and Duncan (1981) represent this perspective.

4.3.5.4 ORGANIZATIONAL LEARNING AS INSTITUTIONALIZED EXPERIENCE

Shrivastava reported that the U.S. Air Force discovered a relationship between the hours required to finish a task and the number of repetitions: decline in per-unit cost correlates with the learning that occurred during each task execution. The Boston Consulting Group extended this learning effect to additional areas. The vital knowledge and experience gained by repeatedly executing a given activity increase the quality of task execution. Yelle (1979) supports this approach.

As organizational learning supports increasing problem-solving ability, the number of possible alternatives in decision-making processes rises. It also improves the speed of reaction to external influences. It can be observed that the contribution of organizational learning in the fact that the learning process itself has a positive effect on the speed of reaction and the firm's knowledge base. The more efficient this process is, the greater the opportunity to respond to the demand for flexibility (Horstmann, 2006).

Additionally, theorists indicated that collaboration with other organizations may enable further organizational learning that supports firms in recognizing dysfunctional routines, or it may prevent strategic blind spots (e.g., Khanna, Gulati and Nohria, 1998; Mody, 1993). Thus, organizational learning is appropriate for integration as a flexibility design principle. The increasing number of alternative action options directly reflects the extension of a firm's knowledge base.

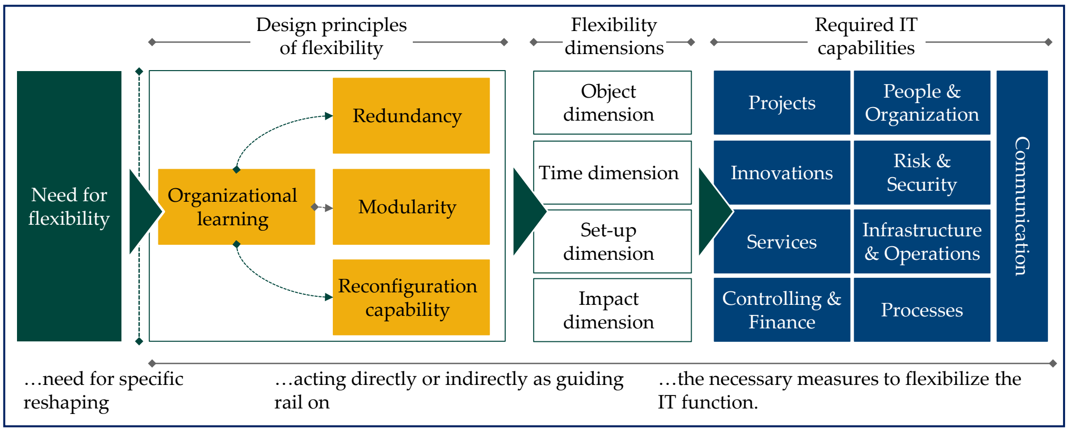
Case study:

Stora Enso is one of the largest forestry companies and paper and packaging manufacturers in the world. This company sees itself as a constant innovator in a traditional industry. Now, their IT function must be re-structured. CIO Thilo Press prescribed a ten-billion-euro program to focus on IT skills. He explained that it is time to learn to forestall problems if the company cannot develop their internal IT function. Press addresses the question of IT value proposition when traditional tasks are largely outsourced. For Press, the answer is clear: the IT function can deliver value only when it can reinvent itself by redefining its roles and responsibilities. Press expects the restructuring of the new IT function to be completed within three to five years at most. He admits that Stora Enso must be systematically prepared for changes. He adds that the development of competencies is not about mere assessments or estimates; rather, it is about the establishment of a learning organization as quickly as possible. Cp. Sarsam, 2011.

4.4 DERIVING MEASURES TO SUPPORT IT FUNCTION FLEXIBILITY

The preceding sections of Chapter 4 discussed the dimensions and design principles of strategic flexibility. This section develops measures that can support the IT function in making its IT value proposition flexible to meet business demands. The identified requirements and solutions of Chapter 2.2 will serve as limiting guidelines. Thus, the next step is a flexibility-oriented description of the IT function's potential. To achieve this objective, the design principles of redundancy, modularity, organizational learning, and reconfiguration capability are applied to the IT capability clusters. The flexibility-oriented description uses the methodology of typology, which enables the development of individual determinants of the flexibility potential for actual use.

Figure 8: Flexibility principles, dimensions, and affected IT capability clusters



To ensure the comparison of the derived flexibility potentials, they are assigned to the object, time, set up, and impact dimensions. The following questions about the flexibility-oriented design principles must be answered:

(1) Redundancy: Which measures are suitable to address excessive capacities or spare capacities within the cluster?
(2) Modularity: Which measures support modular structures in the cluster?
(3) Organizational learning: What types of measures support organizational learning for firm-wide learning and the individual IT employee learning?
(4) Reconfiguration capability: Which measures within the IT function can support the change process and coordination of IT resources?

4.4.1.1 PEOPLE AND ORGANIZATION

For people and organization, the flexibility of the employees' working environment plays a significant role. This flexibility is based primarily on the modularity design principle, which holds that the working environment should be designed so that it can be expanded at any time. Tasks should be structured in such a way that they can be performed quickly by fellow employees. This means that extensive tasks are broken down into smaller tasks. Motor vehicles manufacturing, for example, has used this principle for a long time.

Through broad-based strengthening of managerial skills, authority delegation arrangements, or establishing multiple qualifications, employees can be used quickly for diverse tasks (role flexibility). These measures increase the firm's capability reserves. Modularly designed training can support these capabilities. Modular training supports employee training at each career level and level of knowledge. The use of various modules enables extensive training development tailored to the relevant target groups.

In addition to the flexibility principle of modularity, the redundancy principle supports the flexibility potential of this capability cluster. To respond to market-related influences, a firm's resources may be structured to contain readily available and appropriate capacity and capability reserves. Resource pools can be initiated depending on this available resource capacity. Resource pools integrate resources with pre-defined properties; for example, employees with project management skills may be integrated within the same resource pool. Depending on requirements, project management may assign these employees tasks across multiple divisions. The project manager need not come from the primarily responsible department. The resource pool members' training can be appropriate to the required skill level, and disciplinary control is the resource pool manager's responsibility.

Temporary employment can also be used to react to external influences. Small- to medium-sized firms can use a temporary employment service to mitigate unforeseen resource requirements on short notice. To respond to sudden external influences, any large organization can use the internal capacity reserves typical of that size firm.

The organizational learning principle supports evolutionary strategy development. Future uncertainties make it impractical to develop fixed comprehensive plans for the long term, but simply "muddling through" appears haphazard and less purposeful. As a lever, organizational learning supports planning for an indeterminate future. "Piecemeal engineering" avoids planning everything at once and enables the firm's understanding of reality to evolve in small manageable pieces through experience. Using this evolutionary approach to formulate strategies, firm development occurs in a series of small steps that, correcting for errors, adapt to the next step (Zahn, Nowak and Schön, 2005).

The assessment of complex issues or market-induced effects usually requires the assistance of experts. Small- and medium-sized firms have limited internal expert capacity, and so they can use external services or experts that introduce knowledge and new ideas. Through them, for example, a firm's weaknesses within alliances can be balanced by the strengths of others (Specht, Menke and Behrens, 2005).

Reconfiguration capabilities within this capability cluster support the internal structures for adapting quickly to new requirements. This cluster focuses on people and organization. To improve the flexibility of team members, teams are responsible for not only their usual tasks but also their group's smooth operation (job enrichment). This flexibility includes planning and controlling their tasks. With a much higher amount of freedom in achieving their daily work objectives, employees may use their skills and creativity to accomplish their tasks (cognitive flexibility). Corresponding multiple qualifications support this approach. The increased amount of freedom for employees reduces the number of decision escalations.[111] Thus, this principle applies to the informational basis element of decision making. In turn, reduced need for escalation enables quick decision making that accelerate the processes significantly, positively influencing the speed of action.

Another instrument that enhances employee self-determination is the agreement to flexible work schedule (flexible work hours). Flexible work hours

[111] From the temporal perspective, it is important to note that an early decision may reduce the number of potential action options, and a delayed decision may have the opposite effect.

allow employees to structure their schedule so that they can complete both their daily work tasks and personal needs, and it helps balance short term workload peaks. The range of possible work time models varies, ranging from simple agreements on overtime work to the temporary reduction of the agreed-upon normal work hours through work time accounts. Focusing rigidly on the completion of the number of work hours without focusing on performance does not increase flexibility.

4.4.1.2 RISK AND SECURITY

This capability cluster represents measures to increase the flexibility in risk and security, with the objective of developing flexible structures for responding to risk-oriented issues. This objective is also supported by the flexibility design principles. As current business processes strongly depend on a secure information flow within and across processes, firms, and countries, measures to enhance the risk and security capabilities are vitally important.[112]

The modularity design principle can be used for firms' risk and security frameworks. A modular structured framework supports its objective-oriented usage. In general, security frameworks, such as COSO and Cobit, provide a variety of best practices for various topics.[113] The modular structure frees firms from having to implement one comprehensive method. Instead, they can select the most suitable components of each framework, which they may further customize to their specific needs. For example, a firm can add more control objectives to a certain criterion (e.g., security, quality, or integrity) if they focus on that criterion within the framework.

The modularity design principle may be extended to additional instruments of the risk and security capability cluster. The usage of additional frameworks for business continuity management or identity management may benefit from the advantages of modularity.

Firms can enhance the successful usage of these frameworks through the organizational learning design principle. The mere implementation of such a framework in itself adds no value to the firm. A framework must be self-tuning

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[112] For a detailed description of the business requirements, cp. section 2.2.2.
[113] For an overview of these frameworks, cp. e.g., Huber, 2009.

over time to become successful. The need for a well-defined risk and security framework is widely acknowledged, but the frameworks must be developed over time. Organizational learning supports increased employee awareness of possible issues. In this theory, organizational learning becomes the process of identifying risk and security issues and successfully coping with them. Through experience and learning, employees increase their awareness of new vulnerabilities, which the firm may additionally support with an incentive system.

The redundancy design principle can relate specifically to risk and security supporting IT systems as well as associated roles in their management. Supporting IT systems (enterprise security suites) may provide services of data loss prevention, cloud security, messaging, or mobile device security. As with other IT systems, modular design of risk and security supporting IT systems may increase their flexibility. Furthermore, the design of risk and security management using redundant systems enhances the overall flexibility potential. With redundant IT systems, the IT function can respond to a wide range of changing risks or security issues. Redundant virus walls or firewall systems are suitable for quick response to increasing demand, and different IT systems with the same objective may have different technical standards. For example, viruses that one IT system fails to detect can be found and handled by the other, increasing the capacity to respond to new threats rapidly and effectively.

The design of redundant roles as well as redundant IT systems can support achievement of the greatest flexibility potential. Establishing risk and security countermeasures requires the creation of roles (e.g., compliance officer and data quality board). Establishing a redundant role structure enables more flexible response to unforeseen events. If one role holder cannot perform the required tasks, a cross-trained role holder can take over. Of course, a smooth exchange of ole holder can occur only with full information transparency. The redundant allocation of roles also increases resource flexibility within the IT function, which depends on how quickly the IT function can mobilize its resources in different processes or how quickly they can reconfigure their resources to meet specific needs.

Measures for further increasing the flexibility potential of this capability cluster can relate to the reconfiguration capability measures of the people and organization cluster.

4.4.1.3 INFRASTRUCTURE AND OPERATIONS

As part of the flexibility enhancement of the capability cluster infrastructure and operations, let us focus on the need for modular architecture and modular software applications. Firms currently use diverse IT systems to perform different tasks and services, usually independently of each other. Isolating each application prevents a high level of integration with loose coupling of individual modules. In contrast to isolated systems, SAP software modules can interact, with each module offering different services and independent tasks (e.g., FI, CO, HR), thus enabling creation of an integrated IT system by coupling these modules.

Additionally, networked systems containing individual modular components may extend a firm's flexibility potential. Networked systems comprise individual modules that can be organized in accordance with dynamic environmental conditions. In comparison with hierarchically structured IT systems, networked systems are more flexible and provide significantly higher adaptability. Thus, a modularly designed IT system from a single manufacturer may be unnecessary.

On the basis of common frameworks and interfaces, additional loosely coupled modules can extend the functionality situational. A high degree of standardization (e.g., interfaces, data exchange formats, delivery services) also increases the flexibility potential, as does the usage of open source software. Using existing source code, future software may be freely adapted to the firm's requirements. Open source software can serve as a foundation module for commercially developed software; for example, many embedded systems such as home routers and mobile phones use the open-source Linux operating system.

In addition to the IT systems' modular architecture, the redundancy design principle plays an important role. For example, redundant data may be used, and the IT systems architecture may apply the redundancy design principle.

Providing redundant data especially supports data handling when unforeseen security threats arise. Thus, lost data on one physical storage unit may be updated from backup on another physical memory device. Redundant data does, of course, have its downside. To ensure the data's timeliness, it must be synchronized regularly across all storage devices. The operation of several physical storage devices for a constantly increasing amount of data incurs monetary expenditures. It is not only possible for data to be maintained redundantly, but IT systems may also be implemented redundantly. Therefore, single functions provided by the IT system are similarly redundant, allowing operational business continuity at peak periods or if individual components fail (business continuity). Using virtualization and cloud services further enhances this redundancy.

Within this capability cluster, the organizational learning design principle serves to identify and assess new trends and technological updates. The objective of this identification and assessment is the interpretation of "weak signals."[114] Technological trends should be assessed in terms of their development, future performance, availability, user acceptance, and possible negative impacts. The assessment should also record the impact times of technological trends. Thus, the firm can initiate countermeasures to avoid certain negative developments. In addition to potential risks, firms should also identify opportunities that possible trends present. Firms that can enhance technological trends and innovations faster than competitors gain an increased competitive potential (Specht, Menke and Behrens, 2005).

4.4.1.4 PROCESSES

The flexibility of the IT function's established processes may be further developed by applying the related design principles. The modularity principle exists within processes that comprise separate components, modules, or sub-processes. Depending on the scope of tasks, the process stakeholders may be assigned accordingly. The process chain decomposition supports requirements reduction for the various participants within the process.[115] Stakeholders can then work on smaller sub-tasks of the process. Smaller sub-tasks can simplify transmission of individual tasks to other employees. The ability to transfer smaller sub-tasks to other employees increases the capacity to respond quickly to changing conditions.

Distribution of individual sub-tasks may be observed in answering requests at the user help desk. If the current responsible instance cannot answer the user's request appropriately, the next sub-task of the process is initiated and request is

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[114] For further information about weak signals, cp. Ansoff, 1975.

[115] For an overview of modularity within the organizational concept of Taylorism, cp. Picot, Reichwald and Wigand, 1998.

moved to another instance. When the request has been answered satisfactorily, the entire process terminates with the last instance.

The decomposition and schematization of processes is particularly useful for unique standards or best practices, supporting the initial design and initiation of the process. They also provide greater security to the process participants because if the participants know a similar process (e.g., purchasing process) from other functions, the parties involved will suffer no learning obstacles. Therefore, processes with similar process objectives should be similarly implemented in different functions.

To obtain the advantages of this design principle, the processes must be institutionalized in the IT function by, for example, implementing a process management method. The ideal objective is to replace the normal functional organizational structure through a process-oriented design of the IT function (Picot, Reichwald and Wigand, 1998).

The support of modular, firm-specific processes requires customized technical solutions. As a comprehensive approach, let us consider the process-oriented modularization of IT architecture. The flexible integration of services and processes for IT products helps the IT function to improve its flexibility by using a service-oriented architecture. Service-oriented integration involves point-to-point connection of applications and services through well-defined interfaces, focusing on the reuse of existing, modular application components.

The redundancy design principle can also support this capability cluster. Increasing process redundancy requires different employees or organizational units that use different processes with the same process objective. For example, all business functions can request IT services through parallel processes: by phone, online, or personal contact.

Through process-oriented knowledge management, organizational learning can support flexibility by placing knowledge in the process context. The representation of the knowledge facilitates the understanding and application of the process. Therefore, it seems reasonable to use process-related knowledge to increase process flexibility. Stakeholders can thus quickly understand and apply changed or new structured processes (Haarländer, Schönherr and Krallmann, 2005).

Let us consider further measures for extending the reconfiguration capability within this capability cluster. For example, the scope of process rules or general administration rules can be reduced. Excessive process rules with long decision-making processes using the traditional chain of command leads to inflexibility when responding to market dynamics, and it increases transaction costs (cost of coordination) within the firm. Process rules simplification may therefore create space for situationally defined procedures, although rules simplification does not, of course, mean the complete elimination of process rules.

Another strategy for increasing the reconfiguration capability is to allocate certain assets (e.g., data centers, mass printers) to a public or private contractor for a limited time. Although this operator model increases flexibility by transferring fixed costs to an external operator, it may also transfer the market risk in extreme cases. This flexibility does, however, incur a higher fee to the operator. Nevertheless, an operator model enables the IT function to easily adapt to new tasks and services, and the external operator has the responsibility of integrating individual customer adjustments into certain assets (Wildemann, 2005).

4.4.1.5 PROJECTS

As projects have their own form of organization, existing measures for increasing the flexibility potential of other capability clusters can be reused.

Projects offer a strong flexibility potential by taking on and completing new (unique) tasks for the firm, by expanding the project results to other working areas, and transferring the project results to the hierarchical organization at the end of the project.

The flexibility of executing and organizing projects is also based on the modularity principle by designing the relevant project elements such that they are interchangeable and expandable. This principle can be applied particularly to methods and frameworks that support project management. Thus, frameworks are used to refer to only those tools or processes in the framework that are actually needed for the given project. For example, only the processes of the PMI framework (Project Management Institute, 2010) may be applied as necessary for a specific project (e.g., the processes of the knowledge area “communication”). Methods supporting project management, however, impose a clear sequence of necessary integral steps that must be followed, although they can certainly adapt to a project's requirements.[116]

Even the organization of the project itself may be subject to the modularity design principle. Its modularity may be founded on its subprojects, work packages, or activities. These modular structures facilitate the short-term reconfiguration (e.g., for scope change) and simplify capacity scaling by duplication of individual modules.

A project itself can be understood as an organizational module within the firm's organization. The project organization's largely department-wide structured dictates a specific personnel composition.

The advantage of interdisciplinary project teams is that each project team member can learn from other employees and other departments, including other work areas, processes, or best practices. Within the firm's organizational context, these interdisciplinary project teams function as an autonomous work group. As the measures of the people and organization capability cluster (e.g., flexible working hours, subcontracting) are applicable here too, the flexibility potential may increase.

As an element of designing project structures, the redundancy design principle may also expand flexibility potentials. Redundancy may be integrated in guidelines and policies, work relationships, tasks and assignments, and qualifications as part of the project work (Horstmann, 2006). Redundant guidelines and policies may develop by, for example, having substantively identical rules and policies or by admitting informal settlements. The development of informal guidelines requires a rule of efficiency, which in turn enables the employees' situational adaption of the guidelines and policies for certain ad-hoc requirements.

Because projects are not "naturally" anchored to the hierarchical organization, the creation of purposeful interfaces (e.g., regular meeting days, participation in department meetings) between the project and other department or organizational units is an important measure. Creating these redundant working relationships vitally increases the opportunity to share information and knowledge, enabling the early recognition of flexibility needs.

[116] Cp., e.g., the Prince2 methodology. See Office of Government Commerce, 2009.

Redundant task execution, for example, in the form of parallel central project management offices (PMOs), supports the project manager in executing project tasks (e.g., monitoring project risks, financial controlling). Redundant execution of individual tasks provides the advantage of increasing the speed of action through a situational approach and by accelerating approval processes.

Redundancy of the team members' qualifications is another means of increasing the flexibility potential. Essentially, having broad-based employee qualifications increases their flexibility for alternative tasks, and that advantage must be balanced against the cost of employee development and qualification.

A project's organizational learning can be enhanced by its organizational integration within the firm. Organizational networking is supported by purposefully created formally or informally approved interfaces among separate organizational units that serve to exchange information and knowledge. Examples include idea workshops, brainstorming, and inter-disciplinary committees. Team members may serve as "linchpin", representing their units and assuming information and representation responsibilities (Horstmann, 2006).

Finally, let us address two measures that support the reconfiguration capability design principle. Following the reconfiguration capability principle, individuals or project teams are equipped with sufficient competence for a predefined area of responsibility. Analogous to the people and organization capability cluster, this principle increases the potential for team members' self-regulation of their project activities. To achieve this outcome, employee responsibilities must not be strongly regulated and should provide a fundamental choice among situational actions. The employee's transferred competencies should always relate to the assigned tasks.

The reconfiguration capability can also be additionally supported by the appropriate use of planning instruments. The increasing complexity and dynamic environmental conditions in projects make it challenging to positively identify and control all of the project's internal and external relationships. Scenario management can serve as a planning instrument for considering multiple futures. Unlike traditional forecasting instruments, scenario management supports several possible future trends, permitting alternative development scenarios in the calculation (Hernandez and Wiendahl, 2005).

4.4.1.6 INNOVATIONS

The increase in complexity of innovations and need for faster adaptable innovations has led to flexibility in innovation management becoming a critical success factor for firms.[117]

Having implemented innovation management, the most significant design principle for enhancing flexibility is represented by the organizational learning design principle. To raise the flexibility potential of the pure, functional process of innovation management, firms can apply the flexibility measures of the processes and the people and organization capability clusters. These measures support the basic requirements for a flexible process and for process participants.

In their book *Super-Flexibility for Knowledge Enterprises*, Bahrami and Evans (2005) used the example of Silicon Valley to describe how flexibility supports the development of innovation. During the last 30 years, Silicon Valley firms have developed innovative products and technologies that influenced the global economy. The authors asserted that the Silicon Valley ecosystem[118] provides an anchor of stability that start-ups can use as a source of innovation. This ecosystem adapts to new realities, challenges, and opportunities through a re-configuration process. They described various roles that participate in the process of knowledge-generation and the innovation process (e.g., emerging start-ups, investors, universities, and specialized groups of lawyers, accounts, and consultants). As one important pattern, Bahrami and Evans noted that each of these components is modular and autonomous. Similar to species in a biological ecosystem, these components share a common climate of ground rules and operating norms. Thus, the ecosystem can withstand external influences and disturbances.

The composition of the flexibility design principle as described by Bahrami and Evans can also be used within the IT function to support the ability to increase the capability of innovation management.

Diverse actors and participants in a firm's innovation process contribute to modularity. Participants in the innovation process can be IT employees, manag-

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[117] For a detailed description of this capability cluster, cp. section 2.2.6.

[118] This term may be defined as a "community of independent players that operate inter-dependently, feed off, compete, and collaborate with one another, and that operate within a common climate." Cp. Bahrami and Evans, 2005.

ers, internal clients, or external stakeholders. Each decentralized participant contributes to the generation of new ideas, and their involvement helps to generate new ideas in many business departments. As the generation of ideas is not limited to one central organizational unit, more experiences can be involved, and the decentralized discussion of new ideas enhances the idea generation process. To foster this process, the IT function can contribute to the establishment of personnel, topic-related networks within the organization. Such networks channel employees and topics, and the involvement of many employees and organizational units in the process of innovation increases process redundancy. As every employee can contribute to the innovation process, the process should also be initiated by the idea-generating employees. An excessive bureaucratic burden would complicate the introduction of new ideas.

One critical ingredient in the climate necessary to generate new ideas, as described by Bahrami and Evans (2005), is a pioneering spirit and relentless work attitude. To achieve this climate, the IT function must provide a work environment that encourages innovation.

Automation and freeing employees from routine tasks provides freedom for innovation. The design of incentive structures that honor suitable innovations and new ideas provides another useful instrument supporting organizational learning. Differentiated innovation KPIs can support the control of such incentive structures.

4.4.1.7 SERVICES

The provision of services represents the main purpose of the IT function in firms. IT services should provide a set of functions that support business processes or business activities.[119] Therefore, they are the main components in supporting the ability to react flexibly to changing business requirements. To increase their flexibility, the flexibility design principle can also be applied.

When considering IT service flexibility, internal customers have expressed a growing demand for customized services at a low internal cost. The modularity design principle can be used to meet this requirement. Therefore, the development and delivery of IT services largely depends on strong modularization of IT

[119] For a description of current challenges in IT services, cp. section 2.2.7.

service features and components that can be combined in the greatest possible variety.

This objective can be achieved by a two-stage design of IT services. Technical services provided by the IT function are presented and categorized as technical products. A variety of technical products can be combined into one IT service offered to the business functions. For example, the technical products Oracle or DB2 databases are encapsulated in the IT service "databases." Hosting the z/OS or SPARC system can be encapsulated in an IT service "server capacity."

Module combination offers the advantage that internal customers need not know the names of the technical products. The internal customer simply submits a business requirement (e.g., provision of 2 TB of storage). How the IT function provides the business requirement depends on the decision and setup of the IT function itself. By using module combination, the IT function retains the ability to use other modules or another combination of modules to fulfill the business requirement. Thus, the IT function and its service provision remain flexible.

The concept of IT service modularization also allows the reduction of complexity during the early stages of service development. The decomposition of a service into discrete modules (or technical products) supports decoupled development tasks, significantly reducing the complexity of single tasks. As the interactions between individual modules are largely reduced to interfaces, the number of interdependencies between the modules that must be taken into account by the developer also decreases (Kersten and Kern, 2005).

The redundancy design principle can be used to enhance volume flexibility, which has the objective of adjustment of the existing "production volume" of changing market demands for quantity. Note that a rapid adjustment of the production volume of IT services directly affects the satisfaction of internal customers by, for example, avoiding bottlenecks during an unforeseen increase in storage demand. Redundancy can be increased while increasing the number of alternative usable technical products (e.g., Oracle or DB2 databases) (Wildemann, 2005).

The organizational learning design principle supports the IT function's ability to predict future behavior on the basis of past environmental conditions. This capability reflects a change in the IT function's knowledge base. Knowing specific conditions, the IT function can, for example, respond to cyclical fluctuations in demand (e.g., reduced demand for e-mail services during the holiday season). The flexibility-increasing effect of organizational learning enables the IT function to increase its action flexibility by accessing its experiences in the knowledge base.

The reconfiguration capability design principle consolidates the first three design principles by supporting the rapid adaptation of existing IT resources to new environmental conditions. By using the coordination flexibility of employees, existing resources can be organized and used in a new manner, for example, in configuring the IT services. This outcome requires that the employees have appropriate learning skills (organizational learning); however, as resources are allocated differently, the resource itself must also be flexible. The availability of redundant resources supports using resources in a new manner because individual resources can support different IT services (e.g., multi-qualified IT employees, databases for different IT systems).

4.4.1.8 CONTROL AND FINANCE

This cluster's flexibility potential resides largely in the usage of financial resources. The IT function's general budget and the budget for individual projects falls within IT's financial resources. Nevertheless, the IT function's potential flexibility is mainly determined by the firm's opportunities to achieve financial flexibility.

In quantitative terms, financial flexibility, which is the ability to access and restructure its financing at a low cost,[120] exists when financial resources can be increased in the short term to respond to unforeseen external impacts. Financially flexible firms can avoid financial distress in the face of negative shocks and readily fund investment when profitable opportunities arise (Gamba and Triantis, 2008).

Therefore, firms can realize flexibility potentials on the assets side of the balance sheet through bank deposits, cash, or working capital, and on the liabili-

[120] Gamba and Triantis also found that firms with more flexible financial resources can partially compensate for high-cost external financing. This finding suggests that financial flexibility and monetary investments are, to some extent, equivalent to each other. Cp. Gamba and Triantis, 2008.

ties side by unutilized lines of credit or raising equity capital. Horstmann (2006) notes that these potentials may remain unidentified by financial accounting.

Regarding the redundancy design principle, financial resources are often identified as the firm's most flexible resources. Ghemawat and del Sol note that financial resources can be used by any firm for any purpose (Ghemawat and del Sol, 1998) and can thus be classified as a universal flexibility potential.[121] The availability of capital on short notice strongly influences the degree of flexibility potential. The short-term availability of capital can be expanded by increasing credit limits, demanding shareholder contributions, and deferment of payment periods. Other forms of financing, such as mezzanine capital, can also increase flexibility potential. Mezzanine capital is defined as neither exclusively debt nor entirely equity (Schink, 2011) and can be designed flexibly in terms of return rates, repayment terms, and other agreements (Slamanig, 2004).

The flexibility of budget planning also plays an important role. In the redundancy and modularity design principles, a top-down/bottom-up planning approach can serve to gather relevant planning data. On one hand, the IT function management performs the planning, defining goals and budgets for IT organizational units. On the other hand, these organizational units (e.g., storage hosting product management, IT-PMO) use a bottom-up planning approach to plan the activities for their specific working environment. A more reliable budget plan can be developed by consolidating these unit plans.

Regarding the modularity design principle, leasing[122] or outsourcing instruments increase the flexibility potentials by enabling business function requirements to be scaled on short notice, such as the demand of maintenance services from an external service provider and the outsourcing of data networks or enterprise applications (OVUM, 2010).

The organizational learning design principle is somewhat adaptive to financial resources, such as convertible bonds, which are initially characterized as a liability, depending on the contractual arrangements (e.g., in response to an underlying stock price), but can later be converted into equity capital. Horstmann (2006) notes that flexibility potential can also be increased by the conversion of

[121] Supporting this argument, see also Horstmann, 2006.
[122] For a description of leasing as a flexibility instrument, cp. Bellmann, 2005.

receivables through factoring or sale-and-lease-back transactions. Another instrument that supports organizational learning is represented by stakeholder-oriented management reporting. This instrument supports, on one hand, the ability to customize the management reporting to the specific stakeholder (e.g., CIO, CFO). On the other hand, interchangeable KPIs representing cause-and-effect relations support customization. The balanced scorecard[123] by Norton and Kaplan provides a good example of stakeholder-specific management reporting. The structure and KPIs are fully interchangeable within the balanced scorecard to address stakeholder needs and foster organizational learning. In addition to the design of a stakeholder-specific management reporting, the analysis of market trends plays an important role. Analyzing market trends can increase awareness of possible impacts on IT function's requirements. To increase organizational learning, the analysis results can be integrated into the balanced scorecard, thus enhancing feedback to firm's management as well.

For reconfiguration capability, financial resources can increase flexibility potential if they can be automatically converted. Depending on the dynamic environment, specific types of capital can be converted, such as convertible bonds as borrowed capital which can be converted into equity capital at the current stock price. A credit account's variable interest, which depends on market dynamics, can also support IT flexibility potential (Horstmann, 2006).

4.4.1.9 COMMUNICATION

The existing flexibility potential can also be increased within the communication capability cluster. The IT function's communication within the firm is complex, comprising a variety of messages, communication channels, and stakeholders (e.g., external suppliers, internal customers). Design principles can also serve to enhance the flexibility potential within this capability cluster.

The modularity design principle can address the IT requirement to tailor communication content. A modularly designed communication concept supports stakeholder-oriented communication. Different components can be communicated regarding specific events, such as server failures, regularly scheduled mainte-

[123] For further information about the concept of the balanced scorecard cp. Kaplan and Norton, 1992.

nance, or information about specific software upgrades. Communication of regularly recurring events that must be communicated within the firm can be prepared for individual modules in advance. These prepared modules can be used by IT employees on short-notice. An extensive coordination regarding the communication content as well as obtaining the relevant decisions can be dispensed.

Apart from the modularity design principle, redundancy also increases flexibility potential. On the basis of the modular communication concept, stakeholders must be reached in their preferred manner. Modern technology constantly changes communication methods. Wikis, chats, communities, blogs, or video conferences serve as communication platforms. The selection of the "right" technology increases the ability to reach stakeholders. As each communication receiver is distinct, the IT function should use redundant communication channels and platforms. For example, the communication of failures or software upgrades can be communicated via e-mail to the specific stakeholders and in the IT function blog to increase the likelihood that all stakeholders receive the message regardless of their communication preferences.

Regarding the reconfiguration capability, a cross-department communication enables IT employees to recognize the different ways of thinking, expectations, and requirements that business functions communicate. Through cross-department communication, participants expand their horizons, and this broader understanding by IT employees increases the function's flexibility potential. Flexibility wins can be achieved by the IT function as well as by the firm as a whole. Cross-department communication enhances flexibility when, for example, developing new IT services. Adequate coordination between the IT function as service provider and the business functions as internal customers is necessary because regular communication enables all parties to attain a mutual understanding of challenges. This understanding shortens development time and can detect possible failures at an early stage, leading in turn to increased flexibility through time savings and cost savings for all participants.

Another instrument that supports freely adjustable communication is decentralized communication, which enables the IT function to provide stakeholder-specific information. Each organizational unit of the IT function can communicate its specific information. For example, the organizational unit in charge of risks and security issues can independently communicate information regarding its topic. This approach provides shorter reaction time, fewer approval stages, and less process traffic.

Cross-department communication supports organizational learning as well as reconfiguration capability. The regular exchange of information between the IT function and business functions increases organizational learning. The understanding of other opinions, expectations, and impacts increases the IT function’s knowledge base, which stores the accrued experience. An increased knowledge base that underlies decision processes supports the IT function in adapting possible solutions and recognizing behavioral patterns. Such support increases flexibility by increasing the speed of decision making and of reacting to unforeseen events. Furthermore, accrued experiences can be used to structure the IT function’s communication. Value-reporting required by the business functions can be set up with the accrued information. In addition to the understanding of the relevant content, a wider understanding of the available communication platforms can also be obtained, which in turn supports providing the communication content via the “right” communication platform.

Internal communication as well as cross-department communication supports organizational learning and increases the IT function’s knowledge base by supporting the increase of experiences. The ability to communicate clearly within the IT function expands the knowledge and experience of all employees and develops their ability to react quickly to new situations and challenges. Therefore, the employees’ communication abilities should be improved on a regular basis.

4.5 EMPIRICAL ASSESSMENT OF DERIVED MEASURES

The previously derived flexibility measures have been assessed using an online survey.[124] The participating IT managers rated each derived measure in the capability clusters regarding their usefulness in enhancing IT function flexibility. Figure 9 summarizes the online-survey results, reporting the individual flexibility measures related their capability clusters and flexibility design principles. The figure also illustrates the survey participants’ ratings of the individual measures.

[124] For a detailed description of the method used, please refer to ch. A.2, p. 154.

Figure 9: Overview of ranking of the flexibility measures rated[125]

Ranked flexibility measures in regard to design principles

Required IT capabilities (Capability clusters)

	Redundancy	Modularity	Organizational learning	Reconfiguration capability
People & Organization	4. Multiple qualifications 5. Deputy arrangements 9. Integration of resource pools 10. Usage of temporal work	2. Modularly designed training concept 11. Modular restructuring of tasks	7. Evolutionary strategy development 8. Knowledge increase through experts	1. Increased degree of freedom 3. Flexible working hours 6. Job enrichment
Risk & Security	3. Parallel supporting IT-systems 2. Multiple holders for specific roles	5. Modular structured Risk & Security frameworks	1. Increase employees' awareness 4. Integration of incentive systems	
Infrastructure & Operations	4. Redundant stored data	1. Modular architecture of IT systems	3. Identifying and assessing technological trends	2. High degree of standard-ization 5. Usage of open source as development platform
Processes	7. Similar processes with equal process objectives	2. Decomposition of process chains 4. Process Institutionalization 1. Service-oriented processes	3. Support of a process-oriented knowledge management	5. Operator model for specific assets 6. Reducing process rules
Projects	4. Redundant task execution 1. Redundant working relationships		2. Organizational networking	3. Transferred responsibilities to project teams 5. Scenario management
Innovations	4. Involvement of all employees	6. Decentralized idea generating of all organizational units	2. Automation/elimination routine tasks 5. Incentive structures incl. adequate KPIs	1. Working environment allowing innovations 3. Reduced bureaucratic burdens
Services	1. Individual IT services for internal customers 2. Redundant "production volumes"			
Controlling & Finance	4. Realizing credit limits 7. Mezzanine capital	2. Top-down/ button-up planning 3. Planning with modular plans	8. Convertible bonds 6. Sale-and-lease-back 1. Stakeholder-specific reporting	5. Variable credit interests
Communication	3. Different communication plattforms providing the same content	3. Preparation of individual communication modules	1. Increasing inter-functional communication 2. Improved employee's communication abilities	

The rank was assigned on the basis of the participating IT managers' assessments, identifying the flexibility measures as having very low to very high impact on IT function flexibility.

Sections 4.5.1–4.5.9 explain in detail how the participating IT managers rated the individual measures for enhancing flexibility.

4.5.1 PEOPLE AND ORGANIZATION

Figure 10 reports the flexibility measure ratings for the people and organization cluster, several of which stand out. Among all the flexibility measures for this cluster, more than 53% of respondents indicated that increasing the degree of freedom, a modularly designed training concept, and multiple qualifications have

[125] A similar overview of flexibility measures has been published in *HMD* journal. Cp. Wiedenhofer, 2013.

the highest impact on increasing IT function flexibility. In comparison to the flexibility measures of other capability clusters, these three flexibility measures received the largest percentage of high and very high ratings clearly demonstrating that flexibility can be improved mainly by the employees. The high ranking of the measure of increasing the degree of freedom reveals the importance of self-determination in the IT function. However, the responses are distributed differently among the IT function areas. Respondents working in project management identified lower importance for this measure, with only 9% of those respondents rating it as highly influential on flexibility in comparison to other IT areas. However, respondents working in overall IT management identified this measure's primary importance, with 47% of those respondents rating the degree of freedom as highly important for flexibility.[126]

Responses regarding flexible working hours also confirm this finding. More than 33% of all respondents indicated that flexible working hours have a very high impact on enhancing IT function flexibility. At 34%, this measure received the highest proportion of response for a very high impact on flexibility in this capability cluster. As a group, working in the IT management field gave it the highest rating as more than 32% indicated a very high influence on flexibility. This proportion of respondents indicating the highest rating is closely followed by respondents working in control (20%) and project management (19%). But only 9% of respondents acting in other areas indicated a very high influence of this measure.

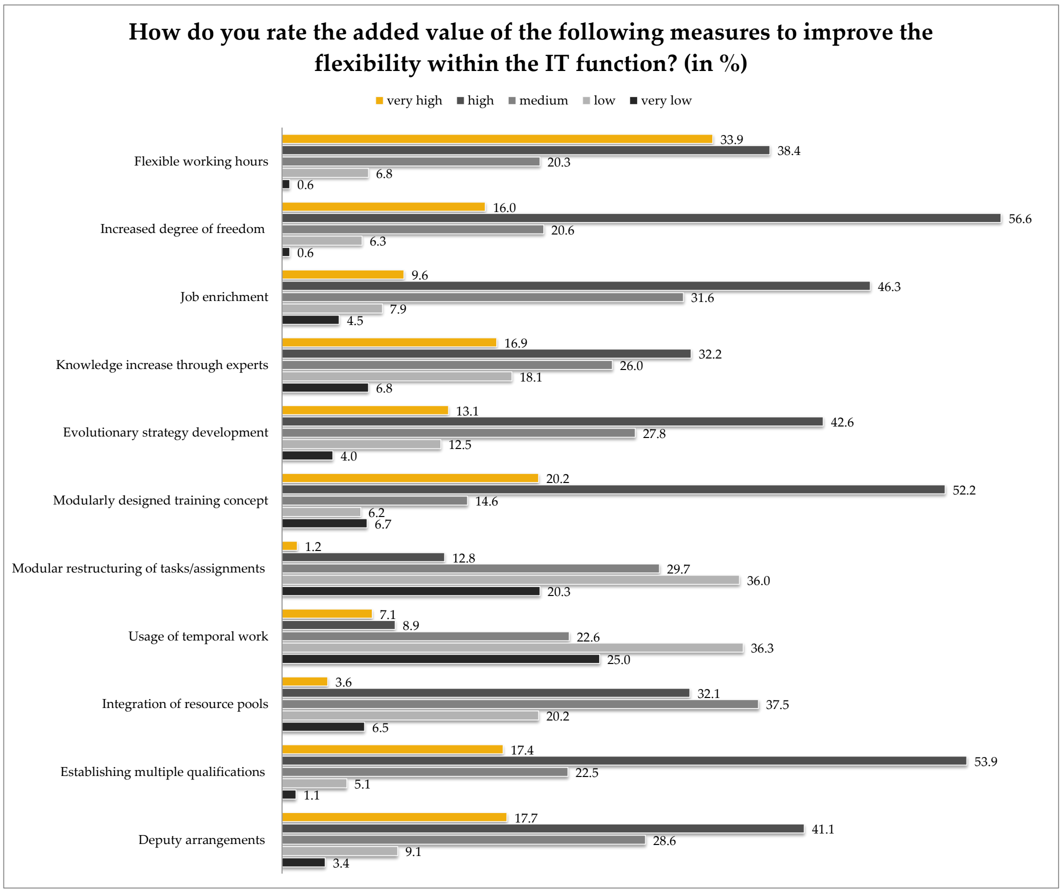
However, another 38% of the respondents indicated a high impact for this measure. Thus, more than 72% of all respondents in total confirm this flexibility measure's importance. Implementing flexible working hours enables employees to manage their work hours for their existing workload.

Responses also confirm the importance of self-determination for establishing multiple qualifications. Respondents seem to recognize that IT employees with multiple qualifications can work anywhere within the IT function. For example, multiple qualifications allow them to work as an IT product manager or an

[126] The overview of the detailed figures may be found in Chapter A.2.5.3. The figures relate to the percentages in the measure. Generally, these figures do not represent the figures in the specific area of IT function unless otherwise indicated.

IT project manager. For environmental dynamics, respondents have a wider range in which to allocate their employees' skills. An individualized training curriculum supports multiple qualifications; thus, modularly structured training that supports the needs of each individual in the IT function has been rated as important, with 52% of all respondents indicating that modularly structured training supports flexibility highly. 20% of the respondents indicated a very high impact on flexibility.

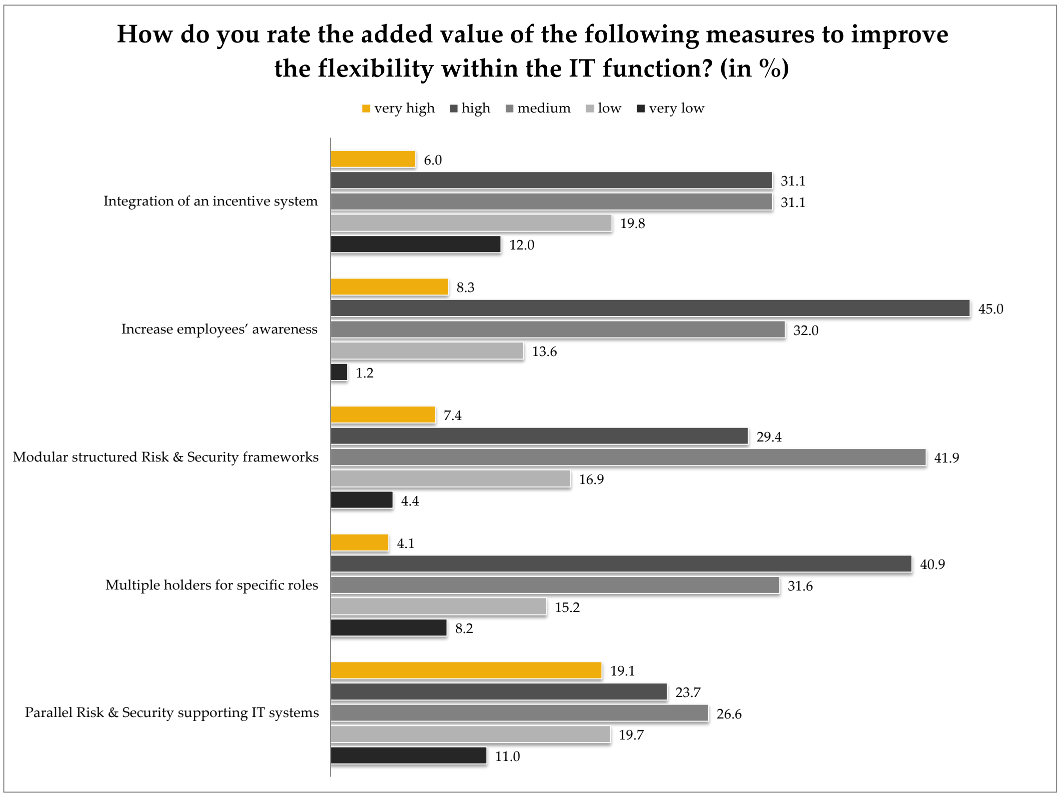
Figure 10: Flexibility measure ratings: people and organization



4.5.2 RISK AND SECURITY

Figure 11 reports the respondents' assessment of flexibility measures for the risk and security cluster. Their rating indicates that increased employee awareness has a special significance. Forty-five percent of all respondents reported that increased employees' awareness has a high impact on improving flexibility for risk and security topics. This sounds reasonable because users or IT employees can quickly identify irregularities in their work environment. However, the employees themselves can sometimes inadvertently cause security incidents. Security incidents can be caused by, for example, employees' storage devices (e.g., USB-drives) infected with malicious software. Especially in dynamic environments, security threats can vary in type and intensity. As IT employees act as efficient early indicators, their increased awareness provides more flexibility. This is also supported by the responses regarding the integration of an incentive system. Establishing an incentive system can further increase IT employee awareness because it directly benefits them. 37% of respondents indicated that integrating an incentive system for risk and security awareness improves their flexibility. Furthermore, 41%, mostly those in overall IT management, identified the added value of multiple holders of specific roles as another measure that highly affects flexibility. More than 42% of such participants attributed a very high impact to this measure (39% of such respondents indicated a high impact). Respondents who work in the project management field also supported the value of multiple roles, with 29% of project managers indicating its very high impact on flexibility. This rating seems reasonable as employees who have held multiple roles have a wider range of utilization. Nevertheless, the disadvantages must be acknowledged. To have several roles, employees require prior training or continuing education, and IT employees must be able to fulfill each role's expectations.

Figure 11: Flexibility measure ratings: risk and security

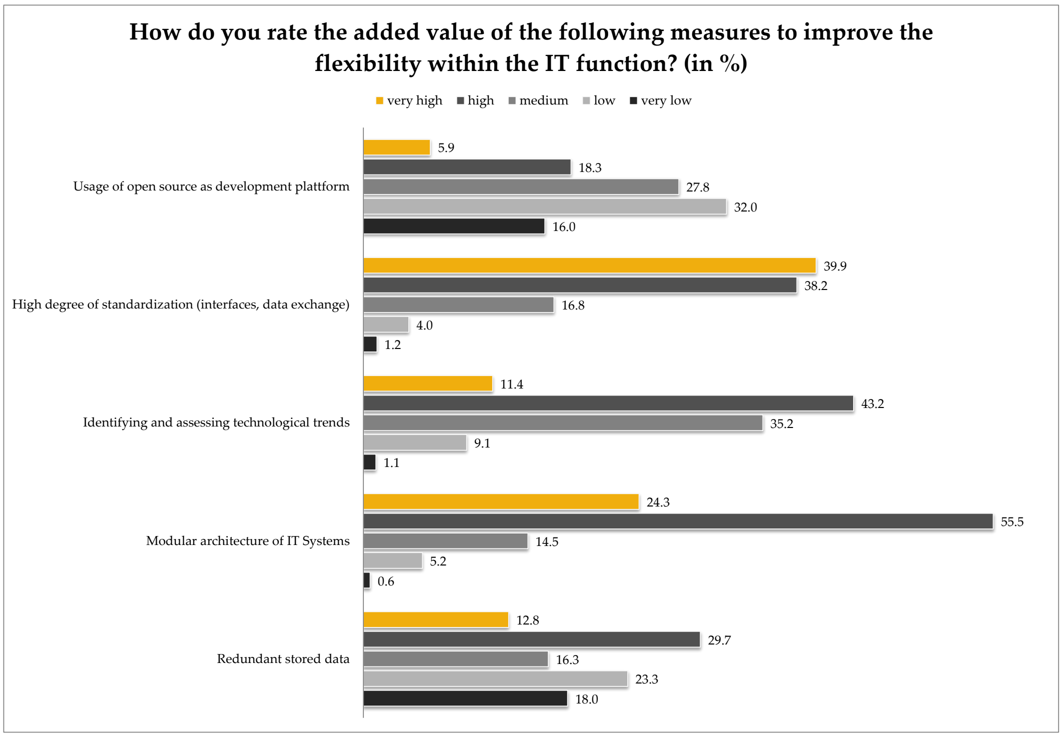


In addition to human aspects, respondents attributed to modular structured risk and security frameworks a significant impact on improving IT function flexibility (e.g., Grundschutz by the German Federal Agency for Security in Information Technology). Respondents use modular structured frameworks to adjust the framework to meet their requirements. Its modularity and decoupling of individual modules allow quick adjustments that do not affect other modules, thus supporting flexible response to external influences. Forty-two percent rated this measure as having a medium impact, and 29% indicated a high impact on flexibility. These values largely reflect the perception of respondents in the control and IT management fields.

4.5.3 INFRASTRUCTURE AND OPERATIONS

Figure 12 reports the respondents' assessment of flexibility measures for the infrastructure and operations cluster within which one measure stands out. More than 55% of all respondents indicated that a modular IT system architecture highly supports IT function flexibility. This figure largely represents the ratings by respondents working in the control field (24%) and management (37%), with almost 16% in other units. This rating is easy to understand as modularity is one of the flexibility design principles. Because many IT systems or programming IT frameworks innately have a modular design (e.g., SAP systems or Java frameworks), respondents have already benefited from their flexibility. A quarter of all respondents rated modular IT systems architecture as having a very high impact on flexibility. More than 28% of respondents working in the development field supported this rating. 29% of such respondents indicated a very high impact.

Figure 12: Flexibility measure ratings: infrastructure and operations



In second place is the measure regarding the identifying and assessing technological trends. IT managers seem to be aware that the usage of new technologies provides comprehensive advantages and supports the firm in achieving its business objectives. Forty-three percent of respondents indicated a high impact on their IT function flexibility, and 10% rated it has having low to very low impact on flexibility. Fifty-six percent of the IT managers working in the user help desk field indicated that they observe only very low to low impact of this measure.

Almost 80% of all respondents observed that a high degree of standardization of interfaces, data exchange formats, and other elements ease the interaction of different IT systems. As a variety of firms have many different IT systems, easy interaction and easy coupling helps them improve their flexibility. However, this perception is not shared by respondents working in control, 57% of whom indicated a low impact of standardization on flexibility.

The respondents' ratings of open source platforms seem inexplicable in the context of other response distributions. Almost 76% of the respondents rated such platforms as having a very low to medium impact on IT function flexibility. In total, 48% of the respondents indicated a very low to low impact. At first glance, open source products deliver many advantages as they can be adapted to the IT functions' needs. However, open source products have disadvantages, including future security threats or immature products that cannot be compared with commercial software.

For the last measure, "redundant stored data," the responses do not provide a uniform picture. Almost 43% of respondents rated this measure as having a high to very high impact on flexibility, but 58% indicated only medium to very low impact. Categorized by IT function area, 39% of respondents working in IT management, 21% working in control, 7% working in project management, and 14% working in other areas indicated a medium influence for redundant stored data.

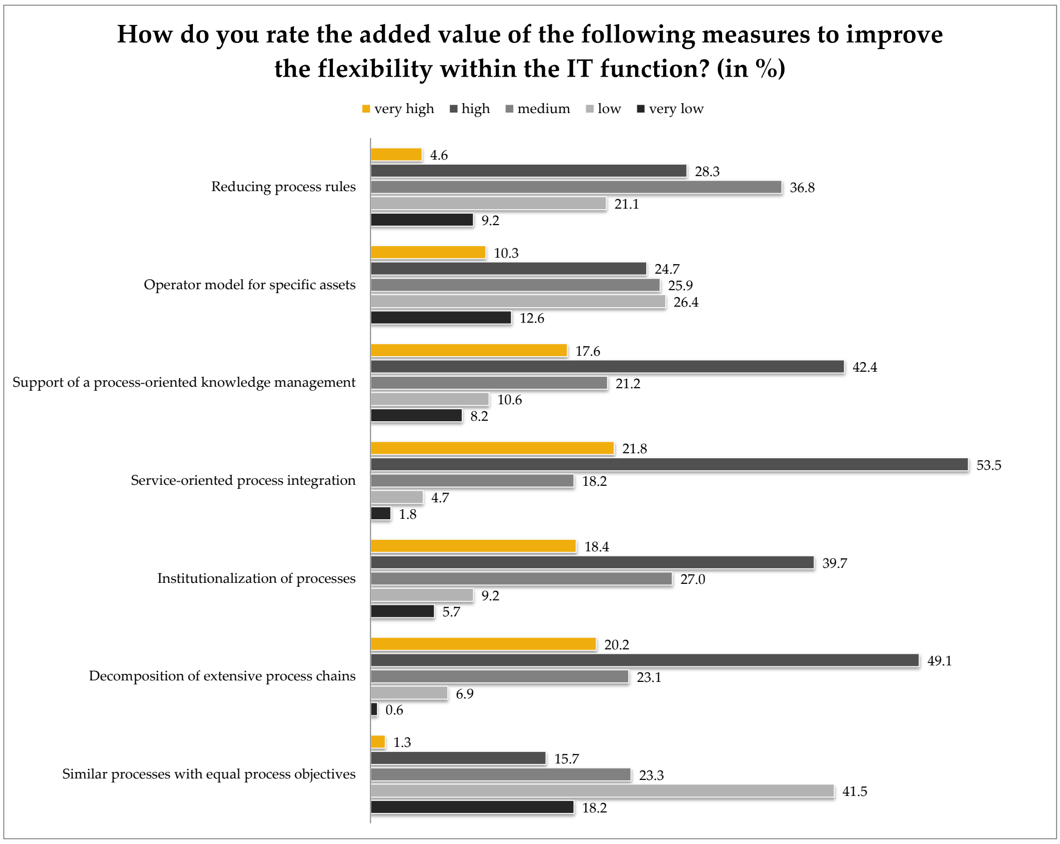
4.5.4 PROCESSES

Figure 12 reports the respondents' assessment of flexibility measures for the processes cluster within which three measures stand out. Almost 54% of the respondents rated service-oriented process integration as having a high impact on IT function flexibility. Modularly designed services can support processes in a wide spectrum of applications, thus enabling reorganization of services and processes to respond to external environmental influences as needed. Twenty-two percent of respondents indicated a very high impact on flexibility. This percentage largely reflects the perception of respondents working in IT management

(43%). In this capability cluster, service-oriented process integration received the largest percentage of ratings as having very high impact on flexibility.

The second highest-rated measure for impact on IT function flexibility is decomposition of extensive process chains. Because process chains consist of main and sub-processes, they also have an innately modular design. Through decomposition, firms can separate extensive process chains into smaller pieces so that processes can be tailored to the needs of the process owners. Small modules can be arranged in accordance with IT functions' responses to environmental dynamics.

Figure 13: Flexibility measure ratings: processes



Almost 70% of all respondents rated this measure as having a high to very high impact on flexibility. Seventy-one percent of respondents in development and 50% of respondents in IT management indicated a high impact on IT flexibility. The demand for institutionalized processes also emphasizes this measure. Almost 60% of respondents answered that institutionalized processes through process management supports the improvement of IT function flexibility. Twenty-seven percent shared this opinion and indicated a medium impact on flexibility. Here, the main indications come from respondents working in development, IT management, and control. Institutionalized process management can also support process-oriented knowledge management. Forty-two percent indicated a high impact and 18% reported a very high impact on flexibility by implementing process-supporting knowledge management. In contrast, 65% of the respondents demanded the reduction of process rules as they indicated a high to medium impact on flexibility. These results suggest that institutionalized processes must be balanced between bureaucracy and the respondents' demands. Processes that are excessively institutionalized limit the IT managers' "breathing room" (flexibility). Together with the responses for the people and organization capability cluster, these percentages reveal that the IT employee, his actions, decisions, and knowledge comprise the core of flexibility efforts.

An unclear picture emerges, however, for the measure regarding different operating models for specific assets, such as outsourcing specific IT processes (e.g., printing pay slips). The advantages for flexibility enhancement are not unique to the respondents, possibly because each operating model suffers disadvantages. For example, if outsourcing (including offshore providers) does not provide the expected value, possibly because of the changing technological environment, that decision is reversed. Cloud-computing also increases the possibilities for changing IT processes.

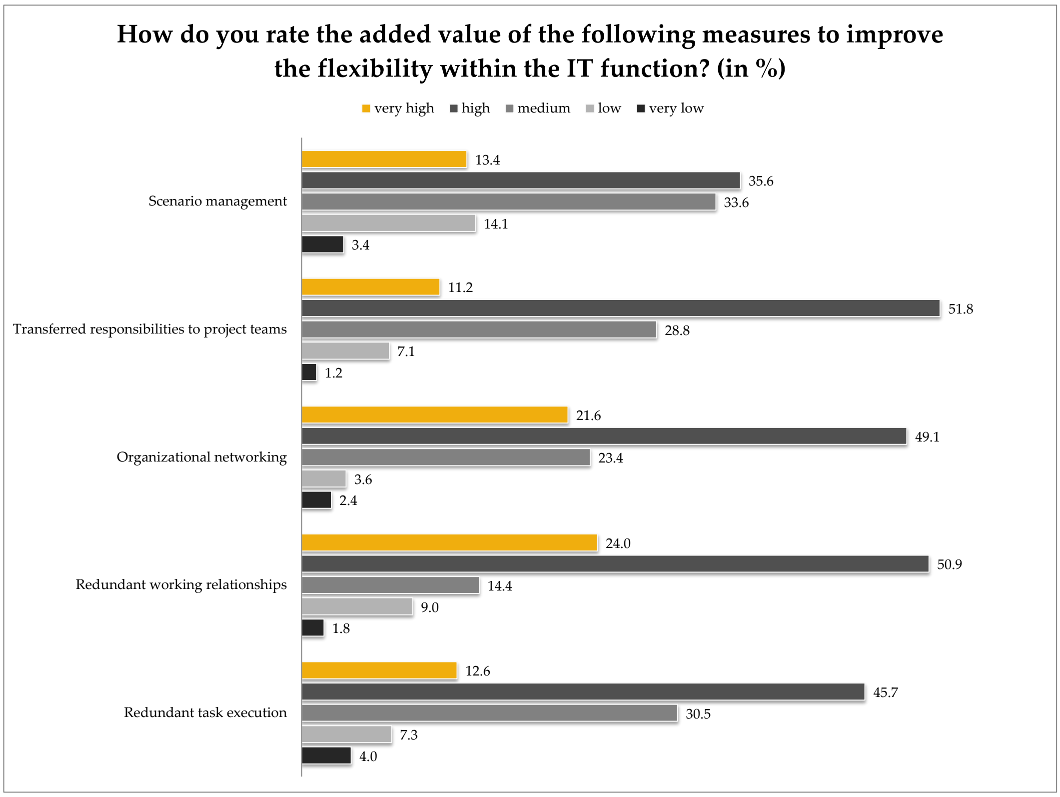
4.5.5 PROJECTS

Figure 14 reports the respondents' assessment of flexibility measures for the projects cluster, wherein approximately 50% of respondents rated three measures as having a high impact. The greatest percentage (52%) of respondents rated the measure of responsibilities transferred to project teams as having a high impact to improve flexibility. If IT employees in the project team are given greater responsibility, they might become more flexible. This rating strongly assumes that firm conditions are adequate for employees' decision-making power. This focus on IT employees once more supports IT managers' recognition of IT employees as a significant driver of IT flexibility, as demonstrated in the previous capability clusters.

Analyses of respondents' ratings of other measures demonstrate that organizational networking, including communication, was rated by 49% of respondents as having a high impact on IT flexibility. Fifty-one of respondents indicated that redundant working relationships highly support the enhancement of IT flexibility; this largely reflects the high rating by 71% of respondents in the development field. This interpretation may result from redundant communications supporting the exchange of more information, thereby deriving greater project transparency for all stakeholders. With more information on the development project, stakeholders can react more flexibly to difficulties and information asymmetries may be reduced. These statements may also be reinforced by the measure of improving the organizational networking. Almost 75% of the respondents identified a high to very high impact of organizational networking on flexibility enhancement. Again, it can be assumed that the exchange of information and the creation of trusting relationships have a high priority. Especially in project business, these activities improve the flexibility of the participants.

Thirdly, 51% of respondents indicated that redundant task execution highly supports flexibility. In particular, this means that project administrative tasks that the project manager himself would have performed are taken over by, for example, a PMO or other project assistance staff. This transfer of administrative tasks enables the project manager to focus on key project activities, providing him more time for decision making and thus flexible action.

Figure 14: Flexibility measure ratings: projects

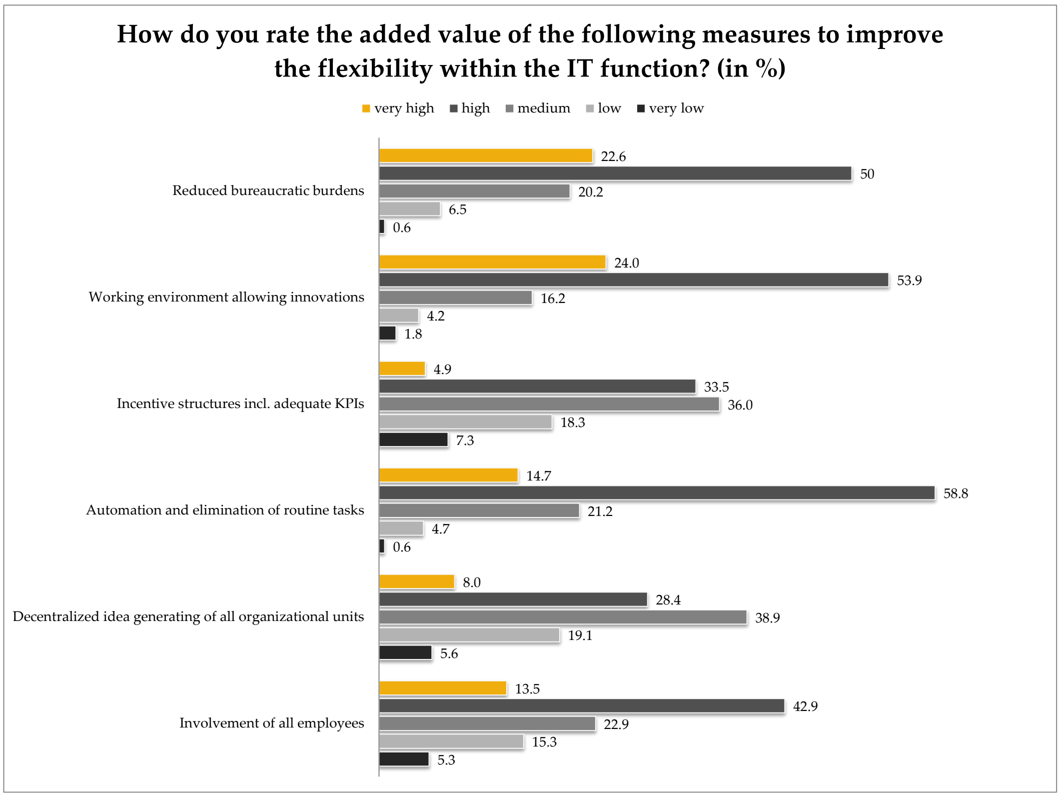


The managers' responses to the impact of scenario techniques are divided. Thirty-five percent of respondents indicated a high impact on IT flexibility, and another 34% indicated only a medium impact. This uneven distribution can also be found among the areas of the IT function. Roughly 4% percent of the respondents working in the IT management field indicated only a very low impact of scenario techniques on IT flexibility, whereas 50% observed a high (37%) to very high (13%) impact. More clear is the distribution in the IT function of controlling. 52% of respondents in that field indicated a medium impact, and 10% rated this measure as having a very low or low impact on IT flexibility. These distributions can be explained by the different experiences of the participants, not all of whom have had wide experiences in the usage of scenario techniques.

4.5.6 INNOVATIONS

Figure 14 reports the respondents' assessment of flexibility measures for the innovations cluster, wherein approximately half of the respondents rated four measures as having a high impact on flexibility. Almost 59% indicated that the automation and elimination of routine tasks highly supported the flexibility of innovations, with 15% rating this measure as having a very high impact on enhanced flexibility. These figures largely represent the perception of respondents working in the IT management field. Fifty-seven percent of all responding project managers identified this measure as having a high impact on IT flexibility (very high: 17%). These responses are understandable for the development of innovations. Innovations can occur only if the participants have sufficient empowerment and time to think about innovation or to follow the prescribed innovation process. The automation and elimination of routine tasks relates closely to the reduction of bureaucratic burdens in submitting innovations. Half of the respondents observed that bureaucratic burdens impede employee innovations. A variety of different forms, applications, and long testing and approval processes in the firm prevent spontaneous expression of innovative ideas. More than 22% of respondents rated reducing bureaucratic burdens as having a very high impact on flexibility. Respondents working particularly in the project management (40%) and IT management (18%) fields indicated this value.

Figure 15: Flexibility measure ratings: innovation



More than 53% of respondents commented that an adequate working environment supports innovations in the firm, and 24% of respondents identified this measure as having a very high impact on flexibility. The technical areas of the IT function (e.g., development, operations, and testing), however, reveal a different picture. Only 8% of respondents in these areas indicated a high impact on IT flexibility. The method of designing a working environment that encourages innovation certainly merits discussion. Rigid processes and a negative attitude toward innovations in the corporate culture do not encourage innovation.

The fourth measure, which more than 56% of respondents rated as having a high to very high impact on flexibility, was the involvement of all employees in innovations. Less than half of the respondents consider employee involvement critical in the development of innovations. The processing of innovations should not be limited to special functions or people. The assessment of this measure is also supported by the responses to another flexibility measure, the decentralization of idea development. Nearly 40% of the participants assess the impact of this measure on flexibility as medium; 28%, however, rated it as having a high impact on flexibility.

Furthermore, nearly 70% of the respondents acknowledge the value of incentives, indicating a medium to high impact of an incentive system for innovations on IT flexibility. Twenty-six percent of the participants rated it as having only a low to very low impact on flexibility. Incentive systems help IT managers to establish and track their IT employees' goals for innovation, making IT employees' participation mandatory.

4.5.7 SERVICES

Figure 15 reports the respondents' assessment of flexibility measures for the services cluster. For the measures derived, this capability cluster is likely to be smaller; nevertheless, the respondents rated certain measures as having a high impact on flexibility. The influence of individual, modular IT service on IT function flexibility is rated high by 41% of the participants. Sixty percent of participating user help desk IT managers indicated a high impact. Thirty-four percent of all respondents perceived a medium impact from this measure. More than 6% even identified modular IT services as having a very high influence on enhancing the IT function's flexibility. Considering the constant conflict between business requirements and the available IT services, this response pattern of the IT managers is understandable.[127] IT services that can be adjusted flexibly should reduce this conflict. By using flexible IT services, the IT function can structure services to the specific needs of internal customers. Modularity supports this customization.

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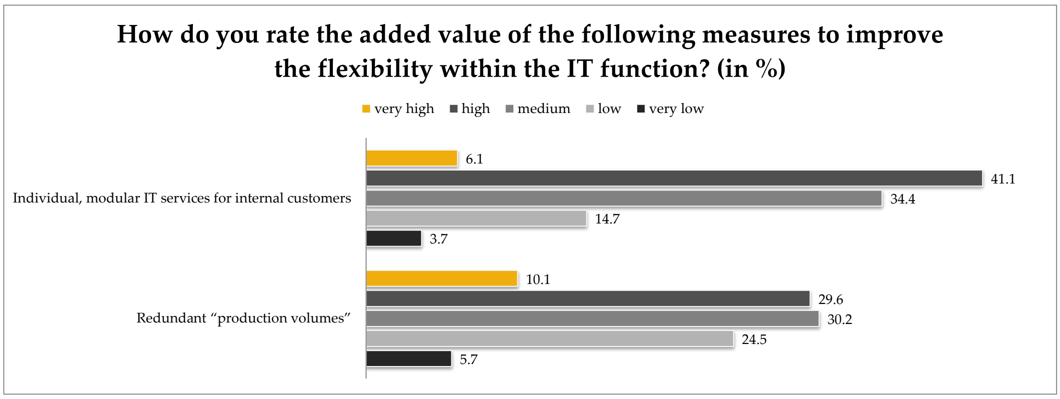
[127] For further information in regard to IT business alignment, cp. e.g., Tarafdar and Qrunfleh, 2009, and Schwarz et al., 2010.

Figure 16: Flexibility measure ratings: services



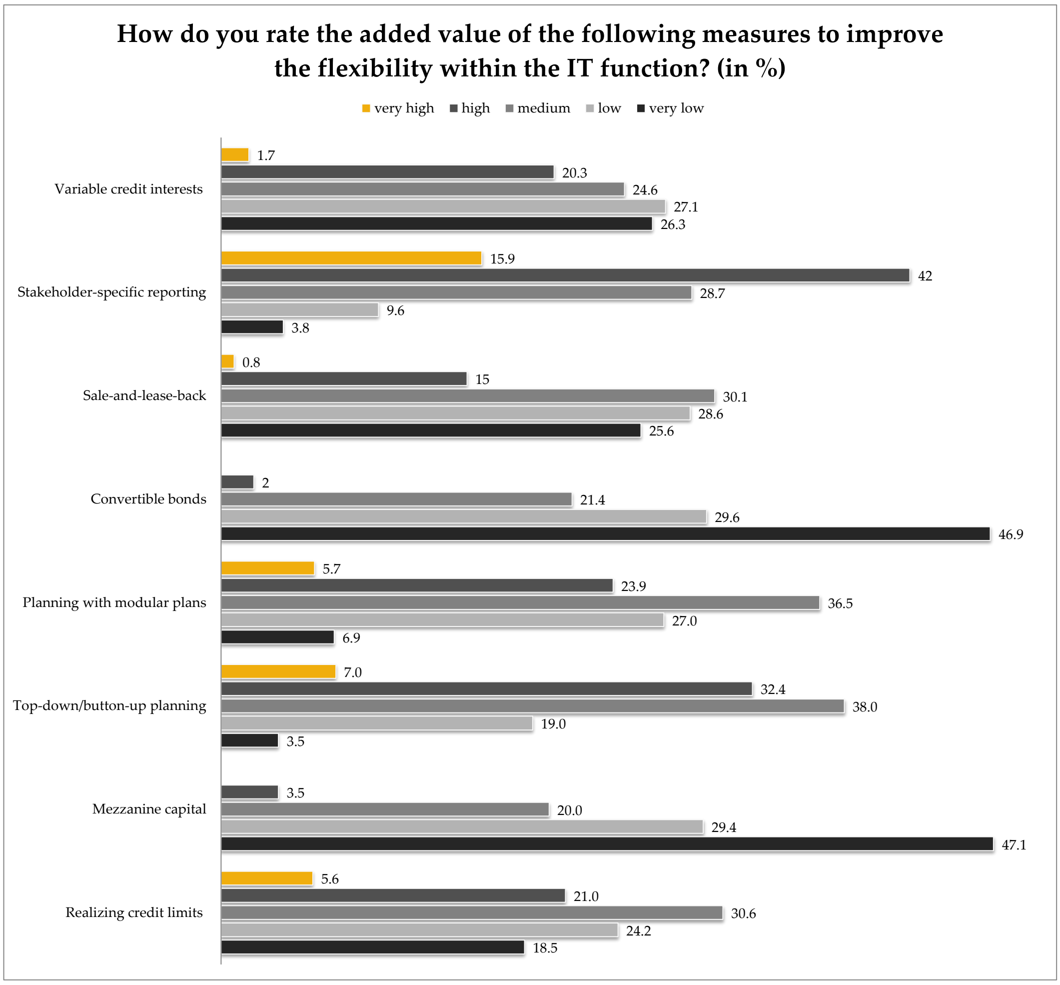
In addition to modular IT services, respondents observed that redundant production volumes and storage capacity help them to increase their flexibility potential. Providing redundant storage enables IT services to respond quickly to demand peaks, which in turn responds to a dynamic environment in a timely manner. Roughly 30% of the respondents attributed to this measure a high impact on IT flexibility, 10% indicated a very high impact, and another 30% indicated medium influence. The distribution of 70% of responses across medium to very high impact demonstrates that IT managers find this measure important for flexibility.

4.5.8 CONTROL AND FINANCE

Figure 17 reports the respondents’ assessment of flexibility measures for the control and finance cluster. Many respondents indicated that financial measures have a very low impact on IT flexibility. This distribution is understandable because the IT function usually operates within the firm and has no independent financing. Mezzanine capital and convertible bonds in particular are not considered measures for increasing IT function flexibility, with nearly 50% of respondents indicating very low influence on flexibility. Especially those respondents working in the technical areas of the IT function rated those measures as having a very low impact on IT flexibility. These measures, which were inspired by Horstmann (2006), certainly focus primarily on the flexibility of the firm as a whole and less on the flexibility of the IT function. In addition to convertible bonds and mezzanine capital, sale-and-lease-back and variable interests are rated by respondents as having a very low impact on IT flexibility.

More than 54% indicated very low to low influence for sale-and-lease-back measures, and 53% indicated very low to low impact from variable interests. In contrast, almost 47% of the participants indicated that sale-and-lease-back measures have a very high to medium impact on IT flexibility. These opinions are shared across all areas of the IT function. For the reasons discussed, this result is understandable. In addition to the measures having little influence on flexibility, participants also observed effective measures in this capability cluster, although even these measures' ratings are not as high as the average measures in other capability clusters.

Figure 17: Flexibility measure ratings: control and finance

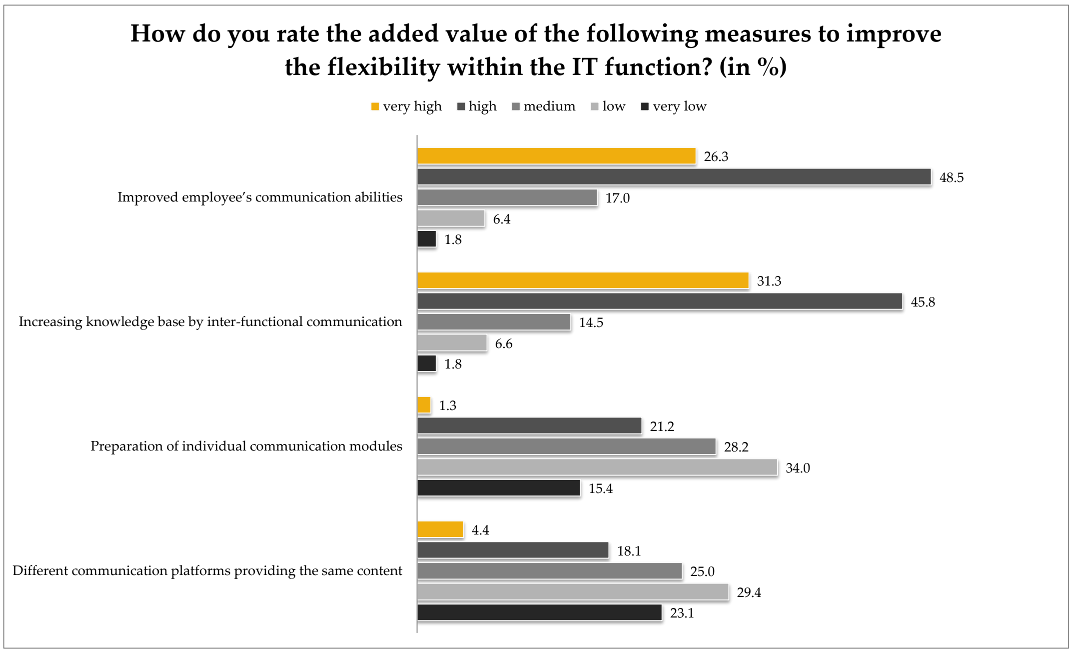


Stakeholder reporting and the two planning measures stand out as positively affecting flexibility. Forty-two percent of respondents indicated that stakeholder-oriented reporting has a high impact on IT function flexibility. This result is understandable because it is necessary to obtain transparent and comprehensive information to be able to initiate measures for flexibility. Thus, it is important to provide adequate KPIs in the stakeholder reporting. In addition to the design of stakeholder reports, the planning process is considered as a way to enhance flexibility. A planning process that uses a top-down and a bottom-up approach is evaluated as having a very high (7%) to medium (38%) impact on enhancing flexibility by more than 77% of respondents. This counter-current process allows more valid planning because it encompasses both bottom-up and top-down planning and, at its completion, consolidates the resulting redundant information. The use of modular plans also supports the validity of planning. Almost 37% of respondents indicated that modular plans have a medium impact on flexibility, and nearly 30% indicated a very high (6%) to high (24%) influence of modular plans. Integrated in a counter-current process, modular planning increases the validity of planning as IT employees craft their separate area plans, and the overall planning process consolidates those results.

4.5.9 COMMUNICATIONS

Figure 18 reports the respondents' assessment of flexibility measures for the communications cluster, within which two flexibility measures stand out. Almost 49% of respondents identified the improvement of employee communication abilities, and almost 46% identified inter-functional communication as key measures to increase flexibility. Moreover, 26% and 31% of respondents indicated a very high impact on flexibility for employee communication abilities and inter-functional communication, respectively. In contrast, respondents working in the control field did not identify this measure as adding value to flexibility. In overall, forty-six percent of the respondents working in the control field indicated a low impact of the improvement of employee communication, and more than 60% of this group indicated a very low (33%) to low (27%) impact on flexibility in regard to the improvement of inter-functional communication. Twenty-seven percent of the respondents in the field of project management share this opinion, indicating only a low impact of inter-functional communication on flexibility.

Figure 18: Flexibility measure ratings: communications



Most operational measures were rated rather low by the respondents, only 21% of whom indicated a high added value to flexibility by the preparation of individual communication modules. These pre-established communication modules can be used individually and in diverse combinations for internal and external communications. Thirty-four percent of respondents rated these modules as having a low impact on flexibility. Half of all respondents working in the user help desk field estimated a low to very low influence on flexibility by prepared communication modules, and gave similar ratings to different communication platforms with the same content. To reach a wider range of employees, firms can use several channels for internal communication. Providing the same information on multiple channels increases the probability of reaching their employees and enhances effective information distribution. However, only 23% of respondents rated this measure as having a very high and a high impact on flexibility. More than half of the respondents observed only a low or very low impact to IT function flexibility. Specifically, a quarter of all respondents working in IT management field and 75% of respondents in the operations field indicated a very low impact.

Considering all responses, the distribution of answers within this capability cluster reconfirms that IT managers identified IT employees as critically important to flexibility, surpassing the importance of operational measures. In this capability cluster, IT managers identified comprehensive communication as a key measure for increasing flexibility.

5 IT VALUE AS AN EVALUATION OBJECT

5.1 ECONOMIC PERSPECTIVE OF VALUE

For centuries, philosophers, sociologists, and economists have attempted to craft a useful and meaningful system that allows people to understand the concept of value and better define the value[128] itself.

Oerter (1978) defined values,

"as an internal or internalized concept (…) that contributes to the perspective from which we see the world and behave in it. The surrounding culture determined by the value system is closely connected with settings and is often identified with them."

Oerter defined abstract characteristics imprinted on the individual by the society. Rosenstiel (1987) defined "these individually identifiable reference points" as values. Balog and Cyba (1986) found that values play a central role in evaluation processes, representing standards and measures assigned to actions, objects, or goods and indicating positive or negative attributes.

Despite the aforementioned definitions of value, two basic approaches have been applied in business administration. One approach focuses on the cost of goods and the second approach on their utility. Many value theories attempt to combine both approaches, especially regarding the utility of goods (Luschnig, 2009).

For the utility of goods, Bartsch and Schlagwein (2010) defined value as a transformation process described by its resources, the process of production, and its outcome or value. Schultze extended this definition with a subjective perspective, describing the value of a good as individual benefit evaluations. Schultze

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[128] The term "value" may be used as a model term only. It represents an approximate size of an objective defined within a decision model, from which the psychological meaning of the value of needs satisfaction must be differentiated. For a further discussion of the theoretical term "value," also see Schneider (1995).

(2001) argued that economic value is not an inherent property of the goods themselves; rather, it is the relationship of each individual party to the specific good. Thus, the value differs from party to party, and each party's perspective becomes significant. This subjective evaluation theory[129] rests on the decision-theoretic theory of investments (Cp., e.g., Serfling and Pape, 1995; Perridon and Steiner, 1999), wherein the value of the specific goods equals the marginal price[130] to a potential buyer. At this marginal price, the potential buyer feels indifferent to other investment alternatives and sets the standard through opportunity costs (Ballwieser, 1999). Exceeding this price would be irrational as rejection of a higher price would yield a greater benefit. The value determination depends on an individual party who attempts to maximize his individual value within his target system.[131]

5.2 DEFINITION OF IT VALUE

5.2.1 IT VALUE PROPOSITION IN ACADEMIC LITERATURE

The academic research on the added value of the IT function has long been discussed in the German and Anglo-Saxon regions. Empirical research on the IT value proposition is primarily based in the Anglo-American region.

Such research is often conducted under the term "business value of IT." In German-speaking countries, IT value is also expressed as, for example, performance, efficiency, effectiveness, benefit, or productivity. Aspects of IT value are sometimes summarized under the term of IT Control (Schmid, 2008). Research on the IT value proposition can be traced back to the discussion of the IT productivity paradox, which remains unresolved (Remenyi, Money and Bannister, 2007).

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[129] Barthel is critical of the subjective evaluation theory. As a representative of the comparison-based evaluation theory, Barthel proposes setting the price on the basis of a benchmark. The pseudo-accuracy of other evaluation approaches may be excluded as the value relies on a market price. Cp. Barthel, 1996. Ballwieser (1997) disagrees.

[130] Ballwieser asserted that the objective value can only serve as the lower limit. The marginal price should be clearly differentiated. Cp. Ballwieser, 1995.

[131] This study later examines whether any value can be identified on the basis of an evaluation method.

Although a variety of evaluation methods attempt to measure IT value in different contexts, many offer no clear definition and comprehensive understanding of the evaluation object (Bannister and Remenyi, 2000). Cronk and Fitzgerald (1997) noted that sometimes the definition of IT value is the same as its measures. They further assert that, frequently, no attempt is made to define IT value under the assumption that the reader has a similar understanding as that of the author (Cronk and Fitzgerald, 1997).

Pfeiffer (2003) asserted that the academic discussion of the definition of IT value originated with Cron and Sobol's 1983 article. Cron and Sobol (1983) investigated the relationship between computerization and firm performance.[132] Over time, further studies have been performed, producing a wide range of definitions. Thus, the definition of IT value remains problematic. Wisemann (1992) differentiated between value and benefits, asserting that values are both larger and more important than benefits.

Tallon et al. (2000) characterized IT value as "the contribution of IT to firm performance". This is also followed by Strecker (2008), who defines the IT value proposition as a positive or negative impact on firm performance. However, the definition and measurements of firm performance must be made separately according to Strecker. Brynjolfsson and Hitt were more precise, focusing on the dimensions affected by IT value. They argue that one component of IT value is its ability to enable organizational investments that can have a significant impact on processes, work practices, and productivity growth or on intangible products characteristics such as convenience, timeliness, quality, and variety (Brynjolfsson and Hitt, 2000). Bartsch and Schlagwein (2010) narrowed the definition to a process-oriented perspective. They described the IT value proposition as a contribution to documenting process objectives. Kohli and Grover (2008) broadened the focus and followed Brynjolfsson and Hitt in emphasizing that IT value could manifest itself in many ways, such as productivity, process improvements, profitability, and consumer surplus, or through improvements in supply chains or innovations. They asserted that IT value can manifest itself at many levels. Gammelgard et al. described this manifestation through two perspectives. They ar-

[132] They found that the IT function has a positive impact on firms' performance, but this impact depends on the adequate use of computerization.

gued from the business management perspective, emphasizing that investments in information technology are expected to bring benefits in the same dimensions as other investments: higher margins, improved customer satisfaction, and improved efficiency. They then asserted that from the technical perspective, the quality of information systems is important and can be expressed by functionality, availability, performance, and security (Gammelgard, Ekstedt and Gustafsson, 2006).

Seddon et al. followed the subject-oriented evaluation theory, emphasizing the individual perception of IT value, wherein the success of information technology as a value depends on each stakeholder's judgment (Seddon, Staples and Patnayakuni, 1999). Thus, IT value can be differentiated among different stakeholders. Mitra et al. also emphasized this individual perspective, focusing on measurement of IT value by performance metrics on dimensions that stakeholders find important (Mitra, Sambamurthy and Westermann, 2011).

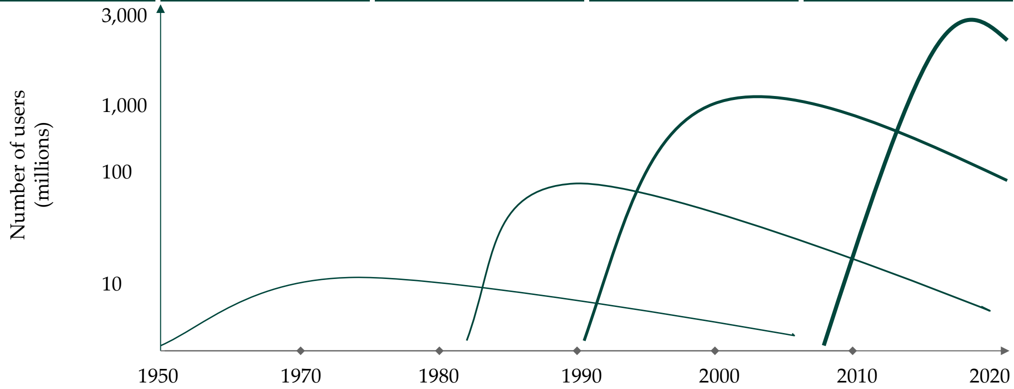
Dünnebacke et al. emphasized the monetary aspect of the IT value definition: total monetized IT-induced value effects (Dünnebacke et al., 2009).

Because of the numerous definitions and absence of a distinct definition of IT value, Pfeifer's definition remained general. He asserted that IT value can be defined broadly as the IT function's overall support of the firm's business (Pfeifer, 2003).

5.2.2 HISTORICAL EVOLUTION OF IT VALUE EVALUATION

The illustration in Figure 19 of approaches to defining the IT value proposition depicts how the value of information technology and its evaluation have changed over the years. To understand this conceptual change, Pfeifer proposed characterizing the historical evolution of information technology. In agreement with Moschella (1997), Pfeifer (2003) separated the evolution into four stages: system-centric, pc-centric, network-centric, and content-centric convergence eras.

Figure 19: Stages of IT evolution



Stage of evolution	System-centric 1950 - 1984	PC-centric 1985 - 1990	Network-centric 1991 - 2006	Content-centric 2007 - today
Technology Focus	▪ Data center	▪ Internal LANs	▪ Public networks	▪ Transparency
IT-Value Focus	▪ Efficiency	▪ Productivity	▪ Customer service	▪ Virtualization
Expected benefits	▪ Costs reduction	▪ Costs reduction	▪ Organizational improvement	▪ Flexibility improvement
Evaluation methods	▪ ROI, NPV ▪ IRR, …	▪ TCO ▪ Lifetime costs, …	▪ IT-Balanced Scorecard, …	▪ Frameworks

Source: According to Moschella, 1997 and Pfeifer, 2003

5.2.2.1 DATA PROCESSING, 1950–1984

In the early 1950s, the first computers strongly affected business computing. These systems were used primarily to process large-scale numeric tasks such as invoicing or payroll (Remenyi, Money and Bannister, 2007). Until the mid-1980s, the first stage of evolution was marked by the capacity and limitations of the computer itself. The primary objective was to increase computer performance. Grosch investigated the ratio between PC performance and costs, and found that the performance and the costs of a PC correlate positively (Friedewald, 1998). On the basis of this principle, IT investments concentrated on operating mainframe computers. The organization of the IT function followed the organization of mainframes. Thus, the IT function was usually centralized (Krcmar, 2005). Schmid estimated that in that era, PCs comprised roughly 20% of business employees' equipment (Schmid, 2008).

During this period, academic research focused mainly on information technology and its implementation within the organizational structure (Cp., e.g., Hak Chong Lee, 1964; Foster and Flynn, 1984; Baum and Burack, 1969). Nevertheless, cost avoidance and cost reduction remained a central focus, with the main advantage of implementing computers considered to be their initial costs. Finance oriented metrics such as ROI[133], NPV[134], and IRR[135] have been used to identify the potential advantages of acquiring computers (Remenyi, Money and Bannister, 2007).

In one of Gallagher's early publications regarding evaluation literature (Gallagher, 1974), he developed a method for determining the monetary value of a management report calculated by information technology. This method captures user perception expressed via semantic differential techniques. Gallagher demonstrated that the value of information technology depends on the separate contributions of the report design and its organizational position.

Ackhoff was one of the first theorists who expressed doubt regarding the value of information technology. He questioned theorists' general assumption regarding computers' added value. Ackhoff challenged the assumption that managers are better able to make decisions with the support of management information systems and the diverse information they provide (Ackhoff, 1967).

5.2.2.2 THE PC, 1985–1990

Microcomputers introduced the possibility of distributed processing. Although the first microcomputers were produced in the late 1960s, smaller firms could afford their own computers only some years later (Remenyi, Money and Bannister, 2007). Low initial costs enabled organizations to increase the use of distributed processing. Microcomputers allowed smaller tasks to be managed separately, a phenomenon known as downsizing (Krcmar, 2005). Moore's law

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[133] ROI is calculated by dividing the annual net profit derived from the IT investment by the total cost of the IT investment. Cp. Remenyi, Money and Bannister, 2007.

[134] Net present value is the sum of all discounted cash flows derived from the IT investment. Cp. Ibid., p. 6.

[135] Internal rate of return describes the discount rate that yields an NPV of zero. Cp. Ibid., p. 6.

replaced Grosch's law. Moore predicted a doubling of the hardware price-performance ratio every 12–18 months (Krcmar, 2005).

During that period, computers could both perform rapid automated numeric calculations and gather management information. Porter and Miller's influential work described information technology as an enabler of competitive advantage. Concepts such as "total cost of ownership" or "lifetime cost" replaced traditional elements of cost control (Remenyi, Money and Bannister, 2007).

During this period, Teece published his convincing description of the value of technological innovation and analysis of make-or-buy decisions regarding competitive capacities in different environments (Teece, 1988). At the same time, Cron and Sobol also published their investigation of the relationship between computerized applications and firm performance measured by profits as a percentage of sales, return on net, or return on assets in the pharmaceuticals industry (Cron and Sobol, 1983). Their article marks the first attempt to identify more criteria for evaluating IT value, a research path that academics and practitioners continue to explore.

Wiseman (1992) was another pioneer in that area who developed an approach to evaluate information technology, describing an approach to analyze IT value within a firm. This approach integrates the business and technology domains and presents a scoring system, which Wiseman demonstrated practically in two case studies.

5.2.2.3 THE NETWORK, 1991–2006

The network era was characterized mainly by the entry of the Internet and networked interconnection among computers. Because of extensive technological progress, CPU processing time was no longer a scarce resource, but bandwidth was. With the increased use of networks, firms and people could collaborate more readily, and new business models and new customer services arose (e.g., online-shopping, e-commerce). The IT function became an increasingly significant element of the value chain (Schmid, 2008). IT began to be considered a value enabler that actively supports evolving business processes. During this era, the exploitation of computer resources to integrate information systems was considered evolutionary applications (Remenyi, Money and Bannister, 2007). Business process management and business process reengineering were elements of revolutionary information systems and have been described as major facilitators for transforming firms. To this, Bower and Christensen (1995) introduced the concept of disruptive technological innovation in this period, publishing major articles during 1995–1997. Within this concept they describe one of the most consistent patterns in business:

"the failure of leading companies to stay at the top of their industries when technologies or markets change." (Bower and Christensen, 1995)

Toward the end of the previous era, Hammer published a paper in the *Harvard Business Review,* asserting that the value of computers lies in their capability to enable managers to break away from routine tasks (Hammer, 1990). This reasoning was based on U.S. firms' belief that everything would work out well if they had the right product and service at the right time (O'Neill and Sohal, 1999). On the basis of this process-oriented concept, Soh and Markus (1995) crafted a process theory explaining how IT creates business value. Their research highlight IT usage and IT knowledge as intermediate outcomes.

During that era, other articles investigated the value of information technology. Barua et al. used a formal model to examine the strategic impacts of IT investments, focusing particularly on IT-related quality competition in a duopoly. They found that IT-inefficient firms have followership incentives whereas the leadership incentives for IT-efficient firms depend on their IT cost structure as well as on the degree of substitutability between the services of the two firms (Barua, Kriebel and Mukhopadhyay, 1991).

Weill (1992) investigated the relationship between IT investments and firm performance in the valve manufacturing industry and found that the relationship varies depending on the observation period. The strong usage of IT investments was found to have a significant relationship with firm performance over six-year studies. In the short term, however, heavy IT investments correlated only with relatively poorly performing firms.

Solow (1987) declared that he found no evidence for increased productivity from computer use. Brynjolfsson then analyzed this productivity paradox[136] in a

[136] The productivity paradox referred to the fact that the national productivity statistics did not seem to be affected by the sizeable IT investments in the U.S. Cp. Ibid., p. 10.

widely-cited article (Brynjolfsson, 1993). He noted the contradictive relationship between significant increase in computer power and relatively slow growth in macroeconomic productivity. Numerous studies and articles regarding this paradox have been published, both supporting (Brynjolfsson, 1993) and condemning (de Jager, 1995) the paradox. A few years later, Brynjolfsson admitted errors in his approach (Brynjolfsson and Hitt, 1995). In 2001, Dedrick and Kraemer (2001) assessed a variety of IT payoff studies and asked whether there might be a new paradox.[137]

After the turn of the millennium, research turned away from IT value measurement and investigated the dot-com bubble bursting. Bannister et al. asserted that the increasing investments in the IT function confirm that IT produces organizational value during that time.[138] Integrating the organizational perspective, Norton and Kaplan's[139] balanced scorecard concept that includes monetary and non-monetary indicators gained increasing acceptance.

Near the end of that era, Nicholas Carr (2003) suggested in his *Harvard Business Review* article that the IT function should no longer be of strategic concern for firms and IT investments should decrease. He asserted that the IT function had begun to become a commodity, similar to other revolutionary technologies. Thus, the IT function costs had been paid by all competitors but provide distinction to no one. His thesis initiated a widely spread and still ongoing debate (Stewart et al., 2003; Bonfante, 2011a; Bannister and Remenyi, 2005). Bannister et

[137] By reinforcing views of the IT industry, Dedrick and Kraemer show the claim by Brynjolfsson and others that IT investments provide much higher returns that other non-IT investments. According to them, available studies argue that actually the IT function has a massive underinvestment at country and firm level. In this case by spending too little on IT and thus avoid highly profitable investments, business managers and investors seem to be acting irrationally. Dedrick and Kraemer argue, if true, boards of directors should be sacking management teams for failing to take advantage of such opportunities (Dedrick and Kraemer, 2001).

[138] Cp. Remenyi, Money and Bannister, 2007. The issues and challenges regarding producing reliable information about IT value have been raised by Bannister and Remenyi during that time. Cp. Bannister and Remenyi, 2000.

[139] For a detailed introduction to the topic of the balanced scorecard, cp. Kaplan and Norton, 1992.

al. emphasized that if this might be the case, expending effort in evaluating IT value would make no sense (Remenyi, Money and Bannister, 2007). Bannister refuted Carr's assertions and noted new technologies that will have significant impact on IT value (Bannister, 2005).

5.2.2.4 CONVERGENCE, 2007–TODAY

The focus of the current era is mainly virtual platforms for social communications. New forms of communication have been developed with the IT function's support and steadily increasing bandwidth, allowing people to assume pervasive access to wired and wireless connection. This era is characterized by the virtual absence of barriers and limitations to computer power, data storage, or bandwidth. Most inhabitants of developed nations have access to mobile computing and information interchange (Moschella, 1997). New technologies and innovations have become "daily business" (e.g., blogs, wikis), ensuring the continued importance of firms' IT function (Schmid, 2008).

Although IT services are omnipresent, the question regarding IT value has been posed repeatedly. A Forrester Research study revealed that manufacturing firms do not consider information technology as important as other industries do but continue to consider information technology a "basic utility" (Warwick, 2007).

At the beginning of this era, Tallon and Kraemer addressed this unresolved question and analyzed the individual reality behind executives' perceptions of IT value. They used a theory to explore whether researchers use perceptual measures, the biased nature of which influences their perception of the true extent of IT value. Tallon and Kraemer found that executives' perceptions are more fact than fiction. Although individual perceptions are not perfectly objective measures, executives have a sense-making-based perception of IT impacts on firm performance (Tallon and Kraemer, 2007).

One year later, Urbach et al. examined multidimensional approaches to measuring IT value and explored the current state of research through a literature review. The results found that most empirical research analyzes the individual impact of a certain type of IT system, evaluated by means of surveys and structural equation modeling (Urbach, Smolnik and Riempp, 2008).

In the following years, value-based management came into focus. The primary objective of value-based management is the continuous increase of the firm's value. Executives use market indicators to assess their strategies critically (Aders, Herbertinger and Wiedemann, 2003). Strecker (2008) integrated the value-based perspective on information technology and attempts to tangibly define IT value. Lanzinner et al. (2008) reflected the same concepts, using a value mapping approach to control IT infrastructures.

During that time, many models have been developed to describe the interdependencies of IT value within firms. Schmid (2008) presented his recommendation of a firm-specific concept representing IT value. On the basis of pre-defined requirements, he derived a concept with five dimensions: productivity, strategy, processes, quality, and risks. Unfortunately, the derivation of these dimensions was unclear.

Bartsch and Schlagwein described a model embodying the interdependencies between IT value and multiple objectives in the firm (Bartsch and Schlagwein, 2010). Although they crafted an example of a web-service, they failed to explain how their model could be applied to reality.

This era has also seen several crises and downturns that put pressure on executives. On one hand, they must fulfill diverse business requirements, and on the other, they must initiate cost-cutting and restructuring initiatives. They crucially require a clear IT value by using effective evaluation methods.

5.3 DECONSTRUCTION OF IT VALUE

5.3.1 PERSPECTIVES ON IT VALUE

As Chapter 5.2 demonstrated, the relationship between IT investments and associated benefits (e.g., productivity) has challenged researchers for decades. The term IT itself comprises many elements. Although a wide variety of scientific research explores the relationship between IT investments and associated benefits, no clear evaluation and definition of the IT value proposition exists. The literature offers diverse taxonomies for categorizing the IT value proposition, probably because IT value is not a homogeneous entity. However, there is a broad consensus that different perspectives must be taken into account to understand the IT function's role in organizations.

To obtain a comprehensive picture of IT, its impact on different levels, such as the overall economy level, must be assessed. Various economies and countries can experience different impacts. It also has to be understood how IT supports change on the industry level. To understand the IT value proposition at a more detailed level, IT's contribution to firm transformation and productivity growth must be understood. Combining these levels of analysis with additional perspectives enables an effective assessment of the IT value proposition.

The literature reflects a broad consensus about this need for combined analysis and associated perspectives of IT value.[140] Dehning and Richardson asserted that use of such perspectives helps to explain the productivity paradox.[141] Figure 20 depicts these perspectives that researchers have used as the primary factor in categorization.

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[140] Cp., e.g., Paré et al., 2008; Aubert and Reich, 2009, and Neumann, 2011. Neumann adds the perspective of the temporal relation and measurement approach.

[141] Cp. Dehning and Richardson, 2002. However, it is also argued that the decoupling of the perspectives limits their relationship, preventing the development of key insights. Cp. Kohli and Grover, 2008. The firm and the economy level have been used to describe the productivity paradox. For a description of the two productivity paradoxes, cp. e.g., Dehning and Richardson, 2002.

Figure 20: Perspective of IT value research[142]

Perspectives

Attributes

Level of analysis	Benefit category	Evaluation objects	Evaluation methods	Influencing factors
▪ Economy	▪ Impact on intangibles	▪ Single aspect	▪ Account-based	▪ Uncertainty
▪ Industry	▪ Firm performance	▪ Applications	▪ Market-based	▪ Environment
▪ Firm	▪ Process performance	▪ Type of IT	▪ Process-oriented	▪ Lags
▪ Process		▪ System aspect	▪ Surrogate	
▪ Project		▪ IT function	▪ Multi-dimensional	

Many studies have addressed each perspective and associated attributes. Thus, these perspectives also categorize the object of the research.

The remaining sections of Chapter 5 describe these distinctive perspectives and the related research and research results.

5.3.2 LEVEL OF ANALYSIS

5.3.2.1 ECONOMY LEVEL

The level of analysis describes the observation area. The continuum of levels reaches from a higher level, the economy level, down to sub-topics of interest. The first scientific research was done at economy level during the network-centric era. The steadily increasing IT spending and the uncertainty about whether IT affects productivity growth generated a variety of research at this level and led to diverse findings. Some researchers found a positive correlation between IT investments in and increasing productivity at the economy level.

For example, Berndt and Morrison (1995) investigated the extent to which IT investments delivered additional value in reducing costs and increasing productivity. Although they found only limited evidence of a positive correlation between economic profitability and IT investments, they did report a correlation to productivity.

[142] Similar categories may be found in Schryen, 2010; Neumann, 2011 and Aubert and Reich, 2009.

Alfaro Cortés and Alfaro Navarro (2011) analyzed the impact of information technology on economic growth as well as on human development in the European Union. They found that information technology strongly influences economic and human development.

However, studies reveal regional differences, presenting a diverse picture of IT investment impacts. U.S. researchers like Saito, Dos Santos and Sussman, and Oliner and Sichel suggest that IT investments can explain a productivity increase (Oliner and Sichel, 2005; Saito, 2000; Dos Santos and Sussman, 2000). Timmer and van Ark (2005) compared the U.S. economy with the European economy and found similar evidence. Stiroh (2002) investigated IT's impact at both economy and industry levels. He examined whether U.S. industry's productivity correlates to IT usage, and reached conclusions similar to Jorgenson's that

"computer-related gains, large returns to the production and use of computers, and network effects are fundamentally changing the U.S. economy." (Jorgenson and Stiroh, 1999)

However, they asserted that the computer-related gains did not generate a period of faster growth of output and total factor productivity (Jorgenson and Stiroh, 1999).

Canadian studies such as those by Sharpe, Armstrong et al., and van Ark et al. revealed that the productivity growth depends on IT investments (Sharpe, 2006; Armstrong et al., 2002; van Ark, McGuckin and Inklaar, 2003). This positive correlation is also observed in other countries. For example, the results of studies by Oulton and Srinivasan in the UK

"give no ground for believing that growth accounting is overstating the impact of ICT." (Oulton and Srinivasan, 2004)

5.3.2.2 INDUSTRY LEVEL

Attempting to resolve these contradictions between positive and negative correlations, researchers focused at the more detailed industry level. By narrowing the focus, they attempted to overcome broad economic developments and identify the unique relationship between IT investments and productivity increase. The industry level picture, however, was also unclear; some researchers found a positive correlation but others did not.

Huang's empirical research on the Taiwanese banking industry during 1996–2003 found that

"IT capital and computer labor tend to exhibit higher productivities than their non-IT and non-computer counterparts, that IT capital has positive impacts on the marginal productivities of computer labor and borrowed funds, and that the mean technical efficiency is around 87.7%." (Huang, 2005)

Zhu et al. (2004) provided a more precise result, focusing on one aspect in the financial services industry, comparing data samples to examine how economic environments influence e-business. They observed that the firm size correlates negatively to e-business value and that competitive pressure often forces firms to adopt e-business.

Weill (1992) performed an empirical test of the performance impacts of IT investments in the manufacturing sector, focusing on performance impact on sales growth, return on assets, and labor productivity. The empirical results revealed that the quality of firm-wide management strongly influences the relationship between IT investments and firm performance.

Jorgenson et al. (2003) incorporated detailed information for individual industries in their research, revealing that economic growth is primarily influenced by investments in IT and higher education. Their results apply to individual industries as well as the economy overall and reveal the

"jump in information technology investment […] and the revival of productivity growth […]." (Jorgenson, Ho and Stiroh, 2003)

Berndt and Morrison provided less evidence of a positive correlation on the industry level (Berndt and Morrison, 1995). Their studies analyzed economic performance in the U.S. manufacturing industry during 1968–1986, finding only limited evidence of a greater positive correlation between industry profitability and IT investments than that with any other capital investments.

5.3.2.3 FIRM LEVEL

After many theoretical studies and empirical research, it became evident that the economy and industry perspectives appeared inadequate to merit further research.[143] Data, influencing factors, and effects hindered the investigation of clear dependencies and causal relationships. To avoid the existing weaknesses of research at the economy or industry level, researchers changed the level of analy-

[143] At this time, the productivity paradox could not be evaluated.

sis in the early 1990s (Neumann, 2011; Goeken and Patas, 2009). Research at the firm level provided a better understanding of the relationship between IT investments and the generated value.

For example, Brynjolfsson and Hitt (1996) analyzed intangible assets comprising the consumers' surplus from IT investments. Using data from the U.S. Bureau of Economic Analysis, they found that 11 IT investments generated approximately triple their cost in value for consumers.

Mahmood and Mann (2005) also investigated IT value at the firm level. They used firm-level data covering a three-year period to identify the relationship of IT investments to effects on organizational performance and productivity. Their empirical study found a positive correlation between selected measures representing organizational performance and productivity and a higher level of IT investments.

A later study by Brynjolfsson and Hitt also examined the firm level to investigate how computers affect business performance (Brynjolfsson and Hitt, 2000). Grover and Kohli (2012) extended the firm level by not limiting their research to a single firm but framing the analysis to investigate co-creating IT value through four layers of relational arrangements between firms.

5.3.2.4 PROCESS LEVEL

Apart from the firm level, research has investigated IT investment impacts on processes. Jeffers et al. examined the interaction of IT assets with two non-IT assets, revealing that IT assets can either enhance or suppress the impact of non-IT assets on process performance (Jeffers, Muhanna and Nault, 2008).

As Mooney et al. found that the main area of investigation had been the firm level, they concentrated on process research and emphasized the importance of a process-oriented perspective and crafted a framework for assessing IT value (Mooney, Gurbaxani and Kraemer, 2001). Similar to Mooney et al., Schlagwein and Bartsch (2010) investigated IT investment impact at the process level and developed a framework to connect IT value with firm objectives and processes. Unfortunately, they did not test their framework in practice.

Grover et al. identified another paradox. They asserted that although the evolving capabilities of emerging IT functions are evident, research had not demonstrated the correlation between increasing productivity and technological diffusion. Therefore, they empirically examine the relationship among IT diffusion, productivity increase, and related process design. Their findings reveal alternative approaches to examine the productivity paradox and identify the relationship between process design, IT, and productivity (Grover et al., 1998).

One year earlier, Mukhopadhyay et al. investigated the impact of IT on process output and process quality, examining the U.S. Postal Service's optical character recognition and barcode sorting technology in the mail sorting process. Their three-year study results demonstrated that mail sorting output significantly increases from IT usage. Additionally, IT improves the quality of the process, which further improves the output (Mukhopadhyay, Rajiv and Srinivasan, 1997).

5.3.2.5 PROJECT LEVEL

At the process level, Aubert and Reich (2009) supported the project level observation made by Delone and McLean, who had provided the foundation of project level studies in their article "Information Systems Success: The Quest for the Dependent Variable" (DeLone and McLean, 1992). Ensuing studies at the project level drew an informative portrait of IT influences on organizational performance (Aubert and Reich, 2009). Brynjolfsson and Van Alstyne (2007) studied IT impact on the project and task levels at a midsize executive recruiting firm, identifying a positive impact of IT on organizational performance. They found a significant impact on employee productivity at the recruitment firm over a ten-month period.

Ashurst et al. found that the returns on completed IT projects had not been investigated on a large scale. They crafted and empirically tested a model of benefit realization. The assessment of 25 IT projects found no evidence of a consistent, comprehensive, and coherent pattern of benefit realization (Ashurst, Doherty and Peppard, 2008). Stratopoulos and Dehning (2000) also investigated this missing correlation between IT investments and performance growth. On the basis of their empirical research, they hypothesized that the missing correlation factor between IT investment and performance growth is ineffectively implemented IT projects. They asserted that IT must be utilized effectively to increase financial performance and compared successful and less successful IT users, demonstrating that the successful users also have superior financial performance as compared with the less successful users.

Thomas and Fernández (2008) proposed a more cautionary definition of successful projects. They found that project success regularly extends beyond technical performance, cost, or quality dimensions. The success of a project is not a strongly defined concept but a multi-dimensional construct, so that the reported success of the project depends on the method selected and success criteria. Aubert and Reich (2009) also supported this observation, finding a difference of 51% when varying the method by which a project qualified as a success, using the same data. Consequently, the correlation between IT projects and productivity growth is difficult to identify as the success of a project depends on diverse influencing factors intrinsic to the firm.

5.3.3 CATEGORIZATION OF THE BENEFIT

In addition to the analysis perspective, the categorization perspective indicates the types of benefits that IT investments may affect. When changing the analysis perspective at the firm level, researchers no longer focused on firm-level input variables; instead, they investigated the output variables of IT investments (Neumann, 2011). These output variables fell into three categories of benefits: (1) firm performance, (2) impact on tangibles, and (3) increasing process performance.[144]

5.3.3.1 IT VALUE AS FIRM PERFORMANCE

Observers largely agreed that the consideration of benefits in firm performance is essential.[145] The literature further splits firm performance into two subcategories: accounting and market performance (Dehning and Richardson, 2002; Schryen, 2010).

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[144] These categories may also be found in Wiedenhofer, 2013.

[145] Melville et al. found that researchers have defined the term "performance" by intermediate process-level measures as well as organizational measures. Cp. Melville, Kraemer and Gurbaxani, 2004.

Researchers have investigated how investments in the IT function correlate with the firm's increased market performance. For example, Kar Yan Tam (1998) investigated the impact of IT on shareholder return and found that

"there is little evidence that the level of computerization is valued by the market […]."

Brynjolfsson and Hitt also investigated that topic (Brynjolfsson and Hitt, 1996). Dos Santos et al. provided empirical evidence on the effect of announcements of IT investments on the firm's market performance, revealing that the market reacts differently to announcements of innovative IT investments (Dos Santos, Peffers and Mauer, 1993).

Dehning and Richardson's literature review found that existing studies provided strong evidence that the market values IT investments. They noted that the market value increases five to twenty times the amount of IT investments (Dehning and Richardson, 2002).

Several theorists have investigated the accounting perspective, focusing on cost- and profit-oriented figures. For example, Bharadwaj empirically examined the correlation between IT capabilities and firm performance. The results indicated that

"firms with high IT capability tend to outperform a control sample of firms on a variety of profit- and cost-based performance measures." (Bharadwaj, 2000)

Two years later, Dehning and Richardson reviewed more existing studies on firms' accounting performance and came to the overall conclusion that IT investments and financial performance have only a tenuous relationship (Dehning and Richardson, 2002).

5.3.3.2 IT VALUE AS IMPACT ON INTANGIBLES

The high amount of IT investments led to studies on not only financial benefits but also the impact of IT investments on intangibles assets at the firm level. Intangible assets can improve decision-making processes, increase knowledge, or grow customer loyalty. This relationship has been studied but not comprehensively (Schryen, 2010). Devaraj and Kohli (2000) expressed their opinion about why it is so difficult to analyze the impact of IT investments on intangible assets, identifying the difficulty as the isolation of the organizational benefits of IT investments from other factors. They suggested that IT benefits for organizational performance can accrue when they are executed "in concert" with parallel initiatives.

Dedrick et al., who reviewed many empirical findings regarding the relationship between IT investments and associated benefits, also focused on intangible assets (Dedrick, Gurbaxani and Kraemer, 2003). They emphasized that IT is an important enabler of organizational changes that can generate productivity gains.

Gomez and Pather observed a trend of concentrating more on indirect intangible benefits, and found that these benefits are difficult to measure but have a more pervasive effect on individuals and communities. Gomez and Pather (2012) propose

> *"to start building a framework to inform new evaluation paradigms that evaluate the intangible, non-instrumental, unquantifiable impacts of ICT."*

5.3.3.3 IT VALUE AS PROCESS PERFORMANCE

In empirical literature, there is an overall understanding that process performance strongly relates to firm performance (Schryen, 2010; Dehning and Richardson, 2002; Soh and Markus, 1995). The research predominantly examines productivity aspects of process performance (Schryen, 2010). The different theories on IT value as process performance need not be re-examined here as Chapter 5.3.2.4 presented the current state of the literature on process performance.

5.3.4 TYPES OF EVALUATION SUBJECT

For a more comprehensive understanding of IT value, additional attributes (Schryen, 2010), such as specific IT assets that are subject to evaluation, should be discussed. This study uses the evaluation subjects identified by Seddon et al. (1999) and integrated in Figure 20, which classifies the five types IT assets by their perspectives and attributes. These assets are investigated as the evaluation subjects of previous studies.

5.3.4.1 SINGLE ASPECT

A single aspect as an evaluation subject might be an algorithm, a user interface, or other specific interfaces. For example, Aliferis et al. developed algorithms for identifying local causal structures around target variables in the form of direct causes and effects and Markov blankets. They evaluated their set of algorithms and demonstrated how local techniques can be used for scalable and accurate global causal graph identification (Aliferis et al., 2010).

5.3.4.2 SINGLE IT APPLICATIONS

In addition to single aspects, single IT applications in a firm can be the subject of evaluation. Consider, for example, Holman and Harman's evaluation of a regional impact simulator, which depicts climate change on resources and sectors, in regard to stakeholders' requirements (Holman and Harman, 2008). Not only single IT applications but also a firm's entire application landscape may be of interest.

5.3.4.3 TYPE OF IT SYSTEM

The type of IT system also became a research subject. A type of IT system can be a data warehouse, business intelligence solutions, or customer relationship management (CRM) systems, among others. Coltman et al. (2010) examined the impact of CRM systems on firm performance by using a hierarchical construct model. Their results suggest that the impact of IT infrastructure on superior CRM systems is influenced indirectly by human analytics.

5.3.4.4 SPECIFIC SYSTEM ASPECTS

Another subject that has been evaluated is specific system aspects. A specific aspect is a parameter, frame, or their relationship within a set of IT systems. An IT system or its development can have multiple aspects: engineering methods, frameworks, or programming language. For example, Sang-Yong et al. (2009) examined the success of open source software and proposed a mode and identified critical success factors.

5.3.4.5 IT FUNCTION

In addition to the aforementioned evaluation subjects, the IT function itself can also be the subject of research. One example is the study by Guillemette and Paré, who renewed and adjusted the understanding of firms' overall IT function (Guillemette and Paré, 2012). Other research focuses on IT function management, particularly the CIO and his role in the firm. Here, for example, consider the consulting firm Ernst & Young's study analyzing the CIO's role and required skills (Ernst & Young, 2012). Other studies also consider IT employees as a success factor in IT value (cp. e.g., KPMG, 2010).

5.3.5 INFLUENCING FACTORS

Some authors have asserted that the impact of IT investments on firm performance is also influenced by a variety of other non-technological factors. The influencing factors most frequently discussed are time lags between IT investments and gaining benefits, environmental factors, and the increasing uncertainty regarding future economic conditions. Certain authors claim that these factors also explain the productivity paradox (e.g., Brynjolfsson, 1993).

5.3.5.1 LAGS

Several studies investigated the existence of a lag between the date of investing in the IT function and the return on investment. If a lag exists, positive correlation between IT investments and their short-term financial return probably cannot be identified. Furthermore, no effects whatsoever of IT investments may be identifiable. Nonetheless, studies have produced conflicting findings, as predictable among empirical studies (Santhanam and Hartono, 2003; Weill and Olson, 1989).

These studies concluded that IT investment effects on the firm's organization can lag by several periods and is neither direct nor immediate. Brynjolfsson et al. exemplify this assertion as they demonstrated that a period of two to three years after the IT investment must elapse before observing its full impact on the firm (Brynjolfsson et al., 1994).

5.3.5.2 ENVIRONMENT

5.3.5.2.1 REDISTRIBUTION OF BENEFITS

Another factor that influences the return of IT investments is the redistribution of the IT investment benefits. This effect describes IT investments being beneficial to certain firms but unproductive from the perspective of the entire industry or economy. Thus, IT acts as a distributer that rearranges the industry's overall productivity without increasing it. Brynjolfsson (1993) provided an example and asserted that

"IT can be used disproportionately for market research and marketing, activities that can be very beneficial to the firm while adding nothing to total output."

5.3.5.2.2 MISMANAGEMENT OF THE IT FUNCTION

Mismanagement of the IT function also affects the return on IT investments. Brynjolfsson asserted that investments in the IT function cannot be productive because of managers who sometimes do not act in the best interest of their firm, instead

"they are increasing their slack, building inefficient systems, or simply using outdated criteria for decision-making" (Brynjolfsson, 1993).

Another aspect that explains management's failure to leverage IT investments is that they cannot overcome resistance to organizational change in tandem with IT investments (Dos Santos and Sussman, 2000; Stratopoulos and Dehning, 2000).

5.3.5.3 UNCERTAINTY

There is a widespread perception that IT investments are inherently risky because of uncertainty about future conditions, technological complexity, and rapid obsolescence or implementation challenges (Dewan, Shi and Gurbaxani, 2007). This uncertainty became an important parameter in the decision-making process for IT investments. Many theorists integrated uncertainty in their models (Wehrmann and Zimmermann, 2005; Schwartz and Zozaya-Gorostiza, 2003; Panayi and Trigeorgis, 1998).

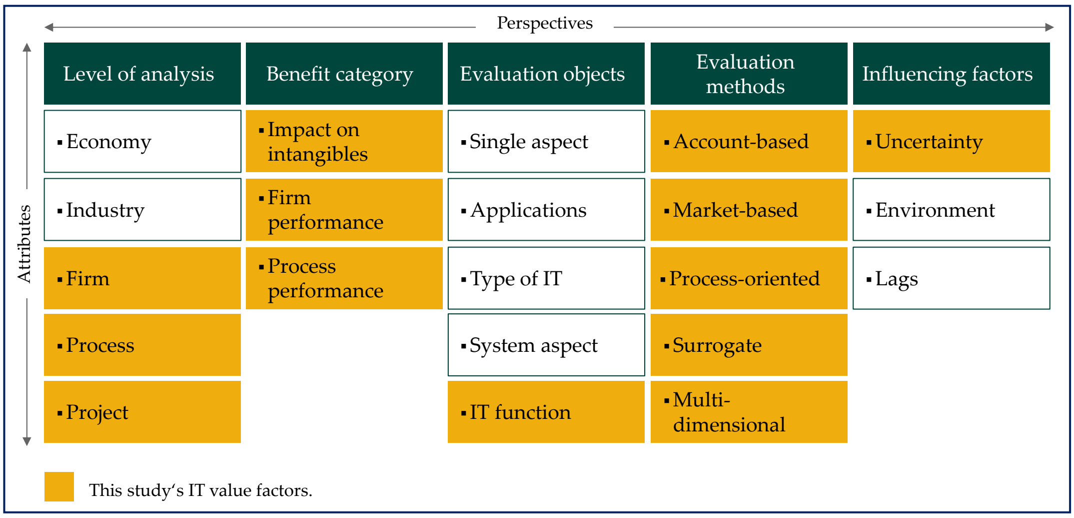
5.3.6 DETERMINING THE IT VALUE DEFINITION USED

As Chapter 5.2 demonstrated, many and varied definitions of IT value exist, some with a broad focus. Many others, however, especially those used primarily in German speaking countries, narrow the definition to only the monetary benefits of IT investments. Definitions devised with an Anglo-Saxon background begin with the single perspective of IT investments and integrate additional aspects. Here, IT value can be understood as a complex relationship between diverse factors within the firm.

An adequate definition for the present study's main objective, the development of a model that supports the control of IT value, has to be identified. The proposed model's purpose of providing recommendations for IT function value measurement and flexibility greatly limits the selection of IT value perspectives and attributes for defining IT value. The study's capability clusters representing an ideal IT function also limit the set of potential definitions for the IT value proposition.

Figure 21 highlights (in orange background) the selected perspectives and attributes of IT value that limit this study's definition of the IT value proposition.

Figure 21: Definition of IT value used in this study



These perspectives and attributes were chosen for the following reasons:

Level of analysis: As the objective of this study limits the level of analysis, the requirements integrated within the capability clusters of Chapter 2.2 are assessed at the firm level, including firm processes as well as projects. The attributes of this perspective cannot be analyzed separately as IT investments in the firm naturally influence projects or processes. Improving firm performance also affects its industry and the economy overall. However, as discussed, the industry and economy levels are too broad to provide insights on the firm level.

Benefit category: It should be focussed on attributes of the benefit category to obtain a comprehensive understanding of the benefits of the capability cluster requirements. A one-sided focus on only a few selected attributes would be counter-productive to the development of a model supporting the control of the IT value proposition.

Evaluation subjects: The development of a technical model for applications or system factors exceeds the scope of this study. As stated in the introduction, the research focuses on the IT function as it represents an important resource for firms in achieving their business objectives. Thus, the perspective of the evaluation subject can be limited to the IT function, and the requirements can directly refer to the IT function.

Evaluation methods: As the identified capability clusters describe the ideal IT function, appropriate evaluation methods must support the control of the IT value proposition. As the requirements in the capability clusters are heterogeneous, a wide range of evaluation methods must be included within the analysis. However, as the number of evaluation methods is unlimited, this study will focus only on those evaluation methods that are primarily used in German firms. Thus, empirical research limits the range of evaluation methods (e.g., Ardour Consulting, 2012c).

Influencing factors: The focus of the examination of influencing factors is limited to uncertainty. Chapter 2.1 presented various market-factors that increase the uncertainty of firm actions. Uncertainty has been described as firms' environment, a considerable influencing factor that flexibility can address. Thus, the definition of the IT value proposition focuses especially on this attribute; however, the study discusses other attributes of this perspective as necessary.

6 ASSESSING IT VALUE EVALUATION METHODS

6.1 CATALOGUE OF REQUIREMENTS

Identifying a practical evaluation method for suitable assignment to a capability cluster demands a clearly structured requirements catalogue on the basis of which to discuss and assess evaluation methods. Requirements can be understood as proposed requirements, which should be fulfilled such that the evaluation methods can support IT value proposition management. This list of requirements cannot be exhaustive, although it is an instrument that guides decision makers in the utility of evaluation methods.

The objective of the requirements catalogue is to specify assessment-relevant criteria to provide a uniform basis for the assessment of the evaluation methods. To achieve this objective, the requirements catalogue must formulate quantitative and qualitative requirements appropriately. The advantage of quantitative requirements is better measurability, whereas qualitative requirements can only be formulated vaguely because of the controversy regarding requirements fulfillment. The complexity of the relevant evaluation methods demands that the assessment criteria remain at a certain level of abstraction. The evaluation methods presented should be measured by the requirements given.

The literature offers various criteria for assessing the utility of evaluation methods. A literature review concluded that the requirements catalogue of Dietrich et al. (2007) can serve as the foundation for assessing the evaluation methods. This foundation has been expanded with assessment criteria that represent flexibility and capability. Figure 22 presents the comprehensive requirements catalogue.

Figure 22: Catalogue of grouped assessment criteria

No	Group	Assessment criteria			
1	General	Validity	Timeliness	Comparability	Clarity
		Understandability	Adequacy	Completeness	
2	Capability cluster	Degree of utilization			
3	Flexibility	Adequacy of object dimension	Adequacy of time dimension	Adequacy of set-up dimension	Adequacy of impact dimension

6.1.1 GROUP 1: GENERAL REQUIREMENTS

6.1.1.1 VALIDITY

The evaluation methods must provide reliable results that describe the facts sufficiently, understandably, and accurately. To this end, the database must be available and the data quality must meet the defined requirements. Over the entire study period, the evaluation method must remain valid (Dietrich, Schulze and Weber, 2007).

6.1.1.2 TIMELINESS

Timeliness means that the evaluation methods can calculate current results without delay. If evaluation methods need days or weeks to obtain certain results, these results may be out of date. Dietrich et al. indicated that this is especially true when data is consolidated manually from several sources, making such evaluation methods appropriate only with a long period of time for data gathering (Ibid, p. 14).

6.1.1.3 COMPARABILITY

The results provided by any evaluation method must be comparable with other results. These results must be comparable not only with other evaluation methods (peer-group comparison) but also over time. The variation of the evaluation methods' results over time has always been highly informative. In practice, it is often more important to assess the changes in individual states over time than the individual periodic results (Ibid, p. 15). If the results of the evaluation methods are not comparable over time, the results cannot be used to support IT function management.

6.1.1.4 CLARITY

The results of the evaluation methods must be clear. Presentation of the results in purely numerical columns is usually ineffective. The diversity of metrics provides little information for IT function management. Therefore, the evaluation method results must lend themselves to graphic representation. The presentation of the results must be clear, and the integration of additional dependent variables within the calculation must be transparent. This can, for example, be the integration of market interest rates. To explain the final results, these dependent variables must be transparently identified within the calculation.

6.1.1.5 UNDERSTANDABILITY

An evaluation method must be understandable. On one hand, the understandability of the processes' results is critical to IT function management. Depending on the target group, the processed results require different levels of aggregation. Each senior management level usually requires a different level of aggregation. On the other hand, the applicability of the evaluation method must be understandable. Unless evaluation methods require complex calculations and voluminous data, the methods are used infrequently because they may provide unrealistic results.

6.1.1.6 ADEQUACY

Adequacy describes the ability to gather necessary data for use with the evaluation method. The basis for the calculation represents quantitative and qualitative data. A KPI can be determined much more quickly with an evaluation method if the necessary data can be compiled at favorable costs. Dietrich et al. (2007) note, however, that costs should not be the focus in choosing an evaluation method; a more important factor is whether the evaluation method makes a meaningful assessment.

6.1.1.7 COMPLETENESS

A system of figures must be complete. An incomplete system of figures provides no benefit because it may not fully determine certain KPIs. Only a complete collection of all required information necessary for a specific evaluation method can represent a comprehensive picture for interpretation. If many pieces of the puzzle are missing or incomplete, analysts cannot draw reliable conclusions (Ibid, p. 15).

6.1.2 GROUP 2: CAPABILITY CLUSTER REQUIREMENTS

This group of assessment criteria describes the assignment of each evaluation method to a capability cluster. The strength of this relationship is determined by the corresponding assessment of the respondents in the survey.

6.1.3 GROUP 3: FLEXIBILITY REQUIREMENTS

6.1.3.1 ADEQUACY OF OBJECT DIMENSION

The object dimension describes firms' ability to react to external influences by adjusting their objectives. This criterion determines whether the method is suitable for adaptation to firms' changing objectives. This criterion also ensures that the evaluation method can weight firms' objectives.[146]

6.1.3.2 ADEQUACY OF TIME DIMENSION

The time dimension of flexibility characterizes the ability to react to environmental influences by allocating existing resources on short notice. This assessment criterion therefore examines specifically whether the evaluation methods can adequately manage IT function resources. The assessment is based on evaluation method users' estimates.

6.1.3.3 ADEQUACY OF SET-UP DIMENSION

The set-up dimension of flexibility describes the ability to protect the organization against future risks and environmental influences. This type of flexibility supports firms' defense against potential risks. Thus, the evaluation methods

[146] For a further description of the flexibility dimension, cp. 4.2, p. 74.

must be able to assess alternative future scenarios for potential risks. should be assessed The survey participants assess the degree of the evaluation methods' capability.

6.1.3.4 ADEQUACY OF IMPACT DIMENSION

The impact dimension of flexibility refers to firms' ability to change internal structures on short notice to react to environmental influences. The evaluation method must be able to control or evaluate internal structural change (e.g., process change). The survey participants assess each method's degree of this ability.

6.2 PRESENTATION OF MAJOR EVALUATION METHODS

6.2.1 EVALUATION METHODS IN THE LITERATURE

Both in practice and in science, diverse methods have been used to evaluate the IT value proposition. In addition to the classical methods to evaluate monetary (IT) investments, specific methods have been developed that specifically target the measurement of the IT value proposition (Kesten, Müller and Schröder, 2007).

Classical economic investment calculations offer static and dynamic methods. For example, static methods include cost, income, or yield comparisons. Dynamic methods represent a time-differentiated analysis of cost-benefit relations with a discounting factor, exemplified by the net present value, return on assets, or the return on investment method (Maicher, 2011). By discounting the value to the present value, these methods integrate market influences.

Other evaluation methods primarily focus on costs. These methods integrate the cost components of investment decisions. For example, the Total Cost of Ownership integrates direct and indirect costs in its calculation.

Multi-dimensional evaluation methods represent a further development in analysis. These methods attempt to select a set of appropriate measures for evaluating the IT value proposition in a specific context. ISACA's Total Value of IT provides a set of processes and objectives for calculating the maturity of the IT function within its IT value proposition.

Table 3 reports a sample of evaluation methods recently used literature.

Table 3: Evaluation methods used in the literature

Source	Evaluation methods
Dehning and Richardson, 2002	Return on investments
Maicher, 2011	Total cost of ownership
Banker et al., 2011	Total IT spending
Brynjolfsson and Hitt, 1996	Return on assets
Bharadwaj, 2000	Cost of goods sold to sale
Bharadwaj, Bharadwaj and Konsynski, 1999	Tobin's q
Dos Santos, Peffers and Mauer, 1993	Stock return on days -1 and 0
Brynjolfsson and Yang, 1999	Market valuation of computer capital
Barua, Kriebel and Mukhopadhyay, 1995	Inventory turnover
Maicher, 2011	Total value of IT
Barua, Kriebel and Mukhopadhyay, 1995	Capacity utilization
Ray, Barney and Muhanna, 2004	Customer service quality
Grover et al., 1998	Productivity
DeLone and McLean, 2003	User satisfaction

Brynjolfsson and Hitt analyzed the influences of the return on assets, Dos Santos et al. identified reactions of the share market, and Bharadwaj and Konsynski addressed the "Tobin's q" evaluation method. In addition to the analysis of evaluation methods of firm performance, studies have analyzed process-oriented evaluation methods: Barua et al. focused on capacity utilization, and Grover et al. examined productivity.

Bharadwaj and Banker et al. used cost-oriented evaluation methods. Barua et al. used another cost-oriented evaluation method, examining material management-oriented evaluation methods such as stock turnover to indicate the total cost of ownership.

However, most of the studies focused on profit-oriented evaluation methods. Dehning and Richardson analyzed the profitability of investments in the IT function, and Brynjolfsson and Yang examined the changing market valuation of computer capital.

The aforementioned evaluation methods address primarily material values, but other methods address the importance of intangible assets. DeLone and McLean investigated user satisfaction, and Ray et al. addressed customer service quality.

Many of these evaluation methods are characterized by a high level of abstraction, which often appeals only to theorists. However, the evaluation methods' primary objective is to provide a method for calculating the IT function's appropriate value.

6.2.2 TAXONOMY OF SELECTED EVALUATION METHODS

This section describes the classification of the evaluation methods selected, and it serves as a basis for their subsequent presentation and their critical assessment.[147]

The evaluation methods have been selected on the basis of the results of the Ardour Consulting study (Ardour Consulting, 2012c), identifying a set of evaluation methods that firms currently widely use. To concentrate on the essential evaluation methods, the present study uses their results. Other evaluation methods described in the literature are not investigated and will not be considered in the model to ensure its practical orientation and applicability.

The selected methods for evaluating the IT value proposition can be summarized in the categories of accounting-oriented, process-oriented, market-oriented, multi-dimensional, and surrogate methods. Figure 23 represents this categorization and the associated evaluation methods.

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[147] Researchers have discussed diverse categorization and classification concepts. More important than the aggregation of controversial classifications is the transparency of the content represented by the nature of such classifications overall. Alternative structures are used by, for example, Bannister and Remenyi (2000) and by Gomez and Pather (2012).

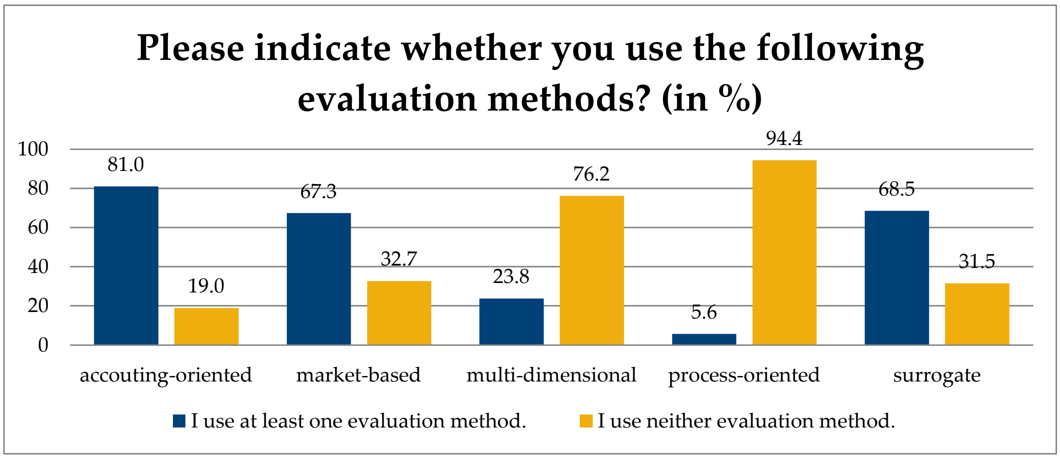
Figure 23: Overview of selected evaluation methods

Categories / Associated evaluation methods

Account-based methods	Process-oriented methods	Market-based methods	Multi-dimensional methods	Surrogate methods
▪ Total cost of ownership	▪ Time-Salary-Time-Saving	▪ Return on investment	▪ Monte-Carlo simulation	▪ Decision tree
▪ Cost comparision	▪ Hedonic wage model	▪ Internal return rate	▪ Val IT	▪ Argument balance sheet
		▪ Net present value	▪ Applied information economic	▪ Risk analysis
		▪ Real options	▪ System dynamic	▪ Utility analysis
			▪ Total economic impact	
			▪ Rapid economic justification	
			▪ Business value index	

Figure 24 depicts the survey's reported percentage of usage of each evaluation method. Respondents indicated that accounting-oriented evaluation methods have a high degree (81%) of utilization, followed by surrogate evaluation methods (69%) and market-oriented evaluation methods (67%). The very narrow set of process-oriented evaluation methods resulted in respondents not confirming the usage of this category, with 94% of respondents using neither evaluation method and only 6% using at least one.

Figure 24: Usage of evaluation methods



6.2.3 CATEGORIES OF EVALUATION METHODS

6.2.3.1 ACCOUNTING-ORIENTED EVALUATION METHODS

Accounting-oriented methods describe metrics that attempt to parameterize individual characteristics or a set of characteristics of investments concentrated in a single evaluative measurement (Bannister and Remenyi, 2000). These evaluation methods' primary focus is cost-oriented, using internal accounting data from to calculate the defined metrics. The following three sub-sections describe this category of evaluation methods.

6.2.3.1.1 TOTAL OPERATING COSTS

The total operating costs describe the costs that occur for the IT function as a whole. Gadatsch and Mayer (2006) note that direct and indirect costs affect the total operating costs. Purchasing costs, installing costs, and occupancy costs can be counted as direct costs. Gadatsch and Mayer (2006) found that IT function direct costs comprise roughly 45% of the total operating costs, and non-controllable, indirect costs 55%. The latter include the cost of downtime, production loss, and opportunity cost of non-used features that cause higher costs (e.g., network drives or data security tools).

6.2.3.1.2 TOTAL COST OF OWNERSHIP

The objective of the total cost of ownership (TCO) method is the transparent presentation of IT investment costs (e.g., hardware or software). Therefore, the TCO approach is not limited to costs of purchasing, installing, and maintaining the hardware and software. It also includes the purchasing and maintenance costs that specific IT investment may incur for user support, networks, servers, and training. Thus, the TCO approach clearly represents both direct and indirect costs of an IT investment (Gadatsch, 2009).

6.2.3.1.3 COST COMPARISON

The cost comparison method compares the incurred costs of several IT services. Costs can be determined for each IT service and then compared with those of other IT functions on the basis of a standardized catalog of the components of IT services (Kütz, 2011). Kütz (2011) also called this method IT benchmarking.

6.2.3.2 MARKET-ORIENTED EVALUATION METHODS

The market-oriented evaluation methods attempt to close the gap between the market valuation and the book value.[148] In comparison to accounting-oriented evaluation methods, these methods combine accounting data and estimated future cash-flow data. Thus, the IT value proposition is based on the potential returns of IT investments. The primary characteristic of market-oriented evaluation methods is the integration of estimated future cash-flows as well as their monetary discounting at the moment of decision (Radinger, 2010). The following four evaluation methods comprise this category.

6.2.3.2.1 RETURN ON INVESTMENT

The return on investment (ROI) method has gained acceptance for evaluating the profitability of investments. This method calculates the ratio between an investment's monetary returns (net cash flows) in proportion to the original investment (Kütz, 2011). Return on investment reflects the trend of sales profitability and capital turnover and can therefore be increased either by costs or increasing capital turnover. This method is part of the Dupont pyramid (Preißler, 2008).

6.2.3.2.2 INTERNAL RETURN RATE

The objective of the internal return rate (IRR) method is to determine the most advantageous investments for the firm. The internal return rate represents a single interest rate that calculates the net present value of a series of returning cash flows equal to zero (Weingartner, 1966). If the internal return rate is greater than the return rate of alternative investments, the investment is profitable.

6.2.3.2.3 NET PRESENT VALUE

This method also calculates the profitability of investments, but on the basis of compound interest. The net present value (NPV) method compares the investment with alternative investment options, such as stock investments. The returning cash flow is discounted by a pre-defined implicit interest rate to the start of

[148] Edvinsson and Brünig noted occasional and temporary gaps between market value and the reality of accounting data. They found that over time the gap deepens. Cp. Edvinsson and Brünig, 2000.

the investment. If this net present value is below zero, the investment is advantageous (Kütz, 2011).

6.2.3.2.4 REAL OPTIONS VALUATION

This method (ROV) supports investment decision by integrating existing dynamics. An option represents the right to perform a certain action. For example, a call option seems to be economically useful if increasing share prices are expected. Uncertainties must be balanced. Investments in the IT function can be understood as options, such as extension options (extension of the scope of functions), delay options (waiting for results of pre-projects), or cancelation options (capacities ordered can no longer be used) (Gadatsch, 2009). These different types of options can be used to extend other traditional methods such as the net present value method. The result is a net present value for each type of option.

6.2.3.2.5 MULTI-DIMENSIONAL EVALUATION METHODS

To avoid the deficits of one-dimensional evaluation methods, analysts have developed evaluation methods representing a complex system of indicators. The objective of these multi-dimensional evaluation methods is to represent firms' structures and processes by combining a set of several metrics and variables to produce a comprehensive view of IT investments as well as their returned value. The calculation includes both monetary and non-monetary metrics. The following seven evaluation methods comprise this category.

6.2.3.2.6 MONTE CARLO SIMULATION

The Monte Carlo Simulation, first used by von Neumann during the Manhattan project, uses a random set of numbers to simulate given scenarios. In this simulation, the pre-defined model can be computed several times with changing input parameters (e.g., investment, allocation, probability). Using probability theory, this process can predict alternative outcomes (Joy, 1991) from which an analyst can derive differentiated statements regarding future scenarios and detect the uncertainty of outcomes from different combinations of all variables (Löhrer and Lux, 2012).

6.2.3.2.7 SYSTEM DYNAMIC

The system dynamic method was developed by Jay W. Forrester in the mid-1950s. This method integrates causal diagrams and policy-oriented simulation models of different settings of problems within complex environments or dynamic systems. A system dynamic model can include a large set of differential and algebraic equations determined by a wide spectrum of relevant data (Homer and Hirsch, 2006). It can be used to analyze the impacts of management decisions in the IT function as a part of strategic planning.

6.2.3.2.8 TOTAL ECONOMIC IMPACT

This The Total Economic Impact (TEI) method invented by Forrester Consulting focuses not only on costs but also on benefit, flexibility, and risk. Furthermore, it weighs the enabling value of a technology in increasing the effectiveness of overall business processes and integrates specific measures for individually selected topics such as configuration management and application quality management to calculate the TEI (Forrester, 2009).

6.2.3.2.9 APPLIED INFORMATION ECONOMIC

The Applied Information Economic (AIE) method comprises several techniques to value IT investments and has been used for about 16 years (Symons, Orlov and Sessions, 2006). It calculates various integrated elements of economics to evaluate IT investment alternatives. These elements represent, for example, operations research, portfolio theory, software metrics, game theory, and options theory. The method synthesizes all elements in a highly rigorous and very complex quantitative model.

6.2.3.2.10 RAPID ECONOMIC JUSTIFICATION

This method, developed by Microsoft, supports evaluating planned IT investments. The Rapid Economic Justification (REJ) method offers the ability to balance the assessment against other methods (e.g., total cost of ownership) that deal only with the project’s cost elements. By integrating instruments and methods, the REJ integrates quantitative and qualitative aspects of the IT value proposition. The method also attempts to evaluate the profit and the costs simultaneously for the entire firm. It focuses primarily on existing processes and data and provides a well-defined output with individual recommendations (Sasvári, 2012).

6.2.3.2.11 BUSINESS VALUE INDEX

INTEL developed this method, which represents a compound index of factors that influence the value of IT investments. The Business Value Index (BVI) assesses an investment's IT value proposition, influence on IT efficiency, and monetary benefit. These factors use predefined material and non-material criteria (e.g., customer need, strategic fit) that the BVI aggregates into a single figure (Intel Corporation, 2009).

6.2.3.2.12 VAL IT

The Val IT framework developed by the IT Governance Institute is intended to complement the COBIT framework. Val IT provides a business and financial perspective for controlling IT's value delivery. The framework includes processes and best practices for the domains of value governance, portfolio management, and investment management (IT Governance Institute, 2008).

6.2.3.3 PROCESS-ORIENTED EVALUATION METHODS

Process-oriented evaluation methods calculate metrics meant to parameterize process attributes. The primary focus of process-oriented evaluation methods is optimization of existing processes by, for example, reducing processing time. These evaluation methods provide metrics that indicate the optimization potential of existing processes as well as process change in IT evolution. The following two evaluation methods comprise this category.

6.2.3.3.1 TIME-SALARY-TIME-SAVING

The objective of the Time-Salary-Time-Saving method evaluates IT-enabled saved time via a monetary equivalent that represents the average personnel costs of relevant organizational units. The following equation calculates the generated value: (Kesten, Müller and Schröder, 2007)

$$Value = \frac{\text{Saved time}}{\text{ø working time}} * \text{ø personnel costs}$$

6.2.3.3.2 HEDONIC WAGE MODEL

The hedonic wage model[149] evolved from the Time-Salary-Time-Saving method to overcome the weaknesses of the original method (Sassone, 1988b). The core idea of this evaluation method is the evaluation of a workplace's changing range of work activities. It evaluates this change by the wage levels on the assumption that new IT systems generate a shift toward high-value work activities, which creates new value in that specific workplace. This model represents a measurement of quality improvement after the introduction of a new IT system (Kesten, Müller and Schröder, 2007).

6.2.3.4 SURROGATE EVALUATION METHODS

Surrogate evaluation methods have a wider range than that those that focus entirely on financial factors. In addition to financial factors, surrogate evaluation methods include non-financial figures to gather a comprehensive view of IT investments. However, the focus of these evaluation methods differs from decision, risk, or utility evaluations. The following four evaluation methods comprise this category.

6.2.3.4.1 DECISION TREE

Decision trees support the decision making process with a tree-like structure: each leaf denotes a class; each inner node denotes an attribute. Multiple leaves can belong to a single class and several inner nodes can belong to one attribute. The successor of the inner nodes can be reached via edges by which an attribute's value is assigned (e.g., probability, cost). Each leaf represents a decision. The root of the decision tree represents the start of the decision making process for arriving at an adequate decision. Starting at the root of the decision tree, a manager follows instructions to reach the each successive inner node until the decision is classified by the leaf. The assigned values guide the decision (Borgelt and Kruse, 1998).

[149] This evaluation method is also called the "work value model." Cp. Sassone, 1988b.

6.2.3.4.2 ARGUMENT BALANCE SHEET

The argument balance sheet offers the easiest method of evaluating IT investments on the basis of effort required (Breiing and Knosala, 1997). This method is limited to comparison of the planned IT investment's verbally described advantages and disadvantages.

6.2.3.4.3 UTILITY ANALYSIS

Utility analysis is one of the most popular evaluation methods of assessing IT investment alternatives. The decision maker's preferences are integrated into the utility analysis accounting. A scoring approach evaluates qualitative and quantitative criteria of specific alternatives. The point value representing the result of the scoring can be compared with point values of other assessed alternatives to identify the optimal alternative (Kesten, Müller and Schröder, 2007).

6.2.3.4.4 RISK ANALYSIS

As future issues may often be unforeseen, appropriate methods should be used early-on to control risks; therefore, risk management relies on risk analysis to identify potential risks that may have a strong impact relating to, for example, IT investments or IT projects. Risk management comprises risk analysis, the assessment of risks, and the adoption of adequate mitigation measures (Gadatsch and Mayer, 2006).

6.3 CRITICAL ASSESSMENT OF EVALUATION METHOD CATEGORIES

6.3.1 ACCOUNTING-ORIENTED EVALUATION METHODS

The evaluation methods presented in this category can be assessed as an overall important contribution to controlling the IT value proposition. Two hundred respondents regularly used at least one of the evaluation methods in this category, making this the most heavily used category of evaluation methods.

Figure 25: Usage frequency of accounting-oriented evaluation methods

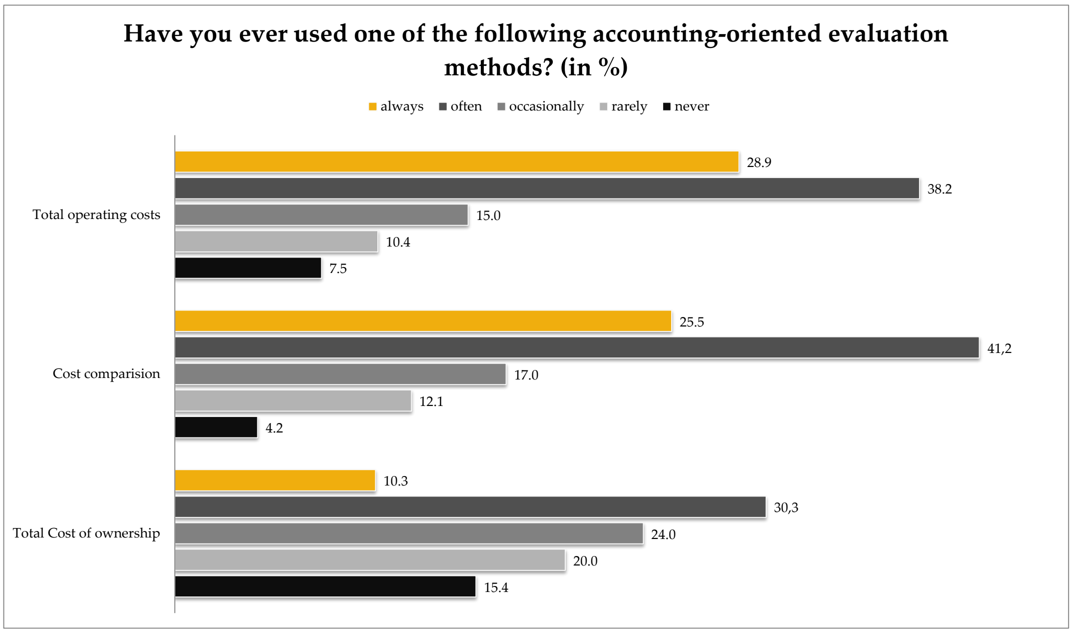


Figure 25 reports that 41% of respondents used cost comparisons often to support the evaluation of the IT value proposition, with roughly 25% indicating that they always use this method. The second most commonly used evaluation method in this category is total operating costs. Roughly 38% use this evaluation method often. The results for this category's evaluation methods are understandable, and more than 60% agreed that the evaluation methods' results are objective and comprehensible. More than 50% of respondents agreed that the availability of the necessary data and ease of use make these evaluation methods easy to apply (Table 4).

The main advantages of these evaluation methods reside especially in taking into account the full emerging IT costs. Thus, these evaluation methods enable a more comprehensive evaluation of IT costs than do other cost accounting or market-oriented concepts, such as ROI (Gadatsch and Mayer, 2006). This advantage does, however, also pose a disadvantage.

Inditango Management Consulting found that these evaluation methods that concentrate on costs alone often have a surprising effect on users. Because the results often indicate that the recurring variable costs exceed the initial investment by several times (Inditango Management Consulting AG, 2001), the results enable users to plan the necessary IT budget. But as those evaluation methods concentrate only on the comparison of costs, these accounting-oriented evaluation methods select the investment alternative with the least cost efficiency, taking into consideration no further (non-monetary) parameters. The IT managers who responded to the survey also observed this phenomenon. More than 51% answered that these evaluation methods cannot integrate non-monetary figures. Because these evaluation methods do not consider benefits or revenues, they support the selection of the most cost-effective IT investment – not the most economical IT investment.

Contrary to the claim of the majority of these evaluation methods to provide a preliminary assessment, their future orientation is actually not especially prominent. Thus, these evaluation methods can determine results only at the reporting date. Moreover, the evaluation methods' results are determined from historical data, supporting only vague recommendations for future IT function investment decisions. Almost 87% of respondents indicated that these evaluation methods cannot support future scenarios.

Furthermore, 40% of respondents indicated that such methods cannot incorporate external dependencies transparently, which is understandable as they concentrate on costs alone. Gadatsch and Mayer emphasizes that another disadvantage of these evaluation methods, especially total cost of ownership, is its purely technical focus (Gadatsch and Mayer, 2006). These evaluation methods concentrate only on IT processes and infrastructure, with not regard to personnel costs.

Table 4: Assessment of accounting-oriented evaluation methods[150]

Accounting-oriented evaluation methods	Percentages frequency					Aver-age	Vari-ance	Standard Error
General requirements	strongly disagree	dis-agree	neither nor	agree	strongly agree			
1. The calculation results are always objective and comprehensible.	1.1	7.4	30.7	49.4	11.4	3.63	0.68	0.06
2. The statements are understandable.	1.7	5.7	23.0	56.3	13.2	3.74	0.68	0.06
3. The method supports the realistic determination of the IT value proposition.	13.5	23.5	37.1	22.9	2.9	2.78	1.08	0.08
4. The method can be applied regularly.	.6	8.6	18.3	45.7	26.9	3.90	0.84	0.07
5. The results may be used to do a peer group comparison.	6.1	23.7	37.7	27.2	5.3	3.02	0.97	0.09
6. Non-monetary effects can be measured by the method.	52.1	29.6	10.1	6.5	1.8	1.76	0.99	0.08
7. Dependencies on external influences can be incorporated transparently.	17.6	40.0	27.1	13.5	1.8	2.42	0.98	0.08
8. The method is easy to apply.	1.1	10.3	33.1	41.1	14.3	3.57	0.81	0.07
9. The necessary data are available.	1.1	9.8	29.3	44.8	14.9	3.63	0.80	0.07
10. Several periods may be included.	.6	3.5	14.0	46.5	35.5	4.13	0.67	0.06
Flexibility requirements								
11. With changing firms' objectives, the method can be easily adapted.	3.7	13.6	38.3	34.6	9.9	3.33	0.92	0.08
12. With a change in the weighting of firms' objectives, the method can be easily modified.	3.8	13.8	40.0	33.1	9.4	3.31	0.91	0.08
13. The employment variation can be measured by the method.	30.3	30.3	21.3	16.8	1.3	2.28	1.23	0.09
14. The method supports the control of resources.	9.4	24.1	27.1	32.4	7.1	3.04	1.23	0.09
15. Future scenarios can be easily mapped.	16.4	26.1	36.4	17.6	3.6	2.66	1.13	0.08
16. Alternative IT investments can be evaluated.	2.9	13.4	25.6	43.0	15.1	3.54	1.00	0.08
17. Different risk expectations can be considered.	12.6	25.7	30.5	27.5	3.6	2.84	1.16	0.08
18. The method is suitable to control structural changes.	24.7	31.3	27.1	14.5	2.4	2.39	1.17	0.08
Capability Cluster								
19. Assigned capability cluster	Infrastructure & Operations							

Most of the respondents disagreed with many statements about flexibility-oriented requirements. Seventy-eight percent of respondents did not know whether the accounting-oriented evaluation methods support firms' changing objectives. These answers are understandable as the accounting-oriented evalua-

[150] Each requirement's average value is the average of the related scale, where 1 represents "strongly disagree" and 5 "strongly agree." The average of the frequency percentages is not shown.

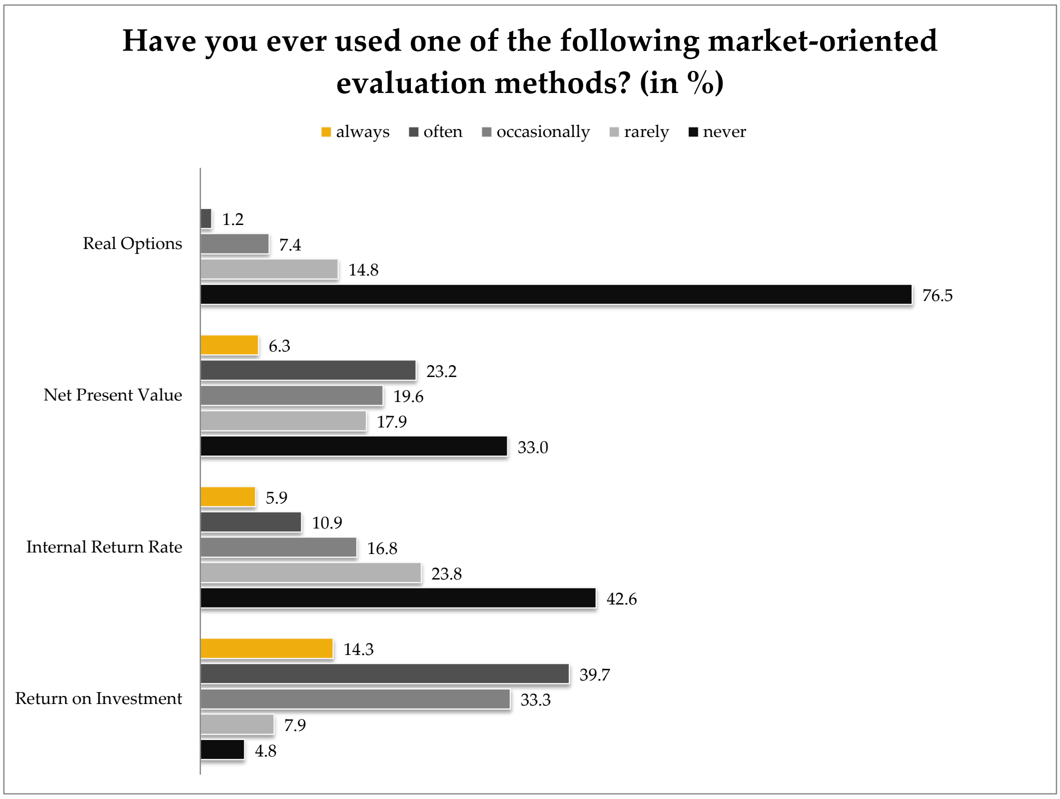
tion methods concentrate only on cost comparison, intending no relationship to firms' business objectives.

More than 62% of respondents use these evaluation methods to control the IT value proposition in the capability cluster of infrastructure and operations. This result reflects the assessment of Moschella (1997), who explained that those evaluation methods are primarily used in the early evolution stages of hardware investments (cp. Figure 19).

6.3.2 MARKET-ORIENTED EVALUATION METHODS

Figure 26 reveals that not all the methods in this category are used with equal frequency. Only 1% of respondents often use the real options method that reflects flexibility in its option pricing model. In contrast, almost 77% reported that they never use this method.

Figure 26: Usage frequency of market-oriented evaluation methods



The real option method was meant to extend other evaluation methods by usage of an option premium. Thus, business flexibility should be included in the decision-making calculation (Krag and Kasperzak, 2000). Since the calculation of the real options evaluation method is dominated by stochastic processes based on the knowledge of former values, which are in turn determined by other evaluation methods, the criticism of these evaluation methods can be transferred to the real options evaluation method.

Another criticism of the real options approach is the avoidance of subjectively estimated probabilities calculated by stochastic processes. This disadvantage, however, is apparent only when the market value of a similar object (twin asset) can be determined. Otherwise, the real option evaluation method is as effective as other evaluation methods to determine the IT added value (Krag and Kasperzak, 2000).

The main criticism of this evaluation method focuses on the option pricing theory itself, which describes a variety of assumptions (e.g., completeness of capital markets, principle of arbitrage). However, such capital market assumptions cannot be confirmed in real life situations, which are instead characterized by imperfect capital markets, making the usage of this evaluation method questionable. Model variations, however, have supported the usage of this evaluation method.[151]

Almost 40% of all respondents often used the return on investment evaluation method. Thirty-three percent used this evaluation method occasionally. Thus, the respondents used this evaluation method most often in this category.

The return on investment considers a certain period and does not take future cash flows into account. As this evaluation method does not focus on flexibility as either as an opportunity or as a risk, the IT function cannot calculate a risk surcharge related to the return on capital. The return on investment is merely a reference date assessment of the IT function's performance, calculated from previous periods.

Return on investment is the primary figure in the DuPont system, which describes additional figures for calculating monetary performance. The more

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[151] Tomaszewski (2000) provides an overview of model modifications.

these underlying figures (e.g., net interest income, depreciation) are compressed and abstracted, the greater the inconsistency and comprehensibility of the results.

The main problem of return on investment, however, is that the ratio of profit to invested capital is not very meaningful. Thus, a positive result by this evaluation method does not support the decision to perform certain investments. In comparison to alternative IT investments, investments with a higher return on investment generally take precedence, thus preventing more meaningful IT investments.

In addition to the return on investment, almost 30% of respondents used net present value often or always. Its integration of external interest rates makes net present value seem, at first glance, to be a "dynamic" evaluation method. Twenty-eight percent of respondents agreed that external dependencies can be integrated within this evaluation method. The ability to calculate the net present value requires realistic assumptions regarding the IT function's future performance. Forty-six percent of respondents agree that future scenarios can be easily mapped by this evaluation method. However, this is also one of the main criticisms of market-oriented evaluation method: future management decisions are not included in their valuation calculation. Thus, strategic flexibility is not taken into account adequately. The net present value evaluation method relies on a unique set of expected future earnings for determining current investment alternatives. Consequently, it assumes that IT management has no further influence on the IT function's economic development.

For realistic planning of future earnings, researchers have observed that long planning horizons result in forecast uncertainty. This prediction problem is inherent in the market-oriented evaluation methods (Pape, 1999). The longer the period, the greater the inaccuracy of the underlying plan factors. Planners use different schemas or modified phase measurement methods to reduce or objectify the forecasting problem, but such efforts seem unlikely to enable a long planning horizon to effectively include data of former periods to calculate future earnings—although 38% of respondents reported that the necessary data is available. Furthermore, these future earnings can be presented by different types of cash flows.[152] The type of the cash flow must be chosen inter-subjectively but their assumptions must be pre-defined, making a comparison among peer-groups difficult. Forty-five percent of respondents did not know whether a peer-group comparison could be performed by using these evaluation methods.

To integrate the expected risks, the net present value evaluation method uses the capital market interest rate, which is expected to reflect the possible market risks.

Table 5 reports that this category of evaluation methods has high acceptance among the respondents, the majority of whom indicated that they agree or strongly agree to the general requirements. More than 50% of IT managers indicated that the results of these evaluation methods are understandable. Compared with other categories of evaluation methods, this has the second highest value. Almost 70% considered these evaluation methods regularly applicable as the necessary data are available (48%), but only 30% indicated that these evaluation methods can determine a realistic IT value proposition. More than 44% denied the evaluation methods' ability to measure non-monetary effects.

[152] For further information regarding different cash flows, cp. Schultze, 2001 or Drukarczyk and Schüler, 2001.

Table 5: Assessment of market-oriented evaluation methods

Market-based evaluation methods	Percentages frequency					Aver-age	Vari-ance	Standard Error
General requirements	strongly disagree	dis-agree	neither nor	agree	strongly agree			
1. The calculation results are always objective and comprehensible.		13.2	41.2	38.6	7.0	3.39	0.81	0.08
2. The statements are understandable.	.9	6.0	32.8	53.4	6.9	3.59	0.75	0.07
3. The method supports the realistic determination of the IT value proposition.	6.3	32.1	31.3	28.6	1.8	2.88	0.96	0.09
4. The method can be applied regularly.		8.7	21.7	48.7	20.9	3.82	0.86	0.08
5. The results may be used to do a peer group comparison.	7.1	16.7	45.2	27.4	3.6	3.04	0.94	0.10
6. Non-monetary effects can be measured by the method.		44.1	33.3	18.0	4.5	1.83	0.88	0.08
7. Dependencies on external influences can be incorporated transparently.	7.9	21.9	40.4	28.1	1.8	2.94	0.94	0.09
8. The method is easy to apply.	3.5	18.4	30.7	38.6	8.8	3.31	0.99	0.09
9. The necessary data are available.	.9	12.9	37.9	42.2	6.0	3.40	0.82	0.08
10. Several periods may be included.	1.8	5.3	16.7	46.5	29.8	3.97	0.92	0.09
Flexibility requirements								
11. With changing firms' objectives, the method can be easily adapted.	4.7	18.7	39.3	32.7	4.7	3.14	0.94	0.09
12. With a change in the weighting of firms' objectives, the method can be easily modified.	6.5	20.6	37.4	26.2	9.3	3.11	1.05	0.10
13. The employment variation can be measured by the method.	27.5	34.9	25.7	11.9		2.22	0.98	0.09
14. The method supports the control of resources.	8.8	23.0	34.5	28.3	5.3	2.98	1.04	0.10
15. Future scenarios can be easily mapped.	6.2	15.9	31.9	36.3	9.7	3.27	1.05	0.10
16. Alternative IT investments can be evaluated.	.9	7.0	21.1	49.1	21.9	3.84	0.88	0.08
17. Different risk expectations can be considered.	4.5	22.3	29.5	35.7	8.0	3.21	1.02	0.10
18. The method is suitable to control structural changes.	18.2	37.3	20.9	20.9	2.7	2.53	1.10	0.10
Capability Cluster								
19. Assigned capability cluster	Controlling & Finance							

More than 38% of respondents used these evaluation methods to control the IT value proposition within the capability cluster of controlling and finance, a predictable result due to the strong financial focus of the evaluation methods in this category.

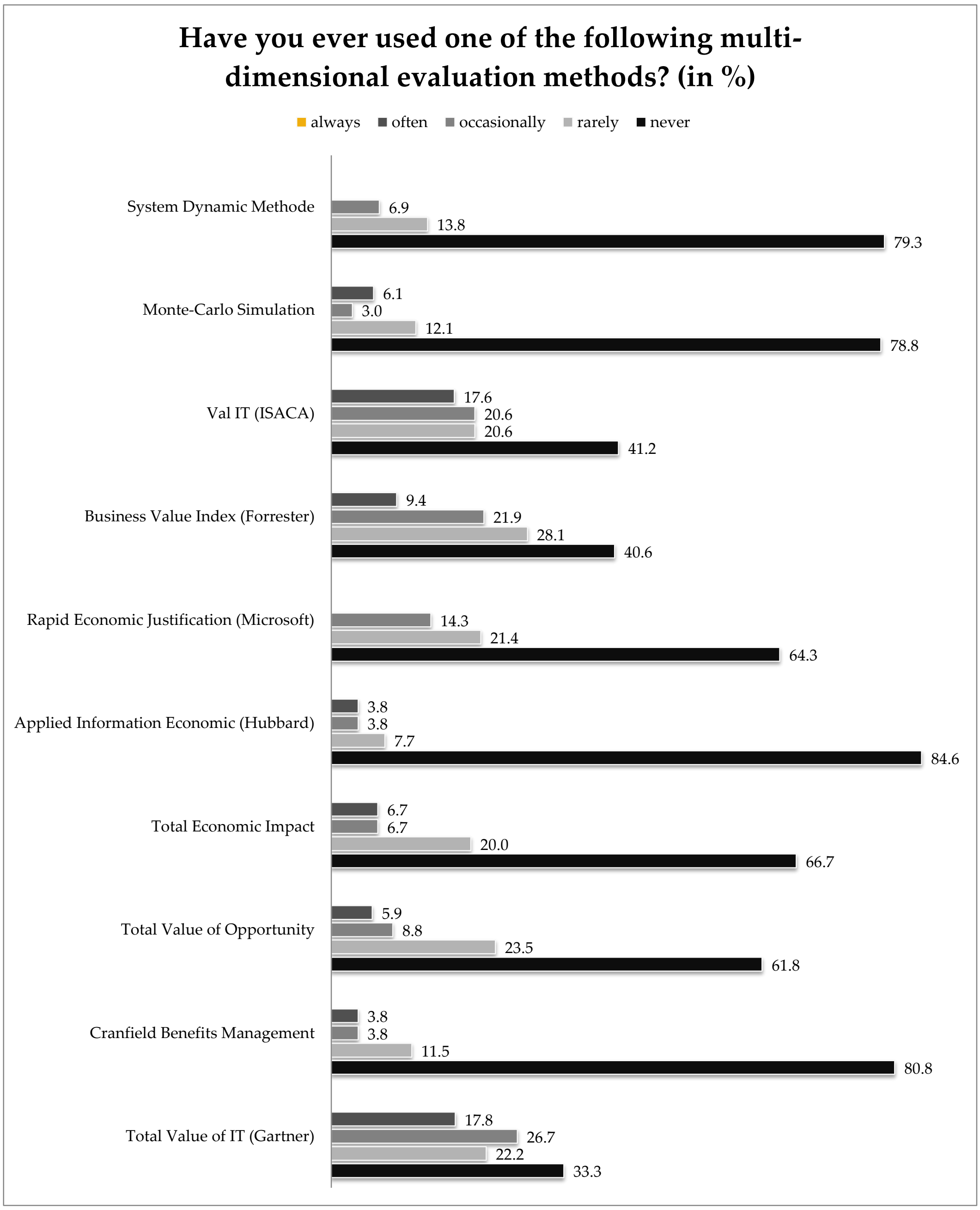
6.3.3 MULTI-DIMENSIONAL EVALUATION METHODS

Figure 27 clearly reports that IT managers did not use most of the multi-dimensional evaluation methods, re-emphasizing that the results of the Ardour

Consulting study cannot be confirmed overall.[153] Nonetheless, some IT managers did use several multi-dimensional evaluation methods, primarily the Total Value of IT by ISACA. Almost 18% of the respondents used this method often, and nearly 21% used it occasionally, but almost 15% also used the Total Value of Opportunity occasionally or often. The lowest level of usage is attributed to the Cranfield Benefits Management evaluation method, with almost 81% of respondents never using this evaluation method. Maicher indicated that main criticism of the Cranfield Benefits Management evaluation method is the comprehensive approach, the implementation of which can evolve into a complex matter (Maicher, 2011). Nevertheless, he also highlighted the advantages of this evaluation method. Its clear cause-and-effect relations allows this evaluation method to focus on the IT value proposition and related changes (Maicher, 2011). However, the results of the survey indicate that IT managers did not share this opinion.

[153] For an overview of the study results, cp. Maicher, 2011. The complete results can be found at Ardour Consulting, 2012c.

Figure 27: Usage frequency of multi-dimensional evaluation methods



In addition, Dünnebacke and Wolters (2011) confirmed that all multi-dimensional evaluation methods have their disadvantages. First, in favor of new investments in the IT function, this category of evaluation methods neglects the assessment of the existing IT function. Second, these evaluation methods' results are entirely qualitative. This finding is also supported by 60% of respondents identifying these evaluation methods' strong non-monetary focus. Results are usually not expressed quantitatively, and by concentrating on qualitative results, the degree of subjectivity increases as definitions of descriptive indicators can be only imprecise.

Dünnebacke and Wolters (2011) asserted that multi-dimensional evaluation methods calculate the impact on the IT value proposition on the basis of estimations. On the basis of a calculated total score from individual rating criteria, these evaluation methods assess alternative IT investments without the monetary perspective. Additionally, Kesten et al. emphasized that multi-dimensional evaluation methods often use a process-oriented approach for calculating the IT value proposition. This process-oriented approach in turn includes additional methods and tools. The differences among the multi-dimensional evaluation methods are therefore reflected by their integrated instruments and methods. Thus, their effectiveness and quality largely depend on the quality and effectiveness of their methods and tools (Kesten, Schröder and Wozniak, 2006). For example, Microsoft's Rapid Economic Justification evaluation method recommends using financial metrics like net present values or real options theory (Microsoft, 2003). Of course, using these instruments incurs the inherent shortcomings of these evaluation methods. The problems of calculating a realistic IT value proposition are strictly determined by the selection of the underlying methods and tools, and so the challenge lies in the selection of these integrated methods and tools.

Table 6: Multi-dimensional evaluation methods

Multi-dimensional evaluation methods	Percentages frequency					Aver -age	Vari -ance	Standard Error
General requirements	strongly disagree	dis-agree	neither nor	agree	strongly agree			
1. The calculation results are always objective and comprehensible.	3.3	26.7	33.3	36.7		3.03	0.79	0.16
2. The statements are understandable.	3.2	6.5	38.7	51.6		3.39	0.58	0.14
3. The method supports the realistic determination of the IT value proposition.		13.3	20.0	46.7	20.0	3.73	0.89	0.17
4. The method can be applied regularly.		29.0	22.6	38.7	9.7	3.29	1.01	0.18
5. The results may be used to do a peer group comparison.	3.6	28.6	42.9	21.4	3.6	2.93	0.81	0.17
6. Non-monetary effects can be measured by the method.	3.3	13.3	23.3	33.3	26.7	3.67	1.26	0.21
7. Dependencies on external influences can be incorporated transparently.		15.6	31.3	46.9	6.3	3.44	0.71	0.15
8. The method is easy to apply.	31.3	25.0	25.0	15.6	3.1	2.34	1.39	0.21
9. The necessary data are available.		22.6	29.0	41.9	6.5	3.32	0.83	0.16
10. Several periods may be included.		10.3	24.1	55.2	10.3	3.66	0.66	0.15
Flexibility requirements								
11. With changing firms' objectives, the method can be easily adapted.		13.3	33.3	50.0	3.3	3.43	0.60	0.14
12. With a change in the weighting of firms' objectives, the method can be easily modified.	6.9	13.8	31.0	41.4	6.9	3.28	1.06	0.19
13. The employment variation can be measured by the method.	10.3	17.2	24.1	44.8	3.4	3.14	1.19	0.20
14. The method supports the control of resources.	3.2	9.7	29.0	45.2	12.9	3.55	0.92	0.17
15. Future scenarios can be easily mapped.		10.3	37.9	48.3	3.4	3.45	0.54	0.14
16. Alternative IT investments can be evaluated.	3.4	6.9	24.1	55.2	10.3	3.62	0.82	0.17
17. Different risk expectations can be considered.	6.9	13.8	20.7	48.3	10.3	3.41	1.18	0.20
18. The method is suitable to control structural changes.		12.9	25.8	51.6	9.7	3.58	0.72	0.15
Capability Cluster								
19. Assigned capability cluster	Processes							

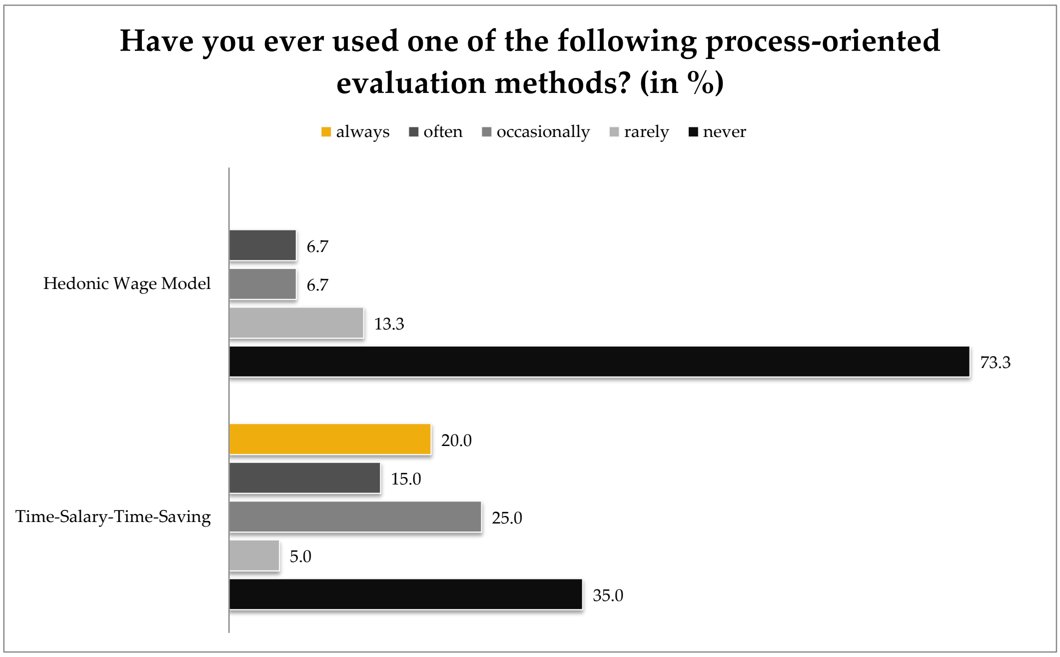
Because of the characteristic flexibility, management can extend multi-dimensional evaluation methods with additional methods and tools.

The respondents clearly acknowledged this flexibility, with almost 49% indicating that these evaluation methods can easily be adapted to changing firm objectives (Table 6). However, this very flexibility also increases the methods' disadvantages. By selecting adequate integrated methods and tools, management can determine which type of evaluation problems they want to include. The exact, objectively understandable, calculated IT value proposition cannot therefore be identified sufficiently, a fact also observed by the IT managers' responses. Although 50% of respondents indicated that these evaluation methods' results are understandable, 75% did not know or did not agree that these evaluation methods can be used for peer group comparison. However, these integrated instruments and methods also expand the range of application of multi-dimensional evaluation methods; therefore, many respondents agreed or strongly agreed to the criteria. Roughly 67% of the respondents agreed that multi-dimensional evaluation methods calculate a realistic IT value proposition.

6.3.4 PROCESS-ORIENTED EVALUATION METHODS

Figure 28 reports respondents' use of process-oriented evaluation methods. The hedonic wage model was never used by 73% of respondents, a clear indicator of its inutility.

Figure 28: Usage frequency of process-oriented evaluation methods



Only 20% used this evaluation method occasionally or rarely. The time-salary-time-saving evaluation method was more widely used. Twenty percent of respondents always used this evaluation method, and 40% used it occasionally or often.

Kesten et al. recognized that the time-salary-time-saving evaluation method is becoming increasingly popular and noted that this evaluation method is easy to use and its results can easily be understood (Kesten, Müller and Schröder, 2007). The survey respondents agreed with Kesten et al. Sixty percent agreed or strongly agreed that the calculation is always objective and comprehensible. Furthermore, 93% indicated that the statements are understandable, 73% agreed that the evaluation method is easy to use, and 86% found these evaluation methods useful for peer-group comparison.

Kesten et al. also realized the disadvantages of these evaluation methods, observing that they negate how the saved time is actually used. This question has also been raised by Sassone, who asked if the value is the same whether

"the saved time is spent at the water cooler, or doing proportionally more of all activities, or devoting the saved time to the most important work." (Sassone, 1988a)

The assumption that the time saved necessarily produces an immediate saving potential is often unrealistic. Furthermore, Sassone explained that these evaluation methods include the assumption that a person's value equals his or her costs to the firm. According to Sassone, a person's generated value is greater than their costs. Thus, this evaluation method underestimates the "true value of saved time" (Sassone, 1988a).

In addition to the time-salary-time-saving evaluation method, Kesten et al. demonstrated the weaknesses of the hedonic wage model. This evaluation method relies on the assumption that a shift in activity and salary level results from a new IT application. Its result is a value for each working place analyzed, which represents improved quality through the introduction of a new IT application. Kesten emphasized that the assessment of the new IT application's impact with fictitious hourly rates seems to be arbitrary. Additionally, the development of an activity profile—before and after the IT application implementation—seems very complex and time consuming. Kesten et al. asserted that these factors, together with the development of activity profiles including a high level of subjectivity, might cause this evaluation method to fail in practice (Kesten, Müller and Schröder, 2007).

Table 7: Assessment of process-oriented evaluation methods

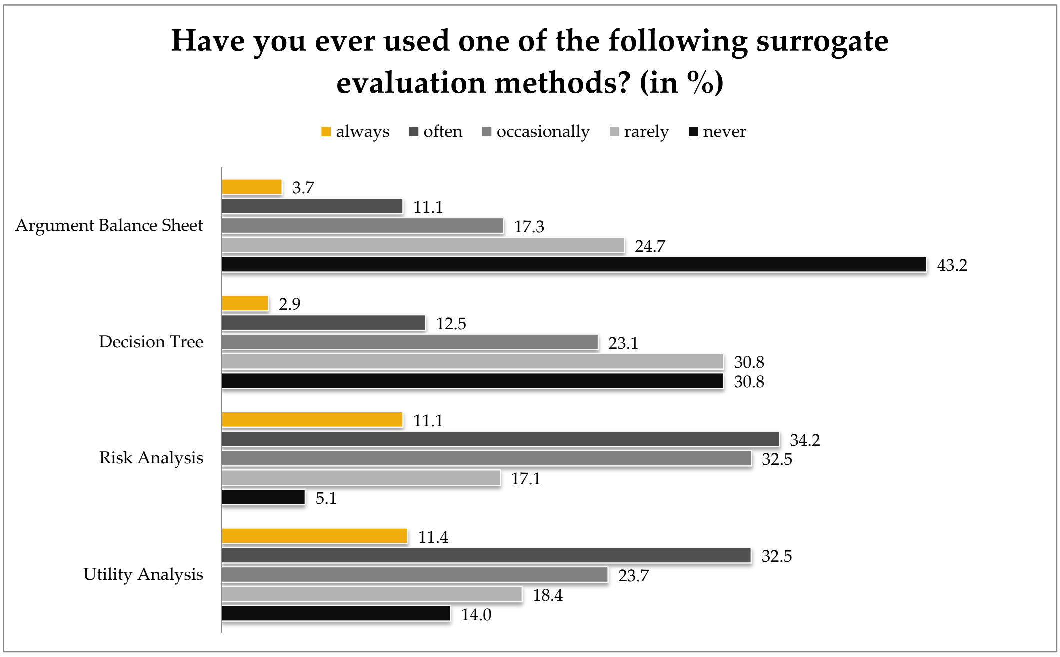
Process-oriented evaluation methods	Percentages frequency					Aver -age	Vari -ance	Standard Error
General requirements	strongly disagree	dis-agree	neither nor	agree	strongly agree			
1. The calculation results are always objective and comprehensible.	13.3		26.7	33.3	26.7	3.60	1.69	0.34
2. The statements are understandable.			6.7	46.7	46.7	4.40	0.40	0.16
3. The method supports the realistic determination of the IT value proposition.		26.7	40.0	26.7	6.7	3.13	0.84	0.24
4. The method can be applied regularly.	6.7		6.7	46.7	40.0	4.13	1.12	0.27
5. The results may be used to do a peer group comparison.			14.3	64.3	21.4	4.07	0.38	0.16
6. Non-monetary effects can be measured by the method.	53.3	6.7		26.7	13.3	2.40	2.83	0.43
7. Dependencies on external influences can be incorporated transparently.	73.3	13.3		13.3		1.53	1.12	0.27
8. The method is easy to apply.		6.7	20.0	33.3	40.0	4.07	0.92	0.25
9. The necessary data are available.		6.7	13.3	26.7	53.3	4.27	0.92	0.25
10. Several periods may be included.	66.7		13.3	13.3	6.7	1.93	2.07	0.37
Flexibility requirements								
11. With changing firms' objectives, the method can be easily adapted.	60.0	6.7	13.3	20.0		1.93	1.638	0.33
12. With a change in the weighting of firms' objectives, the method can be easily modified.	66.7	6.7	6.7	20.0		1.80	1.600	0.33
13. The employment variation can be measured by the method.	6.7	20.0	6.7	60.0	6.7	3.40	1.257	0.29
14. The method supports the control of resources.		13.3	40.0	40.0	6.7	3.40	.686	0.21
15. Future scenarios can be easily mapped.	60.0		20.0	20.0		2.00	1.714	0.34
16. Alternative IT investments can be evaluated.	64.3		21.4	7.1	7.1	1.93	1.918	0.37
17. Different risk expectations can be considered.	71.4		14.3	14.3		1.71	1.451	0.32
18. The method is suitable to control structural changes.		6.7	20.0	40.0	33.3	4.00	.857	0.24
Capability Cluster								
19. Assigned capability cluster	People & Organization							

Table 7 reports that more than 27% of respondents used process-oriented evaluation methods to control their IT value proposition for the people and organization capability cluster. As both evaluation methods strongly relate to personal time savings, this result is understandable.

6.3.5 SURROGATE EVALUATION METHODS

At first glance, Figure 29 reveals that the respondents strongly rejected only one evaluation method as 43% never used the argument balance sheet. This result is surprising because the argument balance sheet is an easy evaluation method to use. It provides easy comparison of the advantages and disadvantages of certain IT investments. It can be assumed that the IT manager performs this comparison of advantages and disadvantages in conjunction with other evaluation methods, for example, in the context of multi-dimensional evaluation methods. However, 57% of respondents used this evaluation method from rarely to often.

Figure 29: Usage frequency of surrogate evaluation methods



Within this category, the IT function most often used risk and utility analysis. Forty-five percent of respondents used risk analysis always or often, closely followed by utility analysis, which 44% of respondents used often or always. This is understandable as these evaluation methods are easy to handle, as supported by 54% of respondents. Because of easy handling, 62% indicated that these evaluation methods can be applied regularly.

Similar to multi-dimensional evaluation methods, all surrogate evaluation methods primarily provide qualitative results, as observed by almost 34% of respondents. However, unlike multi-dimensional evaluation methods, surrogate methods cannot integrate additional (financial) instruments and tools to compensate this deficit.

This strong focus on qualitative results includes a high degree of subjectivity that cannot be underestimated. When using the risk analysis evaluation method, for example, the assessment of hypothetical risks can be completely different for each stakeholder. This evaluation method provides only a framework, structure, and procedure, which must then be configured by individual users (e.g., the definition of risk classes, probability scales). With such freedom, this evaluation method offers the ability to quickly identify upcoming problems and challenges, to which the firm environment can rapidly adapt and control emerging risks. The survey respondents also identified this freedom to adapt these evaluation methods (Table 8).

Table 8: Assessment of surrogate evaluation methods

Surrogate evaluation methods	Percentages frequency					Aver -age	Vari -ance	Standard Error
General requirements	strongly disagree	dis- agree	neither nor	agree	strongly agree			
1. The calculation results are always objective and comprehensible.	8.2	17.3	41.8	30.9	1.8	3.01	0.89	0.09
2. The statements are understandable.	.9	8.8	38.1	40.7	11.5	3.53	0.72	0.08
3. The method supports the realistic determination of the IT value proposition.	15.5	30.9	30.9	18.2	4.5	2.65	1.18	0.10
4. The method can be applied regularly.	.9	9.0	27.9	39.6	22.5	3.74	0.89	0.09
5. The results may be used to do a peer group comparison.	18.3	26.8	35.4	15.9	3.7	2.60	1.16	0.12
6. Non-monetary effects can be measured by the method.	8.2	26.4	31.8	23.6	10.0	3.01	1.24	0.11
7. Dependencies on external influences can be incorporated transparently.	6.4	18.2	32.7	37.3	5.5	3.17	1.01	0.10
8. The method is easy to apply.	.9	12.6	32.4	36.0	18.0	3.58	0.92	0.09
9. The necessary data are available.	1.8	14.4	43.2	34.2	6.3	3.29	0.73	0.08
10. Several periods may be included.	4.8	21.0	27.6	32.4	14.3	3.30	1.21	0.11
Flexibility requirements								
11. With changing firms' objectives, the method can be easily adapted.	4.8	23.8	22.9	40.0	8.6	3.24	1.13	0.10
12. With a change in the weighting of firms' objectives, the method can be easily modified.	6.9	21.6	26.5	39.2	5.9	3.16	1.10	0.10
13. The employment variation can be measured by the method.	34.3	33.3	22.5	7.8	2.0	2.10	1.06	0.10
14. The method supports the control of resources.	15.2	20.5	31.3	27.7	5.4	2.88	1.30	0.11
15. Future scenarios can be easily mapped.	5.5	24.8	26.6	35.8	7.3	3.15	1.11	0.10
16. Alternative IT investments can be evaluated.	4.5	21.8	21.8	36.4	15.5	3.36	1.26	0.11
17. Different risk expectations can be considered.	10.6	28.3	45.1	15.9		3.66	0.76	0.08
18. The method is suitable to control structural changes.	12.1	23.4	29.0	31.8	3.7	2.92	1.19	0.11
Capability Cluster								
19. Assigned capability cluster	Risk & Security							

More than 48% indicated that these evaluation methods can be easily adapted to changing firm objectives. Furthermore, 45% found these evaluation methods are individually configurable by changing firm objectives' weights.

The same advantages and disadvantages can be applied to all surrogate evaluation methods. For example, the structure of utility analysis must be configured individually by the user. This individually configured structure must be understood inter-subjectively to increase transparency. However, finding a structure that is easily understandable by everyone is difficult. Thus, respondents indicated that these evaluation methods are unsuitable for peer-group comparison: 35% were unsure and 45% disagreed.

Overall, almost 80% of the respondents used surrogate evaluation methods primarily to control the IT value proposition for the risk and security capability cluster. Although 23% agreed that these evaluation methods are suitable for the realistic determination of the IT value proposition, roughly 31% were unsure. Approximately 88% of the respondents stated that they use these evaluation methods in the risk and security capability cluster.

7 DERIVING RECOMMENDATIONS FOR A REFERENCE MODEL

7.1 REFERENCE MODELS IN BUSINESS INFORMATICS

To formulate an adequate strategy for controlling a specific real life problem, Porter suggested the derivation of either a model or a framework[154] (Porter, 1991). By developing a rigorous, situation-specific model, Porter identified several disadvantages. Porter (1991) explains that models attempt to abstract complexity to a few variables, emphasizing that

"the normal significance of each model depends on the fit between its assumptions and reality."

Although many previous researchers have used models, Porter recommended making progress and building frameworks to provide more structured and precise tools for understanding the firm environment. Goeken added that frameworks are usually constructed by combining and integrating different concepts related to the specific question (Goeken, 2003).

A framework enables the identification of relevant variables and questions that must be answered to develop conclusions tailored to a particular problem (Porter, 1991).[155] Thus, frameworks cannot impose law-like relationships between variables. Furthermore, Porter noted that frameworks' complexity makes it difficult to falsify arguments (Porter, 1991). Osterloh and Grand also focused on complexity. They asserted that frameworks are instruments for structuring highly complex problems. They represent communication tools to derive alternative options for action (Osterloh and Grand, 1995). By using these communication tools, problems' multiple facets should not be limited, but structured precisely and comprehensively according to the complexity of the problem.

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[154] The term framework is used synonymously with model in this study.

[155] Porter emphasizes that, in this sense, frameworks may be considered almost expert systems. See Porter, 1991.

The advantages of frameworks do not refer to the accuracy of the derived alternatives for action. Their advantage is represented by the suitability of their structure and individual components to solve practical problems. Thus, Goeken emphasized that frameworks have evolved in business informatics as an appropriate research method (Goeken, 2003).

7.2 STRUCTURE OF THE PROPOSED REFERENCE MODEL

7.2.1 QUALITY CRITERIA AND OBJECTIVES

7.2.1.1 QUALITY CRITERIA

Suitable quality criteria must be defined by which to assess the proposed model. These quality criteria then serve to measure whether the established model meets the defined quality standards. However, according to Goeken and Schütte and Rosemann, quality criteria that can measure the framework are difficult to derive (Goeken, 2003; Schütte and Rosemann, 1997). However, recent studies have produced a convergence of certain characteristics that can serve as quality criteria for re-usable models.[156] The following characteristics of models have been discussed in the literature and are used in this study to assess the model:

- **Abstraction:** The character of the model creates a customizable abstraction of the real-world situation. This excerpt from the real world is transformed into a model by using defined rules and guidelines (Deelmann and Loos, 2004b). The abstraction of the real world should be user-oriented.
- **Application:** The application describes the degree to which the model can be used for a variety of user-specific application needs. Pescholl therefore emphasized that the applicability of a model can be supported by appropriate tools (Pescholl, 2010). Scheer described this characteristic as adaptability and emphasized the ability to adapt the model to changing organizational circumstances (Scheer, 1997).

[156] Schütte and Rosemann described these characteristics as principles for reference modeling. Cp. Schütte and Rosemann, 1997.

- **Clarity:** This characteristic addresses the user's individual needs. It demands that the reference model meet the user requirements for clarity (Becker, Rosemann and Schütte, 1997).[157] The user should be able to understand all aspects of the reference model at a glance, including layout, structure, and language.
- **Comparability:** According to Becker et al., the necessary comparability can be divided into two separate elements: syntactic and semantic comparability. Syntactic comparability can be understood as compatibility with other models, and it can be achieved by crafting a meta model that combines the relationships among different models. Semantic comparability requires content-oriented comparability between different models (Becker, Rosemann and Schütte, 1997). Deelmann and Loos strongly emphasized the model's completeness (Deelmann and Loos, 2004b).
- **Completeness and correctness:** Scheer emphasized these characteristics regarding semantics and syntax. For syntax completeness and correctness, selected methodology that defines the model must be consistently applicable to this complex design task. Semantic completeness and correctness exist if the model provides all relevant knowledge for at least one use case (Scheer, 1997). Schütte and Rosemann described this characteristic as the principle of correctness (Schütte and Rosemann, 1997). In general, Becker et al. emphasized that the model's correctness depends on the target audience (Becker, Rosemann and Schütte, 1997). Additionally, the model must be designed to respond to changing environments. For its designated level of abstraction and components, the model must be expandable and adaptable to the users' needs to ensure its completeness.
- **Economic viability:** This characteristic adds the economic perspective to reference modeling. Of course, the economic perspective is interpreted differently by the model developer and user (Becker, Rosemann and Schütte, 1997). The developer is more interested in the model's efficient mainte-

[157] Rosemann and Schütte noted that one user of the model may feel comfortable with a syntactically incorrect reference model that has many redundancies, whereas another may perceive it as confusing. Cp. Becker, Rosemann and Schütte, 1997.

nance and in the initial costs, whereas the users seek to optimize existing structures rapidly (Becker, Rosemann and Schütte, 1997).

- **Generality:** The model should be designed to represent the majority of real-world information objects.[158] Here, Becker et al. found a dilemma. As general models have a large market, firm-specific adoptions should be included in the selection criteria of the model (Becker et al., 2002). Deelman and Loos also identified this conflict (Deelmann and Loos, 2004b).
- **Relevance:** This characteristic requires that modeling results correspond to the results of a consensus-building process (Becker et al., 2002) by selecting the technical contents of the model and the modeling techniques to fulfill the users' purpose. Becker et al. emphasized that a purposeful, not a complete, consensus-building is required for economic elements. It should ensure that the model users and developer do not suffer pseudo-accuracy (Becker et al., 2002). The technical content presented in the model should be tailored to the users' needs. Focusing on only elements relevant to the model prevents the user from being overloaded with information extraneous to the model.
- **Systematic Construction:** This characteristic demands the separation of organizational, procedural, and technical factors within the model (Becker, Rosemann and Schütte, 1997).
- **Visualization:** Deelmann and Loos asserted the importance of the graphical representation of the embedded information objects and therefore formulated a number of aspects to consider (Deelmann and Loos, 2004a). Consistency has been represented by forms, such as the line style and thickness of all information objects. These graphical elements enhance the model's readability and clarity.

7.2.1.2 OBJECTIVES

These characteristics represent the basic requirements of the proposed model, based on which the model's objectives can be defined and its structure determined.

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[158] This demand was also proposed by Neumann. Cp. Neumann, 2011. In this context, Pescholl emphasized the reusability of reference models (Pescholl, 2010).

The model's objectives derive from this study's three main objectives. It **(1) represents a comprehensive understanding of the IT value proposition.** To control the IT value proposition within the IT function, the model **(2) gives recommendations regarding the usage of associated evaluation methods** that concentrate on controlling the IT value proposition. As each firm's specification of its IT value proposition differs, the associated evaluation methods should encompass all possible areas of application. Further, as firms are currently struggling with a dynamic environment, this study also focuses on strategic flexibility. To integrate the ability to react to environmental issues flexibly, the model **(3) describes how the IT value proposition can support strategic flexibility.**

7.2.2 GENERAL STRUCTURE AND ELEMENTS OF THE REFERENCE MODEL

Having defined the fundamental objectives of the proposed model, let us now identify a suitable structure. To give this structure a scientific focus and to make it inter-subjectively understandable by the reader, it makes sense for this study to use surrounding structures that are already described in the literature.

Previous chapters have developed the elements and structure of the proposed model so that it achieves the primary objective of this study by controlling the IT value proposition for strategic flexibility. Chapter 3 described the IT function's role as a business resource and its added value and introduced the concept of IT capability. Chapter 2 identified the necessary requirements that the IT function must fulfill to be accepted as a reliable service provider by the business functions. As these requirements involve a strong relationship to the IT capability construct established by Aral and Weill (Chapter 3), they should be used as the model's main elements. The nine capability clusters identified will be integrated into the model. These capability clusters consolidate the IT function requirements that represent increased improvement of IT-based resources in the firm. Ashurst et al. supported this approach, emphasizing that it makes sense to conceptualize IT's value contribution

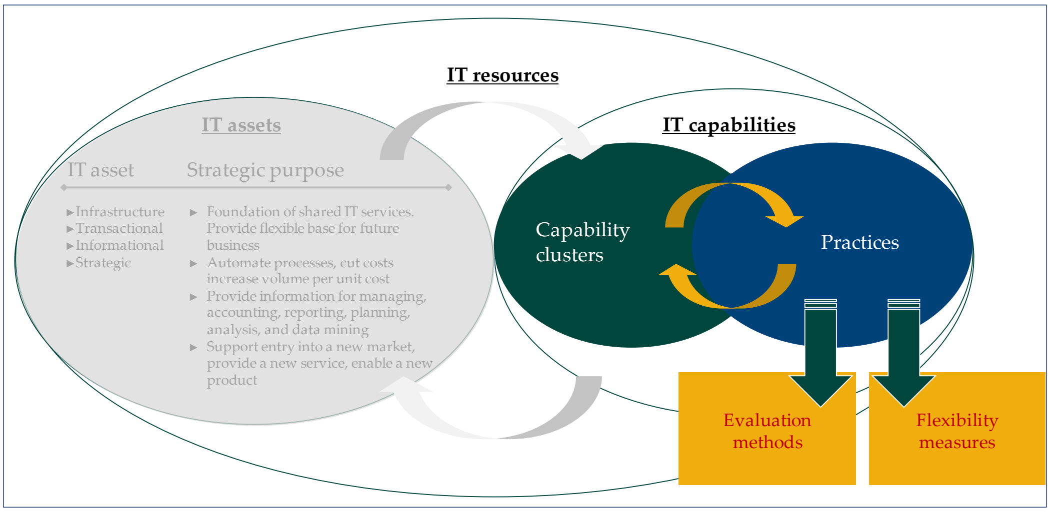
"as an organizational capability that has the express purpose of ensuring that investments made in IT consistently generate value, through the enactment of a number of distinct, yet complementary, competencies." (Ashurst, Doherty and Peppard, 2008)

However, Ashurst et al. also found that such a model usually contains a relatively high level of granularity and provides potential rewards only by increasing the granularity. Ashurst et al. proposed that this goal might be achieved by decomposing the rewards into smaller constituent practices, underpinned by further knowledge or experiences (Ashurst, Doherty and Peppard, 2008). Wenger et al. interpreted Ashurst et al.'s defined practices 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 and Snyder, 2002)

Following this definition, the proposed model will define for each capability cluster its associated evaluation methods and flexibility measures. They will "create a basis for action and problem solving" and will extend the well-known Aral and Weill model. Figure 30 depicts the Aral and Weill model as well as the evaluation method and flexibility measure component extensions.

Figure 30: Extended Aral and Weill model



Chapter 4 identified the design principles for deriving flexibility measures. Here, those design principles determine flexibility measures for each capability cluster. IT managers were asked to validate and rate these flexibility measures. The same approach was chosen for assessing well-known evaluation methods in Chapter 6. Thus, these two components can be added to the Aral and Weill model.

7.2.3 CONTENT OF THE REFERENCE MODEL

Having described the model's general structure and elements, let us examine the content of the elements in greater detail by briefly reviewing the previously identified capability clusters and their associated evaluation methods and flexibility measures.

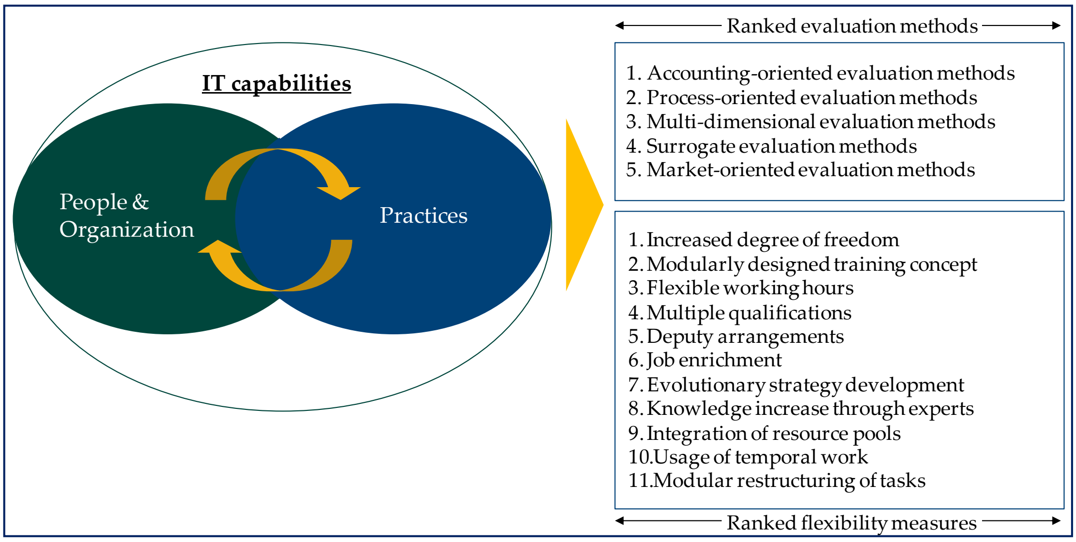
To provide a clearer picture of the flexibility measures, let us examine the model's applicability in real-life situations through examples of practical recommendations based on best practices in the literature for adapting parts of the model to firms' specifications. Nevertheless, these examples represent only a snapshot as each firm (user) must determine its specific design.

7.2.3.1 PEOPLE AND ORGANIZATION

As Chapter 2.2.1 demonstrates, the people and organization cluster presents manifold challenges. Therefore, this section of the model figures strongly for the IT function, as confirmed by the survey, where respondents rated flexibility measures as very important.

Thus, this section's objective is to provide practices that enable the IT function to improve its working environment. A better working environment will enhance the ability of employees and leadership to react to external dynamics more flexibly. For example, flexible working hours support employees in adapting their work behavior to the IT function's current needs.

Figure 31: Elements of the reference model: people and organization



In addition to providing a better workplace, this section of the model is responsible for improving employee skill levels. Survey respondents identified their employees as the primary enabler in improving IT function flexibility, as reflected in flexibility measure assessments. The flexibility measures that focus on employee development and self-determination were rated highest. This result suggests that IT managers prefer such skills in their employees. For example, multiple qualifications or a high degree of freedom in decision making help employees assess new situations quickly and to make appropriate decisions on short notice.

Controlling employee capacity is also essential for the IT manager, albeit a subordinate issue. Resource pool integration can support employees' capacity control. In a resource pool, each resource is assigned at least one skill profile (e.g., project manager), and the entry and exit date of the resource is necessary for the pool's accurate capacity planning. It is assumed that the skill profiles associated to resource pools have similar qualifications for the expected tasks.

Table 9 provides an example of employee allocation. Employee 6 enters the firm on 01/03/2014. Thus, the capacities of the related skill profile (junior configuration manager) and the entire resource pool are increased at that time. Employee 4 left the firm on 31/03/2010, decreasing the capacity of the skill profile "junior IT technical engineer."

Table 9: Resource pool and capacity planning

Skill profile	Employee	Entry	Exit
Senior IT service administrator	Employee 1	01/01/09	
	Employee 2	01/09/09	
Junior IT technical engineer	Employee 3	01/01/10	
	Employee 4	01/12/09	31/03/10
Junior configuration manager	Employee 5	01/01/13	
	Employee 6	01/03/14	

The resource pool supports long-term capacity planning, which can be populated only if the time planning is performed using flat work hours. When differences occur because of the flat work hours, the real presence of employees must be handled accordingly.

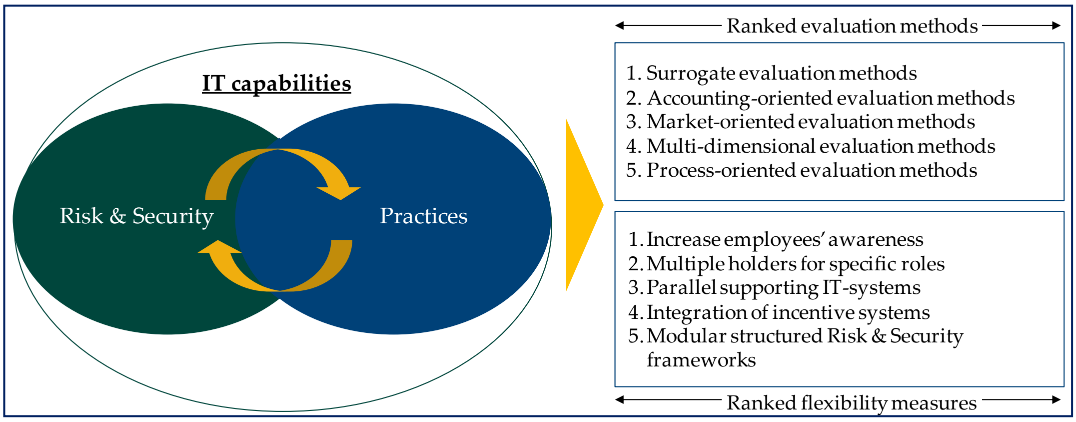
Apart from the individual measures for improving flexibility, Dehning and Stratopoulos also found that IT skills are essential in the IT function (Dehning and Stratopoulos, 2003), but they focused primarily on managerial IT skills rather than technical IT skills. Their findings revealed that managerial skills correlate positively to the firm's competitive advantage, whereas technical IT skills do not support a competitive advantage (Dehning and Stratopoulos, 2003).

For the related evaluation methods, IT managers selected primarily accounted-based evaluation methods to control the IT value proposition for people and organization. This outcome reveals that their main focus is on measuring employment costs, which accounting-oriented evaluation methods measure. Process-oriented methods were found to provide only secondary support for IT value proposition control, once again suggesting a strong focus on costs.

7.2.3.2 RISK AND SECURITY

IT functions currently face an increasing number of security threats. The type of threats and method of attacks changes constantly. Such threats' direct impact on firm performance, corporate liability, loss of credibility, and negative monetary impact make the ability to react flexibly to changing security threats vital for firms. Therefore, all the flexibility measures defined should have the objective of supporting the IT function to mitigate future security threats by increasing flexibility. Figure 32 depicts the survey respondents' ranking of increased employee awareness as the most supportive flexibility measure. Because employees identify security threats on the front line, the value of increasing their perception of such security risks is understandable.

Figure 32: Elements of the reference model: risk and security



This statement was also supported by the Back et al. practice report on implementing a risk management system at Freudenberg, which found that employees and their individual behavior are crucial for the functioning and efficiency of risk measures in firms (Back et al., 2004). The German Federal Office of Information Security also found that increased level of employee awareness was the basic requirement for information security and addressing security threats. Employees' motivation and values and their working environment strongly affect risk and security handling in the firm (Federal Office of Information Security, 2008).

However, the increase of employee awareness cannot stand alone; instead, it must be tailored to the specific setup of the firm. Various activities can also support this flexibility measure. For example, Junginger and Krcmar's empirical study found that brainstorming supports the identification of security threats. Unlike other function employees, IT employees are particularly qualified to identify IT-related risks with this method (Junginger and Krcmar, 2004), which can be part of the firm's overall risk analysis. As risk analysis is a surrogate evaluation method, survey respondents indicated that they considered these evaluation methods to increase flexibility in the risk and security capability cluster.

The German Federal Office of Information Security suggests further activities to increase employee awareness of security threats. For example, training increases awareness of the importance of security safeguards and their application. Security training should be integrated into existing training concepts and should be created for diverse target groups (e.g., administrators, users, management, IT experts).

Furthermore, the German Federal Office of Information Security recommends establishing an online security forum that provides tips on security safeguards, current security threats and issues, presentations on information security, and technical magazines (Federal Office of Information Security, 2008).

In addition to increased awareness and risk analysis, further measures increase IT function flexibility. For example, modular risk and security frameworks can be adjusted to the firm's specific needs. One risk and security framework is the German "IT Baseline Protection Catalog," published by the Federal Office for Information Security and illustrated in Figure 33. By using this catalog, the Federal Office for Information Security provides a simple methodology for firms and government agencies to structure and implement information security.

The "IT Baseline Protection Catalog" recommends standard security measures to support typical business processes, applications, and IT systems. This methodology helps to create IT security strategies easily and economically. In the diverse field of information security, this framework's modularity streamlines the organization and preparation of IT security strategies. The components reflect typical sequences of business processes and components of the IT function, such as business continuity management, client-server networks, communications, and applications, with possible risks documented for each.

Figure 33: IT Baseline Protection Catalog methodology

IT-Grundschutz methodology

Components	Catalog of threads	Catalog of measures
▪ General aspects	▪ Force majeure	▪ Infrastructure
▪ Infrastructure	▪ Organizational deficiencies	▪ Organization
▪ IT systems	▪ Human error actions	▪ Staff
▪ Networks	▪ Technical failure	▪ Hardware and software
	▪ Deliberate acts	▪ Communication
		▪ Emergency preparedness

Source: Federal Office of Information Security, 2008

The "IT Baseline Protection Catalog" can be divided into individual components, the catalog of threats and the catalog of measures.

The framework's components include a short description of procedures and IT systems, and an overview of the threat situation and possible recommendations. The catalog of threats contains detailed descriptions of possible security threats identified in individual components. The detailed description of possible countermeasures is in the catalog of measures.

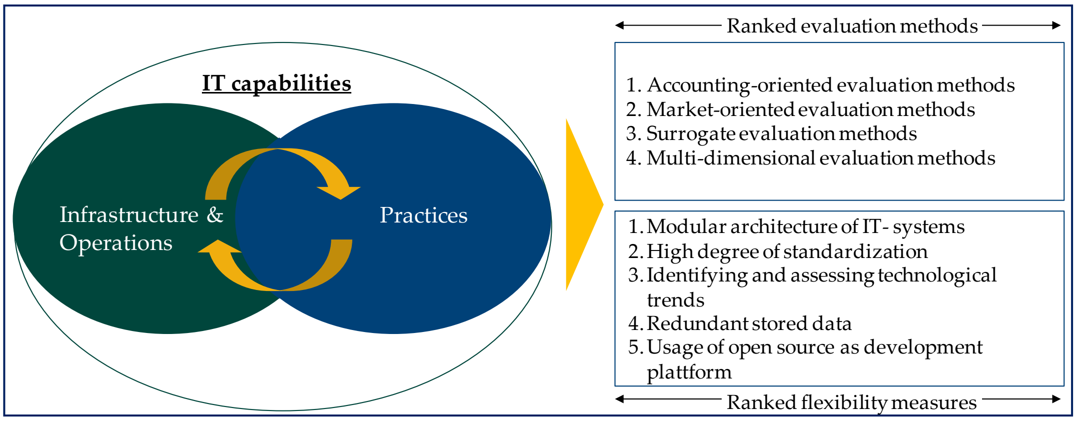
Surrogate evaluation methods can support the design, implementation, and operation processes of the derived IT security countermeasures. For example, the utility evaluation method can assess each IT security countermeasure for its additional value to IT function flexibility. However, multi-dimensional evaluation methods can also control the usage of such measures by being designed to integrate key performance indicators related to risks and IT security issues, such as the percentage of e-mail communication secured by electronic signatures, the percentage of systems running antivirus software, or the amount of lost data storage.

7.2.3.3 INFRASTRUCTURE AND OPERATIONS

The IT infrastructure connects hardware and software, communication, and other equipment used to provide the required IT services. As previously noted, the IT infrastructure represents a critical component of the IT function. The IT infrastructure's ability to cope with the current challenges flexibly can be considered a unique differentiator from market competitors, and IT operations are equally necessary to maintain and manage the IT infrastructure itself.

To establish the necessary flexibility, the survey respondents indicated possible flexibility measures. Figure 34 reveals that the highest ranked measure for increasing flexibility is the modular architecture of IT systems.

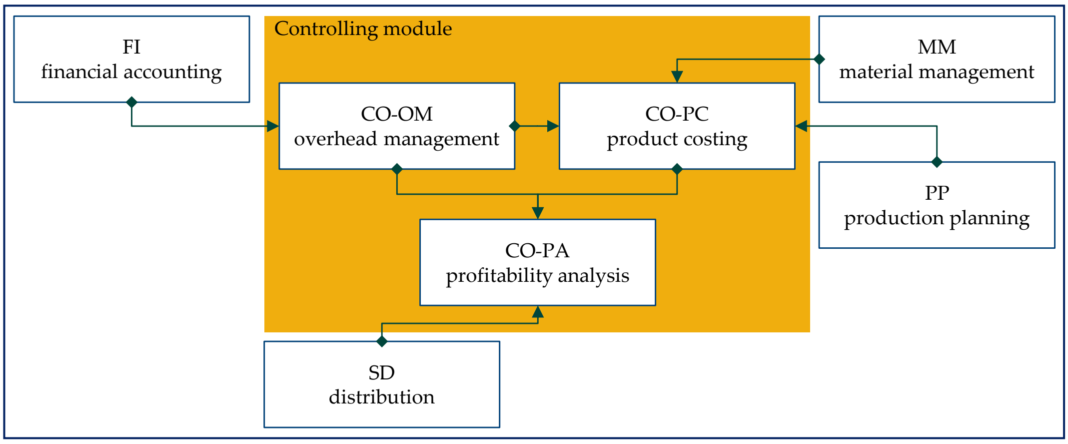
Figure 34: Elements of the reference model: infrastructure and operations



The advantages of modularity have been discussed. Among the most popular IT systems with a modular architecture are those of the SAP AG, which offers solutions for diverse business processes, databases, and technologies. These solutions can support customer relationship management, enterprise resource planning, human resources management, and financial management.

Each single solution in turn consists of more granular, modular components. For example, their financial management solution contains, among other components, an accounting module comprising a purely external accounting module and a control module. These modules in turn contain more granular modules that represent specific tasks. Figure 35 depicts the control module integrating overhead management, product costing, and profitability analysis (Brück, 2009). These individual components of the control module in turn use other components located outside the control module, such as materials management or production planning.

Figure 35: Modular structure of the SAP control module (example)



Source: Brück, 2009

In addition to the usage of modular structure IT systems, another flexibility measure that respondents ranked highly is redundant stored data, which provides many advantages for the IT function, such as offline data availability. Data that is usually available online can be provided via an offline backup, a feature that may be important for areas of application where an online connection cannot be set up at all or not at the required speed. For example, IBM's Lotus Notes application provides this feature by replicating online databases for offline application. Furthermore, redundant stored data support the run-time performance of applications that use databases, achieving performance improvement by denormalizing (Müller, 1992).

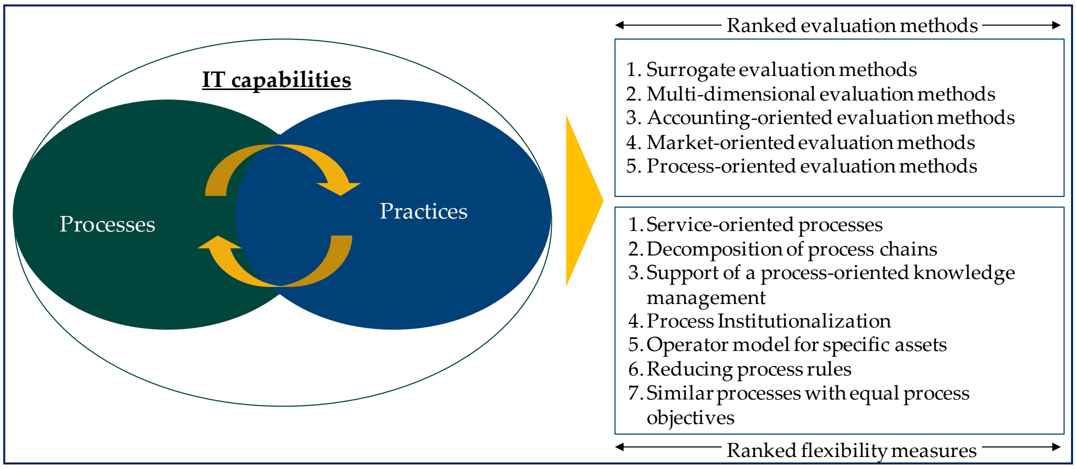
The redundant data tactic poses disadvantages as well as advantages. Redundant data are often associated with negative consequences, such as data inconsistencies. This may occur when stored data is changed only in one database or system without synchronization with other systems. Furthermore, redundant data may use unnecessary data storage, and thus affect the performance of crucial IT systems. Another disadvantage is that redundant data can occupy unnecessary space, thereby affecting the entire system.

Survey respondents ranked accounting-oriented evaluation methods the highest for supporting the control of this element of the model (Figure 33). This is understandable as the control of hardware and IT infrastructure is important for this element of the model. A total cost of ownership or cost comparison approach is consistent with controlling these hardware-oriented costs.

7.2.3.4 PROCESSES

IT functions must cope with a dynamic environment by adapting their internal structures to respond quickly to external business requirements. Figure 36 depicts the element of the model that supports the control of IT value for processes. Here, flexibility measures relate to evaluation methods.

Figure 36: Elements of the reference model: processes

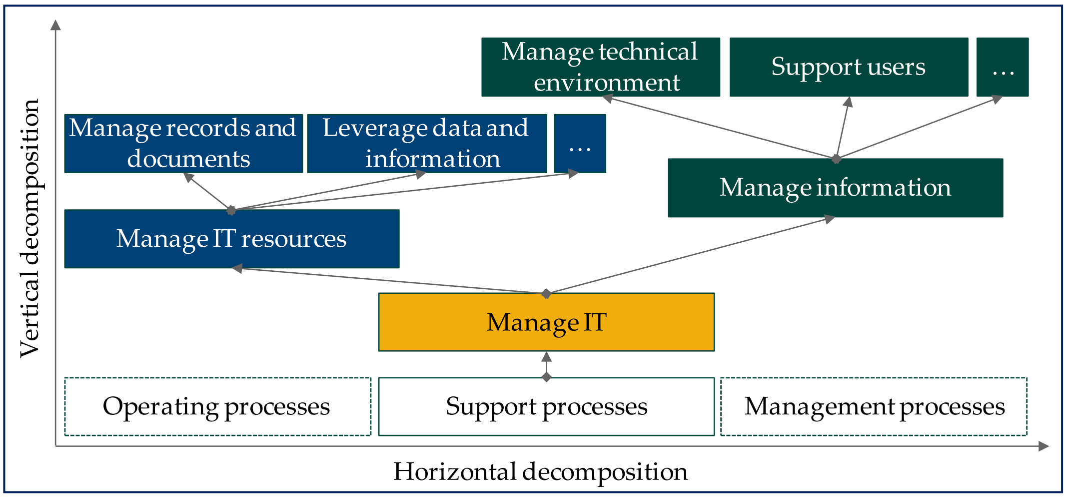


Survey respondents ranked service-oriented processes and the decomposition of process chains highest, which represent the IT managers' wish to provide appropriate services to the business functions. Therefore, the IT function's underlying processes must be designed to support the provision of services. The decomposition of process chains, ranked second among flexibility measures, supports service-oriented processes.

The decomposition of process chains allows the flexible structuring of processes for different criteria. Vertical decomposition identifies the parent and child process elements, and horizontal decomposition describes the relationships to predecessors and successors. Thus, the decomposition depicts all process elements and their relationship to successors and predecessors (Krcmar, 2005).

Figure 37 illustrates the decomposition of the support process "manage information technology." The process can be vertically divided into the sub-processes "manage IT resources" and "manage information." These two sub-processes can be further separated into single process steps such as "manage technical environment" or "support users."

Figure 37: Process decomposition



Source: According to Krcmar, 2005 and Ernst & Young, 2013[159]

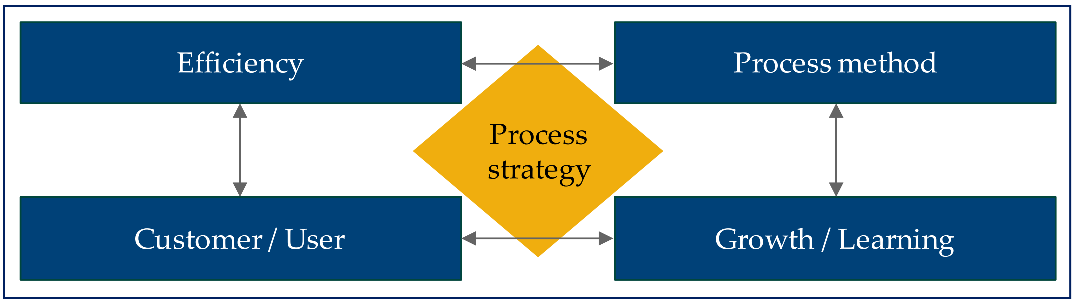
Process decomposition increases the understanding of the IT function process landscape. Furthermore, the quality and processing time of the totality of IT processes can be evaluated. From this information, recommendations can be derived for adapting the process landscape to changing environmental requirements. An institutionalized process management is able to support the realization of these derived recommendations. IT managers ranked process institutionalization in fourth place. Krcmar asserts that process management can be understood as the design, implementation, and evaluation of functional steps (Krcmar, 2005). The recommendations provided by process management follow a set of objectives, among which the primary objective is the fulfillment of customer requirements (Gaitanides, 2009). Therefore, the processes are perceived as service-oriented. Achieving this primary objective requires that enabling objectives be defined, which may consist of various key performance indicators related to process quality, processing time, and costs. Depending on a firm's strategy and the associated process strategy, the occurrence of these objectives may vary. Firms that concentrate on customer satisfaction may focus on process optimization of processing time in the order-to-cash process. The focus of processes of internal

159 The illustration combines the generic figure by Krcmar with the process "manage information technology" described in the Ernst & Young General Process Model. Cp. Krcmar, 2005 and Ernst & Young, 2013.

functions that do not relate to production or customer management will serve mainly as efficiency criteria (Krcmar, 2005).

These different objectives and process strategies require the identification of adequate evaluation methods to control this element of the model. Survey respondents ranked surrogate evaluation methods first in this capability cluster (Figure 35). Risk and utility analysis as a subset of surrogate evaluation methods can assess the impact of a firm's process changes. In addition to surrogate evaluation methods, IT managers also indicated the benefit of multi-dimensional evaluation methods. Following the ideas of Rehäuser (1999), Krcmar recommends implementing a balanced scorecard[160] as a system of key performance indicators for process management, categorizing the information that supports process control into four dimensions, as illustrated in Figure 38.

Figure 38: Balanced scorecard for process controlling



Source: Rehäuser, 1999 and Krcmar, 2005

Each dimension comprises a variety of key performance indicators. *Efficiency* describes the firm shareholders' perspective. If the firm's value increases in the shareholders' opinion, key performance indicators such as costs or customer loyalty may be prioritized and linked to process management objectives. The *customer/user* dimension includes customer perception of the firm. "Customer satisfaction" or "schedule adherence rate" are key performance indicators supporting this dimension. Here, customers can also be the IT function's internal customers. The *process method* dimension describes the internal ability to design, implement, and operate the processes. Associated key performance indicators focus primarily on the operational structure. The fourth dimension, *growth/learning,* concentrates

[160] Although this evaluation method was not subject to empirical assessment, it is described here briefly as another evaluation method for practitioners.

on the firm's adjustment to dynamic environments; thus, it integrates a flexibility component into the balanced scorecard (Krcmar, 2005).

7.2.3.5 PROJECTS

In the qualitative content analysis, various sources indicated that successful project completions remain a strong challenge for firms for many reasons (e.g., missing project strategy or project scope, project complexity, lack of specialized resources). However, the changing environment makes projects crucial to implementing new structures or technologies in the IT function. Thus, IT function flexibility capabilities for project management must be strengthened.

Figure 39: Elements of the reference model: projects

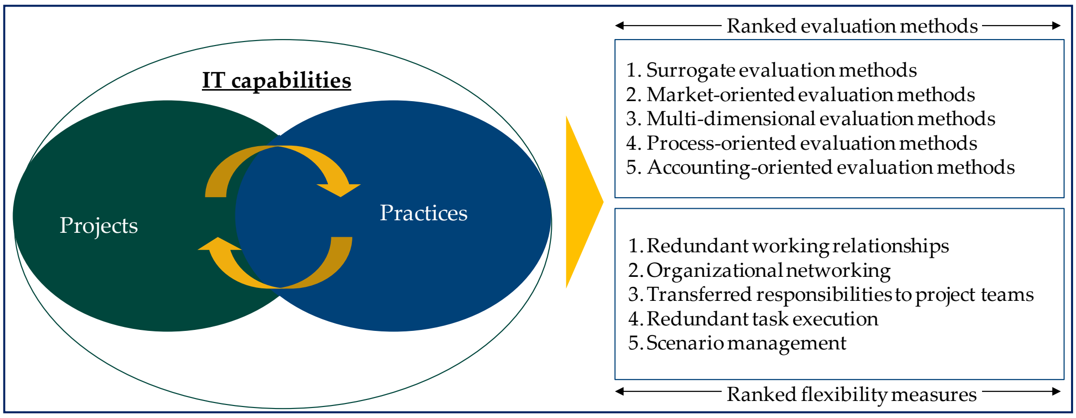
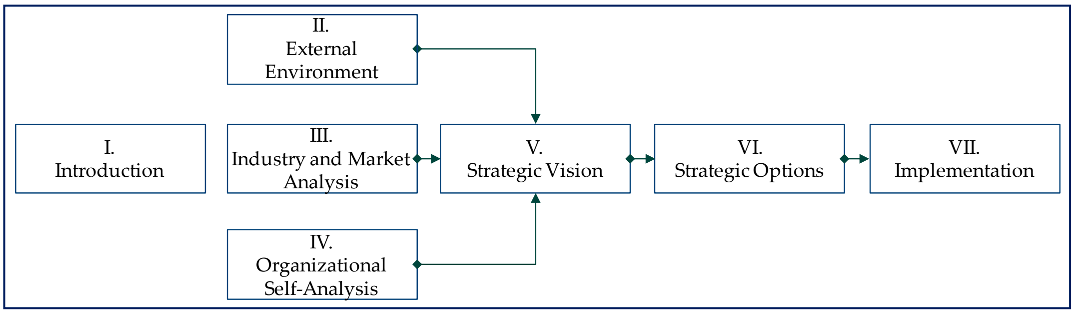


Figure 39 illustrates the survey respondents' ranking of flexibility measures and evaluation methods for enhancing the IT function's flexibility in the project delivery element of the model. IT managers placed the highest priority on flexibility measures that enhance information redundancy in a project's working environment. IT managers thus indirectly indicated that information redundancy is necessary for managing projects in dynamic environments. Information redundancy supports the project manager in making effective decisions. The flexibility measures ranked first, second, and fourth support information redundancy. Survey respondents also ranked scenario management in their top five flexibility measures.

Scenario management can improve project management in a dynamic environment by supporting the determination of flexible budgets or alternative courses of action for different scenarios. It can also safeguard project objectives (Broetzmann and Goetz, 2009). The literature and practice offer various approaches to scenario management. Mietzner differentiated between two basic approaches: model-based and intuitive. Although intuitive approaches are primarily used in Anglo-American regions, model-based approaches are widely applied in Europe (Mietzner, 2009).

Schoemaker's scenario planning approach belongs among the intuitive approaches. As CEO of Decision Strategies International, Schoemaker et al. used this approach to craft scenarios for credit unions (Schoemaker, Randall and Schuurmans, 1999).

Figure 40: Schoemaker's scenario planning approach



Source: Schoemaker, Randall and Schuurmans, 1999

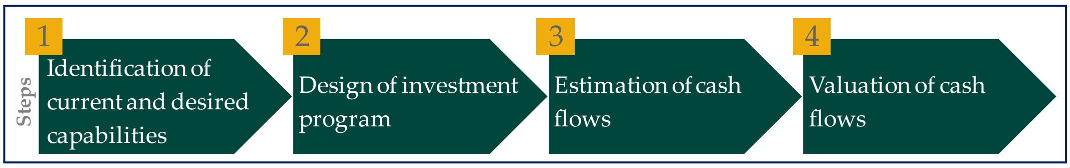
To craft future scenarios for credit unions, Schoemaker's approach was divided into the seven phases depicted in Figure 40. The objective of the first phase, introduction, is to review the firm's previous performance and special challenges to becoming more strategic. The firm itself must perform this review. Phase two focuses on firm's external environment and crafts industry specific scenarios. The third phase examines the market segments and determines in which in areas the firm can compete. The fourth phase analyzes the firm's core competencies. This internal analysis clarifies those actions at which the firm excels. During the ensuing vision phase, employees develop a high-level description of what the firm will do in the future and outline fundamental points that might arise. On the basis of the defined vision, the sixth phase refines the vision and develops strategic priorities and action plans that projects will implement (Schoemaker, Randall and Schuurmans, 1999).[161]

[161] For a more detailed description of Schoemaker's approach, also cp. Schoemaker, 1997.

To control the capabilities in this element of the model, survey respondents indicated that they use primarily surrogate or market-oriented evaluation methods. This outcome is understandable as surrogate evaluation methods can be used in different phases of the project. For example, during the initiating phase a utility analysis or an argument balance sheet can gather all information from which to estimate the project benefit. During all other phases, risk analysis is a suitable evaluation method to control possible risks and associated counter measures.

In contrast, market-oriented evaluation methods serve primarily to evaluate project initiation. Weihs consigned this approach to the real options category (Weihs, 2008). The real option evaluation method can calculate an IT project's meaningfulness. The literature offers several approaches to concretize this evaluation method.[162] Balasubramanian et al. used a four-step approach to manage investments in the IT function (Balasubramanian, Kulatilaka and Storck, 2000). Figure 41 illustrates this approach.[163]

Figure 41: Real option approach by Balasubramanian et al.



Source: Balasubramanian, Kulatilaka and Storck, 2000

The first step involves translating the firm's vision into specific, business-related capabilities. This analysis of the relevant business capabilities strongly affects the valuation of the IT project. Defined capabilities support the investment decision at each stage, depending on the success of the preceding stages and environmental conditions. The responsible investment manager can react to changing conditions by adjusting the investments at each stage.

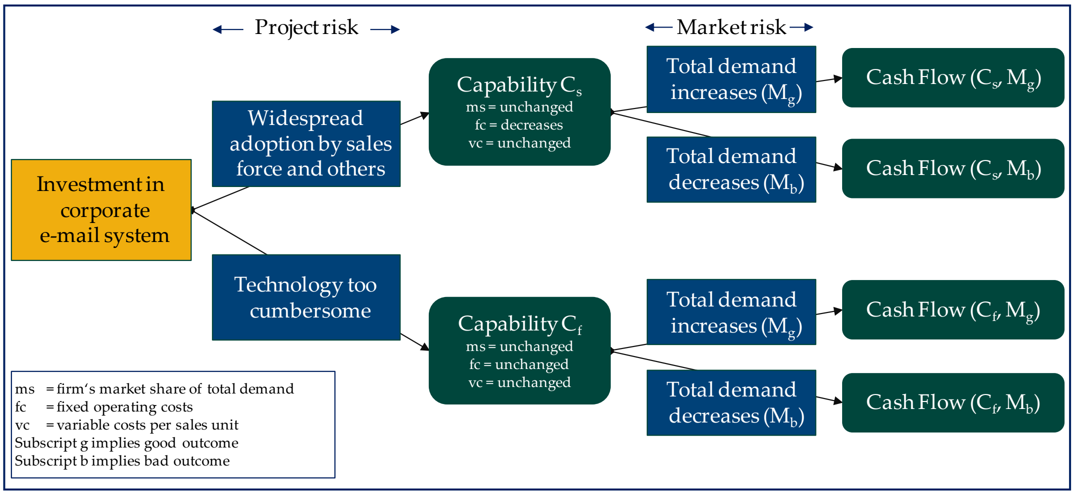
To overcome an IT project's environmental uncertainty, Balasubramanian et al. suggested in step two designing an investment program based on their analytical framework that supports decision makers in building a decision tree by de-

[162] For further information to the real option approach, cp. e.g., Krychowski and Quélin, 2010; Kümpel and Pollmann, 2011 or Eikelmann et al., 2013.

[163] The description of this four-step approach may be found at Balasubramanian, Kulatilaka and Storck, 2000 .

termining the set of possible choices at each decision point. Figure 42 depicts a decision tree of the first stage of an IT project to implement a new corporate e-mail system. This decision tree includes potential cash-flows for the outcomes indicated by the various decisions.

Figure 42: Decision tree at first stage of an IT project



Source: Balasubramanian, Kulatilaka and Storck, 2000

After the investment program design is complete, the next step determines the incremental cash flows generated by each capability. Finally, the decision tree can calculate an optimal value at each project stage, using a dynamic programming algorithm or a Monte Carlo simulation. Balasubramanian et al. recommended continuing the calculation until the initial decision point has been reached.

Balasubramanian et al. found that this approach not only predicts the IT project's impact but also improves the understanding of how business capabilities and operating drivers affect investment decisions (Balasubramanian, Kulatilaka and Storck, 2000).

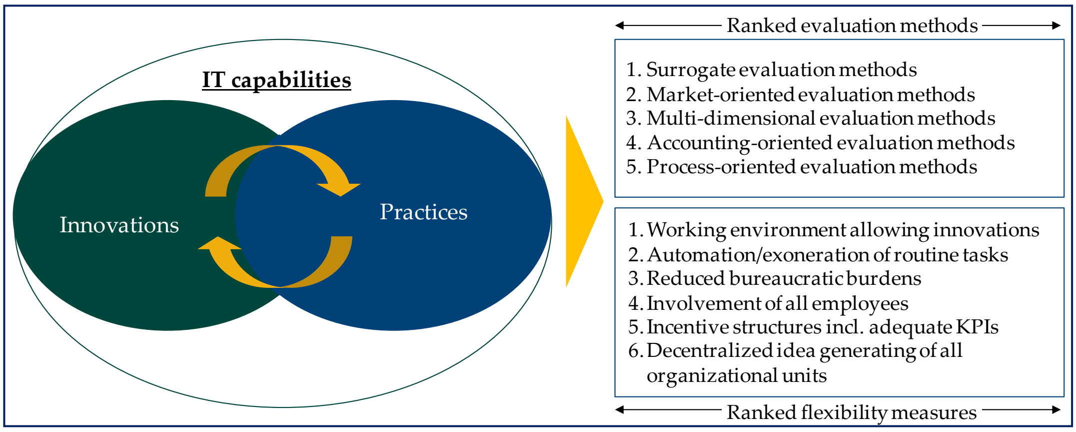
7.2.3.6 INNOVATIONS

The requirements for IT function innovation are diverse. Innovative services, innovation engines, and faster innovations are some of the current requirements for the IT function.[164] Focusing on these requirements, it seems obvious that

[164] Cp. section 2.2.6.

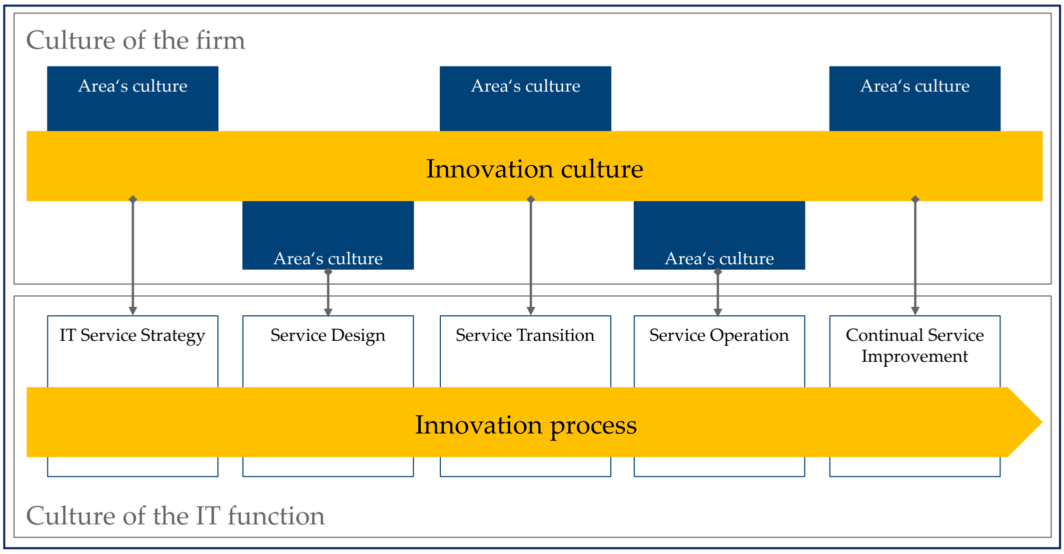
the IT function must be able to remain flexible in its innovations. To increase the IT value proposition for innovation capabilities, the model recommends flexibility measures and evaluation methods.

Figure 43: Elements of the reference model: innovations



IT managers indicated that a work environment that allows innovations seems to be the most necessary requirement for increasing IT function innovation capabilities. All the flexibility measures listed can be consolidated in an innovation culture characterized by norms, values, and mindsets that influence employee behaviors regarding innovation processes. As these processes cannot be limited to single functions within the firm, an innovation culture focuses on the firm as a whole (Vahs and Trautwein, 2000), and this principle apply to the IT function as well. All areas in IT must exhibit the characteristics of an innovation culture to improve the IT function's overall innovation capability.

Figure 44: Cross-functional innovation culture[165]



Source: Vahs and Trautwein, 2000

In their empirical study, Vahs and Trautwein demonstrated how innovative firms use these flexibility measures, among others, and their study re-emphasized the working environment as the basis for innovation. Such a working environment is characterized in particular by employees who independently develop new ideas, take responsibility, and are empowered to make decisions. Their study found that the surveyed firms did not consistently exhibit these characteristics.

The authors also underline the presence of a trustful "mistake culture" between employees and their supervisors, a relationship that minimizes control. However, Vahs and Trautwein conclude that most of the surveyed firms do not exhibit this trustful relationship (Vahs and Trautwein, 2000).

The survey respondents ranked surrogate evaluation methods highest for controlling this capability cluster. Surrogate evaluation includes methods such as risk or utility analysis, an argument balance sheet, or a decision tree. Performing risk analysis is quite important for innovation. Although innovations represent the firm's success, they also include a high risk of lost investments. By analyzing an innovation's potential for success and evaluating the possibility of a bad in-

165 Based on Vahs and Trautwein's approach for a generic production process (Vahs and Trautwein, 2000) and extended by ITIL-specific organizational units to be suitable for an IT function.

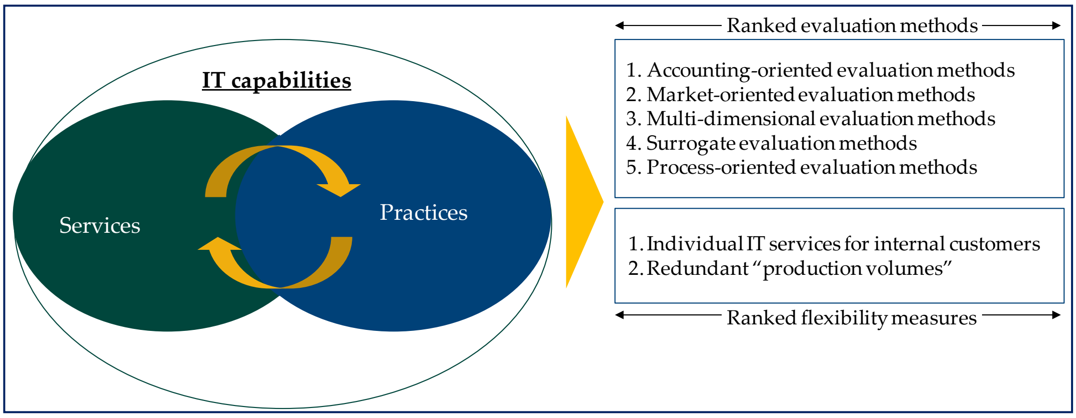
vestment, risk and utility analyses can serve as the basis for the IT function's investment decision. Thus, both instruments assist in the decision-making process. Gleich and Schentler emphasized the balance between creativity and risk limitations. Excessive control of the creative potential in the innovation process can cause rejection of innovative ideas at an early stage if they cannot demonstrate strong rentability (Gleich and Schentler, 2011). Therefore, those evaluation methods must be used in a balanced manner.

The model includes market-oriented evaluation methods of innovations, which respondents ranked in second place. In addition to analyzing innovations' potential opportunities and risks, managers must calculate their profitability and impact on the balance sheet. Here, market-oriented evaluation methods provide an adequate set of instruments, especially traditional evaluation methods such as return on investment. Evaluation methods that focus on turnover, profit, or cost figures dominate innovation control (Handermann and Robers, 2007). Sood and Tellis performed an empirical case study using their adapted marked-based evaluation methods for stock market returns on innovation. By observing the change of this evaluation method, they found that the estimated return on innovation must be calculated across all phases of the project: returns on events associated with the initiation phase occur 4.7 years ahead of project launch. Additionally, they found that returns were highest during development activities (Sood and Tellis, 2010).

7.2.3.7 SERVICES

The IT function must provide adequate services to business functions in a turbulent environment. Although the IT function's budget is often subject to reductions and business requirements change, the IT function must develop, operate, and maintain their services. Figure 45 depicts the model's integration of flexibility measures and evaluation methods to control IT services' value.

Figure 45: Elements of the reference model: services



Survey respondents ranked focus on individual IT services for internal customers first among flexibility measures. Varying customer preferences make the adequate design of IT services highly important, but it also causes a tradeoff. Although IT functions are asked to deliver IT services on short notice, seemingly requiring standardized "one-size-fits-all" IT services, individual IT services must also support the business to enhance its competitive advantage. To overcome this trade off, Böhmann et al. introduced the concept of modular service architectures and provide a real-life example of how to leverage this concept to improve service design while customizing it to meet changing requirements (Böhmann, Junginger and Krcmar, 2003). This concept[166] enabled them to systematically integrate the demands of environmental heterogeneity, which IT services must address. Thus, they integrate the capability of flexibility within the concept. Their concept is based on a service architecture that establishes a framework for individual IT service elements that can be combined into improved or new IT services. They identified drivers for variety in IT services based on customer requirements. The large number of drivers for heterogeneity prevents IT services from becoming fully standardized. Decomposition separates complex IT services into several IT service elements. Grouping these IT service elements in IT service modules enables designers to combine them into IT service products that fulfill the customer's need. These separate IT service elements and modules represent the modular service

[166] The development of this concept was part of an action research project and was tested at a leading German provider of application hosting services. The concept's description can be found at Böhmann, Junginger and Krcmar, 2003.

architecture within which IT develops service products that benefit the customer. Böhmann et al. suggest a five-step approach for developing adequate IT services. This approach supports IT service designers in defining IT service modules with both heterogeneity and interdependencies, as Figure 46 depicts.

Figure 46: Steps for defining IT service modules

Source: Böhmann, Junginger and Krcmar, 2003

The first step analyzes the required IT service features. This step produces a comprehensive overview of IT service requirements. The identification of the necessary IT services and their demand begins with analysis of documents and solutions for individual customers. This analysis must also take into account possible environmental factors and changing customers' choices in regard to varying demands for IT services.

The second step identifies the drivers for variety to create an understanding of the implications of IT function's customer needs. This analysis includes environmental factors influencing the to-be developed IT services and explores possible variants of the IT services. Böhmann et al. emphasized that this step is essential for defining the modular service architecture,

"as it ensures that the design of the modules reflects the effect of external factors, the variation of customer requirements, and the flexibility of the service that customers demand over time." (Böhmann, Junginger and Krcmar, 2003)

The third step analyzes the specific IT service requirements determined by the environmental factors. In their example, Böhmann et al. explained that the essential feature of fast recovery time generates the requirement for adequate business continuity procedures that may affect one or more IT service modules. The adaptation of these requirements can generate variants of module candidates. The IT service modules' design reflects these variants that express needs of the IT function customers.

On the basis of the preceding analysis, the fourth step identifies IT service modules that can generally serve to set up the IT service product. Here, Böhmann et al. suggested a variety of modules. These modules and the service architecture are specified in greater detail in the fifth step. Individual IT service modules are then configured from the definition of interfaces between the single IT service modules. The required features, external factors, and requirement adaptations determine the final configuration. The final step produces a list of choices from which one module variant is selected for the modular service architecture.

In addition to the flexibility measures defined by the modular service architecture, the IT managers assigned high rankings to accounting- and market-oriented evaluation methods for this element of the model. As the group of accounting-oriented evaluation methods consists of, for example, the evaluation method cost comparison, it is understandable that these evaluation methods can control the value of IT-services. Thus, the main focus of controlling IT services is the allocated costs of service set-up.[167] By comparing the various cost types (e.g., development costs, installation, and maintenance) necessary for developing the IT service, options can arise for combining IT service elements. To support this cost comparison, Kütz suggested using the key performance indicator “percentage of cost type n compared to the overall IT-service costs” (Kütz, 2011). Additionally, the IT services’ full lifecycle costs can be compared. To calculate the lifecycle costs, Kütz recommended using the key performance indicator “total of all service-oriented costs since initiation of the IT service” (Kütz, 2011).

Using this evaluation method, the IT function can combine the most cost effective IT service elements to provide the required IT service.

7.2.3.8 CONTROL AND FINANCE

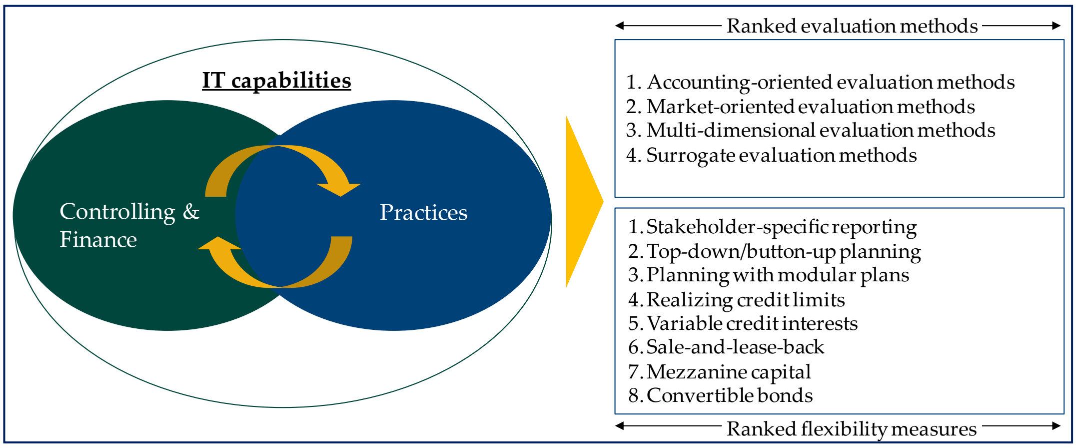
The challenges to IT functions in the area of control and finance are manifold: cost reductions and control of IT investments and budgets.

The model recommends implementing flexibility measures and evaluation methods to enhance the capability to control these challenges. Figure 47 depicts

[167] In a broader sense, Kütz also supported this thought, asserting that internal customers’ usage of IT services cannot be taken for granted. Because of strong competition, the internal IT function has to create “sellable” IT services with measurable business benefits (Kütz, 2011).

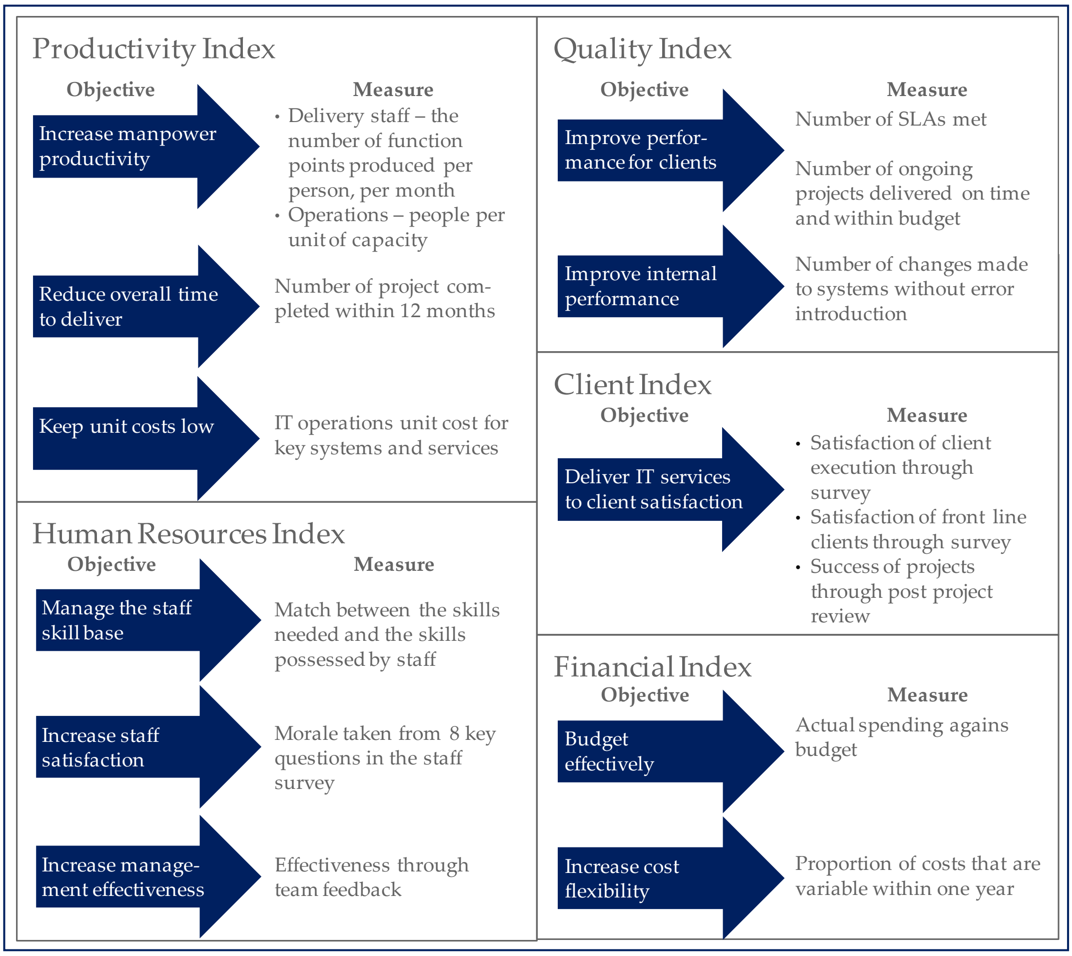
survey respondents' ranking of the suitable flexibility measures and evaluation methods.

Figure 47: Elements of the reference model: control and finance



The highest ranked flexibility measure is the development of stakeholder-specific reporting. Stakeholders of the IT function can be internal addressees including, for example, various business functions that use IT function services. External addressees such as government agencies, audit firms, or customers can also be stakeholders, and providing adequate information for these stakeholders can support their decisions regarding the IT function. Appropriate reporting can effectively detect problems such as mismanagement, limited capacities, or cost overruns. Kesten et al. emphasized that the reports currently found in firms often exhibit many defects (Kesten, Müller and Schröder, 2007), but no reporting solution suitable for all types of IT functions exists. Kesten et al. described a typical performance management system that IT functions might use. This performance management system, originally developed by Graeser (1998), can serve as a foundation for IT reporting. However, Kesten et al. emphasized the necessity to connect the KPIs to the processes that support the IT strategy (Kesten, Müller and Schröder, 2007), as Figure 47 illustrates.

Figure 48: Example of a set of KPIs for IT reporting



Source: Cited by Kesten, Müller and Schröder, 2007 according to Graeser, Willcocks and Pisanias, 1998

In addition to establishing stakeholder-specific IT reporting, this element of the model suggests using additional flexibility measures, such as the sale-and-lease-back method. Although measure has found wide acceptance over the ensuing six decades, Cary, in his 1949 *Harvard Business Review* article, met this with skepticism and commented that

"the sale and lease-back device is being currently hawked and brokered as a panacea for most corporate needs." (Cary, 1949)

Cary acknowledged that the sale-and-lease-back method was introduced to finance firms' needs (Cary, 1949). For the IT function, Oettinger (2008) much more recently observed that this flexibility measure has its advantages, adding that it is especially advantageous for mid-size firms because it enables them to calculate the evolving leasing rates, set up hidden reserves, and plan reliably.

To illustrate how to define this flexibility measure, Oettinger describes the successful leasing of IT function hardware the “print-IT-easy” financing approach offered by Siemens Finance and Leasing to IT functions and office retailers in need of printing and copying solutions. It contains a usage-based rental contract and allows IT functions and office retailers to offer their customers demand- and page-price-oriented printing and copying solutions. Thus, this financing approach is manufacturer-independent, enabling IT functions and office retailers to rent their hardware from the provider of the financing approach (Oettinger, 2008).

In addition to ranking the flexibility measures, survey respondents evaluated evaluation methods for this model element, with accounting-oriented and market-oriented evaluation at first and second rank, respectively (Figure 46). These evaluation methods can be used in different areas of application in this element of the model. Kütz suggested using the cost comparison evaluation method for benchmarking the IT function’s service portfolio (Kütz, 2011). This evaluation method compares the IT function overall, as well as individual IT functions. Kütz recommended performing the cost comparison, or IT benchmarking, with a standardized IT service catalogue: the IT operations unit comprises subordinate services, as does the software development unit. Thus, Kütz suggested multiplying the number of IT services by the individual cost rates of each unit to determine at what price other units can provide the requested IT services (e.g., IT project management hours) in the shopping cart as compared with the referenced unit (cp. Table 10).

Table 10: Cost comparison on the basis of IT service catalogue

	IT Service		
Unit within the IT function	Amount	Costs	Total
IT Operations	100	2.00	200
Software development	200	1.50	300
Average	150	1.67	

Source: Kütz, 2011

Once calculated, the average amount of the demanded IT service can be multiplied by the individual cost rate of each area within the IT function, thus determining the price at which each unit can provide the demanded quantity of IT services (Kütz, 2011).[168]

7.2.3.9 COMMUNICATIONS

IT function communications strongly affect the transparency of its value. Settle found that IT function communications with the business functions must focus increasingly on "delivering services" instead of IT projects and individual IT assets (Settle, 2010). However, an incorrect communication incurs risks for the IT function regarding its communicated IT value.

To avoid such errors, the model provides flexibility measures and evaluation methods that support the improvement of the IT value proposition through its communications, as Figure 49 illustrates. The survey respondents' highest ranked flexibility measures were increased inter-functional communication and the improvement of employees' communication abilities.

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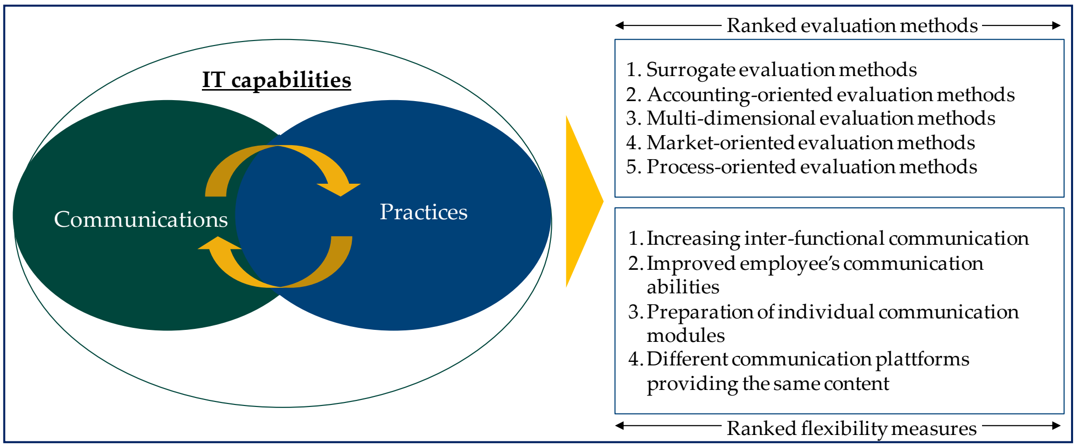
[168] This type of calculation may also apply to other areas (e.g., cost comparison of different cost types within the IT-service). However, Kütz offered no further explanations.

Figure 49: Elements of the reference model: communication



Schaffry found that the IT function's inter-functional communications must be tailored to each business function (Schaffry, 2007). He emphasized that IT communications cannot be performed by a "watering can" approach. Forrester used IT archetypes to tailor the communication to the specific addressee so that IT managers can determine each business function's expectations of IT communications.[169] Forrester identified three archetypes of IT functions: (1) the solidly reliable utility that provides cost-effective IT services, (2) the trusted supplier that delivers application projects on budget and on time addressing business requirements and providing a solid utility, and (3) the partner player that creates competitive solutions with suppliers, customers, and internal addresses as well as being a trusted supplier (Cameron, 2012). In addition to focusing on these IT archetypes, Forrester observed that end user job roles determine their individual use of IT communications. Table 11 provides an example of end user job role communication tailoring. The call center representatives need different information from that of the power user, who needs a very broad window into the IT function (Cameron and Belanger, 2007). Such tailored communication can also be adjusted to the IT archetype that each employee role demands.

[169] For an overview of the Forrester IT archetypes, cp. e.g., Cameron, 2012.

Table 11: Communication content by employee role

Employee role	Example	Communication content
Captured user	Call center rep or inventory picker	▪ Change management activities and status associated with system upgrades
Desktop automation user	Administrator or clerk	▪ Coming tools and services to enhance usability ▪ Suggestions of how to improve tool use
Power user	Financial analyst or market specialist	▪ New business services, master data strategies, and classes for improved access
Manager	Call center manager or sales manager	▪ Reminder of tools that enhance management activities like reviews and expenses ▪ Best practices for using these tools to meet job objectives
Executive	President or business unit general manager	▪ Relevant investment plans, status, and results ▪ Related sourcing strategies and execution
Board of directors member	Internal exec or external notable	▪ Strategic project plans, status, and business results ▪ Leading-edge technology use and business results

Source: Cameron and Belanger, 2007

Nevertheless, Forrester asserted that only differentiating the communication by user role really matters. In some cases, the communication remains the same and need not be tailored to another IT archetype.

In addition to the definition of the flexibility measures, this element of the model recommends using surrogate evaluation methods. Forrester shares the recommendation that the success of IT communication must be monitored and managed as a continuous program (Cameron and Belanger, 2007). The evaluation methods integrated within the model can serve primarily to set up the IT function communication activities. Here, utility analysis calculates the potential utility of the IT communication, and risk analysis identifies potential communication risks and determines risk responsibility and counter measures.

7.3 CRITICAL ASSESSMENT OF THE REFERENCE MODEL

This chapter created the model on the basis of the information from this study's empirical research and the literature review. Using a meta model as a limiting framework, capability clusters and flexibility measures were combined. Quality criteria and objectives for the proposed model had previously been derived. This section now assesses the extent to which the model has met these requirements, considering quality criteria and model's objectives separately.

7.3.1 ASSESSMENT OF QUALITY CRITERIA

Requirement #1 (Abstraction): Obtaining an adequate level of abstraction seems difficult. The balance between an overly high level of abstraction and an excessively strongly specified model must be found. Both extremes present strong challenges to the user, so that he relies on other models. However, the model crafted herein abstracts from real-world situations and is not limited to a small number of specific challenges in a tightly defined context. Furthermore, it is not limited to a few industry sectors. Nevertheless, the model focuses on firm IT functions. The selected elements of the model (flexibility measures and capability clusters) limit the extent of the model's usage. Thus, the user obtains an appropriate level of abstraction that can be served as a starting point for adjusting the model to a firm's specific needs.

Requirement #2 (Application): The level of application is closely connected to the level of abstraction. Only with a certain level of abstraction can the model be used for a variety of applications. The model's elements limit its application. However, as the elements have been empirically derived (e.g., capability clusters), the model takes into account the entire range of applications within the IT function. Thus, the structure of the model developed in this study can be considered widely useful and consistent with this requirement.

Requirement #3 (Clarity): The individual needs for a models' clarity differs among users, each of whom adapts the model to his needs. As the model and its elements are represented graphically for each capability cluster, each capability cluster's structure seems intuitively understandable. However, the graphical illustration of the model is limited to each of the nine capability clusters. The high number of elements prohibits an overview representing all capability clusters, flexibility measures, and evaluation methods. The absence of an overview may cause the user an increased familiarization effort at first glance. The text provides further explanations of the model. As these explanations are written in English, the model user must master this language. However, as English language comprehension can be considered available in principle, this obstacle is minor.

Requirement #4 (Comparability): Assessment of the model's comparability is difficult. Although this comparability must be assessed semantically, it also must be assessed syntactically. Becker et al. established the requirement that the model must integrate the underlying meta models (Becker, Rosemann and Schütte, 1995). The model fulfills this requirement as it uses the Aral and Weill model as a meta-construct. Their model has been widely discussed in the literature. As other elements of the model (e.g., evaluation methods, capability clusters, and flexibility measures) must be defined, further meta models are not integrated into the overall model.

Semantic comparability focuses on the comparability of the model's content and requires content-related comparability among models. First, this aspect of comparability can relate to models integrated within the model. The model incorporates no other models or model elements beyond the Aral and Weill meta-construct. Thus, internal comparability cannot be assessed. Second, comparability can relate to models external to the reference model and used to control the IT value proposition (e.g., IT governance frameworks). The comparability of such models to the reference model is also not possible, especially because of each model's different perspectives, usage of other models' elements, degree of abstraction, and the related content. For example, the degree of abstraction of the DeLone and McLean model in relation to the reference model is similar, but they use different elements and content (DeLone and McLean, 2003). The Bartsch and Schlagwein framework uses a more process-oriented model to describe the different components of the IT value proposition (Bartsch and Schlagwein, 2010). Thus, comparability with external models is difficult. Certain models do, however, have similarities to the reference model. For example, the IT Capability Maturity Framework (IT-CMF) by the Innovation Value Institute (IVI) comprises elements used within the model (Conway, 2012). As the IVI model and the reference model are based on IT capabilities, both models incorporate many of the same capabilities (e.g., project management).

Requirement #5 (Completeness and Correctness): The model's completeness and correctness are important. The model's completeness should provide all the relevant knowledge that the user needs to apply to at least one use case. The model can be assumed to offer a degree of completeness that varies across the three main components: capability clusters, flexibility measures, and evaluation methods. The completeness of the capability clusters can be rated as adequate, largely because of the empirically derived IT function requirements. The capability clusters were derived from the literature review. Here, it must be mentioned that the degree of abstraction compensates for missing sub-capabilities. However, the empirical survey identified no further issues that would suggest incompleteness in the capability clusters. For the model's flexibility measures, the degree of completeness cannot be verified. Countless flexibility measures exist, which could have been considered within the model. To achieve clarity and applicability, the model must include a meaningful number of flexibility measures. Chapter 2.2 established the general conditions for flexibility measures in the description of current challenges and the determination of requirements for the IT function. Nevertheless, the model may omit certain meaningful flexibility measures.

This argument can also apply to assessing the completeness of the evaluation methods. To reduce the uncountable number of evaluation methods, the study used the results of Ardour Consulting. Those evaluation methods were assumed to be widely used in German firms. However, the empirical survey revealed that many IT managers do not know or do not use those evaluation methods to control the IT value proposition. Therefore, the model's completeness of evaluation methods can be assumed to need improvement.

For the model's correctness, the selected modeling methodology must be chosen by its usage. Here, no pre-defined modeling language has been used. Rather, the objective was to obtain a loose coupling and to combine the components representing a specific element of the model. This objective also contributes to the fulfillment of another requirement of the model. By using a loose coupling among the model's elements—capability clusters, flexibility measures, and evaluation methods—the model can respond to changing environments by shortening or expanding each of the elements.

Requirement #6 (Economic viability): In addition to the model's content relevance, the cost of modeling, maintenance, and usage of the model must be considered. Becker et al. noted that there are two perspectives in regard to assessing the model's costs: its development and its usage (Becker, Rosemann and Schütte, 1997). Becker et al. found that a too detailed degree of abstraction in design organization seems inadequate (Becker, Rosemann and Schütte, 1995).

As the model has been developed within this study, the development costs can be considered acceptable. However, the implementation cost cannot be quantified reliably as they depend largely on the individual adjustments by each user of the model. As the model claims to only provide individual recommendations, the implementation need not be fully and comprehensively assessed. Therefore, an estimate of the cost of implementation would not be reliable. The maintenance costs or costs for further development can be rated as fairly high, especially because all components of the model must be validated. Therefore, this study's steps must be replicated.

Requirement #7 (Generality): The requirement of generality conflicts with the model's specialization and purpose. On one hand, the model should represent diverse real-world use cases; on the other, it should readily adjust to firms' specific needs. Deelmann and Loose recommended developing a language that balances the trade-off between specialization and generalization. The model maintains a certain abstraction level, and the user defines firm specifics, thus ensuring the model's generality. However, this generality also incurs risks, especially when the user customizes or defines the specific elements. Here, the model provides appropriate evaluation methods for capability clusters, but it remains unspecific regarding use case implementation. Therefore, firms may incur greater risks if elements of the model are incorrectly selected or adjusted, thereby generating false information for decision making.

Requirement #8 (Relevance): The criterion of relevance describes the balance between user requirements for the model and their fulfillment within it. The user should select the elements necessary to fulfill his purpose.

The model fulfills this requirement broadly. The model's objectives were drawn from current user needs identified in the literature. Thus, the identified objects can be assumed to, at least partially, contain the most common user requirements. Each element of the model was drawn from the objectives identified by empirical tools. Therefore, the selection of the elements can be assumed to cover most user needs.

Nevertheless, a risk regarding the requirements' coverage persists as this study did not conduct an explicit requirement analysis of users' possible needs. This approach did, however, have the advantage that the model's user does not suffer information overload with elements, items, or connections that he does not need. Performing an *a priori* requirements analysis would have identified many overly detailed user desires for incorporation into reference model.

Requirement #9 (Systematic construction): To meet this requirement, Becker et al. asserted that two elements are necessary: an information architecture integrating diverse elements (e.g., function, process, and object) and mapping issues to the corresponding element (Becker, Rosemann and Schütte, 1995). The model cannot meet this requirement because it was designed without specified information architecture elements. The model instead focusses on elements and their utility, but it does provide recommendations for diverse capability clusters. Thus, capability clusters partially fulfill the requirement; nevertheless, the model does not fully comply with the requirement.

Requirement #10 (Visualization): The graphical representation of the reference is important to the user. The design omits unnecessary forms and lines, and the graphical illustration provides consistency. Much of the model is described textually, but the graphical representation itself meets user needs.

Limiting the forms and lines to the graphical minimum enables the user to find the necessary information quickly, with consistent shapes and lines illustrating the elements of each capability cluster. This consistent illustration of the model's elements relieves the user of the burden of learning variations of graphical symbols. Once familiar with the graphical elements, the user can easily understand each capability cluster.

Both the graphical elements and the graphical representation of the underlying meta-construct are consistent. The low level of graphical variation enables the user to recognize the original, underlying models.

7.3.2 ASSESSMENT OF THE REFERENCE MODEL'S OBJECTIVES

Requirement #11 (Comprehensive understanding of the IT value proposition): A comprehensive understanding of the IT value proposition is necessary for the enhancement of IT function flexibility. Therefore, the model integrates a comprehensive understanding of the IT value proposition. The model uses one particular type of element to represent comprehensive understanding of the IT value proposition. Through qualitative content analysis, the model identifies and groups the IT function requirements into capability clusters. This content analysis ensured that all capability clusters address the IT function business requirements, representing the IT function's comprehensive impact on the IT value generated.

However, the capability clusters describe only the requirements derived by the qualitative content analysis. The partially high degree of abstraction and strong grouping of the identified requirements during the content analysis may cause information to either be displayed insufficiently prominently in the model or be excluded during the model's development. Furthermore, elapsed time figures strongly; as IT function requirements change rapidly the study's content analysis may not identify all future relevant requirements. Therefore, it seems reasonable to verify the completeness of the capability clusters periodically.

Requirement #12 (Recommendation of evaluation methods): The model's objective is to provide recommendations for the usage of evaluation methods to control the IT value proposition in each capability cluster. To exclude an excessive set of evaluation methods, which are available to control the IT value proposition, the analysis was limited to a defined set of evaluation methods. This limitation was based on an empirical study that identified the evaluation methods used most often in German firms.

This limitation has the advantage of avoiding integrating all possible evaluation methods into the development of the model. However, its disadvantage is that only the most-used evaluation methods were included in the model, introducing the possibility that the model may omit certain somewhat widely used evaluation methods but it may integrate others that it should have omitted (e.g., due to using an inappropriate or invalid study as limitation baseline). The evaluation methods included were, however, confirmed by the empirical study: many IT managers indicated that they are unaware of or do not use in their IT functions many of the evaluation methods presented. The model therefore includes certain evaluation methods that are not used by all of the respondents. Thus, the model recommends unfamiliar evaluation methods that the IT function managers cannot implement quickly. Here, it is important to understand that this does not mean that the model provides incorrect evaluation methods, but rather that a large number of respondents have had no experience in those evaluation methods. Therefore, such managers may reject the model or engage in time consuming implementations.

In addition to omitting certain evaluation methods, a further disadvantage of the model is the association between capability clusters and evaluation methods. This association was established on the basis of the IT managers' responses. However, because of the level of abstraction, IT managers may not have had a complete awareness of the IT requirements for each capability cluster. Thus, the IT managers may have identified inaccurate associations between capability clusters and evaluation methods. This effect could also have been worsened by the definition of the evaluation method categories. Because of the large number of evaluation methods, the survey could not verify them individually and instead created categories of evaluation methods. This compilation of the evaluation methods into categories may also have confused the survey respondents, which might in turn have influenced the model's proposed associations between capability clusters and evaluation methods. However, the number of responses clearly supports the model's association between capability clusters and evaluation methods.

Requirement #13 (Description of associated flexibility measures): In addition to the recommendations for evaluation methods, the model's objectives included providing recommendations for capability cluster flexibility. To achieve this objective, IT managers assessed the utility of several flexibility measures derived on the basis of the current challenges and requirements identified for each capability cluster.[170] The current challenges and the requirements served as guidelines for the derivation of flexibility measures. Here, it should be noted critically that the guidelines have a high degree of freedom, preventing a complete and error-free derivation of flexibility measures as the number of possible flexibility measures is infinite. The guidelines served only to substantiate this infinity and to limit the number of possible flexibility measures. Therefore, the model offers only a limited number of flexibility measures, and many others probably exist.

[170] Current challenges and requirements identified for all of the capability clusters may be found in Chapter 2.

8 CONCLUSION AND OUTLOOK

8.1 SUMMARY OF KEY FINDINGS

In recent years, IT has become an important success factor for firms acting in national and international markets. In corporate leadership, the IT function represents a vital element supporting the business organization in achieving its goals. Doing this, IT investments have risen steadily for many years.

However, not all business functions share the perception that the IT function is a key player in the firm. As Chapter 1 demonstrated, the overall confidence in IT and the perception of the IT value proposition is often below expectations. Business requirements seem unfulfilled. Many studies confirm these perceptions. IT functions use diverse evaluation methods to increase and control its value. However, these evaluation methods seem incapable of steering the IT value proposition consistently. Many of the evaluation methods used focus only on monetary aspects and seem unable to address all business requirements.

Additionally, in light of the ongoing crisis and market dynamics, the question arises of how the IT function must be set up to support firm flexibility. It is indisputable that flexibility is an appropriate instrument for responding rapidly to market changes. Therefore, the IT function must adjust their business-relevant IT capabilities to respond to changing business demands flexibly.

Thus, both flexibility measures and adequate evaluation methods must be integrated into a comprehensive operating model that supports the management of the IT value proposition. Such a model enables the IT function to align its IT value proposition with external requirements.

Current IT research approaches have provided specific knowledge about IT value contribution, but a comprehensive model combining current business requirements, associated evaluation methods, and flexibility measures is currently missing. The following research questions attempt to close this research gap:

1. How can the IT value proposition be understood comprehensively?
2. What capabilities must the IT function fulfill to be perceived as an added value to business functions?
3. Which evaluation methods are useful to control the capabilities of the IT value proposition?
4. Which measures must be integrated into the IT function to increase its flexibility to provide an agile IT value proposition?
5. How can researchers derive a comprehensive model that combines evaluation methods to manage IT function capabilities and those measures necessary to increase IT function flexibility?

The findings obtained in addressing these research questions are summarized below.

A literature search addressed the ability **to understand the IT value proposition comprehensively,** revealing that the academic community has long discussed the IT value proposition. As stated in Chapter 5, this discussion has been characterized by various synonyms for the IT value proposition and was strongly affected by the productivity paradox. Additionally, the search found that the understanding of the added value of the IT function has changed over time. The IT value focus evolved from efficiency and cost reduction via productivity to virtualization and flexibility improvement. This change has also been accompanied by an evolving understanding of the IT function, its maturity level (data center vs. IT enabler) and the evaluation methods used. These different stages were impressively presented by Moschella (1997).

Although many studies have attempted to define the IT value proposition comprehensively in concrete terms, the research community could not, as is often the case, concur on one definition. Having developed definitions of the IT value proposition from various specific perspectives, subsequent definitions tended to use a wider set of descriptive perspectives to define the IT value proposition. Morphological boxes vividly represented this phenomenon. The IT value proposition aligned with the objectives of the present study was defined by the following perspectives and attributes: level of analysis (firm, process, project), benefit category (impact on intangibles, firm and process performance), evaluation objects (IT function), evaluation methods (accounting- and market-oriented, process-oriented, surrogate and multi-dimensional) as well as "uncertainty" as an attribute to the perspective of "influencing factors."

Having understood the IT value proposition as a comprehensive set of perspectives and attributes, it is important to determine **the capabilities that the IT function must fulfill to be perceived as an added value to business functions**. It seems obvious that the IT function can increase its value contribution only if other business functions confirm that the IT function meets their requirements. Thus, the integration of adequate IT capabilities figures strongly in value creation. The resource-based theory serves to explain the necessity for understanding these IT capabilities as a critical success factor for competitive advantages. As stated in Chapter 3, IT capability can be understood as a multi-dimensional construct comprising diverse components.

To compile a comprehensive overview of the necessary capabilities that the IT function must provide to the business, the study performed a qualitative content analysis that identified IT function business requirements. For this purpose, extensive materials (literature, survey raw data, and online sources) were analyzed and verified for IT function requirements. The available material yielded many requirements, including more than 490 paraphrased text passages. These requirements were condensed into nine major capability clusters: people and organization, risk and security, infrastructure and operations, processes, projects, innovations, services, control and finance, and communication. These capability clusters represent the basis of business-required IT capabilities and a comprehensive theory of IT value. Throughout this study, the capability clusters served as essential design elements for the model developed herein.

Having identified the necessary IT capabilities, it must be verified which **evaluation methods are useful to control these IT capabilities for IT value creation**. A catalogue of requirements was developed to identify adequate evaluation methods. As stated in Chapter 6, this requirements catalogue was categorized into three requirement types: (1) general requirements, (2) capability cluster association, and (3) flexibility. Group 1 included general requirements for any type of evaluation methods as determined from the literature. Group 2 comprises the requirements of the capability clusters. Requirements for flexibility comprise Group 3. All requirements were derived theoretically in Chapter 4.

An empirical survey was conducted to determine the suitability of the evaluation methods. One basis for this empirical survey was the catalogue of requirements, and the other was the set of possible evaluation methods, which was limited by a German consulting firm's study. Thus, the present study used only evaluation methods that are currently in use by German firms. To facilitate the participants' responses to the survey, the evaluation methods were divided into five categories: (1) accounting-oriented, (2) market-oriented, (3) multi-dimensional, (4) process-oriented, and (5) surrogate. As stated in Chapter 6, this categorization focuses on common practices in the literature and limited the survey's answer options to a smaller number.

The results reveal that respondents use *accounting-oriented evaluation methods* the most. IT managers often use cost comparison and understand it as a highly objective evaluation method. However, these evaluation methods have a strong backward-looking focus and are unsuited to controlling intangible assets and to changing hypothetical scenarios. Most of the participants indicated that this category is not suitable to control IT function flexibility.

In contrast to accounting-oriented evaluation methods, *market-oriented evaluation methods* offer the advantage of greater future-orientation and integration of changing environments. Therefore, it is also surprising that respondents rarely use real options evaluation methods, which have a strong flexibility component. The most used evaluation method in this category is return on investment, and the second most used is net present value. Most respondents indicated that future scenarios can be integrated in these types of evaluation methods. Therefore, this category of evaluation methods has high acceptance among IT managers.

The responses regarding *multi-dimensional evaluation methods* reveal that respondents do not use the full range of evaluation methods presented in the survey. This outcome raises the question of why the consulting firm identified these evaluation methods among those currently used in Germany. However, the majority of survey respondents acknowledged this category's strong non-monetary focus, and the responses demonstrated that these evaluation methods can be easily adapted to changing firm objectives and therefore support firm flexibility. The strong qualitative aspects, however, seem to make an objective peer-group comparison difficult.

The results regarding *process-oriented evaluation* methods reveal a wide difference in usage of the two models presented: most respondents do not use the hedonic wage model, but the time-salary-time-saving method is more commonly used. A strong majority indicated that this evaluation method is easy to use and to understand. Almost 33% of the respondents answered that this category supports the capability cluster in terms of people and organization.

A majority of respondents answered that they use *surrogate evaluation methods*. The results reveal that this category of evaluation methods is easy to handle and can be applied to diverse situations on short notice. Almost 50% of respondents agreed that these evaluation methods can be applied to changing firm objectives. However, these evaluation methods are essentially qualitative and therefore involve a high degree of subjectivity. Only 20% of respondents considered these evaluation methods suitable for the realistic determination of the IT value proposition.

Having identified the advantages and disadvantages of evaluation methods, **measures were developed that increase IT function flexibility for an agile IT value proposition**. Chapter 4 describes four design principles for flexibility measures: (1) redundancy, (2) modularity, (3) reconfiguration capability, and (4) organizational learning.

As Chapter 4 states, *redundancy* in the IT function reflects unproductive resources that can mitigate order or utilization peaks (e.g., high demand on storage on short notice). *Modularity* means the structuring of a system using smaller subsystems (e.g., units, modules) that allow better management (e.g., modules of an ERP system). The third flexibility design principle is *reconfiguration capability*, which describes the ability to reconfigure firm structures to address internal or external requirements. Closely connected is *organizational learning*, which must be demonstrated to enhance the reconfiguration of the firm. Without the ability to learn from the past, firms cannot respond adequately to new situations.

These four design principles were combined with the capability clusters to derive measures that support IT function flexibility and have been evaluated by the help of an empirical survey. In response to this survey, IT managers assessed these flexibility measures and ranked their utility in each capability cluster.

Having developed and assessed the evaluation methods and flexibility measures, the study derived **a comprehensive model combining evaluation methods for managing IT function capabilities and measures to increase IT function flexibility**. This comprehensive model is based on the Aral and Weill model, which represents the meta-construct for the proposed model. As described in Chapter 3, their model combines IT capabilities with IT assets and practices to control the IT function. This model was extended by the three components developed in the present study: (1) capability clusters, (2) associated evaluation methods, and (3) ranked flexibility measures. A graphical representation of the model components enhances its overall transparency. As all firms are structured differently, the configuration of the model must be adaptable to firms' standards. To support such individual configuration, the model provides examples of flexibility measure configurations, further improving the model components' transparency.

8.2 DOMAINS REQUIRING FURTHER RESEARCH

This study developed a model that provides recommendations to IT functions for controlling their IT value proposition in a dynamic environment. Further research is needed to enhance the IT function's ability to respond adequately to the increasing need for flexibility. The following research gaps need to be further investigated:

Definition of the flexibility demand in IT functions: The motivation for this study was the IT function's challenge to adapt to dynamic environments to provide added value to firms' business functions. To adapt quickly to changing business requirements, IT must have the capability to assess changing environments. Awareness of current trends and possible changes supports early adaptation. Although such foresight is rarely completely accurate, further research should investigate how the IT function can identify and implement future requirements at an early stage to have more time, build flexibility potential, and implement flexibility measures.

Investigation of the optimal interaction of IT resources and flexibility demand: This study revealed that increasing flexibility potential does not always provide advantages. For example, the provision of resources can increase IT costs. To avoid undesirable side-effects, the IT function must determine the proper ratio of flexibility measures to the actual demand for flexibility so that the IT function remains a key player supporting firms' business functions. Thus, further research should examine how the firm and the IT function can optimally manage this tradeoff.

Development of flexibility measures' best practices for different firms and industries: This study's model provides recommendations regarding the usage of evaluation methods and flexibility measures, describing examples applying individual flexibility measures for each capability. As each firm is different, no ideal application of these flexibility measures exists for all firms. Therefore, further research should investigate how these flexibility measures can be characterized for specific types of firms or specific industries.

Integration into firm's operating model: This study developed a model that focusses on recommendations towards the IT function. It should be noted, however, that the developed model does not connect to the total operating model of the firm. The link between IT function and firm is not represented at the level of individual measures, but at level of a superior integration dimension. Thus, further research is needed to investigate how the developed model can be integrated organizationally into the total operating model of the firm.

8.3 OUTLOOK

Firms face increasing challenges because of changing requirements in dynamic markets. To remain competitive in these difficult economic times, firms must respond rapidly to evolving requirements. With the ability to respond to varying requirements, the IT function supports business functions through information management, encountering each business unit's unique expectations. The IT function should meet situationally formulated requirements regarding innovations, project management, cost savings, etc. To maintain and increase the IT function's value added, all these requirements should be fulfilled in real time for which IT functions must be shaped by organizational measures in a manner that enables them to respond flexibly to ad hoc requirements. The Aral and Weill model describes the essential components enabling the control of IT's value added. By expanding their model's flexibility dimension and definition of evaluation methods, this study's model recommends how each capability cluster can focus more strongly on IT flexibility. Its applicability results primarily from the usage of common evaluation methods, techniques of representation, and its logical structured architecture. To achieve universal applicability, the model remains at a certain level of abstraction, which requires its user to define the details and tailor the model to his firm.

The implementation of such a model seems to be difficult for firms under current conditions. Nevertheless, as this study demonstrates, controlling the IT value proposition is becoming increasingly vital to firms. In the course of this model's implementation, firms must find ways to enable the IT function to expand its value proposition through provision of products and services to business functions. IT functions that cannot control their added value flexibly will incur losses through the firm's resultant inability to respond to changing conditions.

Although many studies have previously addressed the importance of the IT value proposition, they have overlooked the connection between increases in efficiency and investments in flexibility potential. Several interesting questions remain. How can an increase in IT costs be avoided while increasing flexibility potential? To what extent does the level of flexibility differ among different types of firms, industries, and IT function maturity levels? The knowledge produced by answering these questions can contribute greatly to the expansion of existing concepts of IT function management flexibility. Such additional knowledge would support the IT function in meeting each business function's demands for IT services. If the IT function cannot successfully meet these demands, its ability to react is limited and the value provided to business objectives decreases. Thus, the words of 35th president of the U.S. John F. Kennedy continue to frame the challenge that the present study has addressed and that future research must investigate further:

"Change is the law of life. And those who look only to the past or present are certain to miss the future."

APPENDIX

A.1 RESEARCH DESIGN OF THE LITERATURE REVIEW

To identify the requirements of the IT function within the firm, a qualitative content analysis was used. This kind of instrument includes a variety of methods to systematically analyze text material. This type of analysis was designed in conjunction with a large-scale interview study on psychosocial effects of unemployed people (Mayring, 2000). The objective of content analysis is:

"the analysis of material derived from any kind of communication". (Mayring, 2010)

Mayring summarizes content analysis, and stresses that it analyzes communication in a rule-based and systematic way, and that it draws conclusions on certain aspects of communication.

Based upon the identified text material, the content analysis derives a category system while running the analysis. In addition, specific text passages are identified and encoded by pre-defined rules. This allows a clear association between the various categories and the identified passages (Mayring, 2010). The final compilation and interpretation of the textual material takes place along pre-established categories.

Figure 50 shows the basic steps of the qualitative content analysis used within this research appraisal. By using qualitative content analysis, requirements for the IT function will be identified. It is structured along the illustrative steps, which are displayed in the following figure.[171]

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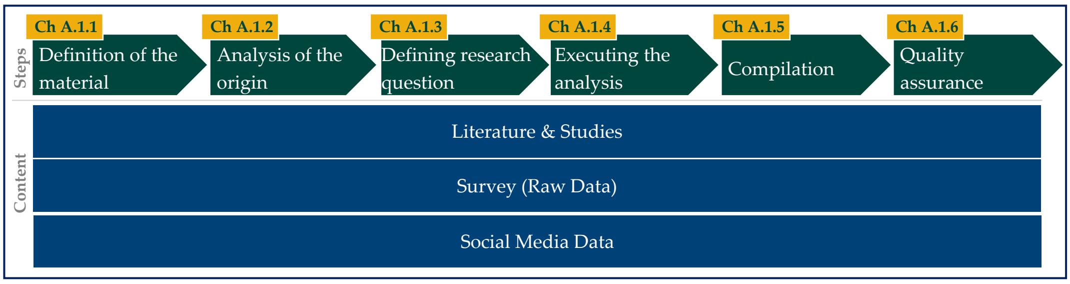
[171] For a comprehensive overview of the qualitative content analysis cp. Mayring, 2010. The discussion of advantages and disadvantages of different types of qualitative text analysis is not part of this research appraisal. Further literature on qualitative content analysis can be found in Ibid., pp. 136–144.

Figure 50: Methodology of the content analysis



Source: Mayring, 2010

A.1.1 DEFINITION OF THE MATERIAL

The basis for identifying the requirements of the IT function is represented by relevant literature. A structured evaluation of this literature should ensure that a comprehensive amount of text materials is collected. Thus, the objective of this step was to accumulate a variety of text material that was as comprehensive as possible. The accumulated text material should represent the majority of requirements of the IT function.

The selected text material includes studies, journals and book chapters as well as published social media search results. This text material was published during 2005 and 2011. In total, the text material research took 82 documents into account.

The text material has been extracted from a wide range of disciplines: Business Economics, Computer Science, Information Management, Enterprise Architecture, Information Systems, Informatics, Business Administrations, Economics, Organizational Behavior, etc. The text passages that contain requirements for the IT function were analyzed, and more than 490 relevant passages were identified. These passages mainly deal with the design, implementation or restructuring of IT functions within firms.

Scientific researchers or practitioners published the selected sources, and a variety of texts were released by firms specialize in Information Technology and Information Management.

A.1.2 ANALYSIS OF THE ORIGIN

The analyzed documents consist of three different types: (1) freely available literature, (2) documents from social media sites, and (3) raw data of a survey performed by the consulting firm Ernst & Young.

The *freely available literature* analyzed was randomly sampled from various well-known sources.[172] These sources were, inter alia, Web of Knowledge, Ebsco, Google Scholar, SpringerLink, federal agencies, professional service firms or relevant books. The author collected the sample between 01/2011 and 12/2011. The sources were searched with a wide range of keywords: all permutations of "value," "information management," "information technology" and "benefit." All of the identified documents include topics on issues of information technology. The selection was done using a probability selection. Thus, all identified documents had the same chance to be a random sample.[173]

The *documents from social media sites*, the second document type, were extracted out from social media sites. To find these documents, instruments of social media analytics were employed. The following search engines were used in particular: socialmention, addictomatic and Ice Rocket. By using these search engines, a variety of search criteria was used: IT, Nutzen, Informationstechnologie, Trends, Wertbeitrag, Anforderungen, Flexibilität, Mehrwert, Megatrend, Wartung, Abteilung, Benefit, Opportunities. This social media analytics was done from 10th January 2012 to 17th January 2012.

The third document type analyzed consisted of the *raw data of a study* performed by the consulting firm Ernst & Young (2011c).

All three analyzed document types are mainly available in electronic form, specifically in PDF format. The raw data of the study performed by Ernst & Young is in MS Excel format.

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172 Friedrichs describes a sample as a selection of items (n) from the totality of all elements (N) that are marked by one or more characteristics. The population can also be called total amount or universe. See Friedrichs, 1999.

173 For an explanation of the probability selection and a further description of different sampling types cp. Ibid., p. 133.

A.1.3 DEFINING THE RESEARCH QUESTION

The identified text material describes various topical issues and questions in the context of IT. The authors of the material use studies to represent their own opinion in their publications.

The objective of the third step was to structurally extract statements that reflect the attitude of authors regarding (business) requirements for the IT function.

According to Mayring's content analysis model of communication (2010), the direction of analysis is to make statements about the cognitive and action background of the authors. Since the text to be analyzed stands alone, its socio-cultural background serves as a framework to classify the meaning of the text (Mayring, 2010).

Seeing that market-relevant information is urgently needed in dynamic environments, the requirements towards firms' IT functions might have changed. In earlier literature the main focus of IT requirements has been e.g. process integration of production processes (Armour and Teece, 1980), development of certain complementary capacities (Teece, 1988) or questions regarding the structural IT differences among firms (Clemons and Row, 1991). However, in this context, it is of interest to analyze current requirements against the IT function – especially in turbulent environments. It should be identified how these requirements affect the organizational integration of the IT function and how the IT function should be designed in the future. This results in two main questions for the analysis of the text material:

- What requirements for the IT function do the authors currently see?
- Is it possible to derive concrete recommendations to design the planned IT function?

The identified text material has been analyzed through summarizing, explication and structuring. The objective of summarizing is to reduce the text material in a way that the key content will remain present, and the abstraction of the text material will provide a more manageable corpus of the base material (Mayring, 2010). The technique of explication follows the objective to collect further material to understand questionable text passages. These questionable text passages should later be interpreted in a wider context (Mayring, 2010). The objective of the structuring is to filter aspects of IT requirements out of the text material. Doing this, a cross-selection through the text material was done. This structuring results into a system of categories.

A.1.4 EXECUTING THE ANALYSIS

Having defined the origin and the formal characteristics of the text material, the analysis was performed. The analysis was done through execution of the following:

- Defining the units to analyze
- Reducing the amount of selected units
- Paraphrasing selected units
- Defining the system of categories

The first activity was the *definition of the textual units* within the documents. The selected units were subject to research. In order to define the correct textual units, each document was reviewed as a whole. This helped to develop a more foreseeable corpus of the whole document. Afterwards, the key textual units within the documents were defined. Textual units that had no relation to IT requirements were left out. These defined pages or text passages describe the requirements of the IT function. The outcome of this activity was the documentation of the defined textual units within an excel-based listing.

Due to the large amount of text material, the first activity produced a variety documented textual units. The objective of the second activity was the *reduction of the amount of selected units*. This reduction was performed by using the following rules of interpretation (according to Mayring, 2010):

1. Delete the content of the defined units which are not related to IT requirements
2. Delete the content of the defined units that are not considered essential regarding the research question
3. Take those units that are assumed to have a key content
4. Take theoretical assumptions in cases of doubt

Having reduced the amount of the text material, the basis for *paraphrasing of the selected units* was built. Paraphrasing means that the identified units are now rewritten in a concise form focusing on the content. The following rules of interpretation were used (Mayring, 2010):

1. Delete all non-content-bearing text components of the identified units
2. Extract the content-bearing text components of the text
3. Transform the content-bearing text components in short grammatical form in regard to the requirements of IT. The content-bearing text components should be implicit with the newly formulated text components.

Having paraphrased the identified units, the content was generalized based upon defined categories. The identified requirements for the IT function were heterogeneous: some requirements were on an abstract level and some requirements were described specifically. All the identified requirements needed to be organized into a more manageable taxonomy with different categories. Thus, in this activity, the *system of categories* was developed. This development is in the center of the performed analysis as the categories reflect the prospective requirements regarding the IT function.

The definition of the categories was done inductively. Without relying on pre-defined theoretical concepts, the text material directly derives the categories by using the instrument of generalizing. Deriving these categories, the following set of guidelines was used (according to Gammelgard, Ekstedt and Gustafsson, 2006):

- **Semantic similarity:** As a first sorting procedure, IT requirements with the same meanings were grouped. This sorting produced a set of categories with similar concepts and generated a holistic view of all IT requirements. E.g., Training, Knowledge Transfer and Organisational Restructuring were brough closely together, and "People & Organization" was derived.
- **Category exclusiveness and completeness:** The development of the category system was as collectively exhaustive and mutually exclusive as possible, such that one category does not overlap with another. The IT requirements should be clearly assigned to or associated with one category. Double assignments should be avoided. Furthermore, the system of categories was meant to be able to express all kinds of identified requirements originating from the sources. No IT requirement was excluded for the reason of not being im-

portant enough. However, due to the wide range of requirements, overlapping could not be avoided in all cases.

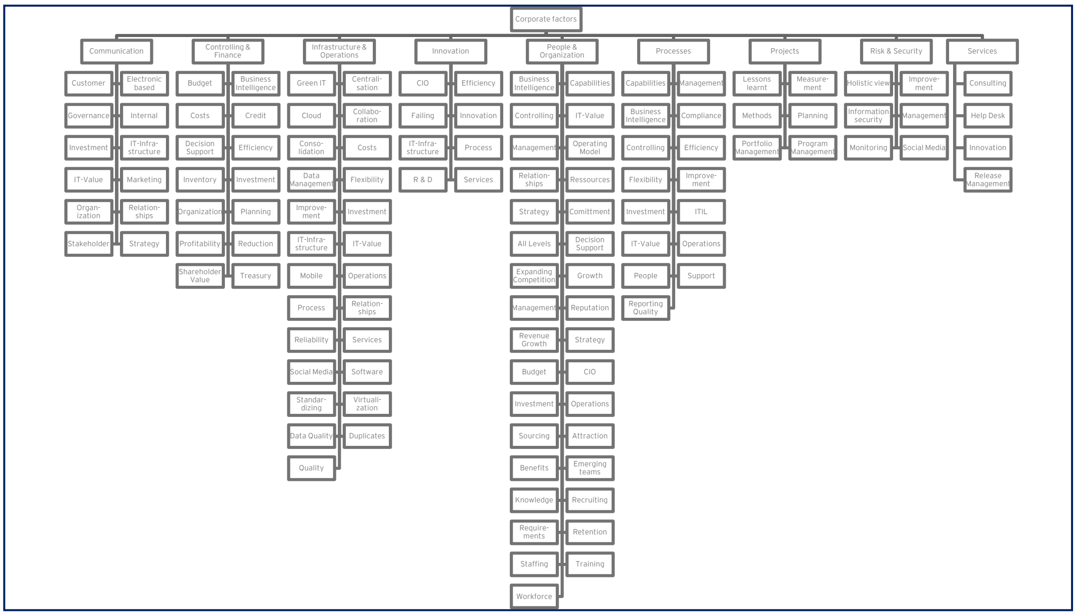
- **Balanced size of category:** The size of each category was supposed to be manageable. If too many IT requirements were grouped together into one category, the category was split into further (sub-) categories. That way, a nuanced taxonomy of IT requirements was derived. Nevertheless, the level of detail of each category had to be adjusted against a reasonable level of abstraction for all categories
- **Common perception:** The goal was to develop a system of categories, which should come as no surprise to the reader. As such, the system of categories should be easily recognized and understood. Therefore, a common vocabulary has been used.

Having derived the categories, they were grouped again into capability clusters (parent categories at the highest level). The findings are presented in chapter 2. To strengthen the focus on the main requirements for the IT function, only the parent capability clusters are presented.

During the analysis, the category system was verified at regular intervals and has been partially updated. In particular, it has been verified, whether the defined categories fulfill the purpose of the research question and whether the selection criteria and the level of abstraction were chosen adequately. In the case of changes, the category system was updated.

Figure 51 shows the derived category system. The 2nd level represents the capability clusters and the 3rd level shows the capability sub clusters.

Figure 51: Capability clusters and derived categories



Having defined the system of categories, the paraphrased units were generalized based upon these categories. The following rules of interpretation were used at this activity (according to Mayring, 2010):

1. Generalize the new formulated text components to the defined categories
2. Examine if the text components can be derived into the categories
3. If a category is missing, derive a new category
4. Take theoretical assumptions in cases of doubt

A.1.5 COMPILATION AND INTERPRETATION

The derived system of categories shows the identified requirements towards the IT function. The description and usage of these requirements is illustrated within the main text body. Here, the consolidated requirements are called capability clusters. These capability clusters represents one component of the to-be model. Besides these derived requirements of the IT function, chapter 2 also shows market-factors that influence the IT function and its organizational setup.

A.1.6 QUALITY ASSURANCE OF THE DERIVED CATEGORIES

The reliability of the performed categorization plays an important role within this thesis. Especially in the light of error sources due to variability of measures, this criterion becomes critical.

To ensure the quality of the performed qualitative content analysis, Mayring (2010) suggests the criterion of intercoder-reliability. This criterion provides information about stability and reliability of the categorization as part of the qualitative content analysis. Having the content analysis performed by two people, this criterion measures the agreement of their observations. Within this thesis, this measurement could only be carried out on some selected paraphrased textual units due to the large amount of data. A second expert analyzed the categorizations of the first 120 paraphrased textual units on 16th June 2012. The results of the expert and the results of the author were compared.

The intercoder-reliability can be calculated by the usage of Cohen's kappa. It measures the proportion or percent of observed agreements between two judges assigning cases to a set of k categories (Cohen, 1960). The calculation for the selected paraphrased textual units revealed a coefficient of 0.7. This result can be understood as sufficient match.

A.2 METHODOLOGICAL DESIGN OF THE EXECUTED SURVEY

A.2.1 OBJECTIVE AND METHODOLOGY

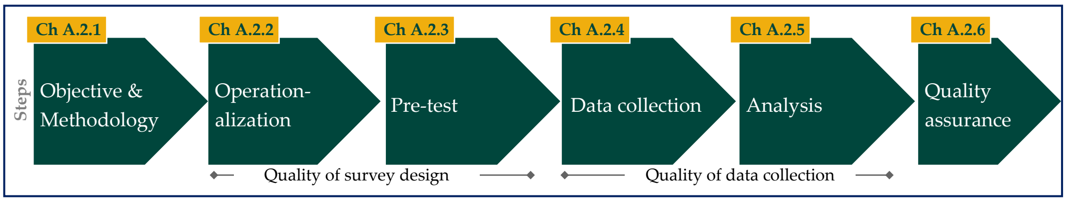
The objective of the planned survey is divided into two individual parts: *validation* and *data gathering*.

The *validation* focuses on the previously derived instruments to increase the flexibility of the IT function. As these instruments are determined by literature review only, the planned survey will provide further insights into how IT managers evaluate these determined flexibility measures.

On the other hand side, the *data gathering* should collect additional information in regard to IT value evaluation methods. Based upon general and specific criteria, the result of the survey should identify advantages and disadvantages of the evaluation methods currently in use. Furthermore, the results should indicate which evaluation methods may be used within single capability clusters. With this knowledge, the planned reference model can be updated.

According to Atteslander's survey methodology, the basic steps of the planned survey are structured into six individual steps. They are represented in Figure 52 (Atteslander, 2008). The activities within each step will be described in the following sections. The online survey's results will be presented within the main body of this research appraisal.

Figure 52: Online survey methodology



Source: According to Atteslander, 2008

To support the online survey, the services of SoSciSurvey[174] have been used. SoSciSurvey is a free survey tool for non-commercial scientific studies. The online survey started on 9th February 2013.

A.2.2 OPERATIONALIZATION

A.2.2.1 CONSTRUCTION OF THE ONLINE SURVEY QUESTIONNAIRE

A.2.2.1.1 CONSTRUCTION GUIDELINES

The survey is designed as a partial census. A full census was not carried out because, on the one hand, a census is costly. On the other hand, von der Lippe and Kladroba note that a census is not preferable to a partial sample size ("workaround") (van der Lippe and Kladroba, 2002).

Because of the lower costs and a shorter processing time, an online survey was conducted to validate the current results of the research paper. An online survey is a web-based survey method that presents the possibility to populate an online questionnaire in an internet browser (Mayer, 2013). Mayer (2013) sees a variety of advantages of an online survey: automatic item-rotation to avoid sort-effects, progress bars, data availability at short notice, and the questionnaire may be filled at a convenient time, etc.

But Olbrich et al. also recognize disadvantages. They note that the group of participants in online surveys is limited to internet users. Furthermore, Olbrich et al. indicate that the data quality also tends to be worse in comparison to written offline surveys. Participants filling online questionnaires care less about the quality of data. Yet Olbrich et al. also support the advantage of relatively low costs (Olbrich, Battenfeld and Buhr, 2011).

While constructing the questionnaire, hints and tips of different scientists were largely integrated:[175]

- **Closed questions:** Most of the questions were designed as closed questions. However, care was taken to ensure that the number of available alternative

[174] The website is reachable at www.soscisurvey.de.

[175] Cp., e.g., Mayer, 2013; Podsakoff et al., 2003. The following recommendations are based upon the mentioned sources.

answers was not overwhelming to the participant. Care was also taken to ensure that alternative answers did not overlap. To avoid forcing participants to provide certain answers, an "I do not know" category was added to closed questions.

- **Dramaturgy of the questionnaire:** No attempt was made to ask awkward or difficult questions at the beginning of the questionnaire. Instead, introductory questions were chosen to capture the (guessed) interest of the participants. An atmosphere of confidence was generated to increase the responsiveness of the participants. General demographic questions were not asked at the beginning to avoid giving the participants doubts about the real meaning of the questionnaire.
- **Range of topics:** To avoid permanent mental leaps of the participants, the questionnaire was divided into separate question areas. The question areas constitute each completed themes, e.g. Flexibility, evaluation methods or general questions.
- **Screening questions:** Screening questions were used to help the participants maintain interest, and to ensure that participants do not need to choose "I do not know" very often. It also unnecessarily prolonged the duration of the survey. The screening questions were particularly used to check the knowledge of the evaluation methods. If some groups of evaluation methods (e.g. process-oriented evaluation methods) were not known by the respondent, the online survey branched to the next questions.
- **Survey duration:** A maximum duration for a survey is difficult to specify. This depends on various influencing factors. As part of the pre-test it was attempted to gain an understanding of a possible duration. The maximum duration for completing the questionnaire should not exceed 20 minutes.
- **Two endings:** To make the questionnaire appear shorter and to maintain the interest of the participant, two endings were added in the questionnaire. After completing one of the last sections of the questionnaire, the participant was informed that there were only two pages left to complete the survey.
- **Anonymity:** The participants of the survey were guaranteed anonymity. This was done in the written invitation to participate in the survey, and the participants were informed about the anonymous use of their data again in the introductory text of the questionnaire.

- **Progress bar:** A progress bar on the website displayed the current progress of the survey at all times. This allowed the participants to know what percent of the survey had been completed and how long was needed to complete the remaining questions.
- **Questionnaire layout:** To take advantage of an attractive yet uncluttered layout, the layout used was the questionnaire provider's default layout, which had already been tested.

A.2.2.1.2 STRUCTURE OF THE QUESTIONNAIRE

The survey questionnaire was divided into three question areas: (1) general data, (2) flexibility measures and (3) evaluation methods. The structure of the survey is represented by Table 12.[176]

Table 12: Structure of the online survey

Question area	Content type	Origin	Strategy
General data	Data regarding the firm	Literature review	Data gathering
	Data regarding the IT function		
Flexibility measures	Flexibility measures of the IT function	Chapter 4	Validation
Evaluation methods	Account-based evaluation methods	Chapter 6	Data gathering
	Market-based evaluation methods		
	Multi-dimensional evaluation methods		
	Process-oriented evaluation methods		
	Surrogate evaluation methods		
	Application of evaluation methods		

A.2.2.1.3 QUESTION AREA 1: GENERAL DATA

The first area of the questionnaire collected basic information regarding the respective firm and the IT function of the participant. At first, general data of the firm were gathered, e.g. legal form, turnover, etc. The second part deals with information regarding the business environment of the IT function. This included

[176] This structure does not fully reflect the sequence of the questions.

the organizational structure, budget, and employees. While gathering this information, statements were derived whether the usage of the evaluation methods were limited to specific kinds of IT functions.

A.2.2.1.4 QUESTION AREA 2: FLEXIBILITY MEASURES

The second area dealt with the derived measures to increase the flexibility within the IT function. These measures were validated regarding their feasibility and application potential. With that in mind, they may be prioritized and mapped to the individual capability cluster within the model. Since the derivation of the measures showed double measures in multiple capability clusters, duplicate measures were not integrated within the online questionnaire.

A.2.2.1.5 QUESTION AREA 3: EVALUATION METHODS

The third area focused exclusively and intensively on information about the usage of evaluation methods. The main question to be evaluated was how practitioners use and assess the methods to evaluate IT's value. Since this paper concentrates on evaluation methods which have already been established in practice, data regarding their advantages and disadvantages may be gathered.[177] The usage of the evaluation methods *per se* does not have to be assessed. The advantages and disadvantages will be applicable on the basis of established requirements. These requirements are separated into three different categories: (1) general requirements, (2) capability cluster requirements and (3) flexibility requirements.

As these requirements may not be represented by simple questions, theoretical constructs have to be used.[178] These constructs (e.g. validity) have to be linked to specific, measurable variables.[179] Such constructs, which are often referred to as

[177] By the help of an empirical investigation, Ardour Consulting identified those evaluation methods used within firms nowadays. Cp. Ardour Consulting, 2012b. Therefore, it is not necessary to examine this question anymore.

[178] As these are latent requirements, which may not be measured directly, an adequate operationalization is needed. Cp. Bortz and Döring, 2006.

[179] Bortz and Döring explain the linkage problem. The linkage problem asks the everyday and scientific terms may be transferred to measurable variables. Cp. Ibid., p. 60.

"latent variables" should be represented by a larger number of indicators (Churchill, Jr., 1979).

With few exceptions, the requirements regarding the evaluation methods are concretized within several questions. Whereever possible, constructs that have been already validated have been used (Ketkar and Sett, 2009 or Dietrich, Schulze and Weber, 2007). By the help of a comprehensive pre-test, the theoretical constructs have been examined for their intelligibility.[180] Table 13 shows the constructs used and their indicators.

Table 13: Theoretical constructs and indicators (General requirements)

(1) General requirements	
Validity	
	The results of the method are objective and traceable.
	The results of the method are clear.
	The method supports the evaluation of the IT value on a real perspective.
Timeliness	
	The necessary data are up-to-date.
	The method can be used on regular terms.
Comparability	
	A peer-group comparison is possible with results of the method.
	The method is able to evaluate non-monetary effects (e.g. customer satisfaction).
Clarity	
	Interdependencies with external effects may be integrated transparently.
Understandability	
	The method can be used easily.
Adequacy	
	The necessary data are available.
Completeness	
	More than one period may be integrated within the method.
	Non-quantifiable aspects may be integrated.

[180] Cp. section A.2.2.2.

(2) Capability cluster requirement	
Coverage	
	The method is primarily used to control the capability cluster N.
(3) Flexibility requirements	
Supporting object dimension	
	Changing goals of the firm may be easily adapted to the method.
	A slightly changed weight of firm's goals may be easily integrated within the method.
	The method is designed so that it quickly adjust to changes in business conditions
Supporting of time dimension	
	The volatility of the activity level may be evaluated with the method.
	The method supports the controlling of all firm resources (financial resources, IT-infrastructure, employees).
Supporting of set up dimension	
	Future scenarios may be easily integrated.
	Prospective risks may be integrated.
	Alternative IT-investments may be evaluated.
Supporting of impact dimension	
	Different expectations of risks may be integrated within the calculation.
	The method is suitable to control structural change (e.g. process change) within the firm.

A.2.2.2 PRESENTATION OF THE USED QUESTIONNAIRE

The following figures represent the constructed pages of the online questionnaire that were used during the online survey:

Figure 53: Questionnaire (pages 1 and 2)

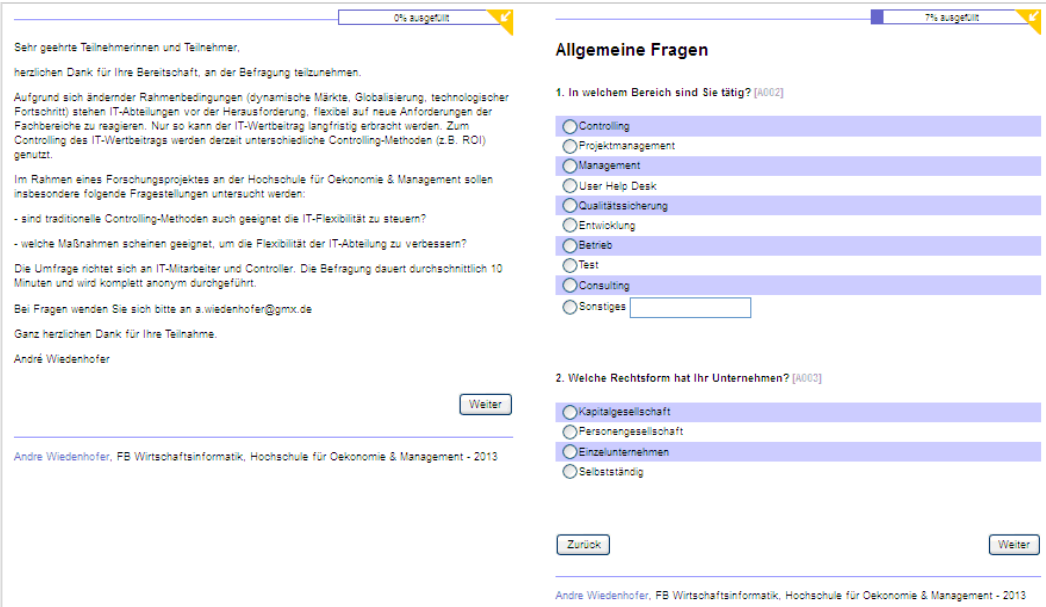


Figure 54: Questionnaire (pages 3 and 4)

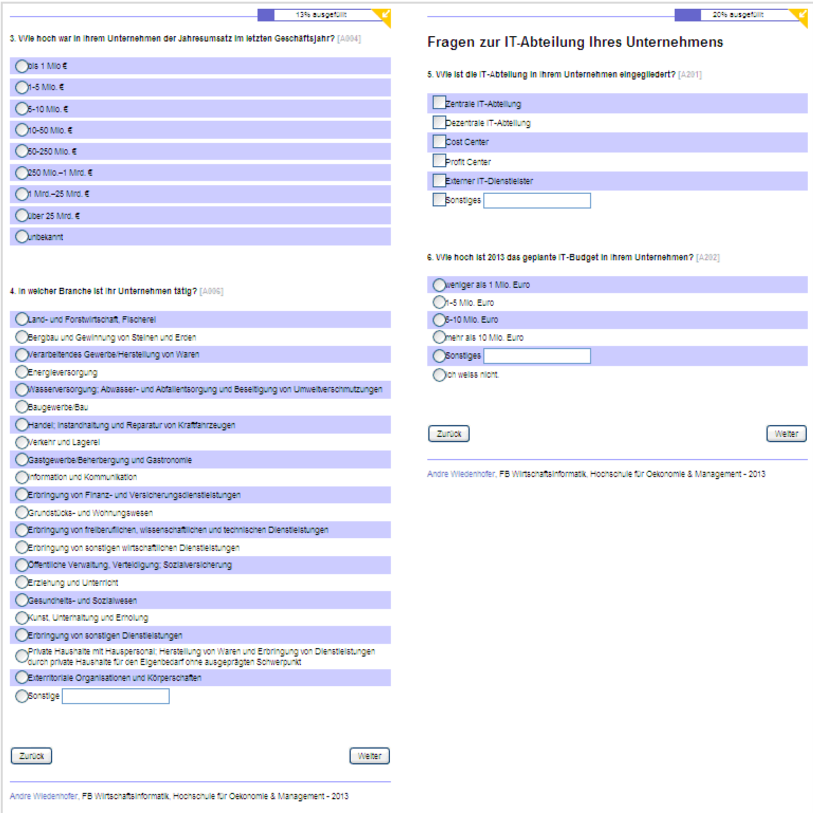


Figure 55: Questionnaire (page 5 [Filter])

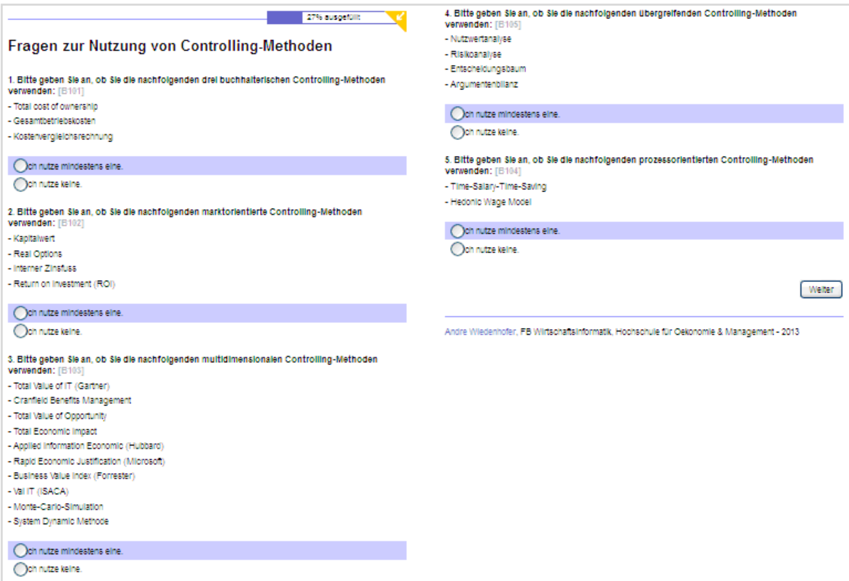
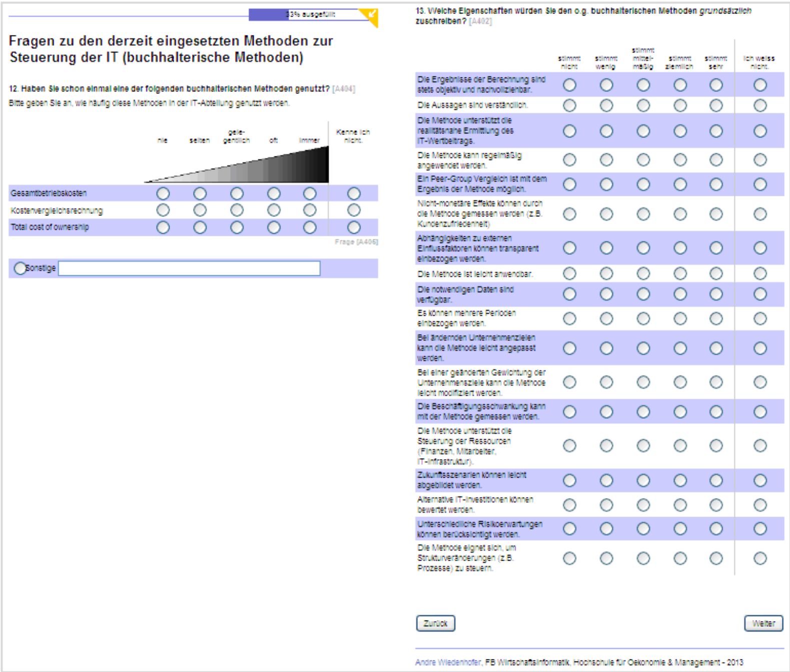


Figure 56: Questionnaire (page 6)



33% ausgefüllt

Fragen zu den derzeit eingesetzten Methoden zur Steuerung der IT (buchhalterische Methoden)

12. Haben Sie schon einmal eine der folgenden buchhalterischen Methoden genutzt? [A404]

Bitte geben Sie an, wie häufig diese Methoden in der IT-Abteilung genutzt werden.

	nie	selten	gele- gentlich	oft	immer	Kenne ich nicht.
Gesamtbetriebskosten						
Kostenvergleichsrechnung						
Total cost of ownership						

Frage [A405]

Sonstige

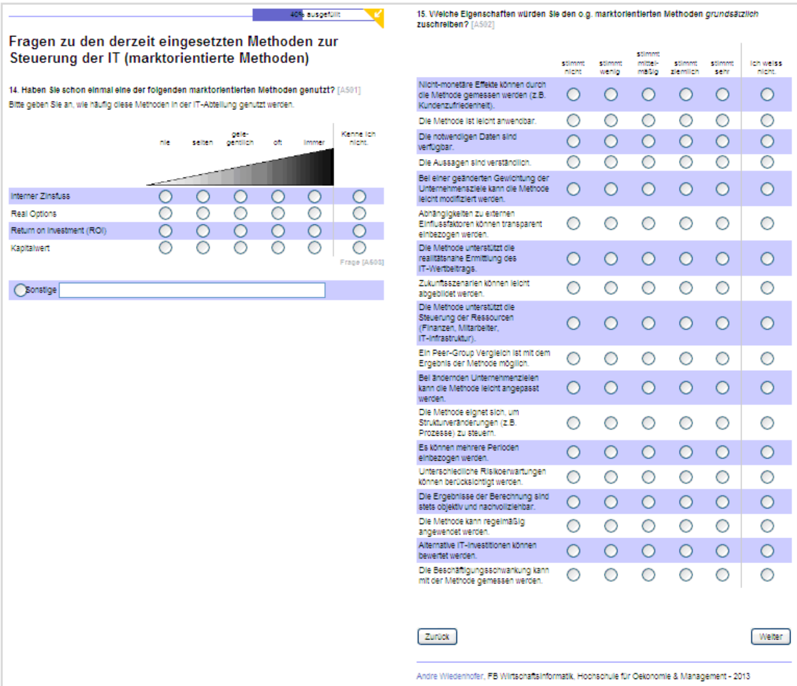
13. Welche Eigenschaften würden Sie den o.g. buchhalterischen Methoden *grundsätzlich* zuschreiben? [A402]

	stimmt nicht	stimmt wenig	stimmt mittel- mäßig	stimmt ziemlich	stimmt sehr	Ich weiss nicht.
Die Ergebnisse der Berechnung sind stets objektiv und nachvollziehbar.						
Die Aussagen sind verständlich.						
Die Methode unterstützt die realitätsnahe Ermittlung des IT-Wertbeitrags.						
Die Methode kann regelmäßig angewendet werden.						
Ein Peer-Group Vergleich ist mit dem Ergebnis der Methode möglich.						
Nicht-monetäre Effekte können durch die Methode gemessen werden (z.B. Kundenzufriedenheit)						
Abhängigkeiten zu externen Einflussfaktoren können transparent einbezogen werden.						
Die Methode ist leicht anwendbar.						
Die notwendigen Daten sind verfügbar.						
Es können mehrere Perioden einbezogen werden.						
Bei ändernden Unternehmenzielen kann die Methode leicht angepasst werden.						
Bei einer geänderten Gewichtung der Unternehmensziele kann die Methode leicht modifiziert werden.						
Die Beschäftigungsschwankung kann mit der Methode gemessen werden.						
Die Methode unterstützt die Steuerung der Ressourcen (Finanzen, Mitarbeiter, IT-Infrastruktur).						
Zukunftsszenarien können leicht abgebildet werden.						
Alternative IT-Investitionen können bewertet werden.						
Unterschiedliche Risikoerwartungen können berücksichtigt werden.						
Die Methode eignet sich, um Strukturveränderungen (z.B. Prozesse) zu steuern.						

Zurück Weiter

Andre Wiedenhofer, FB Wirtschaftsinformatik, Hochschule für Oekonomie & Management - 2013

Figure 57: Questionnaire (page 7)



40% ausgefüllt

Fragen zu den derzeit eingesetzten Methoden zur Steuerung der IT (marktorientierte Methoden)

14. Haben Sie schon einmal eine der folgenden marktorientierten Methoden genutzt? [A501]

Bitte geben Sie an, wie häufig diese Methoden in der IT-Abteilung genutzt werden.

	nie	selten	gele- gentlich	oft	immer	Kenne ich nicht.
Interner Zinsfuss						
Real Options						
Return on Investment (ROI)						
Kapitalwert						

Frage [A503]

Sonstige

15. Welche Eigenschaften würden Sie den o.g. marktorientierten Methoden *grundsätzlich* zuschreiben? [A502]

	stimmt nicht	stimmt wenig	stimmt mittel- mäßig	stimmt ziemlich	stimmt sehr	Ich weiss nicht.
Nicht-monetäre Effekte können durch die Methode gemessen werden (z.B. Kundenzufriedenheit).						
Die Methode ist leicht anwendbar.						
Die notwendigen Daten sind verfügbar.						
Die Aussagen sind verständlich.						
Bei einer geänderten Gewichtung der Unternehmensziele kann die Methode leicht modifiziert werden.						
Abhängigkeiten zu externen Einflussfaktoren können transparent einbezogen werden.						
Die Methode unterstützt die realitätsnahe Ermittlung des IT-Wertbeitrags.						
Zukunftsszenarien können leicht abgebildet werden.						
Die Methode unterstützt die Steuerung der Ressourcen (Finanzen, Mitarbeiter, IT-Infrastruktur).						
Ein Peer-Group Vergleich ist mit dem Ergebnis der Methode möglich.						
Bei ändernden Unternehmenzielen kann die Methode leicht angepasst werden.						
Die Methode eignet sich, um Strukturveränderungen (z.B. Prozesse) zu steuern.						
Es können mehrere Perioden einbezogen werden.						
Unterschiedliche Risikoerwartungen können berücksichtigt werden.						
Die Ergebnisse der Berechnung sind stets objektiv und nachvollziehbar.						
Die Methode kann regelmäßig angewendet werden.						
Alternative IT-Investitionen können bewertet werden.						
Die Beschäftigungsschwankung kann mit der Methode gemessen werden.						

Zurück Weiter

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Figure 58: Questionnaire (page 8)

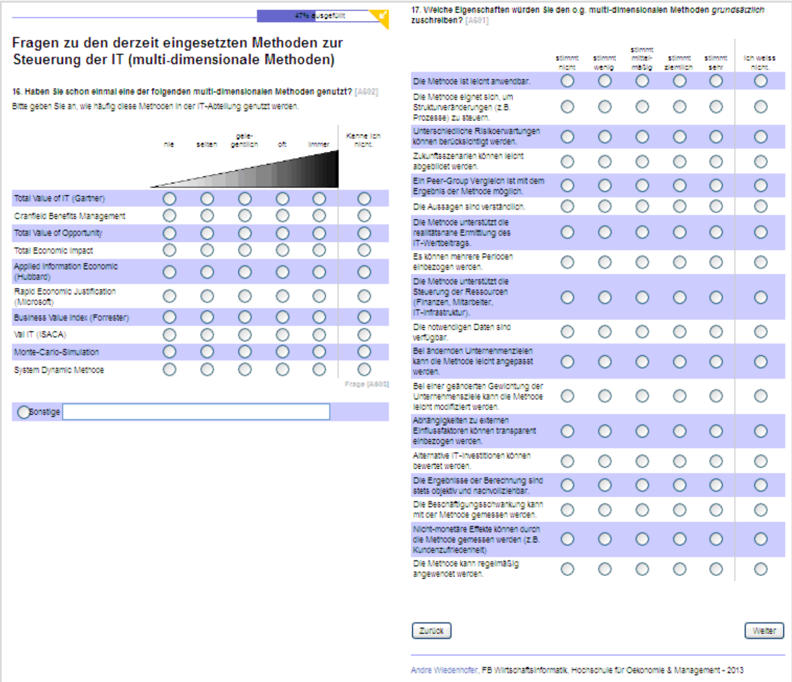


Figure 59: Questionnaire (page 9)

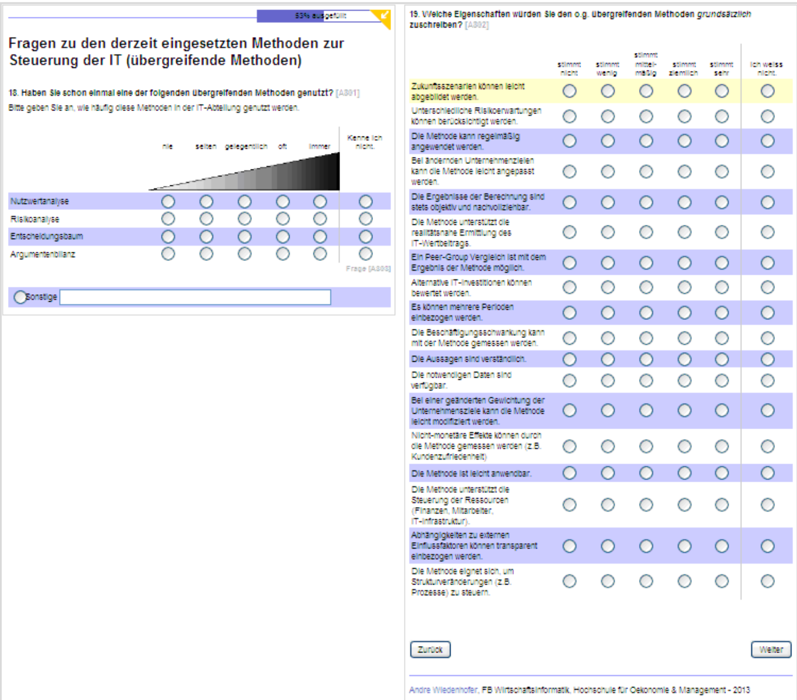
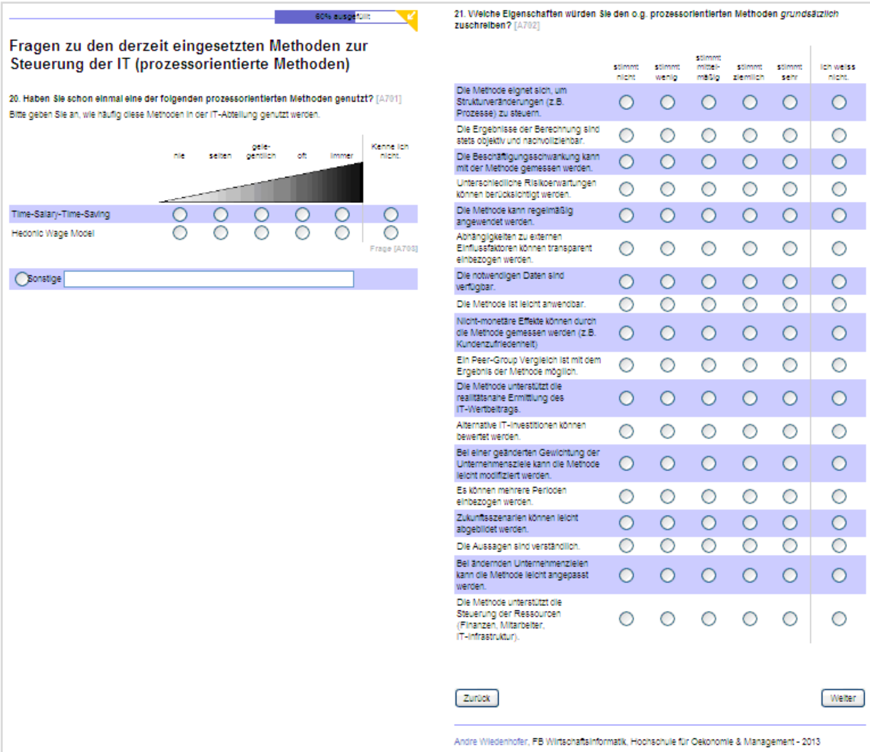


Figure 60: Questionnaire (page 10)



60% ausgefüllt

Fragen zu den derzeit eingesetzten Methoden zur Steuerung der IT (prozessorientierte Methoden)

20. Haben Sie schon einmal eine der folgenden prozessorientierten Methoden genutzt? [A701]

Bitte geben Sie an, wie häufig diese Methoden in der IT-Abteilung genutzt werden.

	nie	selten	gele-gentlich	oft	immer	Kenne ich nicht.
Time-Salary-Time-Saving						
Hedonic Wage Model						

Frage [A703]

Sonstige

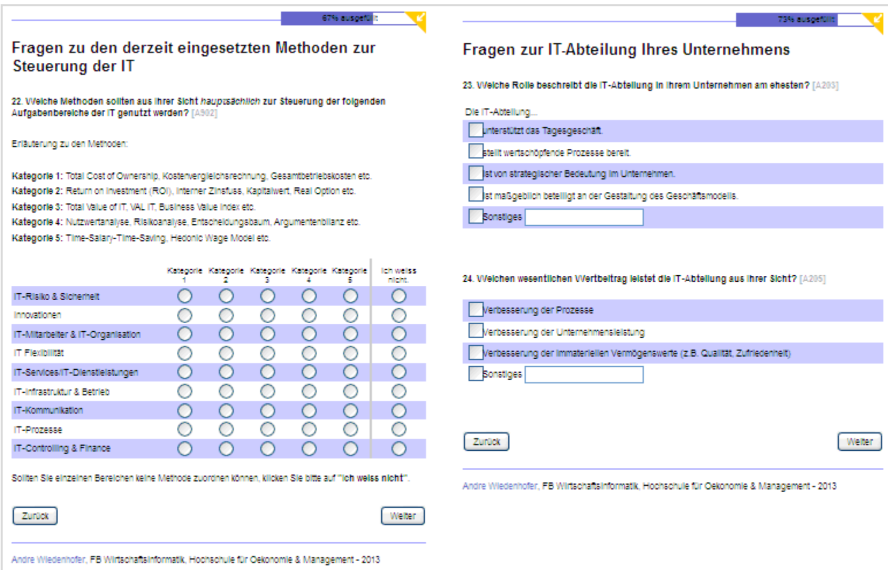
21. Welche Eigenschaften würden Sie den o.g. prozessorientierten Methoden *grundsätzlich* zuschreiben? [A702]

	stimmt nicht	stimmt wenig	stimmt mittel-mäßig	stimmt ziemlich	stimmt sehr	Ich weiss nicht.
Die Methode eignet sich, um Strukturveränderungen (z.B. Prozesse) zu steuern.						
Die Ergebnisse der Berechnung sind stets objektiv und nachvollziehbar.						
Die Beschäftigungsschwankung kann mit der Methode gemessen werden.						
Unterschiedliche Risikoerwartungen können berücksichtigt werden.						
Die Methode kann regelmäßig angewendet werden.						
Abhängigkeiten zu externen Einflussfaktoren können transparent einbezogen werden.						
Die notwendigen Daten sind verfügbar.						
Die Methode ist leicht anwendbar.						
Nicht-monetäre Effekte können durch die Methode gemessen werden (z.B. Kundenzufriedenheit)						
Ein Peer-Group Vergleich ist mit dem Ergebnis der Methode möglich.						
Die Methode unterstützt die realitätsnahe Ermittlung des IT-Wertbeitrags.						
Alternative IT-Investitionen können bewertet werden.						
Bei einer geänderten Gewichtung der Unternehmensziele kann die Methode leicht modifiziert werden.						
Es können mehrere Perioden einbezogen werden.						
Zukunftsszenarien können leicht abgebildet werden.						
Die Aussagen sind verständlich.						
Bei ändernden Unternehmenzielen kann die Methode leicht angepasst werden.						
Die Methode unterstützt die Steuerung der Ressourcen (Finanzen, Mitarbeiter, IT-Infrastruktur).						

Zurück Weiter

Andre Wiedenhofer, FB Wirtschaftsinformatik, Hochschule für Oekonomie & Management - 2013

Figure 61: Questionnaire (pages 11 and 12)



67% ausgefüllt

Fragen zu den derzeit eingesetzten Methoden zur Steuerung der IT

22. Welche Methoden sollten aus Ihrer Sicht *hauptsächlich* zur Steuerung der folgenden Aufgabenbereiche der IT genutzt werden? [A902]

Erläuterung zu den Methoden:

Kategorie 1: Total Cost of Ownership, Kostenvergleichsrechnung, Gesamtbetriebskosten etc.
Kategorie 2: Return on Investment (ROI), Interner Zinsfuss, Kapitalwert, Real Option etc.
Kategorie 3: Total Value of IT, VAL IT, Business Value Index etc.
Kategorie 4: Nutzwertanalyse, Risikoanalyse, Entscheidungsbaum, Argumentenbilanz etc.
Kategorie 5: Time-Salary-Time-Saving, Hedonic Wage Model etc.

	Kategorie 1	Kategorie 2	Kategorie 3	Kategorie 4	Kategorie 5	Ich weiss nicht.
IT-Risiko & Sicherheit						
Innovationen						
IT-Mitarbeiter & IT-Organisation						
IT Flexibilität						
IT-Services/IT-Dienstleistungen						
IT-Infrastruktur & Betrieb						
IT-Kommunikation						
IT-Prozesse						
IT-Controlling & Finance						

Sollten Sie einzelnen Bereichen keine Methode zuordnen können, klicken Sie bitte auf "**Ich weiss nicht**".

Zurück Weiter

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73% ausgefüllt

Fragen zur IT-Abteilung Ihres Unternehmens

23. Welche Rolle beschreibt die IT-Abteilung in Ihrem Unternehmen am ehesten? [A203]

Die IT-Abteilung...

- unterstützt das Tagesgeschäft.
- stellt wertschöpfende Prozesse bereit.
- ist von strategischer Bedeutung im Unternehmen.
- ist maßgeblich beteiligt an der Gestaltung des Geschäftsmodells.
- Sonstiges

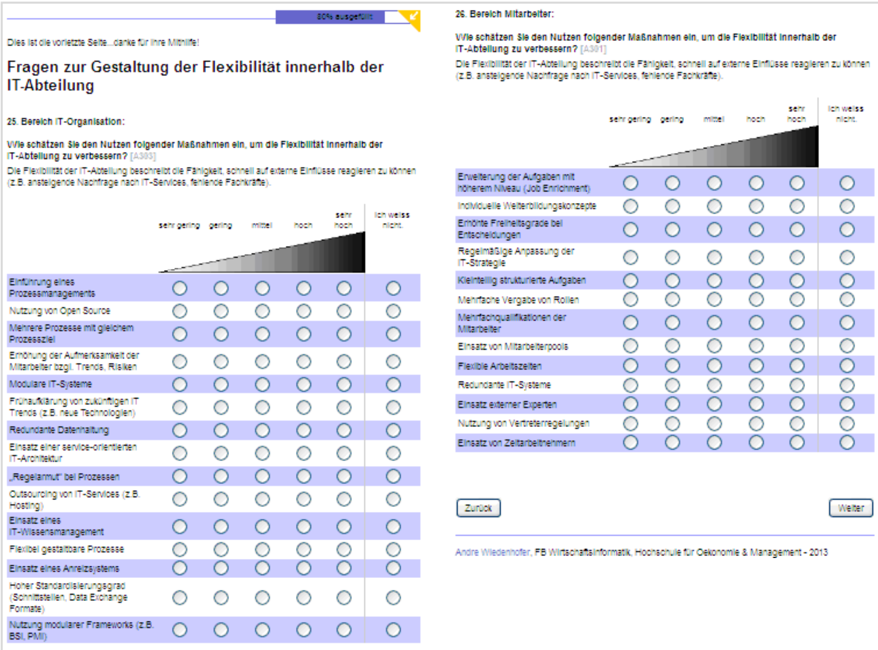
24. Welchen wesentlichen Wertbeitrag leistet die IT-Abteilung aus Ihrer Sicht? [A205]

- Verbesserung der Prozesse
- Verbesserung der Unternehmensleistung
- Verbesserung der immateriellen Vermögenswerte (z.B. Qualität, Zufriedenheit)
- Sonstiges

Zurück Weiter

Andre Wiedenhofer, FB Wirtschaftsinformatik, Hochschule für Oekonomie & Management - 2013

Figure 62: Questionnaire (page 13)



80% ausgefüllt

Dies ist die vorletzte Seite...danke für Ihre Mithilfe!

Fragen zur Gestaltung der Flexibilität innerhalb der IT-Abteilung

25. Bereich IT-Organisation:

Wie schätzen Sie den Nutzen folgender Maßnahmen ein, um die Flexibilität innerhalb der IT-Abteilung zu verbessern? [A303]

Die Flexibilität der IT-Abteilung beschreibt die Fähigkeit, schnell auf externe Einflüsse reagieren zu können (z.B. ansteigende Nachfrage nach IT-Services, fehlende Fachkräfte).

	sehr gering	gering	mittel	hoch	sehr hoch	Ich weiss nicht.
Einführung eines Prozessmanagements						
Nutzung von Open Source						
Mehrere Prozesse mit gleichem Prozessziel						
Erhöhung der Aufmerksamkeit der Mitarbeiter bzgl. Trends, Risiken						
Modulare IT-Systeme						
Frühaufklärung von zukünftigen IT Trends (z.B. neue Technologien)						
Redundante Datenhaltung						
Einsatz einer service-orientierten IT-Architektur						
„Regelarmut" bei Prozessen						
Outsourcing von IT-Services (z.B. Hosting)						
Einsatz eines IT-Wissensmanagement						
Flexibel gestaltbare Prozesse						
Einsatz eines Anreizsystems						
Hoher Standardisierungsgrad (Schnittstellen, Data Exchange Formate)						
Nutzung modularer Frameworks (z.B. BSI, PMI)						

26. Bereich Mitarbeiter:

Wie schätzen Sie den Nutzen folgender Maßnahmen ein, um die Flexibilität innerhalb der IT-Abteilung zu verbessern? [A301]

Die Flexibilität der IT-Abteilung beschreibt die Fähigkeit, schnell auf externe Einflüsse reagieren zu können (z.B. ansteigende Nachfrage nach IT-Services, fehlende Fachkräfte).

	sehr gering	gering	mittel	hoch	sehr hoch	Ich weiss nicht.
Erweiterung der Aufgaben mit höherem Niveau (Job Enrichment)						
Individuelle Weiterbildungskonzepte						
Erhöhte Freiheitsgrade bei Entscheidungen						
Regelmäßige Anpassung der IT-Strategie						
Kleinteilig strukturierte Aufgaben						
Mehrfache Vergabe von Rollen						
Mehrfachqualifikationen der Mitarbeiter						
Einsatz von Mitarbeiterpools						
Flexible Arbeitszeiten						
Redundante IT-Systeme						
Einsatz externer Experten						
Nutzung von Vertreterregelungen						
Einsatz von Zeitarbeitnehmern						

Zurück Weiter

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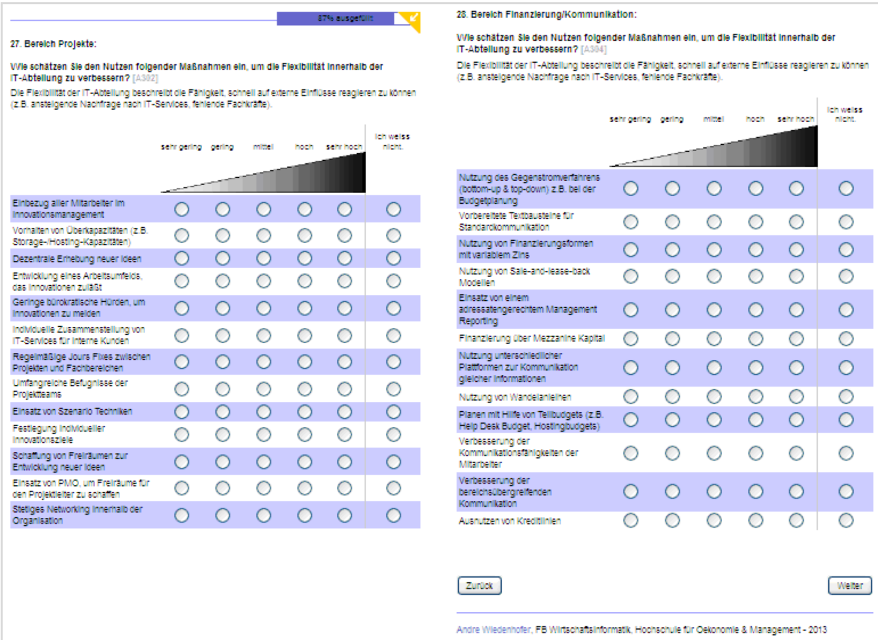
Figure 63: Questionnaire (page 14)



87% ausgefüllt

27. Bereich Projekte:

Wie schätzen Sie den Nutzen folgender Maßnahmen ein, um die Flexibilität innerhalb der IT-Abteilung zu verbessern? [A302]

Die Flexibilität der IT-Abteilung beschreibt die Fähigkeit, schnell auf externe Einflüsse reagieren zu können (z.B. ansteigende Nachfrage nach IT-Services, fehlende Fachkräfte).

	sehr gering	gering	mittel	hoch	sehr hoch	Ich weiss nicht.
Einbezug aller Mitarbeiter im Innovationsmanagement						
Vorhalten von Überkapazitäten (z.B. Storage-/Hosting-Kapazitäten)						
Dezentrale Erhebung neuer Ideen						
Entwicklung eines Arbeitsumfelds, das Innovationen zuläßt						
Geringe bürokratische Hürden, um Innovationen zu melden						
Individuelle Zusammenstellung von IT-Services für interne Kunden						
Regelmäßige Jours Fixes zwischen Projekten und Fachbereichen						
Umfangreiche Befugnisse der Projektteams						
Einsatz von Szenario Techniken						
Festlegung individueller Innovationsziele						
Schaffung von Freiräumen zur Entwicklung neuer Ideen						
Einsatz von PMO, um Freiräume für den Projektleiter zu schaffen						
Stetiges Networking innerhalb der Organisation						

28. Bereich Finanzierung/Kommunikation:

Wie schätzen Sie den Nutzen folgender Maßnahmen ein, um die Flexibilität innerhalb der IT-Abteilung zu verbessern? [A304]

Die Flexibilität der IT-Abteilung beschreibt die Fähigkeit, schnell auf externe Einflüsse reagieren zu können (z.B. ansteigende Nachfrage nach IT-Services, fehlende Fachkräfte).

	sehr gering	gering	mittel	hoch	sehr hoch	Ich weiss nicht.
Nutzung des Gegenstromverfahrens (bottom-up & top-down) z.B. bei der Budgetplanung						
Vorbereitete Textbausteine für Standardkommunikation						
Nutzung von Finanzierungsformen mit variablem Zins						
Nutzung von Sale-and-lease-back Modellen						
Einsatz von einem adressatengerechtem Management Reporting						
Finanzierung über Mezzanine Kapital						
Nutzung unterschiedlicher Plattformen zur Kommunikation gleicher Informationen						
Nutzung von Wandelanleihen						
Planen mit Hilfe von Teilbudgets (z.B. Help Desk Budget, Hostingbudgets)						
Verbesserung der Kommunikationsfähigkeiten der Mitarbeiter						
Verbesserung der bereichsübergreifenden Kommunikation						
Ausnutzen von Kreditlinien						

Zurück Weiter

Andre Wiedenhofer, FB Wirtschaftsinformatik, Hochschule für Oekonomie & Management - 2013

Figure 64: Questionnaire (page 15)

A.2.3 PRE-TEST

The pre-test was conducted from 25 January 2013 until 9 February 2013. The objective of the pre-test was to gather reliable information on understandability, duration of answering, technical problems, scales, and evaluability of the data, etc. The pre-test was divided into the content-oriented pre-test[181] and the technical pre-test.

A.2.3.1 CONTENT-ORIENTED PRE-TEST

To validate the content of the online survey, 15 participants, who were familiar with the topic, analyzed the questionnaire. Three further individuals, who were not familiar with the topic, checked the online survey. The individuals were invited via a personalized email. The email stated the objective of the online survey as well as the relevant points that the reviewer should pay attention to. To ensure a more adequate quality of the reviews, the content-oriented pre-testing was done successively. Thus, the review notes were incorporated until the next participant started his review. The participants were able to note their review notes directly to each site of the online survey and add a reference to the question. It turned out that the questionnaire contained misspellings and some items had to be described more explicitly. On some questions, it also showed that the proposed scale did not fit the questions. All review notes have been incorporated within the online survey.

A.2.3.2 TECHNICAL PRE-TEST

The objective of the technical pre-test was the validation of the online platform. Although it was a professional internet platform, technical problems are not unforeseeable. Having done all content-oriented pre-testing, the technical pre-test was done on 9 February 2013. To validate the technical performance of the online platform, a list of all variables was printed (hard copy). Afterwards, the questionnaire was answered by the author while recording all given answers to the printed list of variables. After all questions were answered, the recorded data was downloaded from the online platform and compared to the recorded data of the

[181] Porst referred to this as a classic pre-test. Cp. Porst, 1998. Porst notes, that there are no fully accepted techniques to execute a pre-test.

printed list of variables. The technical pre-test was conducted with Internet Explorer 7.0 and Firefox Portable 12.0. During the pre-testing, no issues were identified that could have affected the subsequent survey of the participants.

A.2.4 DATA COLLECTION

A.2.4.1 TARGETED SAMPLE SIZE

In regard to the sample size, Bortz and Döring indicate that it is a common misconception that by increasing sample size, the sample's representativeness increases too. This is only true in an unbiased selection. With a biased selection, a large sample size does not help to fix the discrepancy. The error will only be repeated on a larger scale (Bortz and Döring, 2006).

To select the participants within the sample, the cut-off method proposed by Kornmeier was used within this research paper. According to Kornmeier, the cut-off method belongs to the non-random statistical methods (Kornmeier, 2006).[182] This method only selects those elements of the population that had been proven relevant. In the present online survey, only those people who worked as an IT manager[183] in mid-size or larger firms were addressed. As smaller firms will not come into focus, those firms are disregarded within the selection of the sample size. Due to science-economic considerations on the one hand, and the assumption that small firms with less than 250 employees do not control their IT-activities by a variety of evaluation methods on the other hand, this cut-off seems to be understandable. Nevertheless, firms with more than 250 employees represent a large part of all employees in Germany. In regard to the Federal Statistical Office, Germany had 12,154 firms in 2010 that had more than 250 employees (Federal Statistical Office Germany, 2010). This represents 0.3% percent of all registered firms in Germany. Although this percentage is very low, firms with more than 250 employees engage a significant number of employees. According to the German Federal Unemployment Agency, firms with more than

[182] This method is also called concentration method. Cp. Mohr, 2009. Within this research paper, the construction of the cut-off approach is designed according to Ibid., pp. 149–150.

[183] There are further job descriptions, e.g. CIO, Head of IT, Head of Software Development, etc.

250 employees had about 9,189,394 employees. As the total amount of employees in Germany in December 2012 was 28,920,588, firms with more than 250 employees represent 32% of the employees in Germany.

A list that includes all IT managers in Germany does not exist. Therefore, information of a professional provider of business addresses was used. In answer to a request by the author, Cebus: The European Mailing List Broker[184] indicated that they have 14,908 address records available. These records included addresses of IT managers in Germany at firms that emply more than 100 employees[185] (mid- and large size firms).[186] Upon a request by the author, another professional address provider indicates that they have about 8,849 records of IT managers in Germany (Hoppenstedt, 2013). This list includes only IT managers of firms with more than 200 employees. By using this kind of approach, over- and undercoverage errors had to be calculated automatically.[187]

In contrast to the available firms with more than 250 employees (12,154), the information gathered by the address provider (14,908) seems to be conclusive. This number surely represents only a lower limit, since it may be assumed that firms with IT managers tend to be larger firms. Von der Lippe and Kladroba call this cut-off approach a desired non-representativeness (van der Lippe and Kladroba, 2002).

To calculate the targeted sample size, the proposed formula of Kornmeier 2006 for an entire population < 100,000 was used:

---

[184] www.cebus.ch

[185] The employment class of 100 employees had to be chosen. Unfortunately, the employment class that was chosen by the address provider does not match with the official German employment classes. Since the selected class, chosen by the address provider, is smaller, an improved accuracy within the sample size may be expected.

[186] A similar approach to identify the full population has been done by Mohr, 2009.

[187] Undercoverage describes errors that specific objects (e.g. firms, IT managers) may not be on the address list. Overcoverage errors mean that there are addresses that are no longer valid. This may be due to a variety of impacts (short term insolvency, fluctuation of the IT manager etc.). Bortz and Döring explain these errors on the example of an electoral register. Cp. Bortz and Döring, 2006.

$$n = \frac{t^2 * p * q * N}{t^2 * p * q + e^2 * (N - 1)}$$

The following applies:

n: Sample size

t: Confidence interval (e.g. 68, 3%; 95, 5%; 99, 7%)

p: Proportion of the elements in the sample that have the characteristic attributes

q: Proportion of the elements in the sample that (do not) have the characteristic attributes

N: Size of the basic population

e: Sampling error (accuracy)

According to the abovementioned formula, a necessary sample size of 153 participants could be calculated with a confidence interval of 99.7% and a sampling error of 8%.

A.2.4.2 SELECTION AND CONTACTING

A.2.4.2.1 MAIN SELECTION OF THE PARTICIPANTS

The main online survey took place from 09 February 2013 to 07 April 2013.

Every day, 40 IT managers were invited to participate in the online survey. The identification and contacting of the relevant participants was done by using at least two premium Xing accounts. With two premium accounts, it was possible to contact up to 40 participants daily.[188]

[188] One Xing account is able to contact 20 non-contacts daily.

The identified participants were sent the following cover letter:

> Guten Tag Herr <name>/ Guten Tag Frau <name>,
>
> ich bin Promotionsstudent und forsche berufsbegleitend im Bereich des IT-Controllings an der Hochschule für Oekonomie & Management. Im Rahmen meines Promotionsprojektes sollen insbesondere folgende Fragestellungen untersucht werden:
>
> - sind die traditionellen Controlling-Verfahren (z.B. ROI) geeignet, die Steuerung der IT-Flexibilität zu unterstützen?
> - Welche Maßnahmen scheinen zielführend, um die Flexibilität der IT-Abteilung zu verbessern?
>
> Da mich Ihre Einschätzung interessiert, möchte ich Sie gerne zur Teilnahme an meiner Umfrage unter folgendem Link einladen: https://www.soscisurvey.de/IT value/?r=axing
>
> Die Umfrage richtet sich an IT-Leiter. Die Befragung dauert ungefähr 15 Minuten, wird komplett anonym durchgeführt und läuft bis zum 05.04.2013.
>
> Ich weiß, dass die Teilnahme an Umfragen mit anspruchsvollen Fragen wenig Spaß macht. Daher meinen ganz herzlichen Dank für Ihre Mithilfe. Damit helfen Sie mir sehr.
>
> Mit freundlichen Grüßen
>
> André Wiedenhofer

The deadline indicated within the cover letter was adjusted daily. This was intended to allow the participants to answer the questions in a timely manner.

The selection criterion for the extended search consisted mainly of the description of the current position. The main descriptions were: “IT-Leiter” or “IT Leiter”.[189] These items were again expanded by additional search criteria, e.g. “IT” or “Prozess” and the first characters of the zip code. To reach a uniformly distrib-

[189] By using these search criteria, the system also provided results that described IT managers, e.g. “Head of software development”, “CIO”, “Teamlead”, etc.

uted coverage in Germany, the zip code was calculated randomly.[190] As the last and strongest selection criterion, each profile was further confirmed by the author himself. This was done to ensure that the firm and the IT functions had the defined size.

Thus, it may be assumed that the selection of participants was significantly more accurate than by selecting participants with the help of a regular address record[191], since the respective profiles were updated by the participants themselves in Xing actively.

A.2.4.2.2 ADDITIONAL SELECTION OF THE PARTICIPANTS

To expand the sample, additional samples were included. In order to be able to separate the individual samples, each sample was indicated by a special referrer. This referrer was attached to the hyperlink that called the online questionnaire. Figure 65 shows the selected samples, the instruments used to approach the participants, as well as the number of addressed participants.

Figure 65: Different samples and instruments used

#	Sample	Instrument	Addressed participants	Referrer	Online-survey instance
1	Xing IT managers	Individual correspondance	2,151	Xing, jfxing, axing	www.soscisurvey.de/IT-Value/?r=Referrer
2	Personal contacts	Individual correspondance	25	fr	
3	IT-Connections community	Xing community	72,412	com	
4	IT-Netzwerk community	Xing community	17,112	jcom	
5	IT-Professionals Hamburg community	Xing community	1,310	jcom	
6	CEBUS list	Mass mailing	638	aws, tg2, tg3	
7	FOM students	Mass mailing by their instructor	200	mj	

Source: Structure according to Mohr, 2009

In total, seven samples were used to address participants:

[190] This was done by using the random function of MS Excel. The first two characters of the zip code were randomly picked successively.

[191] E.g. provided by the commercial address provider.

- **Sample #1:** As already presented, the main sample has been addressed by the individual correspondence of the target group via Xing. Up to three Xing accounts were used to support this sample. By the usage of two premium accounts, it was possible to contact 40 non-contacts daily. The third non-premium account was only able to address 20 non-contacts a month.
- **Additional sample #2:** Personal contacts, who belonged to the target group and who had relevant expertise, were contacted via email or Xing. They were asked to take part in the online survey.
- **Additional sample #3-5:** The topic and the link to the online questionnaire were posted within the relevant Xing communities. The members of the community were asked to participate in the online survey.
- **Additional sample #6:** In addition, the address list of a professional address provider was used. For this purpose, the services of different vendors were compared. Finally, the addresses were bought at Cebus: The European Mailing List Broker. This provider delivered first and last names of IT managers from all over Germany of firms that have more than 100 employees. Additionally, the central email addresses of the firm were supplied (e.g. info@firma.de). The disadvantage that only the central email addresses were provided was accepted. Through internet research, the author tried to identify the personal email addresses of the responsible IT managers. Furthermore, in the email it was asked to forward the email to the responsible IT manager of the firm. Nevertheless, a large number of emails did not reach the IT managers, for various reasons. The mass mailing was done by using the mass mailing function of SoSciSurvey.[192]
- **Additional sample #7:** FOM students, who were currently enrolled at the faculty of business informatics, were contacted by their instructor. Since it is a part-time IT study program, it can be assumed that the students are currently working mostly in IT functions.

[192] Of course, the critical question is whether it is allowed to collect data for research purposes with the help of unintended personal letters. According to §13 paragraph 2, clause 8 of the German Federal Data Protection Act, the usage of personal data within scientific research is permitted.

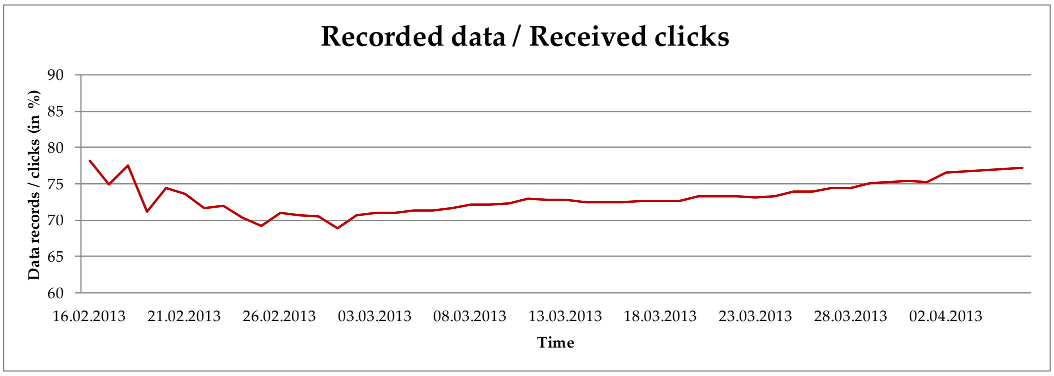
A.2.5 ANALYSIS

A.2.5.1 RETURN RATE

A.2.5.1.1 OVERALL RETURN RATE

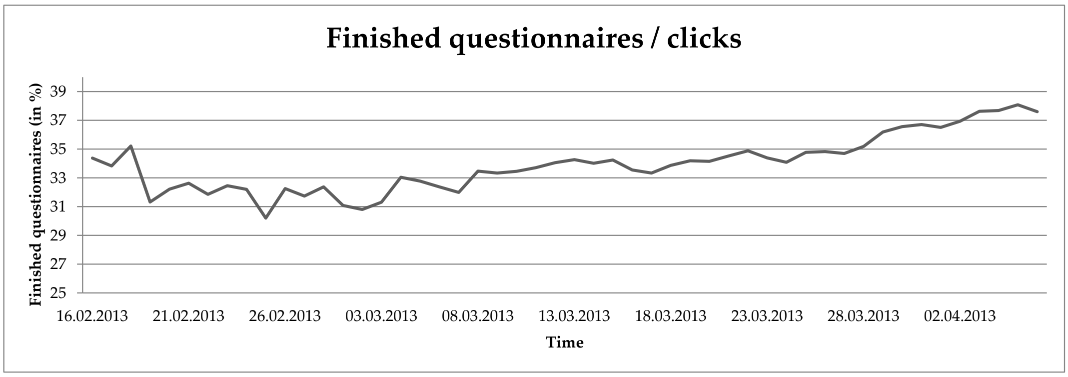
Assuming an online survey, the response rate compared to oral interviews is much smaller (Olbrich, Battenfeld and Buhr, 2011 or Porst, 2001). Therefore, to avoid possible nonresponse bias, incomplete records were stored too. More than 70% of participating respondents who called the online survey produced incomplete data records. This is shown in Figure 66. Half of the participants left the questionnaire after page 9.

Figure 66: (Incomplete) recorded data in relation to received clicks



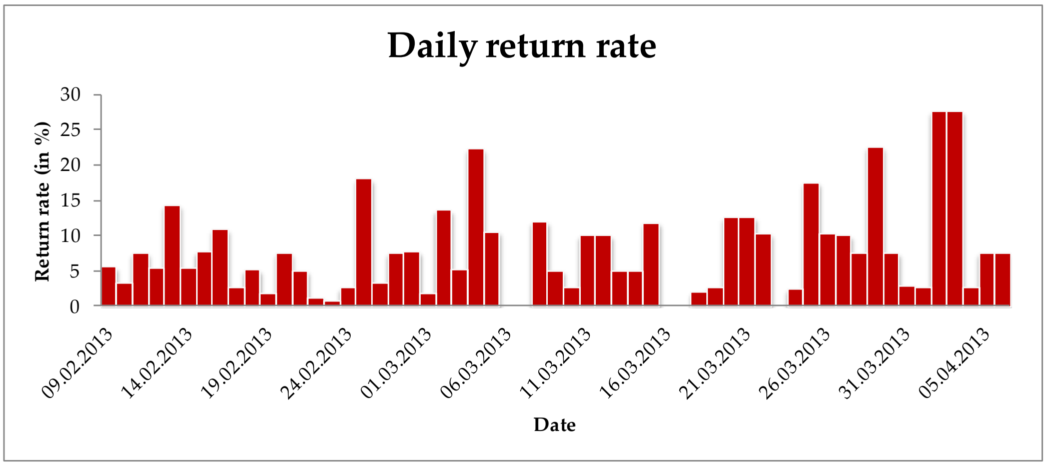
In average 8.6 clicks per day were received over the online survey period. The highest amount of clicks (31 clicks) was recorded on 25 February 2013. This can be explained by the mass survey, which was sent out a day earlier. The lowest amount of clicks was 0 clicks a day. Furthermore, it could be recognized that approximately one third of the participants who entered the online survey via the provided link populated the questionnaire completely.

Figure 67: Completed questionnaires in relation to received clicks



The return rate[193] in total is 18%. 18% of all participants left complete or incomplete data records. 6% populated the questionnaire completely. The variation of the daily return rate may be seen in Figure 68. When looking at the chart, however, it is essential to understand that the daily return rates may not have been specified exactly. To calculate the daily return rate, the relation between the answers received daily and the people invited was calculated. Thus, it could not be recognized whether the answers received daily belonged to the daily invited persons. Participants may decide to answer the questions some days after receiving the invitation. Therefore, an uncertainty within the figures remains. Nevertheless, the chart provides an indication of the return rate.

Figure 68: Daily return rate (in %)



[193] Here, the return rate can be understood as the rate when addressed participants enter any data into the questionnaire.

The daily return rate does not seem to have an apparent pattern. The response rates on weekends and during the week are about the same (7.35% and 7.88%). During the long Easter weekend, the daily return rates decreased. But this effect was compensated for in the days after.

A.2.5.1.2 RETURN RATE BY SAMPLE

Table 14 represents the return rates in regard to the different samples.

Table 14: Return rates per sample

#	Sample	Addressed participants	Answers	Return rate
1	Xing IT managers	2,151	299	13.9%
2	Personal contacts	25	24	96%
3	IT-Connections community	72,412	1	0.0%
4	IT-Netzwerk community	17,112	1	0.0%
5	IT-Professionals Hamburg community	1,310	0	0.0%
6	CEBUS list	638	25	3.9%
7	FOM students	200	24	12%

While taking a focus at the individual samples, the return rates provide a different picture. It can be recognized easily that the personal approach of potential participants provides a higher return rate than an anonymous approach. Publishing the online survey link within different communities did not bring the desired results (sample #3-5). In contrast, the individual approach via Xing mails provided an adequate return rate (sample #1).

The response rate in the mass mailings (sample #6) can be described as inadequate. On the one hand side, this was certainly to the fact that the emails did not reach the prevented IT managers. On the other hand side, the return rate may also indicate the absence of IT managers within the specific firm. Some IT managers may not have been employed at addressed firm. Under-and over-coverage errors may be added in addition. The response behavior of personal contacts is clearly illustrated by the return rate (sample #2 and #7).

A.2.5.1.3 RETURN RATE BY QUESTION AREA

It was found that the responses of the participants as well as the daily return rate varied from question area to question area. This may be due to the fact that some participants did not answer certain questions or certain question areas. E.g., the participants did not have experience in using the indicated evaluation methods. Of course, this has indications to the sampling error of each question area as shown in Table 15.

Table 15: Question areas' sampling error

Question area	Information	Answers (average)	Sampling error
General data	Firm related	215	6.1%
	IT function related		
Flexibility instruments	Data regarding the flexibility of the IT function	188	7.3%
Evaluation Methods	Account-based evaluation methods	192	7.0%
	Market-based evaluation methods	142	8.4%
	Multi-dimensional evaluation methods	59	13.0%
	Process-oriented evaluation methods	33	17.1%
	Surrogate evaluation methods	127	8.5%
	Capability clusters	185	6.6%

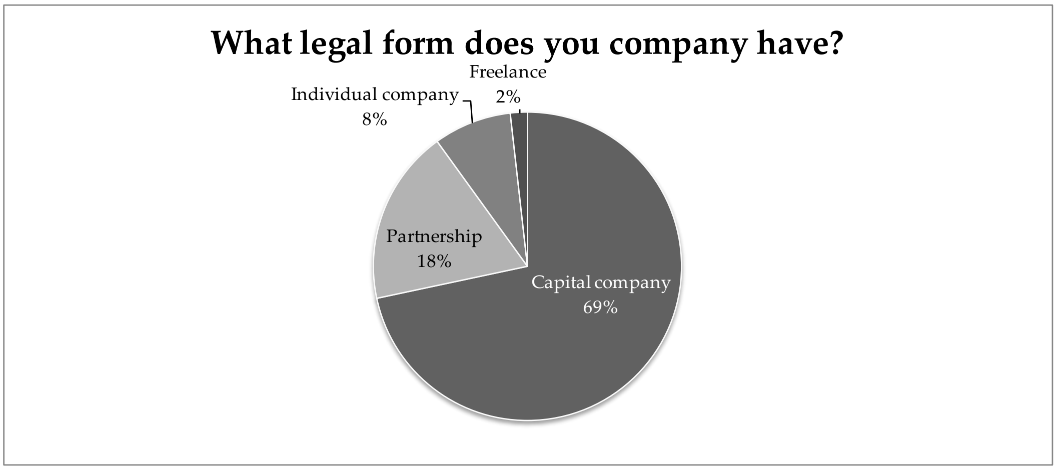
The commonly used sampling error, i.e. the maximum value of probability of an error in rejecting the null hypothesis is situated at 5%, 1% and 0. 1% (Mohr, 2009). In science, however, 10% and even 20% are accepted (e.g. Dannenberg, 2006). The average of all sampling errors of all question areas is 9.2% in regard to a confidence interval of 99.7%. Thus, the value is within acceptable limits. Nevertheless, in some question areas blurring effects may appear due to a higher sampling error. Thus, the null hypothesis that the responses in regard to all evaluation methods are uniformly distributed must be rejected. This is for example within the question area of process- and multi-dimensional evaluation methods. The number of responses reveals that only few of the 181 participating IT managers were able to provide information on these methods. This leads to the conclusion that the study of Ardour Consulting at this point cannot be confirmed. The study of Ardour Consulting represents the evaluation methods that are most commonly used by IT managers (Ardour Consulting, 2012b).

A.2.5.2 STRUCTURE OF THE SAMPLE

A.2.5.2.1 FIRM CHARACTERISTICS

Figure 69 shows the legal form distribution of the respondents' companies. Based upon the conducted online survey, it can be found that the participants in the sample substantially belong to capital companies. This reflects the fact that primarily IT managers that belong to companies with more than 200 employees should be interviewed. In contrast, the proportion of freelancers is below 2% of the respondents.

Figure 69: Overview of the legal forms



In addition to the Capital Companies, however, individual companies and partnerships are represented as well. Table 16 shows the industries in which the respondents' companies mainly operate. The table indicates that the participants of the online survey belong to a wide range of industries. Manufacturing, Information and Communication, Financial and Insurance services, Health and Social Work as well as Wholesale, Retail, and repair of motor vehicles are those industries with the highest percentage of the total amount of respondents. In 2011 these industries were among the most traded in Germany (Statista, 2011).

Table 16: Distribution of the participants' industries[194]

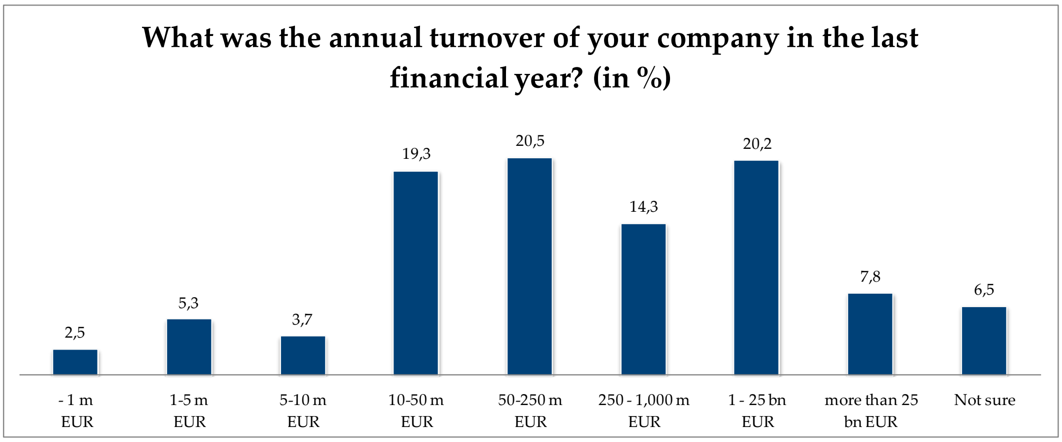
Industry	% of total
Agriculture, hunting and forestry	0.3
Manufacturing	21.6
Electricity, gas	3.7
Water supply	1.5
Construction	0.6
Wholesale, retail trade, repair of vehicles	7.9
Transport, storage	3.7
Hotels and restaurants	0.9
Information and communication	14.9
Financial and insurance services	8.8
Real estate, renting and business activities	0.6
Other professional, scientific activities	2.4
Administrative and other support services	2.4
Public administration and defence	4.3
Education	0.9
Health and social work	7.9
Arts, entertainment and recreation	0.6
Other community, social service activities	3.4
Others	13.4

Besides the indicated industries of the participants, the indicated annual turnover of their companies also reflects a wide range. This is shown by Figure 70. 19.3% of all participating IT managers indicated that annual turnover of their company is between 10 and 50 mil EUR, whereas 20.5% and 20.2% responded that

[194] The presented classification of industries is currently used by the European Union and is based upon the International Standard Industrial Classification of all Economic Activities (ISIC Rev. 3) of the United Nations. For detailed information, cp. United Nations, 2013.

their companies' annual turnover is between 50 and 250 mil EUR and 1 and 25 bil EUR.

Figure 70: Occurrences of the indicated turnover

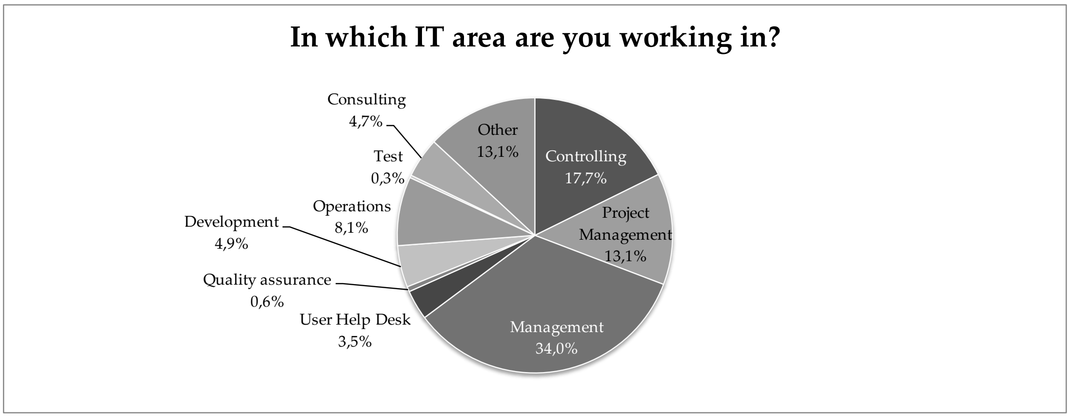


The distribution of the indicated turnover, and the associated industries and the legal form shows that the data basis of the sample as a whole seems to be very heterogeneous. Therefore, a disproportionate influence of certain factors or company types may be excluded.

A.2.5.2.2 CHARACTERISTICS OF THE IT FUNCTIONS

Besides the indication of the participants companies, questions regarding their specific IT working areas had been asked. Figure 71 shows how the participants responded in regard to their IT working area.

Figure 71: Overview of the participants' IT working areas



As the IT working areas have a wide naming range, it is difficult to make statement with a strong validity. Specific tasks may belong to different IT working areas. This is particularly emphasized by the answers the participants gave in relation to the category “others”. Within the category “others”, participants indicated that their IT working area is, e.g., “Consulting incl. management”, “Enterprise Architecture Management”, “ERP consulting”, “Informationsystem”, “IT management”, “IT controlling, IT projekt management”, “ IT Leitung”, “Leitung IT” etc. Based upon this list, it can be seen, that a clear assignment of the participants’ IT working areas to the provided categories is difficult.

A.2.5.3 USED TABLES

The following tables show the consolidation of the raw data of the executed online survey. Those figures are used within the main text body.

A.2.5.3.1 ASSESSMENT OF CAPABILITY CLUSTERS' FLEXIBILITY MEASURES

			Deputy arrangement					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	1	7	8	13	8	37
		% within Area of IT-function	2.7%	18.9%	21.6%	35.1%	21.6%	100.0%
		% within Deputy arrangement	16.7%	43.8%	16.0%	18.3%	25.8%	21.3%
		% of total	.6%	4.0%	4.6%	7.5%	4.6%	21.3%
	Project Management	Amount	1	2	5	9	5	22
		% within Area of IT-function	4.5%	9.1%	22.7%	40.9%	22.7%	100.0%
		% within Deputy arrangement	16.7%	12.5%	10.0%	12.7%	16.1%	12.6%
		% of total	.6%	1.1%	2.9%	5.2%	2.9%	12.6%
	Management	Amount	3	2	20	29	11	65
		% within Area of IT-function	4.6%	3.1%	30.8%	44.6%	16.9%	100.0%
		% within Deputy arrangement	50.0%	12.5%	40.0%	40.8%	35.5%	37.4%
		% of total	1.7%	1.1%	11.5%	16.7%	6.3%	37.4%
	User Help Desk	Amount	1	0	0	4	0	5
		% within Area of IT-function	20.0%	.0%	.0%	80.0%	.0%	100.0%
		% within Deputy arrangement	16.7%	.0%	.0%	5.6%	.0%	2.9%
		% of total	.6%	.0%	.0%	2.3%	.0%	2.9%
	Quality Management	Amount	0	0	0	1	1	2
		% within Area of IT-function	.0%	.0%	.0%	50.0%	50.0%	100.0%
		% within Deputy arrangement	.0%	.0%	.0%	1.4%	3.2%	1.1%
		% of total	.0%	.0%	.0%	.6%	.6%	1.1%
	Development	Amount	0	0	4	2	1	7
		% within Area of IT-function	.0%	.0%	57.1%	28.6%	14.3%	100.0%
		% within Deputy arrangement	.0%	.0%	8.0%	2.8%	3.2%	4.0%
		% of total	.0%	.0%	2.3%	1.1%	.6%	4.0%
	Operations	Amount	0	0	2	2	1	5
		% within Area of IT-function	.0%	.0%	40.0%	40.0%	20.0%	100.0%
		% within Deputy arrangement	.0%	.0%	4.0%	2.8%	3.2%	2.9%
		% of total	.0%	.0%	1.1%	1.1%	.6%	2.9%
	Test	Amount	0	0	1	0	0	1
		% within Area of IT-function	.0%	.0%	100.0%	.0%	.0%	100.0%
		% within Deputy arrangement	.0%	.0%	2.0%	.0%	.0%	.6%
		% of total	.0%	.0%	.6%	.0%	.0%	.6%
	Others	Amount	0	5	8	9	2	24
		% within Area of IT-function	.0%	20.8%	33.3%	37.5%	8.3%	100.0%
		% within Deputy arrangement	.0%	31.3%	16.0%	12.7%	6.5%	13.8%
		% of total	.0%	2.9%	4.6%	5.2%	1.1%	13.8%
	Consulting	Amount	0	0	2	2	2	6
		% within Area of IT-function	.0%	.0%	33.3%	33.3%	33.3%	100.0%
		% within Deputy arrangement	.0%	.0%	4.0%	2.8%	6.5%	3.4%
		% of total	.0%	.0%	1.1%	1.1%	1.1%	3.4%
Total		Amount	6	16	50	71	31	174
		% within Area of IT-function	3.4%	9.2%	28.7%	40.8%	17.8%	100.0%
		% within Deputy arrangement	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	3.4%	9.2%	28.7%	40.8%	17.8%	100.0%

			Establishing multiple qualifications					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	1	4	11	18	4	38
		% within Area of IT-function	2.6%	10.5%	28.9%	47.4%	10.5%	100.0%
		% within Establishing multiple qualifications	50.0%	44.4%	27.5%	18.9%	12.9%	21.5%
		% of total	.6%	2.3%	6.2%	10.2%	2.3%	21.5%
	Project Management	Amount	0	0	5	15	4	24
		% within Area of IT-function	.0%	.0%	20.8%	62.5%	16.7%	100.0%
		% within Establishing multiple qualifications	.0%	.0%	12.5%	15.8%	12.9%	13.6%
		% of total	.0%	.0%	2.8%	8.5%	2.3%	13.6%
	Management	Amount	0	3	18	32	12	65
		% within Area of IT-function	.0%	4.6%	27.7%	49.2%	18.5%	100.0%
		% within Establishing multiple qualifications	.0%	33.3%	45.0%	33.7%	38.7%	36.7%
		% of total	.0%	1.7%	10.2%	18.1%	6.8%	36.7%
	User Help Desk	Amount	1	0	0	3	1	5
		% within Area of IT-function	20.0%	.0%	.0%	60.0%	20.0%	100.0%
		% within Establishing multiple qualifications	50.0%	.0%	.0%	3.2%	3.2%	2.8%
		% of total	.6%	.0%	.0%	1.7%	.6%	2.8%
	Quality Management	Amount	0	0	1	0	1	2
		% within Area of IT-function	.0%	.0%	50.0%	.0%	50.0%	100.0%
		% within Establishing multiple qualifications	.0%	.0%	2.5%	.0%	3.2%	1.1%
		% of total	.0%	.0%	.6%	.0%	.6%	1.1%
	Development	Amount	0	0	2	5	0	7
		% within Area of IT-function	.0%	.0%	28.6%	71.4%	.0%	100.0%
		% within Establishing multiple qualifications	.0%	.0%	5.0%	5.3%	.0%	4.0%
		% of total	.0%	.0%	1.1%	2.8%	.0%	4.0%
	Operations	Amount	0	0	1	3	1	5
		% within Area of IT-function	.0%	.0%	20.0%	60.0%	20.0%	100.0%
		% within Establishing multiple qualifications	.0%	.0%	2.5%	3.2%	3.2%	2.8%
		% of total	.0%	.0%	.6%	1.7%	.6%	2.8%
	Test	Amount	0	0	0	1	0	1
		% within Area of IT-function	.0%	.0%	.0%	100.0%	.0%	100.0%
		% within Establishing multiple qualifications	.0%	.0%	.0%	1.1%	.0%	.6%
		% of total	.0%	.0%	.0%	.6%	.0%	.6%
	Others	Amount	0	2	2	14	6	24
		% within Area of IT-function	.0%	8.3%	8.3%	58.3%	25.0%	100.0%
		% within Establishing multiple qualifications	.0%	22.2%	5.0%	14.7%	19.4%	13.6%
		% of total	.0%	1.1%	1.1%	7.9%	3.4%	13.6%
	Consulting	Amount	0	0	0	4	2	6
		% within Area of IT-function	.0%	.0%	.0%	66.7%	33.3%	100.0%
		% within Establishing multiple qualifications	.0%	.0%	.0%	4.2%	6.5%	3.4%
		% of total	.0%	.0%	.0%	2.3%	1.1%	3.4%
Total		Amount	2	9	40	95	31	177
		% within Area of IT-function	1.1%	5.1%	22.6%	53.7%	17.5%	100.0%
		% within Establishing multiple qualifications	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	1.1%	5.1%	22.6%	53.7%	17.5%	100.0%

			Integration of resource pools					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	1	4	15	13	4	37
		% within Area of IT-function	2.7%	10.8%	40.5%	35.1%	10.8%	100.0%
		% within Integration of resource pools	9.1%	12.1%	23.8%	24.1%	66.7%	22.2%
		% of total	.6%	2.4%	9.0%	7.8%	2.4%	22.2%
	Project Management	Amount	4	4	6	9	0	23
		% within Area of IT-function	17.4%	17.4%	26.1%	39.1%	.0%	100.0%
		% within Integration of resource pools	36.4%	12.1%	9.5%	16.7%	.0%	13.8%
		% of total	2.4%	2.4%	3.6%	5.4%	.0%	13.8%
	Management	Amount	2	18	26	18	0	64
		% within Area of IT-function	3.1%	28.1%	40.6%	28.1%	.0%	100.0%
		% within Integration of resource pools	18.2%	54.5%	41.3%	33.3%	.0%	38.3%
		% of total	1.2%	10.8%	15.6%	10.8%	.0%	38.3%
	User Help Desk	Amount	2	0	1	1	0	4
		% within Area of IT-function	50.0%	.0%	25.0%	25.0%	.0%	100.0%
		% within Integration of resource pools	18.2%	.0%	1.6%	1.9%	.0%	2.4%
		% of total	1.2%	.0%	.6%	.6%	.0%	2.4%
	Quality Management	Amount	0	0	1	0	1	2
		% within Area of IT-function	.0%	.0%	50.0%	.0%	50.0%	100.0%
		% within Integration of resource pools	.0%	.0%	1.6%	.0%	16.7%	1.2%
		% of total	.0%	.0%	.6%	.0%	.6%	1.2%
	Development	Amount	0	2	2	2	0	6
		% within Area of IT-function	.0%	33.3%	33.3%	33.3%	.0%	100.0%
		% within Integration of resource pools	.0%	6.1%	3.2%	3.7%	.0%	3.6%
		% of total	.0%	1.2%	1.2%	1.2%	.0%	3.6%
	Operations	Amount	0	2	0	1	1	4
		% within Area of IT-function	.0%	50.0%	.0%	25.0%	25.0%	100.0%
		% within Integration of resource pools	.0%	6.1%	.0%	1.9%	16.7%	2.4%
		% of total	.0%	1.2%	.0%	.6%	.6%	2.4%
	Test	Amount	0	0	0	1	0	1
		% within Area of IT-function	.0%	.0%	.0%	100.0%	.0%	100.0%
		% within Integration of resource pools	.0%	.0%	.0%	1.9%	.0%	.6%
		% of total	.0%	.0%	.0%	.6%	.0%	.6%
	Others	Amount	2	2	10	7	0	21
		% within Area of IT-function	9.5%	9.5%	47.6%	33.3%	.0%	100.0%
		% within Integration of resource pools	18.2%	6.1%	15.9%	13.0%	.0%	12.6%
		% of total	1.2%	1.2%	6.0%	4.2%	.0%	12.6%
	Consulting	Amount	0	1	2	2	0	5
		% within Area of IT-function	.0%	20.0%	40.0%	40.0%	.0%	100.0%
		% within Integration of resource pools	.0%	3.0%	3.2%	3.7%	.0%	3.0%
		% of total	.0%	.6%	1.2%	1.2%	.0%	3.0%
Total		Amount	11	33	63	54	6	167
		% within Area of IT-function	6.6%	19.8%	37.7%	32.3%	3.6%	100.0%
		% within Integration of resource pools	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	6.6%	19.8%	37.7%	32.3%	3.6%	100.0%

			Usage of temporal work					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	9	10	12	2	4	37
		% within Area of IT-function	24.3%	27.0%	32.4%	5.4%	10.8%	100.0%
		% within Usage of temporal work	21.4%	16.7%	31.6%	13.3%	33.3%	22.2%
		% of total	5.4%	6.0%	7.2%	1.2%	2.4%	22.2%
	Project Management	Amount	6	10	2	5	0	23
		% within Area of IT-function	26.1%	43.5%	8.7%	21.7%	.0%	100.0%
		% within Usage of temporal work	14.3%	16.7%	5.3%	33.3%	.0%	13.8%
		% of total	3.6%	6.0%	1.2%	3.0%	.0%	13.8%
	Management	Amount	14	25	13	7	4	63
		% within Area of IT-function	22.2%	39.7%	20.6%	11.1%	6.3%	100.0%
		% within Usage of temporal work	33.3%	41.7%	34.2%	46.7%	33.3%	37.7%
		% of total	8.4%	15.0%	7.8%	4.2%	2.4%	37.7%
	User Help Desk	Amount	2	0	2	0	0	4
		% within Area of IT-function	50.0%	.0%	50.0%	.0%	.0%	100.0%
		% within Usage of temporal work	4.8%	.0%	5.3%	.0%	.0%	2.4%
		% of total	1.2%	.0%	1.2%	.0%	.0%	2.4%
	Quality Management	Amount	0	0	0	0	2	2
		% within Area of IT-function	.0%	.0%	.0%	.0%	100.0%	100.0%
		% within Usage of temporal work	.0%	.0%	.0%	.0%	16.7%	1.2%
		% of total	.0%	.0%	.0%	.0%	1.2%	1.2%
	Development	Amount	3	2	1	0	0	6
		% within Area of IT-function	50.0%	33.3%	16.7%	.0%	.0%	100.0%
		% within Usage of temporal work	7.1%	3.3%	2.6%	.0%	.0%	3.6%
		% of total	1.8%	1.2%	.6%	.0%	.0%	3.6%
	Operations	Amount	2	1	0	0	1	4
		% within Area of IT-function	50.0%	25.0%	.0%	.0%	25.0%	100.0%
		% within Usage of temporal work	4.8%	1.7%	.0%	.0%	8.3%	2.4%
		% of total	1.2%	.6%	.0%	.0%	.6%	2.4%
	Test	Amount	0	0	0	0	1	1
		% within Area of IT-function	.0%	.0%	.0%	.0%	100.0%	100.0%
		% within Usage of temporal work	.0%	.0%	.0%	.0%	8.3%	.6%
		% of total	.0%	.0%	.0%	.0%	.6%	.6%
	Others	Amount	6	11	4	1	0	22
		% within Area of IT-function	27.3%	50.0%	18.2%	4.5%	.0%	100.0%
		% within Usage of temporal work	14.3%	18.3%	10.5%	6.7%	.0%	13.2%
		% of total	3.6%	6.6%	2.4%	.6%	.0%	13.2%
	Consulting	Amount	0	1	4	0	0	5
		% within Area of IT-function	.0%	20.0%	80.0%	.0%	.0%	100.0%
		% within Usage of temporal work	.0%	1.7%	10.5%	.0%	.0%	3.0%
		% of total	.0%	.6%	2.4%	.0%	.0%	3.0%
Total		Amount	42	60	38	15	12	167
		% within Area of IT-function	25.1%	35.9%	22.8%	9.0%	7.2%	100.0%
		% within Usage of temporal work	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	25.1%	35.9%	22.8%	9.0%	7.2%	100.0%

			Modular restructuring of tasks					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	9	10	15	2	1	37
		% within Area of IT-function	24.3%	27.0%	40.5%	5.4%	2.7%	100.0%
		% within Modular restructuring of tasks	25.7%	16.1%	30.0%	9.1%	50.0%	21.6%
		% of total	5.3%	5.8%	8.8%	1.2%	.6%	21.6%
	Project Management	Amount	5	8	5	4	0	22
		% within Area of IT-function	22.7%	36.4%	22.7%	18.2%	.0%	100.0%
		% within Modular restructuring of tasks	14.3%	12.9%	10.0%	18.2%	.0%	12.9%
		% of total	2.9%	4.7%	2.9%	2.3%	.0%	12.9%
	Management	Amount	14	27	14	7	0	62
		% within Area of IT-function	22.6%	43.5%	22.6%	11.3%	.0%	100.0%
		% within Modular restructuring of tasks	40.0%	43.5%	28.0%	31.8%	.0%	36.3%
		% of total	8.2%	15.8%	8.2%	4.1%	.0%	36.3%
	User Help Desk	Amount	1	1	2	1	0	5
		% within Area of IT-function	20.0%	20.0%	40.0%	20.0%	.0%	100.0%
		% within Modular restructuring of tasks	2.9%	1.6%	4.0%	4.5%	.0%	2.9%
		% of total	.6%	.6%	1.2%	.6%	.0%	2.9%
	Quality Management	Amount	0	1	0	1	0	2
		% within Area of IT-function	.0%	50.0%	.0%	50.0%	.0%	100.0%
		% within Modular restructuring of tasks	.0%	1.6%	.0%	4.5%	.0%	1.2%
		% of total	.0%	.6%	.0%	.6%	.0%	1.2%
	Development	Amount	0	0	4	3	0	7
		% within Area of IT-function	.0%	.0%	57.1%	42.9%	.0%	100.0%
		% within Modular restructuring of tasks	.0%	.0%	8.0%	13.6%	.0%	4.1%
		% of total	.0%	.0%	2.3%	1.8%	.0%	4.1%
	Operations	Amount	2	3	0	0	0	5
		% within Area of IT-function	40.0%	60.0%	.0%	.0%	.0%	100.0%
		% within Modular restructuring of tasks	5.7%	4.8%	.0%	.0%	.0%	2.9%
		% of total	1.2%	1.8%	.0%	.0%	.0%	2.9%
	Test	Amount	0	1	0	0	0	1
		% within Area of IT-function	.0%	100.0%	.0%	.0%	.0%	100.0%
		% within Modular restructuring of tasks	.0%	1.6%	.0%	.0%	.0%	.6%
		% of total	.0%	.6%	.0%	.0%	.0%	.6%
	Others	Amount	3	8	9	4	0	24
		% within Area of IT-function	12.5%	33.3%	37.5%	16.7%	.0%	100.0%
		% within Modular restructuring of tasks	8.6%	12.9%	18.0%	18.2%	.0%	14.0%
		% of total	1.8%	4.7%	5.3%	2.3%	.0%	14.0%
	Consulting	Amount	1	3	1	0	1	6
		% within Area of IT-function	16.7%	50.0%	16.7%	.0%	16.7%	100.0%
		% within Modular restructuring of tasks	2.9%	4.8%	2.0%	.0%	50.0%	3.5%
		% of total	.6%	1.8%	.6%	.0%	.6%	3.5%
Total		Amount	35	62	50	22	2	171
		% within Area of IT-function	20.5%	36.3%	29.2%	12.9%	1.2%	100.0%
		% within Modular restructuring of tasks	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	20.5%	36.3%	29.2%	12.9%	1.2%	100.0%

			Modularly designed training concepts					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	4	3	7	14	10	38
		% within Area of IT-function	10.5%	7.9%	18.4%	36.8%	26.3%	100.0%
		% within Modularly designed training concepts	33.3%	30.0%	26.9%	15.1%	27.8%	21.5%
		% of total	2.3%	1.7%	4.0%	7.9%	5.6%	21.5%
	Project Management	Amount	0	3	3	12	6	24
		% within Area of IT-function	.0%	12.5%	12.5%	50.0%	25.0%	100.0%
		% within Modularly designed training concepts	.0%	30.0%	11.5%	12.9%	16.7%	13.6%
		% of total	.0%	1.7%	1.7%	6.8%	3.4%	13.6%
	Management	Amount	5	2	8	41	9	65
		% within Area of IT-function	7.7%	3.1%	12.3%	63.1%	13.8%	100.0%
		% within Modularly designed training concepts	41.7%	20.0%	30.8%	44.1%	25.0%	36.7%
		% of total	2.8%	1.1%	4.5%	23.2%	5.1%	36.7%
	User Help Desk	Amount	1	0	0	3	1	5
		% within Area of IT-function	20.0%	.0%	.0%	60.0%	20.0%	100.0%
		% within Modularly designed training concepts	8.3%	.0%	.0%	3.2%	2.8%	2.8%
		% of total	.6%	.0%	.0%	1.7%	.6%	2.8%
	Quality Management	Amount	0	1	0	0	1	2
		% within Area of IT-function	.0%	50.0%	.0%	.0%	50.0%	100.0%
		% within Modularly designed training concepts	.0%	10.0%	.0%	.0%	2.8%	1.1%
		% of total	.0%	.6%	.0%	.0%	.6%	1.1%
	Development	Amount	0	0	1	4	2	7
		% within Area of IT-function	.0%	.0%	14.3%	57.1%	28.6%	100.0%
		% within Modularly designed training concepts	.0%	.0%	3.8%	4.3%	5.6%	4.0%
		% of total	.0%	.0%	.6%	2.3%	1.1%	4.0%
	Operations	Amount	1	0	2	1	1	5
		% within Area of IT-function	20.0%	.0%	40.0%	20.0%	20.0%	100.0%
		% within Modularly designed training concepts	8.3%	.0%	7.7%	1.1%	2.8%	2.8%
		% of total	.6%	.0%	1.1%	.6%	.6%	2.8%
	Test	Amount	1	0	0	0	0	1
		% within Area of IT-function	100.0%	.0%	.0%	.0%	.0%	100.0%
		% within Modularly designed training concepts	8.3%	.0%	.0%	.0%	.0%	.6%
		% of total	.6%	.0%	.0%	.0%	.0%	.6%
	Others	Amount	0	1	5	15	3	24
		% within Area of IT-function	.0%	4.2%	20.8%	62.5%	12.5%	100.0%
		% within Modularly designed training concepts	.0%	10.0%	19.2%	16.1%	8.3%	13.6%
		% of total	.0%	.6%	2.8%	8.5%	1.7%	13.6%
	Consulting	Amount	0	0	0	3	3	6
		% within Area of IT-function	.0%	.0%	.0%	50.0%	50.0%	100.0%
		% within Modularly designed training concepts	.0%	.0%	.0%	3.2%	8.3%	3.4%
		% of total	.0%	.0%	.0%	1.7%	1.7%	3.4%
Total		Amount	12	10	26	93	36	177
		% within Area of IT-function	6.8%	5.6%	14.7%	52.5%	20.3%	100.0%
		% within Modularly designed training concepts	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	6.8%	5.6%	14.7%	52.5%	20.3%	100.0%

			Evolutionary strategy development					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	4	5	12	14	3	38
		% within Area of IT-function	10.5%	13.2%	31.6%	36.8%	7.9%	100.0%
		% within Evolutionary strategy development	57.1%	23.8%	24.5%	18.7%	13.0%	21.7%
		% of total	2.3%	2.9%	6.9%	8.0%	1.7%	21.7%
	Project Management	Amount	0	3	4	10	6	23
		% within Area of IT-function	.0%	13.0%	17.4%	43.5%	26.1%	100.0%
		% within Evolutionary strategy development	.0%	14.3%	8.2%	13.3%	26.1%	13.1%
		% of total	.0%	1.7%	2.3%	5.7%	3.4%	13.1%
	Management	Amount	2	7	21	28	7	65
		% within Area of IT-function	3.1%	10.8%	32.3%	43.1%	10.8%	100.0%
		% within Evolutionary strategy development	28.6%	33.3%	42.9%	37.3%	30.4%	37.1%
		% of total	1.1%	4.0%	12.0%	16.0%	4.0%	37.1%
	User Help Desk	Amount	1	0	1	2	0	4
		% within Area of IT-function	25.0%	.0%	25.0%	50.0%	.0%	100.0%
		% within Evolutionary strategy development	14.3%	.0%	2.0%	2.7%	.0%	2.3%
		% of total	.6%	.0%	.6%	1.1%	.0%	2.3%
	Quality Management	Amount	0	1	0	0	1	2
		% within Area of IT-function	.0%	50.0%	.0%	.0%	50.0%	100.0%
		% within Evolutionary strategy development	.0%	4.8%	.0%	.0%	4.3%	1.1%
		% of total	.0%	.6%	.0%	.0%	.6%	1.1%
	Development	Amount	0	1	2	3	1	7
		% within Area of IT-function	.0%	14.3%	28.6%	42.9%	14.3%	100.0%
		% within Evolutionary strategy development	.0%	4.8%	4.1%	4.0%	4.3%	4.0%
		% of total	.0%	.6%	1.1%	1.7%	.6%	4.0%
	Operations	Amount	0	2	1	2	0	5
		% within Area of IT-function	.0%	40.0%	20.0%	40.0%	.0%	100.0%
		% within Evolutionary strategy development	.0%	9.5%	2.0%	2.7%	.0%	2.9%
		% of total	.0%	1.1%	.6%	1.1%	.0%	2.9%
	Test	Amount	0	0	1	0	0	1
		% within Area of IT-function	.0%	.0%	100.0%	.0%	.0%	100.0%
		% within Evolutionary strategy development	.0%	.0%	2.0%	.0%	.0%	.6%
		% of total	.0%	.0%	.6%	.0%	.0%	.6%
	Others	Amount	0	2	6	12	4	24
		% within Area of IT-function	.0%	8.3%	25.0%	50.0%	16.7%	100.0%
		% within Evolutionary strategy development	.0%	9.5%	12.2%	16.0%	17.4%	13.7%
		% of total	.0%	1.1%	3.4%	6.9%	2.3%	13.7%
	Consulting	Amount	0	0	1	4	1	6
		% within Area of IT-function	.0%	.0%	16.7%	66.7%	16.7%	100.0%
		% within Evolutionary strategy development	.0%	.0%	2.0%	5.3%	4.3%	3.4%
		% of total	.0%	.0%	.6%	2.3%	.6%	3.4%
Total		Amount	7	21	49	75	23	175
		% within Area of IT-function	4.0%	12.0%	28.0%	42.9%	13.1%	100.0%
		% within Evolutionary strategy development	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	4.0%	12.0%	28.0%	42.9%	13.1%	100.0%

			Knowledge increase through experts					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	1	5	10	12	10	38
		% within Area of IT-function	2.6%	13.2%	26.3%	31.6%	26.3%	100.0%
		% within Knowledge increase through experts	8.3%	15.6%	21.7%	21.1%	34.5%	21.6%
		% of total	.6%	2.8%	5.7%	6.8%	5.7%	21.6%
	Project Management	Amount	1	4	10	7	2	24
		% within Area of IT-function	4.2%	16.7%	41.7%	29.2%	8.3%	100.0%
		% within Knowledge increase through experts	8.3%	12.5%	21.7%	12.3%	6.9%	13.6%
		% of total	.6%	2.3%	5.7%	4.0%	1.1%	13.6%
	Management	Amount	6	12	16	25	6	65
		% within Area of IT-function	9.2%	18.5%	24.6%	38.5%	9.2%	100.0%
		% within Knowledge increase through experts	50.0%	37.5%	34.8%	43.9%	20.7%	36.9%
		% of total	3.4%	6.8%	9.1%	14.2%	3.4%	36.9%
	User Help Desk	Amount	0	0	2	2	1	5
		% within Area of IT-function	.0%	.0%	40.0%	40.0%	20.0%	100.0%
		% within Knowledge increase through experts	.0%	.0%	4.3%	3.5%	3.4%	2.8%
		% of total	.0%	.0%	1.1%	1.1%	.6%	2.8%
	Quality Management	Amount	1	1	0	0	0	2
		% within Area of IT-function	50.0%	50.0%	.0%	.0%	.0%	100.0%
		% within Knowledge increase through experts	8.3%	3.1%	.0%	.0%	.0%	1.1%
		% of total	.6%	.6%	.0%	.0%	.0%	1.1%
	Development	Amount	1	2	2	1	1	7
		% within Area of IT-function	14.3%	28.6%	28.6%	14.3%	14.3%	100.0%
		% within Knowledge increase through experts	8.3%	6.3%	4.3%	1.8%	3.4%	4.0%
		% of total	.6%	1.1%	1.1%	.6%	.6%	4.0%
	Operations	Amount	0	3	0	2	0	5
		% within Area of IT-function	.0%	60.0%	.0%	40.0%	.0%	100.0%
		% within Knowledge increase through experts	.0%	9.4%	.0%	3.5%	.0%	2.8%
		% of total	.0%	1.7%	.0%	1.1%	.0%	2.8%
	Test	Amount	0	1	0	0	0	1
		% within Area of IT-function	.0%	100.0%	.0%	.0%	.0%	100.0%
		% within Knowledge increase through experts	.0%	3.1%	.0%	.0%	.0%	.6%
		% of total	.0%	.6%	.0%	.0%	.0%	.6%
	Others	Amount	2	3	5	6	8	24
		% within Area of IT-function	8.3%	12.5%	20.8%	25.0%	33.3%	100.0%
		% within Knowledge increase through experts	16.7%	9.4%	10.9%	10.5%	27.6%	13.6%
		% of total	1.1%	1.7%	2.8%	3.4%	4.5%	13.6%
	Consulting	Amount	0	1	1	2	1	5
		% within Area of IT-function	.0%	20.0%	20.0%	40.0%	20.0%	100.0%
		% within Knowledge increase through experts	.0%	3.1%	2.2%	3.5%	3.4%	2.8%
		% of total	.0%	.6%	.6%	1.1%	.6%	2.8%
Total		Amount	12	32	46	57	29	176
		% within Area of IT-function	6.8%	18.2%	26.1%	32.4%	16.5%	100.0%
		% within Knowledge increase through experts	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	6.8%	18.2%	26.1%	32.4%	16.5%	100.0%

			Job enrichment					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	2	4	11	16	4	37
		% within Area of IT-function	5.4%	10.8%	29.7%	43.2%	10.8%	100.0%
		% within Job enrichment	25.0%	28.6%	19.6%	19.8%	23.5%	21.0%
		% of total	1.1%	2.3%	6.3%	9.1%	2.3%	21.0%
	Project Management	Amount	1	1	8	11	3	24
		% within Area of IT-function	4.2%	4.2%	33.3%	45.8%	12.5%	100.0%
		% within Job enrichment	12.5%	7.1%	14.3%	13.6%	17.6%	13.6%
		% of total	.6%	.6%	4.5%	6.3%	1.7%	13.6%
	Management	Amount	3	4	23	30	5	65
		% within Area of IT-function	4.6%	6.2%	35.4%	46.2%	7.7%	100.0%
		% within Job enrichment	37.5%	28.6%	41.1%	37.0%	29.4%	36.9%
		% of total	1.7%	2.3%	13.1%	17.0%	2.8%	36.9%
	User Help Desk	Amount	1	0	2	2	0	5
		% within Area of IT-function	20.0%	.0%	40.0%	40.0%	.0%	100.0%
		% within Job enrichment	12.5%	.0%	3.6%	2.5%	.0%	2.8%
		% of total	.6%	.0%	1.1%	1.1%	.0%	2.8%
	Quality Management	Amount	0	0	1	0	1	2
		% within Area of IT-function	.0%	.0%	50.0%	.0%	50.0%	100.0%
		% within Job enrichment	.0%	.0%	1.8%	.0%	5.9%	1.1%
		% of total	.0%	.0%	.6%	.0%	.6%	1.1%
	Development	Amount	0	2	0	5	0	7
		% within Area of IT-function	.0%	28.6%	.0%	71.4%	.0%	100.0%
		% within Job enrichment	.0%	14.3%	.0%	6.2%	.0%	4.0%
		% of total	.0%	1.1%	.0%	2.8%	.0%	4.0%
	Operations	Amount	1	1	1	2	0	5
		% within Area of IT-function	20.0%	20.0%	20.0%	40.0%	.0%	100.0%
		% within Job enrichment	12.5%	7.1%	1.8%	2.5%	.0%	2.8%
		% of total	.6%	.6%	.6%	1.1%	.0%	2.8%
	Test	Amount	0	1	0	0	0	1
		% within Area of IT-function	.0%	100.0%	.0%	.0%	.0%	100.0%
		% within Job enrichment	.0%	7.1%	.0%	.0%	.0%	.6%
		% of total	.0%	.6%	.0%	.0%	.0%	.6%
	Others	Amount	0	1	10	10	3	24
		% within Area of IT-function	.0%	4.2%	41.7%	41.7%	12.5%	100.0%
		% within Job enrichment	.0%	7.1%	17.9%	12.3%	17.6%	13.6%
		% of total	.0%	.6%	5.7%	5.7%	1.7%	13.6%
	Consulting	Amount	0	0	0	5	1	6
		% within Area of IT-function	.0%	.0%	.0%	83.3%	16.7%	100.0%
		% within Job enrichment	.0%	.0%	.0%	6.2%	5.9%	3.4%
		% of total	.0%	.0%	.0%	2.8%	.6%	3.4%
Total		Amount	8	14	56	81	17	176
		% within Area of IT-function	4.5%	8.0%	31.8%	46.0%	9.7%	100.0%
		% within Job enrichment	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	4.5%	8.0%	31.8%	46.0%	9.7%	100.0%

			Increased degree of freedom					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	0	5	9	18	6	38
		% within Area of IT-function	.0%	13.2%	23.7%	47.4%	15.8%	100.0%
		% within Increased degree of freedom	.0%	45.5%	25.0%	18.4%	21.4%	21.8%
		% of total	.0%	2.9%	5.2%	10.3%	3.4%	21.8%
	Project Management	Amount	0	0	8	9	5	22
		% within Area of IT-function	.0%	.0%	36.4%	40.9%	22.7%	100.0%
		% within Increased degree of freedom	.0%	.0%	22.2%	9.2%	17.9%	12.6%
		% of total	.0%	.0%	4.6%	5.2%	2.9%	12.6%
	Management	Amount	0	2	11	46	6	65
		% within Area of IT-function	.0%	3.1%	16.9%	70.8%	9.2%	100.0%
		% within Increased degree of freedom	.0%	18.2%	30.6%	46.9%	21.4%	37.4%
		% of total	.0%	1.1%	6.3%	26.4%	3.4%	37.4%
	User Help Desk	Amount	1	1	0	1	2	5
		% within Area of IT-function	20.0%	20.0%	.0%	20.0%	40.0%	100.0%
		% within Increased degree of freedom	100.0%	9.1%	.0%	1.0%	7.1%	2.9%
		% of total	.6%	.6%	.0%	.6%	1.1%	2.9%
	Quality Management	Amount	0	0	0	1	1	2
		% within Area of IT-function	.0%	.0%	.0%	50.0%	50.0%	100.0%
		% within Increased degree of freedom	.0%	.0%	.0%	1.0%	3.6%	1.1%
		% of total	.0%	.0%	.0%	.6%	.6%	1.1%
	Development	Amount	0	0	3	1	2	6
		% within Area of IT-function	.0%	.0%	50.0%	16.7%	33.3%	100.0%
		% within Increased degree of freedom	.0%	.0%	8.3%	1.0%	7.1%	3.4%
		% of total	.0%	.0%	1.7%	.6%	1.1%	3.4%
	Operations	Amount	0	0	3	1	1	5
		% within Area of IT-function	.0%	.0%	60.0%	20.0%	20.0%	100.0%
		% within Increased degree of freedom	.0%	.0%	8.3%	1.0%	3.6%	2.9%
		% of total	.0%	.0%	1.7%	.6%	.6%	2.9%
	Test	Amount	0	0	0	1	0	1
		% within Area of IT-function	.0%	.0%	.0%	100.0%	.0%	100.0%
		% within Increased degree of freedom	.0%	.0%	.0%	1.0%	.0%	.6%
		% of total	.0%	.0%	.0%	.6%	.0%	.6%
	Others	Amount	0	3	2	16	3	24
		% within Area of IT-function	.0%	12.5%	8.3%	66.7%	12.5%	100.0%
		% within Increased degree of freedom	.0%	27.3%	5.6%	16.3%	10.7%	13.8%
		% of total	.0%	1.7%	1.1%	9.2%	1.7%	13.8%
	Consulting	Amount	0	0	0	4	2	6
		% within Area of IT-function	.0%	.0%	.0%	66.7%	33.3%	100.0%
		% within Increased degree of freedom	.0%	.0%	.0%	4.1%	7.1%	3.4%
		% of total	.0%	.0%	.0%	2.3%	1.1%	3.4%
Total		Amount	1	11	36	98	28	174
		% within Area of IT-function	.6%	6.3%	20.7%	56.3%	16.1%	100.0%
		% within Increased degree of freedom	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	.6%	6.3%	20.7%	56.3%	16.1%	100.0%

			Flexible working hours					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	1	1	11	13	12	38
		% within Area of IT-function	2.6%	2.6%	28.9%	34.2%	31.6%	100.0%
		% within Flexible working hours	100.0%	8.3%	30.6%	19.1%	20.3%	21.6%
		% of total	.6%	.6%	6.3%	7.4%	6.8%	21.6%
	Project Management	Amount	0	1	2	10	11	24
		% within Area of IT-function	.0%	4.2%	8.3%	41.7%	45.8%	100.0%
		% within Flexible working hours	.0%	8.3%	5.6%	14.7%	18.6%	13.6%
		% of total	.0%	.6%	1.1%	5.7%	6.3%	13.6%
	Management	Amount	0	5	12	29	19	65
		% within Area of IT-function	.0%	7.7%	18.5%	44.6%	29.2%	100.0%
		% within Flexible working hours	.0%	41.7%	33.3%	42.6%	32.2%	36.9%
		% of total	.0%	2.8%	6.8%	16.5%	10.8%	36.9%
	User Help Desk	Amount	0	0	2	2	1	5
		% within Area of IT-function	.0%	.0%	40.0%	40.0%	20.0%	100.0%
		% within Flexible working hours	.0%	.0%	5.6%	2.9%	1.7%	2.8%
		% of total	.0%	.0%	1.1%	1.1%	.6%	2.8%
	Quality Management	Amount	0	0	0	0	2	2
		% within Area of IT-function	.0%	.0%	.0%	.0%	100.0%	100.0%
		% within Flexible working hours	.0%	.0%	.0%	.0%	3.4%	1.1%
		% of total	.0%	.0%	.0%	.0%	1.1%	1.1%
	Development	Amount	0	1	1	2	3	7
		% within Area of IT-function	.0%	14.3%	14.3%	28.6%	42.9%	100.0%
		% within Flexible working hours	.0%	8.3%	2.8%	2.9%	5.1%	4.0%
		% of total	.0%	.6%	.6%	1.1%	1.7%	4.0%
	Operations	Amount	0	1	0	2	1	4
		% within Area of IT-function	.0%	25.0%	.0%	50.0%	25.0%	100.0%
		% within Flexible working hours	.0%	8.3%	.0%	2.9%	1.7%	2.3%
		% of total	.0%	.6%	.0%	1.1%	.6%	2.3%
	Test	Amount	0	0	0	0	1	1
		% within Area of IT-function	.0%	.0%	.0%	.0%	100.0%	100.0%
		% within Flexible working hours	.0%	.0%	.0%	.0%	1.7%	.6%
		% of total	.0%	.0%	.0%	.0%	.6%	.6%
	Others	Amount	0	3	8	8	5	24
		% within Area of IT-function	.0%	12.5%	33.3%	33.3%	20.8%	100.0%
		% within Flexible working hours	.0%	25.0%	22.2%	11.8%	8.5%	13.6%
		% of total	.0%	1.7%	4.5%	4.5%	2.8%	13.6%
	Consulting	Amount	0	0	0	2	4	6
		% within Area of IT-function	.0%	.0%	.0%	33.3%	66.7%	100.0%
		% within Flexible working hours	.0%	.0%	.0%	2.9%	6.8%	3.4%
		% of total	.0%	.0%	.0%	1.1%	2.3%	3.4%
Total		Amount	1	12	36	68	59	176
		% within Area of IT-function	.6%	6.8%	20.5%	38.6%	33.5%	100.0%
		% within Flexible working hours	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	.6%	6.8%	20.5%	38.6%	33.5%	100.0%

			Parallel Risk & Security supporting IT-systems					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	5	8	10	7	7	37
		% within Area of IT-function	13.5%	21.6%	27.0%	18.9%	18.9%	100.0%
		% within Parallel Risk & Security supporting IT-systems	26.3%	23.5%	22.2%	17.1%	21.2%	21.5%
		% of total	2.9%	4.7%	5.8%	4.1%	4.1%	21.5%
	Project Management	Amount	2	7	6	1	6	22
		% within Area of IT-function	9.1%	31.8%	27.3%	4.5%	27.3%	100.0%
		% within Parallel Risk & Security supporting IT-systems	10.5%	20.6%	13.3%	2.4%	18.2%	12.8%
		% of total	1.2%	4.1%	3.5%	.6%	3.5%	12.8%
	Management	Amount	7	10	15	17	14	63
		% within Area of IT-function	11.1%	15.9%	23.8%	27.0%	22.2%	100.0%
		% within Parallel Risk & Security supporting IT-systems	36.8%	29.4%	33.3%	41.5%	42.4%	36.6%
		% of total	4.1%	5.8%	8.7%	9.9%	8.1%	36.6%
	User Help Desk	Amount	0	0	3	2	0	5
		% within Area of IT-function	.0%	.0%	60.0%	40.0%	.0%	100.0%
		% within Parallel Risk & Security supporting IT-systems	.0%	.0%	6.7%	4.9%	.0%	2.9%
		% of total	.0%	.0%	1.7%	1.2%	.0%	2.9%
	Quality Management	Amount	0	0	0	1	1	2
		% within Area of IT-function	.0%	.0%	.0%	50.0%	50.0%	100.0%
		% within Parallel Risk & Security supporting IT-systems	.0%	.0%	.0%	2.4%	3.0%	1.2%
		% of total	.0%	.0%	.0%	.6%	.6%	1.2%
	Development	Amount	1	2	1	3	0	7
		% within Area of IT-function	14.3%	28.6%	14.3%	42.9%	.0%	100.0%
		% within Parallel Risk & Security supporting IT-systems	5.3%	5.9%	2.2%	7.3%	.0%	4.1%
		% of total	.6%	1.2%	.6%	1.7%	.0%	4.1%
	Operations	Amount	1	0	2	1	1	5
		% within Area of IT-function	20.0%	.0%	40.0%	20.0%	20.0%	100.0%
		% within Parallel Risk & Security supporting IT-systems	5.3%	.0%	4.4%	2.4%	3.0%	2.9%
		% of total	.6%	.0%	1.2%	.6%	.6%	2.9%
	Test	Amount	0	0	1	0	0	1
		% within Area of IT-function	.0%	.0%	100.0%	.0%	.0%	100.0%
		% within Parallel Risk & Security supporting IT-systems	.0%	.0%	2.2%	.0%	.0%	.6%
		% of total	.0%	.0%	.6%	.0%	.0%	.6%
	Others	Amount	3	7	4	7	3	24
		% within Area of IT-function	12.5%	29.2%	16.7%	29.2%	12.5%	100.0%
		% within Parallel Risk & Security supporting IT-systems	15.8%	20.6%	8.9%	17.1%	9.1%	14.0%
		% of total	1.7%	4.1%	2.3%	4.1%	1.7%	14.0%
	Consulting	Amount	0	0	3	2	1	6
		% within Area of IT-function	.0%	.0%	50.0%	33.3%	16.7%	100.0%
		% within Parallel Risk & Security supporting IT-systems	.0%	.0%	6.7%	4.9%	3.0%	3.5%
		% of total	.0%	.0%	1.7%	1.2%	.6%	3.5%
Total		Amount	19	34	45	41	33	172
		% within Area of IT-function	11.0%	19.8%	26.2%	23.8%	19.2%	100.0%
		% within Parallel Risk & Security supporting IT-systems	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	11.0%	19.8%	26.2%	23.8%	19.2%	100.0%

			Multiple holders for specific roles					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	4	4	10	17	1	36
		% within Area of IT-function	11.1%	11.1%	27.8%	47.2%	2.8%	100.0%
		% within Multiple holders for specific roles	28.6%	15.4%	18.5%	24.6%	14.3%	21.2%
		% of total	2.4%	2.4%	5.9%	10.0%	.6%	21.2%
	Project Management	Amount	2	5	5	9	2	23
		% within Area of IT-function	8.7%	21.7%	21.7%	39.1%	8.7%	100.0%
		% within Multiple holders for specific roles	14.3%	19.2%	9.3%	13.0%	28.6%	13.5%
		% of total	1.2%	2.9%	2.9%	5.3%	1.2%	13.5%
	Management	Amount	4	10	21	27	3	65
		% within Area of IT-function	6.2%	15.4%	32.3%	41.5%	4.6%	100.0%
		% within Multiple holders for specific roles	28.6%	38.5%	38.9%	39.1%	42.9%	38.2%
		% of total	2.4%	5.9%	12.4%	15.9%	1.8%	38.2%
	User Help Desk	Amount	1	0	2	2	0	5
		% within Area of IT-function	20.0%	.0%	40.0%	40.0%	.0%	100.0%
		% within Multiple holders for specific roles	7.1%	.0%	3.7%	2.9%	.0%	2.9%
		% of total	.6%	.0%	1.2%	1.2%	.0%	2.9%
	Quality Management	Amount	0	0	1	1	0	2
		% within Area of IT-function	.0%	.0%	50.0%	50.0%	.0%	100.0%
		% within Multiple holders for specific roles	.0%	.0%	1.9%	1.4%	.0%	1.2%
		% of total	.0%	.0%	.6%	.6%	.0%	1.2%
	Development	Amount	0	2	3	1	1	7
		% within Area of IT-function	.0%	28.6%	42.9%	14.3%	14.3%	100.0%
		% within Multiple holders for specific roles	.0%	7.7%	5.6%	1.4%	14.3%	4.1%
		% of total	.0%	1.2%	1.8%	.6%	.6%	4.1%
	Operations	Amount	1	1	1	2	0	5
		% within Area of IT-function	20.0%	20.0%	20.0%	40.0%	.0%	100.0%
		% within Multiple holders for specific roles	7.1%	3.8%	1.9%	2.9%	.0%	2.9%
		% of total	.6%	.6%	.6%	1.2%	.0%	2.9%
	Test	Amount	0	0	0	1	0	1
		% within Area of IT-function	.0%	.0%	.0%	100.0%	.0%	100.0%
		% within Multiple holders for specific roles	.0%	.0%	.0%	1.4%	.0%	.6%
		% of total	.0%	.0%	.0%	.6%	.0%	.6%
	Others	Amount	1	3	10	7	0	21
		% within Area of IT-function	4.8%	14.3%	47.6%	33.3%	.0%	100.0%
		% within Multiple holders for specific roles	7.1%	11.5%	18.5%	10.1%	.0%	12.4%
		% of total	.6%	1.8%	5.9%	4.1%	.0%	12.4%
	Consulting	Amount	1	1	1	2	0	5
		% within Area of IT-function	20.0%	20.0%	20.0%	40.0%	.0%	100.0%
		% within Multiple holders for specific roles	7.1%	3.8%	1.9%	2.9%	.0%	2.9%
		% of total	.6%	.6%	.6%	1.2%	.0%	2.9%
Total		Amount	14	26	54	69	7	170
		% within Area of IT-function	8.2%	15.3%	31.8%	40.6%	4.1%	100.0%
		% within Multiple holders for specific roles	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	8.2%	15.3%	31.8%	40.6%	4.1%	100.0%

			Modular structured Risk & Security frameworks					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	0	0	12	11	2	25
		% within Area of IT-function	.0%	.0%	48.0%	44.0%	8.0%	100.0%
		% within Modular structured Risk & Security frameworks	.0%	.0%	21.1%	27.5%	22.2%	18.5%
		% of total	.0%	.0%	8.9%	8.1%	1.5%	18.5%
	Project Management	Amount	1	2	7	5	2	17
		% within Area of IT-function	5.9%	11.8%	41.2%	29.4%	11.8%	100.0%
		% within Modular structured Risk & Security frameworks	16.7%	8.7%	12.3%	12.5%	22.2%	12.6%
		% of total	.7%	1.5%	5.2%	3.7%	1.5%	12.6%
	Management	Amount	3	13	19	15	2	52
		% within Area of IT-function	5.8%	25.0%	36.5%	28.8%	3.8%	100.0%
		% within Modular structured Risk & Security frameworks	50.0%	56.5%	33.3%	37.5%	22.2%	38.5%
		% of total	2.2%	9.6%	14.1%	11.1%	1.5%	38.5%
	User Help Desk	Amount	1	0	2	0	0	3
		% within Area of IT-function	33.3%	.0%	66.7%	.0%	.0%	100.0%
		% within Modular structured Risk & Security frameworks	16.7%	.0%	3.5%	.0%	.0%	2.2%
		% of total	.7%	.0%	1.5%	.0%	.0%	2.2%
	Quality Management	Amount	0	0	1	0	0	1
		% within Area of IT-function	.0%	.0%	100.0%	.0%	.0%	100.0%
		% within Modular structured Risk & Security frameworks	.0%	.0%	1.8%	.0%	.0%	.7%
		% of total	.0%	.0%	.7%	.0%	.0%	.7%
	Development	Amount	0	1	3	1	1	6
		% within Area of IT-function	.0%	16.7%	50.0%	16.7%	16.7%	100.0%
		% within Modular structured Risk & Security frameworks	.0%	4.3%	5.3%	2.5%	11.1%	4.4%
		% of total	.0%	.7%	2.2%	.7%	.7%	4.4%
	Operations	Amount	0	1	2	1	0	4
		% within Area of IT-function	.0%	25.0%	50.0%	25.0%	.0%	100.0%
		% within Modular structured Risk & Security frameworks	.0%	4.3%	3.5%	2.5%	.0%	3.0%
		% of total	.0%	.7%	1.5%	.7%	.0%	3.0%
	Test	Amount	0	0	1	0	0	1
		% within Area of IT-function	.0%	.0%	100.0%	.0%	.0%	100.0%
		% within Modular structured Risk & Security frameworks	.0%	.0%	1.8%	.0%	.0%	.7%
		% of total	.0%	.0%	.7%	.0%	.0%	.7%
	Others	Amount	1	5	8	5	1	20
		% within Area of IT-function	5.0%	25.0%	40.0%	25.0%	5.0%	100.0%
		% within Modular structured Risk & Security frameworks	16.7%	21.7%	14.0%	12.5%	11.1%	14.8%
		% of total	.7%	3.7%	5.9%	3.7%	.7%	14.8%
	Consulting	Amount	0	1	2	2	1	6
		% within Area of IT-function	.0%	16.7%	33.3%	33.3%	16.7%	100.0%
		% within Modular structured Risk & Security frameworks	.0%	4.3%	3.5%	5.0%	11.1%	4.4%
		% of total	.0%	.7%	1.5%	1.5%	.7%	4.4%
Total		Amount	6	23	57	40	9	135
		% within Area of IT-function	4.4%	17.0%	42.2%	29.6%	6.7%	100.0%
		% within Modular structured Risk & Security frameworks	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	4.4%	17.0%	42.2%	29.6%	6.7%	100.0%

			Increase employees' awareness					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	0	2	13	16	3	34
		% within Area of IT-function	.0%	5.9%	38.2%	47.1%	8.8%	100.0%
		% within Increase employees' awareness	.0%	8.7%	24.1%	21.3%	21.4%	20.2%
		% of total	.0%	1.2%	7.7%	9.5%	1.8%	20.2%
	Project Management	Amount	0	6	4	9	3	22
		% within Area of IT-function	.0%	27.3%	18.2%	40.9%	13.6%	100.0%
		% within Increase employees' awareness	.0%	26.1%	7.4%	12.0%	21.4%	13.1%
		% of total	.0%	3.6%	2.4%	5.4%	1.8%	13.1%
	Management	Amount	1	6	22	31	4	64
		% within Area of IT-function	1.6%	9.4%	34.4%	48.4%	6.3%	100.0%
		% within Increase employees' awareness	50.0%	26.1%	40.7%	41.3%	28.6%	38.1%
		% of total	.6%	3.6%	13.1%	18.5%	2.4%	38.1%
	User Help Desk	Amount	1	0	1	2	0	4
		% within Area of IT-function	25.0%	.0%	25.0%	50.0%	.0%	100.0%
		% within Increase employees' awareness	50.0%	.0%	1.9%	2.7%	.0%	2.4%
		% of total	.6%	.0%	.6%	1.2%	.0%	2.4%
	Quality Management	Amount	0	0	1	0	1	2
		% within Area of IT-function	.0%	.0%	50.0%	.0%	50.0%	100.0%
		% within Increase employees' awareness	.0%	.0%	1.9%	.0%	7.1%	1.2%
		% of total	.0%	.0%	.6%	.0%	.6%	1.2%
	Development	Amount	0	1	3	3	0	7
		% within Area of IT-function	.0%	14.3%	42.9%	42.9%	.0%	100.0%
		% within Increase employees' awareness	.0%	4.3%	5.6%	4.0%	.0%	4.2%
		% of total	.0%	.6%	1.8%	1.8%	.0%	4.2%
	Operations	Amount	0	4	0	0	0	4
		% within Area of IT-function	.0%	100.0%	.0%	.0%	.0%	100.0%
		% within Increase employees' awareness	.0%	17.4%	.0%	.0%	.0%	2.4%
		% of total	.0%	2.4%	.0%	.0%	.0%	2.4%
	Test	Amount	0	1	0	0	0	1
		% within Area of IT-function	.0%	100.0%	.0%	.0%	.0%	100.0%
		% within Increase employees' awareness	.0%	4.3%	.0%	.0%	.0%	.6%
		% of total	.0%	.6%	.0%	.0%	.0%	.6%
	Others	Amount	0	2	9	11	2	24
		% within Area of IT-function	.0%	8.3%	37.5%	45.8%	8.3%	100.0%
		% within Increase employees' awareness	.0%	8.7%	16.7%	14.7%	14.3%	14.3%
		% of total	.0%	1.2%	5.4%	6.5%	1.2%	14.3%
	Consulting	Amount	0	1	1	3	1	6
		% within Area of IT-function	.0%	16.7%	16.7%	50.0%	16.7%	100.0%
		% within Increase employees' awareness	.0%	4.3%	1.9%	4.0%	7.1%	3.6%
		% of total	.0%	.6%	.6%	1.8%	.6%	3.6%
Total		Amount	2	23	54	75	14	168
		% within Area of IT-function	1.2%	13.7%	32.1%	44.6%	8.3%	100.0%
		% within Increase employees' awareness	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	1.2%	13.7%	32.1%	44.6%	8.3%	100.0%

			Integration of a incentive system					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	4	9	7	12	4	36
		% within Area of IT-function	11.1%	25.0%	19.4%	33.3%	11.1%	100.0%
		% within Integration of a incentive system	20.0%	27.3%	13.5%	23.5%	40.0%	21.7%
		% of total	2.4%	5.4%	4.2%	7.2%	2.4%	21.7%
	Project Management	Amount	2	4	6	10	1	23
		% within Area of IT-function	8.7%	17.4%	26.1%	43.5%	4.3%	100.0%
		% within Integration of a incentive system	10.0%	12.1%	11.5%	19.6%	10.0%	13.9%
		% of total	1.2%	2.4%	3.6%	6.0%	.6%	13.9%
	Management	Amount	6	15	23	15	2	61
		% within Area of IT-function	9.8%	24.6%	37.7%	24.6%	3.3%	100.0%
		% within Integration of a incentive system	30.0%	45.5%	44.2%	29.4%	20.0%	36.7%
		% of total	3.6%	9.0%	13.9%	9.0%	1.2%	36.7%
	User Help Desk	Amount	1	0	1	2	0	4
		% within Area of IT-function	25.0%	.0%	25.0%	50.0%	.0%	100.0%
		% within Integration of a incentive system	5.0%	.0%	1.9%	3.9%	.0%	2.4%
		% of total	.6%	.0%	.6%	1.2%	.0%	2.4%
	Quality Management	Amount	0	1	0	0	1	2
		% within Area of IT-function	.0%	50.0%	.0%	.0%	50.0%	100.0%
		% within Integration of a incentive system	.0%	3.0%	.0%	.0%	10.0%	1.2%
		% of total	.0%	.6%	.0%	.0%	.6%	1.2%
	Development	Amount	0	1	2	2	1	6
		% within Area of IT-function	.0%	16.7%	33.3%	33.3%	16.7%	100.0%
		% within Integration of a incentive system	.0%	3.0%	3.8%	3.9%	10.0%	3.6%
		% of total	.0%	.6%	1.2%	1.2%	.6%	3.6%
	Operations	Amount	2	0	3	0	0	5
		% within Area of IT-function	40.0%	.0%	60.0%	.0%	.0%	100.0%
		% within Integration of a incentive system	10.0%	.0%	5.8%	.0%	.0%	3.0%
		% of total	1.2%	.0%	1.8%	.0%	.0%	3.0%
	Test	Amount	1	0	0	0	0	1
		% within Area of IT-function	100.0%	.0%	.0%	.0%	.0%	100.0%
		% within Integration of a incentive system	5.0%	.0%	.0%	.0%	.0%	.6%
		% of total	.6%	.0%	.0%	.0%	.0%	.6%
	Others	Amount	4	3	8	8	0	23
		% within Area of IT-function	17.4%	13.0%	34.8%	34.8%	.0%	100.0%
		% within Integration of a incentive system	20.0%	9.1%	15.4%	15.7%	.0%	13.9%
		% of total	2.4%	1.8%	4.8%	4.8%	.0%	13.9%
	Consulting	Amount	0	0	2	2	1	5
		% within Area of IT-function	.0%	.0%	40.0%	40.0%	20.0%	100.0%
		% within Integration of a incentive system	.0%	.0%	3.8%	3.9%	10.0%	3.0%
		% of total	.0%	.0%	1.2%	1.2%	.6%	3.0%
Total		Amount	20	33	52	51	10	166
		% within Area of IT-function	12.0%	19.9%	31.3%	30.7%	6.0%	100.0%
		% within Integration of a incentive system	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	12.0%	19.9%	31.3%	30.7%	6.0%	100.0%

			Redundant stored data					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	6	12	6	6	7	37
		% within Area of IT-function	16.2%	32.4%	16.2%	16.2%	18.9%	100.0%
		% within Redundant stored data	19.4%	30.0%	21.4%	12.0%	31.8%	21.6%
		% of total	3.5%	7.0%	3.5%	3.5%	4.1%	21.6%
	Project Management	Amount	4	7	2	5	4	22
		% within Area of IT-function	18.2%	31.8%	9.1%	22.7%	18.2%	100.0%
		% within Redundant stored data	12.9%	17.5%	7.1%	10.0%	18.2%	12.9%
		% of total	2.3%	4.1%	1.2%	2.9%	2.3%	12.9%
	Management	Amount	12	14	11	20	6	63
		% within Area of IT-function	19.0%	22.2%	17.5%	31.7%	9.5%	100.0%
		% within Redundant stored data	38.7%	35.0%	39.3%	40.0%	27.3%	36.8%
		% of total	7.0%	8.2%	6.4%	11.7%	3.5%	36.8%
	User Help Desk	Amount	1	0	2	2	0	5
		% within Area of IT-function	20.0%	.0%	40.0%	40.0%	.0%	100.0%
		% within Redundant stored data	3.2%	.0%	7.1%	4.0%	.0%	2.9%
		% of total	.6%	.0%	1.2%	1.2%	.0%	2.9%
	Quality Management	Amount	0	0	0	0	2	2
		% within Area of IT-function	.0%	.0%	.0%	.0%	100.0%	100.0%
		% within Redundant stored data	.0%	.0%	.0%	.0%	9.1%	1.2%
		% of total	.0%	.0%	.0%	.0%	1.2%	1.2%
	Development	Amount	1	0	3	3	0	7
		% within Area of IT-function	14.3%	.0%	42.9%	42.9%	.0%	100.0%
		% within Redundant stored data	3.2%	.0%	10.7%	6.0%	.0%	4.1%
		% of total	.6%	.0%	1.8%	1.8%	.0%	4.1%
	Operations	Amount	1	1	0	2	0	4
		% within Area of IT-function	25.0%	25.0%	.0%	50.0%	.0%	100.0%
		% within Redundant stored data	3.2%	2.5%	.0%	4.0%	.0%	2.3%
		% of total	.6%	.6%	.0%	1.2%	.0%	2.3%
	Test	Amount	0	0	0	0	1	1
		% within Area of IT-function	.0%	.0%	.0%	.0%	100.0%	100.0%
		% within Redundant stored data	.0%	.0%	.0%	.0%	4.5%	.6%
		% of total	.0%	.0%	.0%	.0%	.6%	.6%
	Others	Amount	4	6	4	8	2	24
		% within Area of IT-function	16.7%	25.0%	16.7%	33.3%	8.3%	100.0%
		% within Redundant stored data	12.9%	15.0%	14.3%	16.0%	9.1%	14.0%
		% of total	2.3%	3.5%	2.3%	4.7%	1.2%	14.0%
	Consulting	Amount	2	0	0	4	0	6
		% within Area of IT-function	33.3%	.0%	.0%	66.7%	.0%	100.0%
		% within Redundant stored data	6.5%	.0%	.0%	8.0%	.0%	3.5%
		% of total	1.2%	.0%	.0%	2.3%	.0%	3.5%
Total		Amount	31	40	28	50	22	171
		% within Area of IT-function	18.1%	23.4%	16.4%	29.2%	12.9%	100.0%
		% within Redundant stored data	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	18.1%	23.4%	16.4%	29.2%	12.9%	100.0%

			Modular architecture of IT systems					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	1	1	3	23	8	36
		% within Area of IT-function	2.8%	2.8%	8.3%	63.9%	22.2%	100.0%
		% within Modular architecture of IT systems	100.0%	11.1%	12.0%	24.2%	19.0%	20.9%
		% of total	.6%	.6%	1.7%	13.4%	4.7%	20.9%
	Project Management	Amount	0	1	6	7	8	22
		% within Area of IT-function	.0%	4.5%	27.3%	31.8%	36.4%	100.0%
		% within Modular architecture of IT systems	.0%	11.1%	24.0%	7.4%	19.0%	12.8%
		% of total	.0%	.6%	3.5%	4.1%	4.7%	12.8%
	Management	Amount	0	3	6	35	20	64
		% within Area of IT-function	.0%	4.7%	9.4%	54.7%	31.3%	100.0%
		% within Modular architecture of IT systems	.0%	33.3%	24.0%	36.8%	47.6%	37.2%
		% of total	.0%	1.7%	3.5%	20.3%	11.6%	37.2%
	User Help Desk	Amount	0	1	1	3	0	5
		% within Area of IT-function	.0%	20.0%	20.0%	60.0%	.0%	100.0%
		% within Modular architecture of IT systems	.0%	11.1%	4.0%	3.2%	.0%	2.9%
		% of total	.0%	.6%	.6%	1.7%	.0%	2.9%
	Quality Management	Amount	0	0	0	2	0	2
		% within Area of IT-function	.0%	.0%	.0%	100.0%	.0%	100.0%
		% within Modular architecture of IT systems	.0%	.0%	.0%	2.1%	.0%	1.2%
		% of total	.0%	.0%	.0%	1.2%	.0%	1.2%
	Development	Amount	0	2	1	2	2	7
		% within Area of IT-function	.0%	28.6%	14.3%	28.6%	28.6%	100.0%
		% within Modular architecture of IT systems	.0%	22.2%	4.0%	2.1%	4.8%	4.1%
		% of total	.0%	1.2%	.6%	1.2%	1.2%	4.1%
	Operations	Amount	0	0	3	2	0	5
		% within Area of IT-function	.0%	.0%	60.0%	40.0%	.0%	100.0%
		% within Modular architecture of IT systems	.0%	.0%	12.0%	2.1%	.0%	2.9%
		% of total	.0%	.0%	1.7%	1.2%	.0%	2.9%
	Test	Amount	0	0	0	1	0	1
		% within Area of IT-function	.0%	.0%	.0%	100.0%	.0%	100.0%
		% within Modular architecture of IT systems	.0%	.0%	.0%	1.1%	.0%	.6%
		% of total	.0%	.0%	.0%	.6%	.0%	.6%
	Others	Amount	0	1	5	15	3	24
		% within Area of IT-function	.0%	4.2%	20.8%	62.5%	12.5%	100.0%
		% within Modular architecture of IT systems	.0%	11.1%	20.0%	15.8%	7.1%	14.0%
		% of total	.0%	.6%	2.9%	8.7%	1.7%	14.0%
	Consulting	Amount	0	0	0	5	1	6
		% within Area of IT-function	.0%	.0%	.0%	83.3%	16.7%	100.0%
		% within Modular architecture of IT systems	.0%	.0%	.0%	5.3%	2.4%	3.5%
		% of total	.0%	.0%	.0%	2.9%	.6%	3.5%
Total		Amount	1	9	25	95	42	172
		% within Area of IT-function	.6%	5.2%	14.5%	55.2%	24.4%	100.0%
		% within Modular architecture of IT systems	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	.6%	5.2%	14.5%	55.2%	24.4%	100.0%

			Identifying and assessing technological trends					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	0	4	14	17	2	37
		% within Area of IT-function	.0%	10.8%	37.8%	45.9%	5.4%	100.0%
		% within Identifying and assessing technological trends	.0%	25.0%	22.6%	22.7%	10.0%	21.1%
		% of total	.0%	2.3%	8.0%	9.7%	1.1%	21.1%
	Project Management	Amount	0	2	6	12	4	24
		% within Area of IT-function	.0%	8.3%	25.0%	50.0%	16.7%	100.0%
		% within Identifying and assessing technological trends	.0%	12.5%	9.7%	16.0%	20.0%	13.7%
		% of total	.0%	1.1%	3.4%	6.9%	2.3%	13.7%
	Management	Amount	1	4	28	26	5	64
		% within Area of IT-function	1.6%	6.3%	43.8%	40.6%	7.8%	100.0%
		% within Identifying and assessing technological trends	50.0%	25.0%	45.2%	34.7%	25.0%	36.6%
		% of total	.6%	2.3%	16.0%	14.9%	2.9%	36.6%
	User Help Desk	Amount	1	1	2	0	1	5
		% within Area of IT-function	20.0%	20.0%	40.0%	.0%	20.0%	100.0%
		% within Identifying and assessing technological trends	50.0%	6.3%	3.2%	.0%	5.0%	2.9%
		% of total	.6%	.6%	1.1%	.0%	.6%	2.9%
	Quality Management	Amount	0	0	1	0	1	2
		% within Area of IT-function	.0%	.0%	50.0%	.0%	50.0%	100.0%
		% within Identifying and assessing technological trends	.0%	.0%	1.6%	.0%	5.0%	1.1%
		% of total	.0%	.0%	.6%	.0%	.6%	1.1%
	Development	Amount	0	1	1	3	2	7
		% within Area of IT-function	.0%	14.3%	14.3%	42.9%	28.6%	100.0%
		% within Identifying and assessing technological trends	.0%	6.3%	1.6%	4.0%	10.0%	4.0%
		% of total	.0%	.6%	.6%	1.7%	1.1%	4.0%
	Operations	Amount	0	1	2	2	0	5
		% within Area of IT-function	.0%	20.0%	40.0%	40.0%	.0%	100.0%
		% within Identifying and assessing technological trends	.0%	6.3%	3.2%	2.7%	.0%	2.9%
		% of total	.0%	.6%	1.1%	1.1%	.0%	2.9%
	Test	Amount	0	0	1	0	0	1
		% within Area of IT-function	.0%	.0%	100.0%	.0%	.0%	100.0%
		% within Identifying and assessing technological trends	.0%	.0%	1.6%	.0%	.0%	.6%
		% of total	.0%	.0%	.6%	.0%	.0%	.6%
	Others	Amount	0	3	6	12	3	24
		% within Area of IT-function	.0%	12.5%	25.0%	50.0%	12.5%	100.0%
		% within Identifying and assessing technological trends	.0%	18.8%	9.7%	16.0%	15.0%	13.7%
		% of total	.0%	1.7%	3.4%	6.9%	1.7%	13.7%
	Consulting	Amount	0	0	1	3	2	6
		% within Area of IT-function	.0%	.0%	16.7%	50.0%	33.3%	100.0%
		% within Identifying and assessing technological trends	.0%	.0%	1.6%	4.0%	10.0%	3.4%
		% of total	.0%	.0%	.6%	1.7%	1.1%	3.4%
Total		Amount	2	16	62	75	20	175
		% within Area of IT-function	1.1%	9.1%	35.4%	42.9%	11.4%	100.0%
		% within Identifying and assessing technological trends	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	1.1%	9.1%	35.4%	42.9%	11.4%	100.0%

			High degree of standardization					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	0	4	2	15	16	37
		% within Area of IT-function	.0%	10.8%	5.4%	40.5%	43.2%	100.0%
		% within High degree of standardization	.0%	57.1%	6.9%	22.7%	23.5%	21.5%
		% of total	.0%	2.3%	1.2%	8.7%	9.3%	21.5%
	Project Management	Amount	0	1	3	13	6	23
		% within Area of IT-function	.0%	4.3%	13.0%	56.5%	26.1%	100.0%
		% within High degree of standardization	.0%	14.3%	10.3%	19.7%	8.8%	13.4%
		% of total	.0%	.6%	1.7%	7.6%	3.5%	13.4%
	Management	Amount	1	0	11	20	30	62
		% within Area of IT-function	1.6%	.0%	17.7%	32.3%	48.4%	100.0%
		% within High degree of standardization	50.0%	.0%	37.9%	30.3%	44.1%	36.0%
		% of total	.6%	.0%	6.4%	11.6%	17.4%	36.0%
	User Help Desk	Amount	1	1	0	1	2	5
		% within Area of IT-function	20.0%	20.0%	.0%	20.0%	40.0%	100.0%
		% within High degree of standardization	50.0%	14.3%	.0%	1.5%	2.9%	2.9%
		% of total	.6%	.6%	.0%	.6%	1.2%	2.9%
	Quality Management	Amount	0	0	1	1	0	2
		% within Area of IT-function	.0%	.0%	50.0%	50.0%	.0%	100.0%
		% within High degree of standardization	.0%	.0%	3.4%	1.5%	.0%	1.2%
		% of total	.0%	.0%	.6%	.6%	.0%	1.2%
	Development	Amount	0	0	4	3	0	7
		% within Area of IT-function	.0%	.0%	57.1%	42.9%	.0%	100.0%
		% within High degree of standardization	.0%	.0%	13.8%	4.5%	.0%	4.1%
		% of total	.0%	.0%	2.3%	1.7%	.0%	4.1%
	Operations	Amount	0	0	1	2	2	5
		% within Area of IT-function	.0%	.0%	20.0%	40.0%	40.0%	100.0%
		% within High degree of standardization	.0%	.0%	3.4%	3.0%	2.9%	2.9%
		% of total	.0%	.0%	.6%	1.2%	1.2%	2.9%
	Test	Amount	0	0	0	0	1	1
		% within Area of IT-function	.0%	.0%	.0%	.0%	100.0%	100.0%
		% within High degree of standardization	.0%	.0%	.0%	.0%	1.5%	.6%
		% of total	.0%	.0%	.0%	.0%	.6%	.6%
	Others	Amount	0	1	6	10	7	24
		% within Area of IT-function	.0%	4.2%	25.0%	41.7%	29.2%	100.0%
		% within High degree of standardization	.0%	14.3%	20.7%	15.2%	10.3%	14.0%
		% of total	.0%	.6%	3.5%	5.8%	4.1%	14.0%
	Consulting	Amount	0	0	1	1	4	6
		% within Area of IT-function	.0%	.0%	16.7%	16.7%	66.7%	100.0%
		% within High degree of standardization	.0%	.0%	3.4%	1.5%	5.9%	3.5%
		% of total	.0%	.0%	.6%	.6%	2.3%	3.5%
Total		Amount	2	7	29	66	68	172
		% within Area of IT-function	1.2%	4.1%	16.9%	38.4%	39.5%	100.0%
		% within High degree of standardization	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	1.2%	4.1%	16.9%	38.4%	39.5%	100.0%

			Usage of open source as development plattform					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	2	6	17	8	3	36
		% within Area of IT-function	5.6%	16.7%	47.2%	22.2%	8.3%	100.0%
		% within Usage of open source as development plattform	7.4%	11.3%	36.2%	25.8%	30.0%	21.4%
		% of total	1.2%	3.6%	10.1%	4.8%	1.8%	21.4%
	Project Management	Amount	7	8	4	2	1	22
		% within Area of IT-function	31.8%	36.4%	18.2%	9.1%	4.5%	100.0%
		% within Usage of open source as development plattform	25.9%	15.1%	8.5%	6.5%	10.0%	13.1%
		% of total	4.2%	4.8%	2.4%	1.2%	.6%	13.1%
	Management	Amount	13	24	10	11	4	62
		% within Area of IT-function	21.0%	38.7%	16.1%	17.7%	6.5%	100.0%
		% within Usage of open source as development plattform	48.1%	45.3%	21.3%	35.5%	40.0%	36.9%
		% of total	7.7%	14.3%	6.0%	6.5%	2.4%	36.9%
	User Help Desk	Amount	1	1	1	1	0	4
		% within Area of IT-function	25.0%	25.0%	25.0%	25.0%	.0%	100.0%
		% within Usage of open source as development plattform	3.7%	1.9%	2.1%	3.2%	.0%	2.4%
		% of total	.6%	.6%	.6%	.6%	.0%	2.4%
	Quality Management	Amount	0	0	0	1	0	1
		% within Area of IT-function	.0%	.0%	.0%	100.0%	.0%	100.0%
		% within Usage of open source as development plattform	.0%	.0%	.0%	3.2%	.0%	.6%
		% of total	.0%	.0%	.0%	.6%	.0%	.6%
	Development	Amount	0	1	4	2	0	7
		% within Area of IT-function	.0%	14.3%	57.1%	28.6%	.0%	100.0%
		% within Usage of open source as development plattform	.0%	1.9%	8.5%	6.5%	.0%	4.2%
		% of total	.0%	.6%	2.4%	1.2%	.0%	4.2%
	Operations	Amount	0	3	1	1	0	5
		% within Area of IT-function	.0%	60.0%	20.0%	20.0%	.0%	100.0%
		% within Usage of open source as development plattform	.0%	5.7%	2.1%	3.2%	.0%	3.0%
		% of total	.0%	1.8%	.6%	.6%	.0%	3.0%
	Test	Amount	0	0	0	0	1	1
		% within Area of IT-function	.0%	.0%	.0%	.0%	100.0%	100.0%
		% within Usage of open source as development plattform	.0%	.0%	.0%	.0%	10.0%	.6%
		% of total	.0%	.0%	.0%	.0%	.6%	.6%
	Others	Amount	4	7	9	4	0	24
		% within Area of IT-function	16.7%	29.2%	37.5%	16.7%	.0%	100.0%
		% within Usage of open source as development plattform	14.8%	13.2%	19.1%	12.9%	.0%	14.3%
		% of total	2.4%	4.2%	5.4%	2.4%	.0%	14.3%
	Consulting	Amount	0	3	1	1	1	6
		% within Area of IT-function	.0%	50.0%	16.7%	16.7%	16.7%	100.0%
		% within Usage of open source as development plattform	.0%	5.7%	2.1%	3.2%	10.0%	3.6%
		% of total	.0%	1.8%	.6%	.6%	.6%	3.6%
Total		Amount	27	53	47	31	10	168
		% within Area of IT-function	16.1%	31.5%	28.0%	18.5%	6.0%	100.0%
		% within Usage of open source as development plattform	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	16.1%	31.5%	28.0%	18.5%	6.0%	100.0%

			Similar processes with equal process objective					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	6	12	7	5	2	32
		% within Area of IT-function	18.8%	37.5%	21.9%	15.6%	6.3%	100.0%
		% within Similar processes with equal process objective	20.7%	18.2%	18.9%	20.8%	100.0%	20.3%
		% of total	3.8%	7.6%	4.4%	3.2%	1.3%	20.3%
	Project Management	Amount	4	5	7	4	0	20
		% within Area of IT-function	20.0%	25.0%	35.0%	20.0%	.0%	100.0%
		% within Similar processes with equal process objective	13.8%	7.6%	18.9%	16.7%	.0%	12.7%
		% of total	2.5%	3.2%	4.4%	2.5%	.0%	12.7%
	Management	Amount	11	27	17	6	0	61
		% within Area of IT-function	18.0%	44.3%	27.9%	9.8%	.0%	100.0%
		% within Similar processes with equal process objective	37.9%	40.9%	45.9%	25.0%	.0%	38.6%
		% of total	7.0%	17.1%	10.8%	3.8%	.0%	38.6%
	User Help Desk	Amount	1	3	0	1	0	5
		% within Area of IT-function	20.0%	60.0%	.0%	20.0%	.0%	100.0%
		% within Similar processes with equal process objective	3.4%	4.5%	.0%	4.2%	.0%	3.2%
		% of total	.6%	1.9%	.0%	.6%	.0%	3.2%
	Quality Management	Amount	0	1	0	0	0	1
		% within Area of IT-function	.0%	100.0%	.0%	.0%	.0%	100.0%
		% within Similar processes with equal process objective	.0%	1.5%	.0%	.0%	.0%	.6%
		% of total	.0%	.6%	.0%	.0%	.0%	.6%
	Development	Amount	0	2	1	3	0	6
		% within Area of IT-function	.0%	33.3%	16.7%	50.0%	.0%	100.0%
		% within Similar processes with equal process objective	.0%	3.0%	2.7%	12.5%	.0%	3.8%
		% of total	.0%	1.3%	.6%	1.9%	.0%	3.8%
	Operations	Amount	1	3	0	0	0	4
		% within Area of IT-function	25.0%	75.0%	.0%	.0%	.0%	100.0%
		% within Similar processes with equal process objective	3.4%	4.5%	.0%	.0%	.0%	2.5%
		% of total	.6%	1.9%	.0%	.0%	.0%	2.5%
	Test	Amount	0	0	1	0	0	1
		% within Area of IT-function	.0%	.0%	100.0%	.0%	.0%	100.0%
		% within Similar processes with equal process objective	.0%	.0%	2.7%	.0%	.0%	.6%
		% of total	.0%	.0%	.6%	.0%	.0%	.6%
	Others	Amount	3	11	4	4	0	22
		% within Area of IT-function	13.6%	50.0%	18.2%	18.2%	.0%	100.0%
		% within Similar processes with equal process objective	10.3%	16.7%	10.8%	16.7%	.0%	13.9%
		% of total	1.9%	7.0%	2.5%	2.5%	.0%	13.9%
	Consulting	Amount	3	2	0	1	0	6
		% within Area of IT-function	50.0%	33.3%	.0%	16.7%	.0%	100.0%
		% within Similar processes with equal process objective	10.3%	3.0%	.0%	4.2%	.0%	3.8%
		% of total	1.9%	1.3%	.0%	.6%	.0%	3.8%
Total		Amount	29	66	37	24	2	158
		% within Area of IT-function	18.4%	41.8%	23.4%	15.2%	1.3%	100.0%
		% within Similar processes with equal process objective	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	18.4%	41.8%	23.4%	15.2%	1.3%	100.0%

			Decomposition of extensive process chains					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	0	1	12	20	4	37
		% within Area of IT-function	.0%	2.7%	32.4%	54.1%	10.8%	100.0%
		% within Decomposition of extensive process chains	.0%	8.3%	30.8%	23.5%	11.4%	21.5%
		% of total	.0%	.6%	7.0%	11.6%	2.3%	21.5%
	Project Management	Amount	0	4	6	8	5	23
		% within Area of IT-function	.0%	17.4%	26.1%	34.8%	21.7%	100.0%
		% within Decomposition of extensive process chains	.0%	33.3%	15.4%	9.4%	14.3%	13.4%
		% of total	.0%	2.3%	3.5%	4.7%	2.9%	13.4%
	Management	Amount	0	1	13	32	18	64
		% within Area of IT-function	.0%	1.6%	20.3%	50.0%	28.1%	100.0%
		% within Decomposition of extensive process chains	.0%	8.3%	33.3%	37.6%	51.4%	37.2%
		% of total	.0%	.6%	7.6%	18.6%	10.5%	37.2%
	User Help Desk	Amount	1	0	1	2	0	4
		% within Area of IT-function	25.0%	.0%	25.0%	50.0%	.0%	100.0%
		% within Decomposition of extensive process chains	100.0%	.0%	2.6%	2.4%	.0%	2.3%
		% of total	.6%	.0%	.6%	1.2%	.0%	2.3%
	Quality Management	Amount	0	0	0	2	0	2
		% within Area of IT-function	.0%	.0%	.0%	100.0%	.0%	100.0%
		% within Decomposition of extensive process chains	.0%	.0%	.0%	2.4%	.0%	1.2%
		% of total	.0%	.0%	.0%	1.2%	.0%	1.2%
	Development	Amount	0	2	0	5	0	7
		% within Area of IT-function	.0%	28.6%	.0%	71.4%	.0%	100.0%
		% within Decomposition of extensive process chains	.0%	16.7%	.0%	5.9%	.0%	4.1%
		% of total	.0%	1.2%	.0%	2.9%	.0%	4.1%
	Operations	Amount	0	1	1	2	1	5
		% within Area of IT-function	.0%	20.0%	20.0%	40.0%	20.0%	100.0%
		% within Decomposition of extensive process chains	.0%	8.3%	2.6%	2.4%	2.9%	2.9%
		% of total	.0%	.6%	.6%	1.2%	.6%	2.9%
	Test	Amount	0	1	0	0	0	1
		% within Area of IT-function	.0%	100.0%	.0%	.0%	.0%	100.0%
		% within Decomposition of extensive process chains	.0%	8.3%	.0%	.0%	.0%	.6%
		% of total	.0%	.6%	.0%	.0%	.0%	.6%
	Others	Amount	0	2	6	9	6	23
		% within Area of IT-function	.0%	8.7%	26.1%	39.1%	26.1%	100.0%
		% within Decomposition of extensive process chains	.0%	16.7%	15.4%	10.6%	17.1%	13.4%
		% of total	.0%	1.2%	3.5%	5.2%	3.5%	13.4%
	Consulting	Amount	0	0	0	5	1	6
		% within Area of IT-function	.0%	.0%	.0%	83.3%	16.7%	100.0%
		% within Decomposition of extensive process chains	.0%	.0%	.0%	5.9%	2.9%	3.5%
		% of total	.0%	.0%	.0%	2.9%	.6%	3.5%
Total		Amount	1	12	39	85	35	172
		% within Area of IT-function	.6%	7.0%	22.7%	49.4%	20.3%	100.0%
		% within Decomposition of extensive process chains	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	.6%	7.0%	22.7%	49.4%	20.3%	100.0%

			Institutionalization of processes					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	2	3	10	14	8	37
		% within Area of IT-function	5.4%	8.1%	27.0%	37.8%	21.6%	100.0%
		% within Institutionalization of processes	20.0%	18.8%	21.7%	20.3%	25.0%	21.4%
		% of total	1.2%	1.7%	5.8%	8.1%	4.6%	21.4%
	Project Management	Amount	0	3	2	14	5	24
		% within Area of IT-function	.0%	12.5%	8.3%	58.3%	20.8%	100.0%
		% within Institutionalization of processes	.0%	18.8%	4.3%	20.3%	15.6%	13.9%
		% of total	.0%	1.7%	1.2%	8.1%	2.9%	13.9%
	Management	Amount	4	7	19	22	11	63
		% within Area of IT-function	6.3%	11.1%	30.2%	34.9%	17.5%	100.0%
		% within Institutionalization of processes	40.0%	43.8%	41.3%	31.9%	34.4%	36.4%
		% of total	2.3%	4.0%	11.0%	12.7%	6.4%	36.4%
	User Help Desk	Amount	1	0	2	1	1	5
		% within Area of IT-function	20.0%	.0%	40.0%	20.0%	20.0%	100.0%
		% within Institutionalization of processes	10.0%	.0%	4.3%	1.4%	3.1%	2.9%
		% of total	.6%	.0%	1.2%	.6%	.6%	2.9%
	Quality Management	Amount	1	0	0	0	1	2
		% within Area of IT-function	50.0%	.0%	.0%	.0%	50.0%	100.0%
		% within Institutionalization of processes	10.0%	.0%	.0%	.0%	3.1%	1.2%
		% of total	.6%	.0%	.0%	.0%	.6%	1.2%
	Development	Amount	0	0	5	1	1	7
		% within Area of IT-function	.0%	.0%	71.4%	14.3%	14.3%	100.0%
		% within Institutionalization of processes	.0%	.0%	10.9%	1.4%	3.1%	4.0%
		% of total	.0%	.0%	2.9%	.6%	.6%	4.0%
	Operations	Amount	0	2	2	0	0	4
		% within Area of IT-function	.0%	50.0%	50.0%	.0%	.0%	100.0%
		% within Institutionalization of processes	.0%	12.5%	4.3%	.0%	.0%	2.3%
		% of total	.0%	1.2%	1.2%	.0%	.0%	2.3%
	Test	Amount	1	0	0	0	0	1
		% within Area of IT-function	100.0%	.0%	.0%	.0%	.0%	100.0%
		% within Institutionalization of processes	10.0%	.0%	.0%	.0%	.0%	.6%
		% of total	.6%	.0%	.0%	.0%	.0%	.6%
	Others	Amount	1	1	4	13	5	24
		% within Area of IT-function	4.2%	4.2%	16.7%	54.2%	20.8%	100.0%
		% within Institutionalization of processes	10.0%	6.3%	8.7%	18.8%	15.6%	13.9%
		% of total	.6%	.6%	2.3%	7.5%	2.9%	13.9%
	Consulting	Amount	0	0	2	4	0	6
		% within Area of IT-function	.0%	.0%	33.3%	66.7%	.0%	100.0%
		% within Institutionalization of processes	.0%	.0%	4.3%	5.8%	.0%	3.5%
		% of total	.0%	.0%	1.2%	2.3%	.0%	3.5%
Total		Amount	10	16	46	69	32	173
		% within Area of IT-function	5.8%	9.2%	26.6%	39.9%	18.5%	100.0%
		% within Institutionalization of processes	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	5.8%	9.2%	26.6%	39.9%	18.5%	100.0%

			Service-oriented process integration					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	0	1	2	28	5	36
		% within Area of IT-function	.0%	2.8%	5.6%	77.8%	13.9%	100.0%
		% within Service-oriented process integration	.0%	12.5%	6.7%	30.8%	13.5%	21.3%
		% of total	.0%	.6%	1.2%	16.6%	3.0%	21.3%
	Project Management	Amount	1	1	3	14	5	24
		% within Area of IT-function	4.2%	4.2%	12.5%	58.3%	20.8%	100.0%
		% within Service-oriented process integration	33.3%	12.5%	10.0%	15.4%	13.5%	14.2%
		% of total	.6%	.6%	1.8%	8.3%	3.0%	14.2%
	Management	Amount	2	4	16	23	16	61
		% within Area of IT-function	3.3%	6.6%	26.2%	37.7%	26.2%	100.0%
		% within Service-oriented process integration	66.7%	50.0%	53.3%	25.3%	43.2%	36.1%
		% of total	1.2%	2.4%	9.5%	13.6%	9.5%	36.1%
	User Help Desk	Amount	0	0	1	1	2	4
		% within Area of IT-function	.0%	.0%	25.0%	25.0%	50.0%	100.0%
		% within Service-oriented process integration	.0%	.0%	3.3%	1.1%	5.4%	2.4%
		% of total	.0%	.0%	.6%	.6%	1.2%	2.4%
	Quality Management	Amount	0	0	0	1	1	2
		% within Area of IT-function	.0%	.0%	.0%	50.0%	50.0%	100.0%
		% within Service-oriented process integration	.0%	.0%	.0%	1.1%	2.7%	1.2%
		% of total	.0%	.0%	.0%	.6%	.6%	1.2%
	Development	Amount	0	0	2	3	2	7
		% within Area of IT-function	.0%	.0%	28.6%	42.9%	28.6%	100.0%
		% within Service-oriented process integration	.0%	.0%	6.7%	3.3%	5.4%	4.1%
		% of total	.0%	.0%	1.2%	1.8%	1.2%	4.1%
	Operations	Amount	0	1	1	3	0	5
		% within Area of IT-function	.0%	20.0%	20.0%	60.0%	.0%	100.0%
		% within Service-oriented process integration	.0%	12.5%	3.3%	3.3%	.0%	3.0%
		% of total	.0%	.6%	.6%	1.8%	.0%	3.0%
	Test	Amount	0	0	0	1	0	1
		% within Area of IT-function	.0%	.0%	.0%	100.0%	.0%	100.0%
		% within Service-oriented process integration	.0%	.0%	.0%	1.1%	.0%	.6%
		% of total	.0%	.0%	.0%	.6%	.0%	.6%
	Others	Amount	0	1	4	15	3	23
		% within Area of IT-function	.0%	4.3%	17.4%	65.2%	13.0%	100.0%
		% within Service-oriented process integration	.0%	12.5%	13.3%	16.5%	8.1%	13.6%
		% of total	.0%	.6%	2.4%	8.9%	1.8%	13.6%
	Consulting	Amount	0	0	1	2	3	6
		% within Area of IT-function	.0%	.0%	16.7%	33.3%	50.0%	100.0%
		% within Service-oriented process integration	.0%	.0%	3.3%	2.2%	8.1%	3.6%
		% of total	.0%	.0%	.6%	1.2%	1.8%	3.6%
Total		Amount	3	8	30	91	37	169
		% within Area of IT-function	1.8%	4.7%	17.8%	53.8%	21.9%	100.0%
		% within Service-oriented process integration	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	1.8%	4.7%	17.8%	53.8%	21.9%	100.0%

			Support of a process-oriented knowledge management					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	4	4	6	15	7	36
		% within Area of IT-function	11.1%	11.1%	16.7%	41.7%	19.4%	100.0%
		% within Support of a process-oriented knowledge management	28.6%	22.2%	16.7%	21.1%	23.3%	21.3%
		% of total	2.4%	2.4%	3.6%	8.9%	4.1%	21.3%
	Project Management	Amount	1	2	5	8	7	23
		% within Area of IT-function	4.3%	8.7%	21.7%	34.8%	30.4%	100.0%
		% within Support of a process-oriented knowledge management	7.1%	11.1%	13.9%	11.3%	23.3%	13.6%
		% of total	.6%	1.2%	3.0%	4.7%	4.1%	13.6%
	Management	Amount	7	6	15	27	7	62
		% within Area of IT-function	11.3%	9.7%	24.2%	43.5%	11.3%	100.0%
		% within Support of a process-oriented knowledge management	50.0%	33.3%	41.7%	38.0%	23.3%	36.7%
		% of total	4.1%	3.6%	8.9%	16.0%	4.1%	36.7%
	User Help Desk	Amount	1	1	1	1	1	5
		% within Area of IT-function	20.0%	20.0%	20.0%	20.0%	20.0%	100.0%
		% within Support of a process-oriented knowledge management	7.1%	5.6%	2.8%	1.4%	3.3%	3.0%
		% of total	.6%	.6%	.6%	.6%	.6%	3.0%
	Quality Management	Amount	0	1	0	0	1	2
		% within Area of IT-function	.0%	50.0%	.0%	.0%	50.0%	100.0%
		% within Support of a process-oriented knowledge management	.0%	5.6%	.0%	.0%	3.3%	1.2%
		% of total	.0%	.6%	.0%	.0%	.6%	1.2%
	Development	Amount	0	0	3	2	1	6
		% within Area of IT-function	.0%	.0%	50.0%	33.3%	16.7%	100.0%
		% within Support of a process-oriented knowledge management	.0%	.0%	8.3%	2.8%	3.3%	3.6%
		% of total	.0%	.0%	1.8%	1.2%	.6%	3.6%
	Operations	Amount	1	2	0	1	0	4
		% within Area of IT-function	25.0%	50.0%	.0%	25.0%	.0%	100.0%
		% within Support of a process-oriented knowledge management	7.1%	11.1%	.0%	1.4%	.0%	2.4%
		% of total	.6%	1.2%	.0%	.6%	.0%	2.4%
	Test	Amount	0	1	0	0	0	1
		% within Area of IT-function	.0%	100.0%	.0%	.0%	.0%	100.0%
		% within Support of a process-oriented knowledge management	.0%	5.6%	.0%	.0%	.0%	.6%
		% of total	.0%	.6%	.0%	.0%	.0%	.6%
	Others	Amount	0	1	4	15	4	24
		% within Area of IT-function	.0%	4.2%	16.7%	62.5%	16.7%	100.0%
		% within Support of a process-oriented knowledge management	.0%	5.6%	11.1%	21.1%	13.3%	14.2%
		% of total	.0%	.6%	2.4%	8.9%	2.4%	14.2%
	Consulting	Amount	0	0	2	2	2	6
		% within Area of IT-function	.0%	.0%	33.3%	33.3%	33.3%	100.0%
		% within Support of a process-oriented knowledge management	.0%	.0%	5.6%	2.8%	6.7%	3.6%
		% of total	.0%	.0%	1.2%	1.2%	1.2%	3.6%
Total		Amount	14	18	36	71	30	169
		% within Area of IT-function	8.3%	10.7%	21.3%	42.0%	17.8%	100.0%
		% within Support of a process-oriented knowledge management	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	8.3%	10.7%	21.3%	42.0%	17.8%	100.0%

			Operator model for specific assets					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	2	6	12	8	8	36
		% within Area of IT-function	5.6%	16.7%	33.3%	22.2%	22.2%	100.0%
		% within Operator model for specific assets	9.1%	13.0%	27.3%	18.6%	44.4%	20.8%
		% of total	1.2%	3.5%	6.9%	4.6%	4.6%	20.8%
	Project Management	Amount	4	8	3	9	0	24
		% within Area of IT-function	16.7%	33.3%	12.5%	37.5%	.0%	100.0%
		% within Operator model for specific assets	18.2%	17.4%	6.8%	20.9%	.0%	13.9%
		% of total	2.3%	4.6%	1.7%	5.2%	.0%	13.9%
	Management	Amount	6	14	19	20	5	64
		% within Area of IT-function	9.4%	21.9%	29.7%	31.3%	7.8%	100.0%
		% within Operator model for specific assets	27.3%	30.4%	43.2%	46.5%	27.8%	37.0%
		% of total	3.5%	8.1%	11.0%	11.6%	2.9%	37.0%
	User Help Desk	Amount	1	2	2	0	0	5
		% within Area of IT-function	20.0%	40.0%	40.0%	.0%	.0%	100.0%
		% within Operator model for specific assets	4.5%	4.3%	4.5%	.0%	.0%	2.9%
		% of total	.6%	1.2%	1.2%	.0%	.0%	2.9%
	Quality Management	Amount	1	0	0	0	1	2
		% within Area of IT-function	50.0%	.0%	.0%	.0%	50.0%	100.0%
		% within Operator model for specific assets	4.5%	.0%	.0%	.0%	5.6%	1.2%
		% of total	.6%	.0%	.0%	.0%	.6%	1.2%
	Development	Amount	2	3	2	0	0	7
		% within Area of IT-function	28.6%	42.9%	28.6%	.0%	.0%	100.0%
		% within Operator model for specific assets	9.1%	6.5%	4.5%	.0%	.0%	4.0%
		% of total	1.2%	1.7%	1.2%	.0%	.0%	4.0%
	Operations	Amount	1	2	0	0	2	5
		% within Area of IT-function	20.0%	40.0%	.0%	.0%	40.0%	100.0%
		% within Operator model for specific assets	4.5%	4.3%	.0%	.0%	11.1%	2.9%
		% of total	.6%	1.2%	.0%	.0%	1.2%	2.9%
	Test	Amount	0	0	0	0	1	1
		% within Area of IT-function	.0%	.0%	.0%	.0%	100.0%	100.0%
		% within Operator model for specific assets	.0%	.0%	.0%	.0%	5.6%	.6%
		% of total	.0%	.0%	.0%	.0%	.6%	.6%
	Others	Amount	4	10	4	4	1	23
		% within Area of IT-function	17.4%	43.5%	17.4%	17.4%	4.3%	100.0%
		% within Operator model for specific assets	18.2%	21.7%	9.1%	9.3%	5.6%	13.3%
		% of total	2.3%	5.8%	2.3%	2.3%	.6%	13.3%
	Consulting	Amount	1	1	2	2	0	6
		% within Area of IT-function	16.7%	16.7%	33.3%	33.3%	.0%	100.0%
		% within Operator model for specific assets	4.5%	2.2%	4.5%	4.7%	.0%	3.5%
		% of total	.6%	.6%	1.2%	1.2%	.0%	3.5%
Total		Amount	22	46	44	43	18	173
		% within Area of IT-function	12.7%	26.6%	25.4%	24.9%	10.4%	100.0%
		% within Operator model for specific assets	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	12.7%	26.6%	25.4%	24.9%	10.4%	100.0%

			Reducing process rules					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	2	6	12	10	2	32
		% within Area of IT-function	6.3%	18.8%	37.5%	31.3%	6.3%	100.0%
		% within Reducing process rules	14.3%	19.4%	21.4%	23.3%	28.6%	21.2%
		% of total	1.3%	4.0%	7.9%	6.6%	1.3%	21.2%
	Project Management	Amount	2	3	10	6	1	22
		% within Area of IT-function	9.1%	13.6%	45.5%	27.3%	4.5%	100.0%
		% within Reducing process rules	14.3%	9.7%	17.9%	14.0%	14.3%	14.6%
		% of total	1.3%	2.0%	6.6%	4.0%	.7%	14.6%
	Management	Amount	7	12	19	16	3	57
		% within Area of IT-function	12.3%	21.1%	33.3%	28.1%	5.3%	100.0%
		% within Reducing process rules	50.0%	38.7%	33.9%	37.2%	42.9%	37.7%
		% of total	4.6%	7.9%	12.6%	10.6%	2.0%	37.7%
	User Help Desk	Amount	2	0	1	1	0	4
		% within Area of IT-function	50.0%	.0%	25.0%	25.0%	.0%	100.0%
		% within Reducing process rules	14.3%	.0%	1.8%	2.3%	.0%	2.6%
		% of total	1.3%	.0%	.7%	.7%	.0%	2.6%
	Quality Management	Amount	0	0	1	1	0	2
		% within Area of IT-function	.0%	.0%	50.0%	50.0%	.0%	100.0%
		% within Reducing process rules	.0%	.0%	1.8%	2.3%	.0%	1.3%
		% of total	.0%	.0%	.7%	.7%	.0%	1.3%
	Development	Amount	0	2	2	1	0	5
		% within Area of IT-function	.0%	40.0%	40.0%	20.0%	.0%	100.0%
		% within Reducing process rules	.0%	6.5%	3.6%	2.3%	.0%	3.3%
		% of total	.0%	1.3%	1.3%	.7%	.0%	3.3%
	Operations	Amount	0	0	4	1	0	5
		% within Area of IT-function	.0%	.0%	80.0%	20.0%	.0%	100.0%
		% within Reducing process rules	.0%	.0%	7.1%	2.3%	.0%	3.3%
		% of total	.0%	.0%	2.6%	.7%	.0%	3.3%
	Test	Amount	0	0	0	1	0	1
		% within Area of IT-function	.0%	.0%	.0%	100.0%	.0%	100.0%
		% within Reducing process rules	.0%	.0%	.0%	2.3%	.0%	.7%
		% of total	.0%	.0%	.0%	.7%	.0%	.7%
	Others	Amount	0	7	5	5	1	18
		% within Area of IT-function	.0%	38.9%	27.8%	27.8%	5.6%	100.0%
		% within Reducing process rules	.0%	22.6%	8.9%	11.6%	14.3%	11.9%
		% of total	.0%	4.6%	3.3%	3.3%	.7%	11.9%
	Consulting	Amount	1	1	2	1	0	5
		% within Area of IT-function	20.0%	20.0%	40.0%	20.0%	.0%	100.0%
		% within Reducing process rules	7.1%	3.2%	3.6%	2.3%	.0%	3.3%
		% of total	.7%	.7%	1.3%	.7%	.0%	3.3%
Total		Amount	14	31	56	43	7	151
		% within Area of IT-function	9.3%	20.5%	37.1%	28.5%	4.6%	100.0%
		% within Reducing process rules	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	9.3%	20.5%	37.1%	28.5%	4.6%	100.0%

			Redundant task execution					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	0	4	10	17	3	34
		% within Area of IT-function	.0%	11.8%	29.4%	50.0%	8.8%	100.0%
		% within Redundant task execution	.0%	36.4%	22.2%	24.6%	15.8%	22.7%
		% of total	.0%	2.7%	6.7%	11.3%	2.0%	22.7%
	Project Management	Amount	1	1	1	11	7	21
		% within Area of IT-function	4.8%	4.8%	4.8%	52.4%	33.3%	100.0%
		% within Redundant task execution	16.7%	9.1%	2.2%	15.9%	36.8%	14.0%
		% of total	.7%	.7%	.7%	7.3%	4.7%	14.0%
	Management	Amount	3	3	24	21	6	57
		% within Area of IT-function	5.3%	5.3%	42.1%	36.8%	10.5%	100.0%
		% within Redundant task execution	50.0%	27.3%	53.3%	30.4%	31.6%	38.0%
		% of total	2.0%	2.0%	16.0%	14.0%	4.0%	38.0%
	User Help Desk	Amount	1	0	0	2	0	3
		% within Area of IT-function	33.3%	.0%	.0%	66.7%	.0%	100.0%
		% within Redundant task execution	16.7%	.0%	.0%	2.9%	.0%	2.0%
		% of total	.7%	.0%	.0%	1.3%	.0%	2.0%
	Quality Management	Amount	0	0	0	2	0	2
		% within Area of IT-function	.0%	.0%	.0%	100.0%	.0%	100.0%
		% within Redundant task execution	.0%	.0%	.0%	2.9%	.0%	1.3%
		% of total	.0%	.0%	.0%	1.3%	.0%	1.3%
	Development	Amount	0	1	1	1	0	3
		% within Area of IT-function	.0%	33.3%	33.3%	33.3%	.0%	100.0%
		% within Redundant task execution	.0%	9.1%	2.2%	1.4%	.0%	2.0%
		% of total	.0%	.7%	.7%	.7%	.0%	2.0%
	Operations	Amount	0	1	2	1	0	4
		% within Area of IT-function	.0%	25.0%	50.0%	25.0%	.0%	100.0%
		% within Redundant task execution	.0%	9.1%	4.4%	1.4%	.0%	2.7%
		% of total	.0%	.7%	1.3%	.7%	.0%	2.7%
	Test	Amount	0	0	0	1	0	1
		% within Area of IT-function	.0%	.0%	.0%	100.0%	.0%	100.0%
		% within Redundant task execution	.0%	.0%	.0%	1.4%	.0%	.7%
		% of total	.0%	.0%	.0%	.7%	.0%	.7%
	Others	Amount	1	1	5	10	3	20
		% within Area of IT-function	5.0%	5.0%	25.0%	50.0%	15.0%	100.0%
		% within Redundant task execution	16.7%	9.1%	11.1%	14.5%	15.8%	13.3%
		% of total	.7%	.7%	3.3%	6.7%	2.0%	13.3%
	Consulting	Amount	0	0	2	3	0	5
		% within Area of IT-function	.0%	.0%	40.0%	60.0%	.0%	100.0%
		% within Redundant task execution	.0%	.0%	4.4%	4.3%	.0%	3.3%
		% of total	.0%	.0%	1.3%	2.0%	.0%	3.3%
Total		Amount	6	11	45	69	19	150
		% within Area of IT-function	4.0%	7.3%	30.0%	46.0%	12.7%	100.0%
		% within Redundant task execution	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	4.0%	7.3%	30.0%	46.0%	12.7%	100.0%

			Redundant working relationships					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	0	4	3	18	11	36
		% within Area of IT-function	.0%	11.1%	8.3%	50.0%	30.6%	100.0%
		% within Redundant working relationships	.0%	26.7%	12.5%	21.4%	27.5%	21.7%
		% of total	.0%	2.4%	1.8%	10.8%	6.6%	21.7%
	Project Management	Amount	0	2	3	11	7	23
		% within Area of IT-function	.0%	8.7%	13.0%	47.8%	30.4%	100.0%
		% within Redundant working relationships	.0%	13.3%	12.5%	13.1%	17.5%	13.9%
		% of total	.0%	1.2%	1.8%	6.6%	4.2%	13.9%
	Management	Amount	2	5	11	31	11	60
		% within Area of IT-function	3.3%	8.3%	18.3%	51.7%	18.3%	100.0%
		% within Redundant working relationships	66.7%	33.3%	45.8%	36.9%	27.5%	36.1%
		% of total	1.2%	3.0%	6.6%	18.7%	6.6%	36.1%
	User Help Desk	Amount	1	1	0	2	1	5
		% within Area of IT-function	20.0%	20.0%	.0%	40.0%	20.0%	100.0%
		% within Redundant working relationships	33.3%	6.7%	.0%	2.4%	2.5%	3.0%
		% of total	.6%	.6%	.0%	1.2%	.6%	3.0%
	Quality Management	Amount	0	1	0	0	1	2
		% within Area of IT-function	.0%	50.0%	.0%	.0%	50.0%	100.0%
		% within Redundant working relationships	.0%	6.7%	.0%	.0%	2.5%	1.2%
		% of total	.0%	.6%	.0%	.0%	.6%	1.2%
	Development	Amount	0	0	1	5	1	7
		% within Area of IT-function	.0%	.0%	14.3%	71.4%	14.3%	100.0%
		% within Redundant working relationships	.0%	.0%	4.2%	6.0%	2.5%	4.2%
		% of total	.0%	.0%	.6%	3.0%	.6%	4.2%
	Operations	Amount	0	1	2	1	1	5
		% within Area of IT-function	.0%	20.0%	40.0%	20.0%	20.0%	100.0%
		% within Redundant working relationships	.0%	6.7%	8.3%	1.2%	2.5%	3.0%
		% of total	.0%	.6%	1.2%	.6%	.6%	3.0%
	Test	Amount	0	1	0	0	0	1
		% within Area of IT-function	.0%	100.0%	.0%	.0%	.0%	100.0%
		% within Redundant working relationships	.0%	6.7%	.0%	.0%	.0%	.6%
		% of total	.0%	.6%	.0%	.0%	.0%	.6%
	Others	Amount	0	0	4	13	5	22
		% within Area of IT-function	.0%	.0%	18.2%	59.1%	22.7%	100.0%
		% within Redundant working relationships	.0%	.0%	16.7%	15.5%	12.5%	13.3%
		% of total	.0%	.0%	2.4%	7.8%	3.0%	13.3%
	Consulting	Amount	0	0	0	3	2	5
		% within Area of IT-function	.0%	.0%	.0%	60.0%	40.0%	100.0%
		% within Redundant working relationships	.0%	.0%	.0%	3.6%	5.0%	3.0%
		% of total	.0%	.0%	.0%	1.8%	1.2%	3.0%
Total		Amount	3	15	24	84	40	166
		% within Area of IT-function	1.8%	9.0%	14.5%	50.6%	24.1%	100.0%
		% within Redundant working relationships	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	1.8%	9.0%	14.5%	50.6%	24.1%	100.0%

			Organizational networking					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	0	1	12	16	6	35
		% within Area of IT-function	.0%	2.9%	34.3%	45.7%	17.1%	100.0%
		% within Organizational networking	.0%	16.7%	30.8%	19.5%	17.1%	21.1%
		% of total	.0%	.6%	7.2%	9.6%	3.6%	21.1%
	Project Management	Amount	0	1	3	14	5	23
		% within Area of IT-function	.0%	4.3%	13.0%	60.9%	21.7%	100.0%
		% within Organizational networking	.0%	16.7%	7.7%	17.1%	14.3%	13.9%
		% of total	.0%	.6%	1.8%	8.4%	3.0%	13.9%
	Management	Amount	2	2	12	33	11	60
		% within Area of IT-function	3.3%	3.3%	20.0%	55.0%	18.3%	100.0%
		% within Organizational networking	50.0%	33.3%	30.8%	40.2%	31.4%	36.1%
		% of total	1.2%	1.2%	7.2%	19.9%	6.6%	36.1%
	User Help Desk	Amount	1	0	1	1	2	5
		% within Area of IT-function	20.0%	.0%	20.0%	20.0%	40.0%	100.0%
		% within Organizational networking	25.0%	.0%	2.6%	1.2%	5.7%	3.0%
		% of total	.6%	.0%	.6%	.6%	1.2%	3.0%
	Quality Management	Amount	0	0	1	0	1	2
		% within Area of IT-function	.0%	.0%	50.0%	.0%	50.0%	100.0%
		% within Organizational networking	.0%	.0%	2.6%	.0%	2.9%	1.2%
		% of total	.0%	.0%	.6%	.0%	.6%	1.2%
	Development	Amount	0	0	4	3	0	7
		% within Area of IT-function	.0%	.0%	57.1%	42.9%	.0%	100.0%
		% within Organizational networking	.0%	.0%	10.3%	3.7%	.0%	4.2%
		% of total	.0%	.0%	2.4%	1.8%	.0%	4.2%
	Operations	Amount	1	0	1	2	1	5
		% within Area of IT-function	20.0%	.0%	20.0%	40.0%	20.0%	100.0%
		% within Organizational networking	25.0%	.0%	2.6%	2.4%	2.9%	3.0%
		% of total	.6%	.0%	.6%	1.2%	.6%	3.0%
	Test	Amount	0	0	0	1	0	1
		% within Area of IT-function	.0%	.0%	.0%	100.0%	.0%	100.0%
		% within Organizational networking	.0%	.0%	.0%	1.2%	.0%	.6%
		% of total	.0%	.0%	.0%	.6%	.0%	.6%
	Others	Amount	0	2	5	10	6	23
		% within Area of IT-function	.0%	8.7%	21.7%	43.5%	26.1%	100.0%
		% within Organizational networking	.0%	33.3%	12.8%	12.2%	17.1%	13.9%
		% of total	.0%	1.2%	3.0%	6.0%	3.6%	13.9%
	Consulting	Amount	0	0	0	2	3	5
		% within Area of IT-function	.0%	.0%	.0%	40.0%	60.0%	100.0%
		% within Organizational networking	.0%	.0%	.0%	2.4%	8.6%	3.0%
		% of total	.0%	.0%	.0%	1.2%	1.8%	3.0%
Total		Amount	4	6	39	82	35	166
		% within Area of IT-function	2.4%	3.6%	23.5%	49.4%	21.1%	100.0%
		% within Organizational networking	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	2.4%	3.6%	23.5%	49.4%	21.1%	100.0%

			Transferred responsibilities to project team					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	0	4	14	14	4	36
		% within Area of IT-function	.0%	11.1%	38.9%	38.9%	11.1%	100.0%
		% within Transferred responsibilities to project team	.0%	33.3%	29.2%	15.9%	21.1%	21.3%
		% of total	.0%	2.4%	8.3%	8.3%	2.4%	21.3%
	Project Management	Amount	0	0	6	13	3	22
		% within Area of IT-function	.0%	.0%	27.3%	59.1%	13.6%	100.0%
		% within Transferred responsibilities to project team	.0%	.0%	12.5%	14.8%	15.8%	13.0%
		% of total	.0%	.0%	3.6%	7.7%	1.8%	13.0%
	Management	Amount	0	4	18	37	4	63
		% within Area of IT-function	.0%	6.3%	28.6%	58.7%	6.3%	100.0%
		% within Transferred responsibilities to project team	.0%	33.3%	37.5%	42.0%	21.1%	37.3%
		% of total	.0%	2.4%	10.7%	21.9%	2.4%	37.3%
	User Help Desk	Amount	1	0	0	3	1	5
		% within Area of IT-function	20.0%	.0%	.0%	60.0%	20.0%	100.0%
		% within Transferred responsibilities to project team	50.0%	.0%	.0%	3.4%	5.3%	3.0%
		% of total	.6%	.0%	.0%	1.8%	.6%	3.0%
	Quality Management	Amount	0	0	0	2	0	2
		% within Area of IT-function	.0%	.0%	.0%	100.0%	.0%	100.0%
		% within Transferred responsibilities to project team	.0%	.0%	.0%	2.3%	.0%	1.2%
		% of total	.0%	.0%	.0%	1.2%	.0%	1.2%
	Development	Amount	0	0	2	3	2	7
		% within Area of IT-function	.0%	.0%	28.6%	42.9%	28.6%	100.0%
		% within Transferred responsibilities to project team	.0%	.0%	4.2%	3.4%	10.5%	4.1%
		% of total	.0%	.0%	1.2%	1.8%	1.2%	4.1%
	Operations	Amount	0	0	1	2	2	5
		% within Area of IT-function	.0%	.0%	20.0%	40.0%	40.0%	100.0%
		% within Transferred responsibilities to project team	.0%	.0%	2.1%	2.3%	10.5%	3.0%
		% of total	.0%	.0%	.6%	1.2%	1.2%	3.0%
	Test	Amount	0	0	0	1	0	1
		% within Area of IT-function	.0%	.0%	.0%	100.0%	.0%	100.0%
		% within Transferred responsibilities to project team	.0%	.0%	.0%	1.1%	.0%	.6%
		% of total	.0%	.0%	.0%	.6%	.0%	.6%
	Others	Amount	1	3	7	10	2	23
		% within Area of IT-function	4.3%	13.0%	30.4%	43.5%	8.7%	100.0%
		% within Transferred responsibilities to project team	50.0%	25.0%	14.6%	11.4%	10.5%	13.6%
		% of total	.6%	1.8%	4.1%	5.9%	1.2%	13.6%
	Consulting	Amount	0	1	0	3	1	5
		% within Area of IT-function	.0%	20.0%	.0%	60.0%	20.0%	100.0%
		% within Transferred responsibilities to project team	.0%	8.3%	.0%	3.4%	5.3%	3.0%
		% of total	.0%	.6%	.0%	1.8%	.6%	3.0%
Total		Amount	2	12	48	88	19	169
		% within Area of IT-function	1.2%	7.1%	28.4%	52.1%	11.2%	100.0%
		% within Transferred responsibilities to project team	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	1.2%	7.1%	28.4%	52.1%	11.2%	100.0%

			Scenario Management					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	1	2	15	8	3	29
		% within Area of IT-function	3.4%	6.9%	51.7%	27.6%	10.3%	100.0%
		% within Scenario Management	20.0%	9.5%	30.0%	15.4%	15.0%	19.6%
		% of total	.7%	1.4%	10.1%	5.4%	2.0%	19.6%
	Project Management	Amount	0	1	7	10	4	22
		% within Area of IT-function	.0%	4.5%	31.8%	45.5%	18.2%	100.0%
		% within Scenario Management	.0%	4.8%	14.0%	19.2%	20.0%	14.9%
		% of total	.0%	.7%	4.7%	6.8%	2.7%	14.9%
	Management	Amount	2	6	19	20	7	54
		% within Area of IT-function	3.7%	11.1%	35.2%	37.0%	13.0%	100.0%
		% within Scenario Management	40.0%	28.6%	38.0%	38.5%	35.0%	36.5%
		% of total	1.4%	4.1%	12.8%	13.5%	4.7%	36.5%
	User Help Desk	Amount	1	2	0	1	0	4
		% within Area of IT-function	25.0%	50.0%	.0%	25.0%	.0%	100.0%
		% within Scenario Management	20.0%	9.5%	.0%	1.9%	.0%	2.7%
		% of total	.7%	1.4%	.0%	.7%	.0%	2.7%
	Quality Management	Amount	0	0	0	0	2	2
		% within Area of IT-function	.0%	.0%	.0%	.0%	100.0%	100.0%
		% within Scenario Management	.0%	.0%	.0%	.0%	10.0%	1.4%
		% of total	.0%	.0%	.0%	.0%	1.4%	1.4%
	Development	Amount	0	1	3	0	1	5
		% within Area of IT-function	.0%	20.0%	60.0%	.0%	20.0%	100.0%
		% within Scenario Management	.0%	4.8%	6.0%	.0%	5.0%	3.4%
		% of total	.0%	.7%	2.0%	.0%	.7%	3.4%
	Operations	Amount	1	0	2	0	1	4
		% within Area of IT-function	25.0%	.0%	50.0%	.0%	25.0%	100.0%
		% within Scenario Management	20.0%	.0%	4.0%	.0%	5.0%	2.7%
		% of total	.7%	.0%	1.4%	.0%	.7%	2.7%
	Test	Amount	0	0	0	0	1	1
		% within Area of IT-function	.0%	.0%	.0%	.0%	100.0%	100.0%
		% within Scenario Management	.0%	.0%	.0%	.0%	5.0%	.7%
		% of total	.0%	.0%	.0%	.0%	.7%	.7%
	Others	Amount	0	9	4	8	1	22
		% within Area of IT-function	.0%	40.9%	18.2%	36.4%	4.5%	100.0%
		% within Scenario Management	.0%	42.9%	8.0%	15.4%	5.0%	14.9%
		% of total	.0%	6.1%	2.7%	5.4%	.7%	14.9%
	Consulting	Amount	0	0	0	5	0	5
		% within Area of IT-function	.0%	.0%	.0%	100.0%	.0%	100.0%
		% within Scenario Management	.0%	.0%	.0%	9.6%	.0%	3.4%
		% of total	.0%	.0%	.0%	3.4%	.0%	3.4%
Total		Amount	5	21	50	52	20	148
		% within Area of IT-function	3.4%	14.2%	33.8%	35.1%	13.5%	100.0%
		% within Scenario Management	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	3.4%	14.2%	33.8%	35.1%	13.5%	100.0%

			Involvement of all employees					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	2	5	8	14	7	36
		% within Area of IT-function	5.6%	13.9%	22.2%	38.9%	19.4%	100.0%
		% within Involvement of all employees	22.2%	19.2%	20.5%	19.4%	30.4%	21.3%
		% of total	1.2%	3.0%	4.7%	8.3%	4.1%	21.3%
	Project Management	Amount	0	4	6	10	3	23
		% within Area of IT-function	.0%	17.4%	26.1%	43.5%	13.0%	100.0%
		% within Involvement of all employees	.0%	15.4%	15.4%	13.9%	13.0%	13.6%
		% of total	.0%	2.4%	3.6%	5.9%	1.8%	13.6%
	Management	Amount	4	13	14	24	7	62
		% within Area of IT-function	6.5%	21.0%	22.6%	38.7%	11.3%	100.0%
		% within Involvement of all employees	44.4%	50.0%	35.9%	33.3%	30.4%	36.7%
		% of total	2.4%	7.7%	8.3%	14.2%	4.1%	36.7%
	User Help Desk	Amount	1	1	1	2	0	5
		% within Area of IT-function	20.0%	20.0%	20.0%	40.0%	.0%	100.0%
		% within Involvement of all employees	11.1%	3.8%	2.6%	2.8%	.0%	3.0%
		% of total	.6%	.6%	.6%	1.2%	.0%	3.0%
	Quality Management	Amount	0	1	0	0	1	2
		% within Area of IT-function	.0%	50.0%	.0%	.0%	50.0%	100.0%
		% within Involvement of all employees	.0%	3.8%	.0%	.0%	4.3%	1.2%
		% of total	.0%	.6%	.0%	.0%	.6%	1.2%
	Development	Amount	0	0	3	4	0	7
		% within Area of IT-function	.0%	.0%	42.9%	57.1%	.0%	100.0%
		% within Involvement of all employees	.0%	.0%	7.7%	5.6%	.0%	4.1%
		% of total	.0%	.0%	1.8%	2.4%	.0%	4.1%
	Operations	Amount	1	0	1	2	1	5
		% within Area of IT-function	20.0%	.0%	20.0%	40.0%	20.0%	100.0%
		% within Involvement of all employees	11.1%	.0%	2.6%	2.8%	4.3%	3.0%
		% of total	.6%	.0%	.6%	1.2%	.6%	3.0%
	Test	Amount	0	1	0	0	0	1
		% within Area of IT-function	.0%	100.0%	.0%	.0%	.0%	100.0%
		% within Involvement of all employees	.0%	3.8%	.0%	.0%	.0%	.6%
		% of total	.0%	.6%	.0%	.0%	.0%	.6%
	Others	Amount	1	1	5	12	4	23
		% within Area of IT-function	4.3%	4.3%	21.7%	52.2%	17.4%	100.0%
		% within Involvement of all employees	11.1%	3.8%	12.8%	16.7%	17.4%	13.6%
		% of total	.6%	.6%	3.0%	7.1%	2.4%	13.6%
	Consulting	Amount	0	0	1	4	0	5
		% within Area of IT-function	.0%	.0%	20.0%	80.0%	.0%	100.0%
		% within Involvement of all employees	.0%	.0%	2.6%	5.6%	.0%	3.0%
		% of total	.0%	.0%	.6%	2.4%	.0%	3.0%
Total		Amount	9	26	39	72	23	169
		% within Area of IT-function	5.3%	15.4%	23.1%	42.6%	13.6%	100.0%
		% within Involvement of all employees	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	5.3%	15.4%	23.1%	42.6%	13.6%	100.0%

			Decentralized idea generating of all organizational units					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	1	8	9	14	3	35
		% within Area of IT-function	2.9%	22.9%	25.7%	40.0%	8.6%	100.0%
		% within Decentralized idea generating of all organizational units	11.1%	25.8%	14.3%	31.1%	23.1%	21.7%
		% of total	.6%	5.0%	5.6%	8.7%	1.9%	21.7%
	Project Management	Amount	1	4	10	6	1	22
		% within Area of IT-function	4.5%	18.2%	45.5%	27.3%	4.5%	100.0%
		% within Decentralized idea generating of all organizational units	11.1%	12.9%	15.9%	13.3%	7.7%	13.7%
		% of total	.6%	2.5%	6.2%	3.7%	.6%	13.7%
	Management	Amount	3	9	30	13	3	58
		% within Area of IT-function	5.2%	15.5%	51.7%	22.4%	5.2%	100.0%
		% within Decentralized idea generating of all organizational units	33.3%	29.0%	47.6%	28.9%	23.1%	36.0%
		% of total	1.9%	5.6%	18.6%	8.1%	1.9%	36.0%
	User Help Desk	Amount	2	0	1	0	2	5
		% within Area of IT-function	40.0%	.0%	20.0%	.0%	40.0%	100.0%
		% within Decentralized idea generating of all organizational units	22.2%	.0%	1.6%	.0%	15.4%	3.1%
		% of total	1.2%	.0%	.6%	.0%	1.2%	3.1%
	Quality Management	Amount	0	1	1	0	0	2
		% within Area of IT-function	.0%	50.0%	50.0%	.0%	.0%	100.0%
		% within Decentralized idea generating of all organizational units	.0%	3.2%	1.6%	.0%	.0%	1.2%
		% of total	.0%	.6%	.6%	.0%	.0%	1.2%
	Development	Amount	0	0	2	4	1	7
		% within Area of IT-function	.0%	.0%	28.6%	57.1%	14.3%	100.0%
		% within Decentralized idea generating of all organizational units	.0%	.0%	3.2%	8.9%	7.7%	4.3%
		% of total	.0%	.0%	1.2%	2.5%	.6%	4.3%
	Operations	Amount	0	3	1	1	0	5
		% within Area of IT-function	.0%	60.0%	20.0%	20.0%	.0%	100.0%
		% within Decentralized idea generating of all organizational units	.0%	9.7%	1.6%	2.2%	.0%	3.1%
		% of total	.0%	1.9%	.6%	.6%	.0%	3.1%
	Test	Amount	1	0	0	0	0	1
		% within Area of IT-function	100.0%	.0%	.0%	.0%	.0%	100.0%
		% within Decentralized idea generating of all organizational units	11.1%	.0%	.0%	.0%	.0%	.6%
		% of total	.6%	.0%	.0%	.0%	.0%	.6%
	Others	Amount	0	5	8	6	2	21
		% within Area of IT-function	.0%	23.8%	38.1%	28.6%	9.5%	100.0%
		% within Decentralized idea generating of all organizational units	.0%	16.1%	12.7%	13.3%	15.4%	13.0%
		% of total	.0%	3.1%	5.0%	3.7%	1.2%	13.0%
	Consulting	Amount	1	1	1	1	1	5
		% within Area of IT-function	20.0%	20.0%	20.0%	20.0%	20.0%	100.0%
		% within Decentralized idea generating of all organizational units	11.1%	3.2%	1.6%	2.2%	7.7%	3.1%
		% of total	.6%	.6%	.6%	.6%	.6%	3.1%
Total		Amount	9	31	63	45	13	161
		% within Area of IT-function	5.6%	19.3%	39.1%	28.0%	8.1%	100.0%
		% within Decentralized idea generating of all organizational units	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	5.6%	19.3%	39.1%	28.0%	8.1%	100.0%

			Automation and exoneration of routine tasks					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	0	2	10	22	2	36
		% within Area of IT-function	.0%	5.6%	27.8%	61.1%	5.6%	100.0%
		% within Automation and exoneration of routine tasks	.0%	25.0%	27.8%	22.2%	8.0%	21.3%
		% of total	.0%	1.2%	5.9%	13.0%	1.2%	21.3%
	Project Management	Amount	0	2	4	13	4	23
		% within Area of IT-function	.0%	8.7%	17.4%	56.5%	17.4%	100.0%
		% within Automation and exoneration of routine tasks	.0%	25.0%	11.1%	13.1%	16.0%	13.6%
		% of total	.0%	1.2%	2.4%	7.7%	2.4%	13.6%
	Management	Amount	0	1	13	41	7	62
		% within Area of IT-function	.0%	1.6%	21.0%	66.1%	11.3%	100.0%
		% within Automation and exoneration of routine tasks	.0%	12.5%	36.1%	41.4%	28.0%	36.7%
		% of total	.0%	.6%	7.7%	24.3%	4.1%	36.7%
	User Help Desk	Amount	1	0	1	3	0	5
		% within Area of IT-function	20.0%	.0%	20.0%	60.0%	.0%	100.0%
		% within Automation and exoneration of routine tasks	100.0%	.0%	2.8%	3.0%	.0%	3.0%
		% of total	.6%	.0%	.6%	1.8%	.0%	3.0%
	Quality Management	Amount	0	1	0	1	0	2
		% within Area of IT-function	.0%	50.0%	.0%	50.0%	.0%	100.0%
		% within Automation and exoneration of routine tasks	.0%	12.5%	.0%	1.0%	.0%	1.2%
		% of total	.0%	.6%	.0%	.6%	.0%	1.2%
	Development	Amount	0	0	0	7	0	7
		% within Area of IT-function	.0%	.0%	.0%	100.0%	.0%	100.0%
		% within Automation and exoneration of routine tasks	.0%	.0%	.0%	7.1%	.0%	4.1%
		% of total	.0%	.0%	.0%	4.1%	.0%	4.1%
	Operations	Amount	0	0	2	1	2	5
		% within Area of IT-function	.0%	.0%	40.0%	20.0%	40.0%	100.0%
		% within Automation and exoneration of routine tasks	.0%	.0%	5.6%	1.0%	8.0%	3.0%
		% of total	.0%	.0%	1.2%	.6%	1.2%	3.0%
	Test	Amount	0	0	0	1	0	1
		% within Area of IT-function	.0%	.0%	.0%	100.0%	.0%	100.0%
		% within Automation and exoneration of routine tasks	.0%	.0%	.0%	1.0%	.0%	.6%
		% of total	.0%	.0%	.0%	.6%	.0%	.6%
	Others	Amount	0	2	6	7	8	23
		% within Area of IT-function	.0%	8.7%	26.1%	30.4%	34.8%	100.0%
		% within Automation and exoneration of routine tasks	.0%	25.0%	16.7%	7.1%	32.0%	13.6%
		% of total	.0%	1.2%	3.6%	4.1%	4.7%	13.6%
	Consulting	Amount	0	0	0	3	2	5
		% within Area of IT-function	.0%	.0%	.0%	60.0%	40.0%	100.0%
		% within Automation and exoneration of routine tasks	.0%	.0%	.0%	3.0%	8.0%	3.0%
		% of total	.0%	.0%	.0%	1.8%	1.2%	3.0%
Total		Amount	1	8	36	99	25	169
		% within Area of IT-function	.6%	4.7%	21.3%	58.6%	14.8%	100.0%
		% within Automation and exoneration of routine tasks	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	.6%	4.7%	21.3%	58.6%	14.8%	100.0%

			Incentive structures					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	3	5	17	9	2	36
		% within Area of IT-function	8.3%	13.9%	47.2%	25.0%	5.6%	100.0%
		% within Incentive structures	25.0%	16.7%	29.3%	16.4%	25.0%	22.1%
		% of total	1.8%	3.1%	10.4%	5.5%	1.2%	22.1%
	Project Management	Amount	1	5	4	10	1	21
		% within Area of IT-function	4.8%	23.8%	19.0%	47.6%	4.8%	100.0%
		% within Incentive structures	8.3%	16.7%	6.9%	18.2%	12.5%	12.9%
		% of total	.6%	3.1%	2.5%	6.1%	.6%	12.9%
	Management	Amount	5	12	20	23	1	61
		% within Area of IT-function	8.2%	19.7%	32.8%	37.7%	1.6%	100.0%
		% within Incentive structures	41.7%	40.0%	34.5%	41.8%	12.5%	37.4%
		% of total	3.1%	7.4%	12.3%	14.1%	.6%	37.4%
	User Help Desk	Amount	1	1	1	1	1	5
		% within Area of IT-function	20.0%	20.0%	20.0%	20.0%	20.0%	100.0%
		% within Incentive structures	8.3%	3.3%	1.7%	1.8%	12.5%	3.1%
		% of total	.6%	.6%	.6%	.6%	.6%	3.1%
	Quality Management	Amount	0	1	1	0	0	2
		% within Area of IT-function	.0%	50.0%	50.0%	.0%	.0%	100.0%
		% within Incentive structures	.0%	3.3%	1.7%	.0%	.0%	1.2%
		% of total	.0%	.6%	.6%	.0%	.0%	1.2%
	Development	Amount	0	1	2	3	1	7
		% within Area of IT-function	.0%	14.3%	28.6%	42.9%	14.3%	100.0%
		% within Incentive structures	.0%	3.3%	3.4%	5.5%	12.5%	4.3%
		% of total	.0%	.6%	1.2%	1.8%	.6%	4.3%
	Operations	Amount	1	1	2	1	0	5
		% within Area of IT-function	20.0%	20.0%	40.0%	20.0%	.0%	100.0%
		% within Incentive structures	8.3%	3.3%	3.4%	1.8%	.0%	3.1%
		% of total	.6%	.6%	1.2%	.6%	.0%	3.1%
	Test	Amount	1	0	0	0	0	1
		% within Area of IT-function	100.0%	.0%	.0%	.0%	.0%	100.0%
		% within Incentive structures	8.3%	.0%	.0%	.0%	.0%	.6%
		% of total	.6%	.0%	.0%	.0%	.0%	.6%
	Others	Amount	0	4	9	6	1	20
		% within Area of IT-function	.0%	20.0%	45.0%	30.0%	5.0%	100.0%
		% within Incentive structures	.0%	13.3%	15.5%	10.9%	12.5%	12.3%
		% of total	.0%	2.5%	5.5%	3.7%	.6%	12.3%
	Consulting	Amount	0	0	2	2	1	5
		% within Area of IT-function	.0%	.0%	40.0%	40.0%	20.0%	100.0%
		% within Incentive structures	.0%	.0%	3.4%	3.6%	12.5%	3.1%
		% of total	.0%	.0%	1.2%	1.2%	.6%	3.1%
Total		Amount	12	30	58	55	8	163
		% within Area of IT-function	7.4%	18.4%	35.6%	33.7%	4.9%	100.0%
		% within Incentive structures	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	7.4%	18.4%	35.6%	33.7%	4.9%	100.0%

			Working environment allowing innovations					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	0	2	7	17	9	35
		% within Area of IT-function	.0%	5.7%	20.0%	48.6%	25.7%	100.0%
		% within Working environment allowing innovations	.0%	28.6%	25.9%	19.1%	22.5%	21.1%
		% of total	.0%	1.2%	4.2%	10.2%	5.4%	21.1%
	Project Management	Amount	1	0	3	14	4	22
		% within Area of IT-function	4.5%	.0%	13.6%	63.6%	18.2%	100.0%
		% within Working environment allowing innovations	33.3%	.0%	11.1%	15.7%	10.0%	13.3%
		% of total	.6%	.0%	1.8%	8.4%	2.4%	13.3%
	Management	Amount	0	3	13	35	11	62
		% within Area of IT-function	.0%	4.8%	21.0%	56.5%	17.7%	100.0%
		% within Working environment allowing innovations	.0%	42.9%	48.1%	39.3%	27.5%	37.3%
		% of total	.0%	1.8%	7.8%	21.1%	6.6%	37.3%
	User Help Desk	Amount	1	0	0	2	2	5
		% within Area of IT-function	20.0%	.0%	.0%	40.0%	40.0%	100.0%
		% within Working environment allowing innovations	33.3%	.0%	.0%	2.2%	5.0%	3.0%
		% of total	.6%	.0%	.0%	1.2%	1.2%	3.0%
	Quality Management	Amount	0	1	0	0	1	2
		% within Area of IT-function	.0%	50.0%	.0%	.0%	50.0%	100.0%
		% within Working environment allowing innovations	.0%	14.3%	.0%	.0%	2.5%	1.2%
		% of total	.0%	.6%	.0%	.0%	.6%	1.2%
	Development	Amount	0	0	0	6	1	7
		% within Area of IT-function	.0%	.0%	.0%	85.7%	14.3%	100.0%
		% within Working environment allowing innovations	.0%	.0%	.0%	6.7%	2.5%	4.2%
		% of total	.0%	.0%	.0%	3.6%	.6%	4.2%
	Operations	Amount	0	1	1	1	2	5
		% within Area of IT-function	.0%	20.0%	20.0%	20.0%	40.0%	100.0%
		% within Working environment allowing innovations	.0%	14.3%	3.7%	1.1%	5.0%	3.0%
		% of total	.0%	.6%	.6%	.6%	1.2%	3.0%
	Test	Amount	1	0	0	0	0	1
		% within Area of IT-function	100.0%	.0%	.0%	.0%	.0%	100.0%
		% within Working environment allowing innovations	33.3%	.0%	.0%	.0%	.0%	.6%
		% of total	.6%	.0%	.0%	.0%	.0%	.6%
	Others	Amount	0	0	3	12	7	22
		% within Area of IT-function	.0%	.0%	13.6%	54.5%	31.8%	100.0%
		% within Working environment allowing innovations	.0%	.0%	11.1%	13.5%	17.5%	13.3%
		% of total	.0%	.0%	1.8%	7.2%	4.2%	13.3%
	Consulting	Amount	0	0	0	2	3	5
		% within Area of IT-function	.0%	.0%	.0%	40.0%	60.0%	100.0%
		% within Working environment allowing innovations	.0%	.0%	.0%	2.2%	7.5%	3.0%
		% of total	.0%	.0%	.0%	1.2%	1.8%	3.0%
Total		Amount	3	7	27	89	40	166
		% within Area of IT-function	1.8%	4.2%	16.3%	53.6%	24.1%	100.0%
		% within Working environment allowing innovations	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	1.8%	4.2%	16.3%	53.6%	24.1%	100.0%

			Reduced bureaucratic burdens					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	0	1	11	17	6	35
		% within Area of IT-function	.0%	2.9%	31.4%	48.6%	17.1%	100.0%
		% within Reduced bureaucratic burdens	.0%	9.1%	32.4%	20.5%	15.8%	21.0%
		% of total	.0%	.6%	6.6%	10.2%	3.6%	21.0%
	Project Management	Amount	0	0	6	8	9	23
		% within Area of IT-function	.0%	.0%	26.1%	34.8%	39.1%	100.0%
		% within Reduced bureaucratic burdens	.0%	.0%	17.6%	9.6%	23.7%	13.8%
		% of total	.0%	.0%	3.6%	4.8%	5.4%	13.8%
	Management	Amount	0	8	10	32	11	61
		% within Area of IT-function	.0%	13.1%	16.4%	52.5%	18.0%	100.0%
		% within Reduced bureaucratic burdens	.0%	72.7%	29.4%	38.6%	28.9%	36.5%
		% of total	.0%	4.8%	6.0%	19.2%	6.6%	36.5%
	User Help Desk	Amount	1	0	0	2	2	5
		% within Area of IT-function	20.0%	.0%	.0%	40.0%	40.0%	100.0%
		% within Reduced bureaucratic burdens	100.0%	.0%	.0%	2.4%	5.3%	3.0%
		% of total	.6%	.0%	.0%	1.2%	1.2%	3.0%
	Quality Management	Amount	0	0	0	1	1	2
		% within Area of IT-function	.0%	.0%	.0%	50.0%	50.0%	100.0%
		% within Reduced bureaucratic burdens	.0%	.0%	.0%	1.2%	2.6%	1.2%
		% of total	.0%	.0%	.0%	.6%	.6%	1.2%
	Development	Amount	0	0	1	6	0	7
		% within Area of IT-function	.0%	.0%	14.3%	85.7%	.0%	100.0%
		% within Reduced bureaucratic burdens	.0%	.0%	2.9%	7.2%	.0%	4.2%
		% of total	.0%	.0%	.6%	3.6%	.0%	4.2%
	Operations	Amount	0	1	2	0	2	5
		% within Area of IT-function	.0%	20.0%	40.0%	.0%	40.0%	100.0%
		% within Reduced bureaucratic burdens	.0%	9.1%	5.9%	.0%	5.3%	3.0%
		% of total	.0%	.6%	1.2%	.0%	1.2%	3.0%
	Test	Amount	0	1	0	0	0	1
		% within Area of IT-function	.0%	100.0%	.0%	.0%	.0%	100.0%
		% within Reduced bureaucratic burdens	.0%	9.1%	.0%	.0%	.0%	.6%
		% of total	.0%	.6%	.0%	.0%	.0%	.6%
	Others	Amount	0	0	3	14	6	23
		% within Area of IT-function	.0%	.0%	13.0%	60.9%	26.1%	100.0%
		% within Reduced bureaucratic burdens	.0%	.0%	8.8%	16.9%	15.8%	13.8%
		% of total	.0%	.0%	1.8%	8.4%	3.6%	13.8%
	Consulting	Amount	0	0	1	3	1	5
		% within Area of IT-function	.0%	.0%	20.0%	60.0%	20.0%	100.0%
		% within Reduced bureaucratic burdens	.0%	.0%	2.9%	3.6%	2.6%	3.0%
		% of total	.0%	.0%	.6%	1.8%	.6%	3.0%
Total		Amount	1	11	34	83	38	167
		% within Area of IT-function	.6%	6.6%	20.4%	49.7%	22.8%	100.0%
		% within Reduced bureaucratic burdens	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	.6%	6.6%	20.4%	49.7%	22.8%	100.0%

			Redundant "production volumes"					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	3	7	10	10	4	34
		% within Area of IT-function	8.8%	20.6%	29.4%	29.4%	11.8%	100.0%
		% within Redundant "production volumes"	33.3%	17.9%	20.8%	21.7%	25.0%	21.5%
		% of total	1.9%	4.4%	6.3%	6.3%	2.5%	21.5%
	Project Management	Amount	1	5	9	5	1	21
		% within Area of IT-function	4.8%	23.8%	42.9%	23.8%	4.8%	100.0%
		% within Redundant "production volumes"	11.1%	12.8%	18.8%	10.9%	6.3%	13.3%
		% of total	.6%	3.2%	5.7%	3.2%	.6%	13.3%
	Management	Amount	2	18	14	18	6	58
		% within Area of IT-function	3.4%	31.0%	24.1%	31.0%	10.3%	100.0%
		% within Redundant "production volumes"	22.2%	46.2%	29.2%	39.1%	37.5%	36.7%
		% of total	1.3%	11.4%	8.9%	11.4%	3.8%	36.7%
	User Help Desk	Amount	1	0	1	3	0	5
		% within Area of IT-function	20.0%	.0%	20.0%	60.0%	.0%	100.0%
		% within Redundant "production volumes"	11.1%	.0%	2.1%	6.5%	.0%	3.2%
		% of total	.6%	.0%	.6%	1.9%	.0%	3.2%
	Quality Management	Amount	0	1	0	0	1	2
		% within Area of IT-function	.0%	50.0%	.0%	.0%	50.0%	100.0%
		% within Redundant "production volumes"	.0%	2.6%	.0%	.0%	6.3%	1.3%
		% of total	.0%	.6%	.0%	.0%	.6%	1.3%
	Development	Amount	0	1	2	3	0	6
		% within Area of IT-function	.0%	16.7%	33.3%	50.0%	.0%	100.0%
		% within Redundant "production volumes"	.0%	2.6%	4.2%	6.5%	.0%	3.8%
		% of total	.0%	.6%	1.3%	1.9%	.0%	3.8%
	Operations	Amount	0	0	3	1	1	5
		% within Area of IT-function	.0%	.0%	60.0%	20.0%	20.0%	100.0%
		% within Redundant "production volumes"	.0%	.0%	6.3%	2.2%	6.3%	3.2%
		% of total	.0%	.0%	1.9%	.6%	.6%	3.2%
	Test	Amount	0	0	0	0	1	1
		% within Area of IT-function	.0%	.0%	.0%	.0%	100.0%	100.0%
		% within Redundant "production volumes"	.0%	.0%	.0%	.0%	6.3%	.6%
		% of total	.0%	.0%	.0%	.0%	.6%	.6%
	Others	Amount	2	5	8	4	2	21
		% within Area of IT-function	9.5%	23.8%	38.1%	19.0%	9.5%	100.0%
		% within Redundant "production volumes"	22.2%	12.8%	16.7%	8.7%	12.5%	13.3%
		% of total	1.3%	3.2%	5.1%	2.5%	1.3%	13.3%
	Consulting	Amount	0	2	1	2	0	5
		% within Area of IT-function	.0%	40.0%	20.0%	40.0%	.0%	100.0%
		% within Redundant "production volumes"	.0%	5.1%	2.1%	4.3%	.0%	3.2%
		% of total	.0%	1.3%	.6%	1.3%	.0%	3.2%
Total		Amount	9	39	48	46	16	158
		% within Area of IT-function	5.7%	24.7%	30.4%	29.1%	10.1%	100.0%
		% within Redundant "production volumes"	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	5.7%	24.7%	30.4%	29.1%	10.1%	100.0%

			Modular technical products and IT services					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	1	2	10	20	3	36
		% within Area of IT-function	2.8%	5.6%	27.8%	55.6%	8.3%	100.0%
		% within Modular technical products and IT services	16.7%	8.3%	17.9%	30.3%	30.0%	22.2%
		% of total	.6%	1.2%	6.2%	12.3%	1.9%	22.2%
	Project Management	Amount	0	8	5	6	3	22
		% within Area of IT-function	.0%	36.4%	22.7%	27.3%	13.6%	100.0%
		% within Modular technical products and IT services	.0%	33.3%	8.9%	9.1%	30.0%	13.6%
		% of total	.0%	4.9%	3.1%	3.7%	1.9%	13.6%
	Management	Amount	2	11	24	20	2	59
		% within Area of IT-function	3.4%	18.6%	40.7%	33.9%	3.4%	100.0%
		% within Modular technical products and IT services	33.3%	45.8%	42.9%	30.3%	20.0%	36.4%
		% of total	1.2%	6.8%	14.8%	12.3%	1.2%	36.4%
	User Help Desk	Amount	1	0	1	3	0	5
		% within Area of IT-function	20.0%	.0%	20.0%	60.0%	.0%	100.0%
		% within Modular technical products and IT services	16.7%	.0%	1.8%	4.5%	.0%	3.1%
		% of total	.6%	.0%	.6%	1.9%	.0%	3.1%
	Quality Management	Amount	0	0	1	0	1	2
		% within Area of IT-function	.0%	.0%	50.0%	.0%	50.0%	100.0%
		% within Modular technical products and IT services	.0%	.0%	1.8%	.0%	10.0%	1.2%
		% of total	.0%	.0%	.6%	.0%	.6%	1.2%
	Development	Amount	0	1	3	3	0	7
		% within Area of IT-function	.0%	14.3%	42.9%	42.9%	.0%	100.0%
		% within Modular technical products and IT services	.0%	4.2%	5.4%	4.5%	.0%	4.3%
		% of total	.0%	.6%	1.9%	1.9%	.0%	4.3%
	Operations	Amount	1	0	2	1	0	4
		% within Area of IT-function	25.0%	.0%	50.0%	25.0%	.0%	100.0%
		% within Modular technical products and IT services	16.7%	.0%	3.6%	1.5%	.0%	2.5%
		% of total	.6%	.0%	1.2%	.6%	.0%	2.5%
	Test	Amount	0	0	1	0	0	1
		% within Area of IT-function	.0%	.0%	100.0%	.0%	.0%	100.0%
		% within Modular technical products and IT services	.0%	.0%	1.8%	.0%	.0%	.6%
		% of total	.0%	.0%	.6%	.0%	.0%	.6%
	Others	Amount	0	2	9	9	1	21
		% within Area of IT-function	.0%	9.5%	42.9%	42.9%	4.8%	100.0%
		% within Modular technical products and IT services	.0%	8.3%	16.1%	13.6%	10.0%	13.0%
		% of total	.0%	1.2%	5.6%	5.6%	.6%	13.0%
	Consulting	Amount	1	0	0	4	0	5
		% within Area of IT-function	20.0%	.0%	.0%	80.0%	.0%	100.0%
		% within Modular technical products and IT services	16.7%	.0%	.0%	6.1%	.0%	3.1%
		% of total	.6%	.0%	.0%	2.5%	.0%	3.1%
Total		Amount	6	24	56	66	10	162
		% within Area of IT-function	3.7%	14.8%	34.6%	40.7%	6.2%	100.0%
		% within Modular technical products and IT services	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	3.7%	14.8%	34.6%	40.7%	6.2%	100.0%

			Realizing credit limits					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	4	7	9	7	3	30
		% within Area of IT-function	13.3%	23.3%	30.0%	23.3%	10.0%	100.0%
		% within Realizing credit limits	17.4%	23.3%	23.7%	26.9%	42.9%	24.2%
		% of total	3.2%	5.6%	7.3%	5.6%	2.4%	24.2%
	Project Management	Amount	2	1	4	7	0	14
		% within Area of IT-function	14.3%	7.1%	28.6%	50.0%	.0%	100.0%
		% within Realizing credit limits	8.7%	3.3%	10.5%	26.9%	.0%	11.3%
		% of total	1.6%	.8%	3.2%	5.6%	.0%	11.3%
	Management	Amount	12	12	13	9	3	49
		% within Area of IT-function	24.5%	24.5%	26.5%	18.4%	6.1%	100.0%
		% within Realizing credit limits	52.2%	40.0%	34.2%	34.6%	42.9%	39.5%
		% of total	9.7%	9.7%	10.5%	7.3%	2.4%	39.5%
	User Help Desk	Amount	1	1	0	1	0	3
		% within Area of IT-function	33.3%	33.3%	.0%	33.3%	.0%	100.0%
		% within Realizing credit limits	4.3%	3.3%	.0%	3.8%	.0%	2.4%
		% of total	.8%	.8%	.0%	.8%	.0%	2.4%
	Quality Management	Amount	0	0	1	1	0	2
		% within Area of IT-function	.0%	.0%	50.0%	50.0%	.0%	100.0%
		% within Realizing credit limits	.0%	.0%	2.6%	3.8%	.0%	1.6%
		% of total	.0%	.0%	.8%	.8%	.0%	1.6%
	Development	Amount	1	0	3	0	0	4
		% within Area of IT-function	25.0%	.0%	75.0%	.0%	.0%	100.0%
		% within Realizing credit limits	4.3%	.0%	7.9%	.0%	.0%	3.2%
		% of total	.8%	.0%	2.4%	.0%	.0%	3.2%
	Operations	Amount	1	0	2	1	0	4
		% within Area of IT-function	25.0%	.0%	50.0%	25.0%	.0%	100.0%
		% within Realizing credit limits	4.3%	.0%	5.3%	3.8%	.0%	3.2%
		% of total	.8%	.0%	1.6%	.8%	.0%	3.2%
	Test	Amount	0	0	0	0	1	1
		% within Area of IT-function	.0%	.0%	.0%	.0%	100.0%	100.0%
		% within Realizing credit limits	.0%	.0%	.0%	.0%	14.3%	.8%
		% of total	.0%	.0%	.0%	.0%	.8%	.8%
	Others	Amount	2	6	5	0	0	13
		% within Area of IT-function	15.4%	46.2%	38.5%	.0%	.0%	100.0%
		% within Realizing credit limits	8.7%	20.0%	13.2%	.0%	.0%	10.5%
		% of total	1.6%	4.8%	4.0%	.0%	.0%	10.5%
	Consulting	Amount	0	3	1	0	0	4
		% within Area of IT-function	.0%	75.0%	25.0%	.0%	.0%	100.0%
		% within Realizing credit limits	.0%	10.0%	2.6%	.0%	.0%	3.2%
		% of total	.0%	2.4%	.8%	.0%	.0%	3.2%
Total		Amount	23	30	38	26	7	124
		% within Area of IT-function	18.5%	24.2%	30.6%	21.0%	5.6%	100.0%
		% within Realizing credit limits	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	18.5%	24.2%	30.6%	21.0%	5.6%	100.0%

			Mezzanine capital				Total
			very low	low	medium	high	
Area of IT-function	Controlling	Amount	7	7	5	1	20
		% within Area of IT-function	35.0%	35.0%	25.0%	5.0%	100.0%
		% within Mezzanine capital	17.5%	28.0%	29.4%	33.3%	23.5%
		% of total	8.2%	8.2%	5.9%	1.2%	23.5%
	Project Management	Amount	4	5	4	0	13
		% within Area of IT-function	30.8%	38.5%	30.8%	.0%	100.0%
		% within Mezzanine capital	10.0%	20.0%	23.5%	.0%	15.3%
		% of total	4.7%	5.9%	4.7%	.0%	15.3%
	Management	Amount	19	8	3	0	30
		% within Area of IT-function	63.3%	26.7%	10.0%	.0%	100.0%
		% within Mezzanine capital	47.5%	32.0%	17.6%	.0%	35.3%
		% of total	22.4%	9.4%	3.5%	.0%	35.3%
	User Help Desk	Amount	2	0	0	0	2
		% within Area of IT-function	100.0%	.0%	.0%	.0%	100.0%
		% within Mezzanine capital	5.0%	.0%	.0%	.0%	2.4%
		% of total	2.4%	.0%	.0%	.0%	2.4%
	Quality Management	Amount	1	0	0	0	1
		% within Area of IT-function	100.0%	.0%	.0%	.0%	100.0%
		% within Mezzanine capital	2.5%	.0%	.0%	.0%	1.2%
		% of total	1.2%	.0%	.0%	.0%	1.2%
	Development	Amount	0	1	0	1	2
		% within Area of IT-function	.0%	50.0%	.0%	50.0%	100.0%
		% within Mezzanine capital	.0%	4.0%	.0%	33.3%	2.4%
		% of total	.0%	1.2%	.0%	1.2%	2.4%
	Operations	Amount	2	1	0	0	3
		% within Area of IT-function	66.7%	33.3%	.0%	.0%	100.0%
		% within Mezzanine capital	5.0%	4.0%	.0%	.0%	3.5%
		% of total	2.4%	1.2%	.0%	.0%	3.5%
	Test	Amount	1	0	0	0	1
		% within Area of IT-function	100.0%	.0%	.0%	.0%	100.0%
		% within Mezzanine capital	2.5%	.0%	.0%	.0%	1.2%
		% of total	1.2%	.0%	.0%	.0%	1.2%
	Others	Amount	3	2	3	1	9
		% within Area of IT-function	33.3%	22.2%	33.3%	11.1%	100.0%
		% within Mezzanine capital	7.5%	8.0%	17.6%	33.3%	10.6%
		% of total	3.5%	2.4%	3.5%	1.2%	10.6%
	Consulting	Amount	1	1	2	0	4
		% within Area of IT-function	25.0%	25.0%	50.0%	.0%	100.0%
		% within Mezzanine capital	2.5%	4.0%	11.8%	.0%	4.7%
		% of total	1.2%	1.2%	2.4%	.0%	4.7%
Total		Amount	40	25	17	3	85
		% within Area of IT-function	47.1%	29.4%	20.0%	3.5%	100.0%
		% within Mezzanine capital	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	47.1%	29.4%	20.0%	3.5%	100.0%

			Top-down/button-up planning					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	1	8	8	12	4	33
		% within Area of IT-function	3.0%	24.2%	24.2%	36.4%	12.1%	100.0%
		% within Top-down/button-up planning	20.0%	29.6%	14.8%	26.1%	40.0%	23.2%
		% of total	.7%	5.6%	5.6%	8.5%	2.8%	23.2%
	Project Management	Amount	0	5	7	7	1	20
		% within Area of IT-function	.0%	25.0%	35.0%	35.0%	5.0%	100.0%
		% within Top-down/button-up planning	.0%	18.5%	13.0%	15.2%	10.0%	14.1%
		% of total	.0%	3.5%	4.9%	4.9%	.7%	14.1%
	Management	Amount	2	8	22	19	4	55
		% within Area of IT-function	3.6%	14.5%	40.0%	34.5%	7.3%	100.0%
		% within Top-down/button-up planning	40.0%	29.6%	40.7%	41.3%	40.0%	38.7%
		% of total	1.4%	5.6%	15.5%	13.4%	2.8%	38.7%
	User Help Desk	Amount	1	0	2	0	0	3
		% within Area of IT-function	33.3%	.0%	66.7%	.0%	.0%	100.0%
		% within Top-down/button-up planning	20.0%	.0%	3.7%	.0%	.0%	2.1%
		% of total	.7%	.0%	1.4%	.0%	.0%	2.1%
	Quality Management	Amount	0	0	0	1	0	1
		% within Area of IT-function	.0%	.0%	.0%	100.0%	.0%	100.0%
		% within Top-down/button-up planning	.0%	.0%	.0%	2.2%	.0%	.7%
		% of total	.0%	.0%	.0%	.7%	.0%	.7%
	Development	Amount	0	1	2	1	0	4
		% within Area of IT-function	.0%	25.0%	50.0%	25.0%	.0%	100.0%
		% within Top-down/button-up planning	.0%	3.7%	3.7%	2.2%	.0%	2.8%
		% of total	.0%	.7%	1.4%	.7%	.0%	2.8%
	Operations	Amount	1	1	1	1	0	4
		% within Area of IT-function	25.0%	25.0%	25.0%	25.0%	.0%	100.0%
		% within Top-down/button-up planning	20.0%	3.7%	1.9%	2.2%	.0%	2.8%
		% of total	.7%	.7%	.7%	.7%	.0%	2.8%
	Test	Amount	0	1	0	0	0	1
		% within Area of IT-function	.0%	100.0%	.0%	.0%	.0%	100.0%
		% within Top-down/button-up planning	.0%	3.7%	.0%	.0%	.0%	.7%
		% of total	.0%	.7%	.0%	.0%	.0%	.7%
	Others	Amount	0	3	9	4	1	17
		% within Area of IT-function	.0%	17.6%	52.9%	23.5%	5.9%	100.0%
		% within Top-down/button-up planning	.0%	11.1%	16.7%	8.7%	10.0%	12.0%
		% of total	.0%	2.1%	6.3%	2.8%	.7%	12.0%
	Consulting	Amount	0	0	3	1	0	4
		% within Area of IT-function	.0%	.0%	75.0%	25.0%	.0%	100.0%
		% within Top-down/button-up planning	.0%	.0%	5.6%	2.2%	.0%	2.8%
		% of total	.0%	.0%	2.1%	.7%	.0%	2.8%
Total		Amount	5	27	54	46	10	142
		% within Area of IT-function	3.5%	19.0%	38.0%	32.4%	7.0%	100.0%
		% within Top-down/button-up planning	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	3.5%	19.0%	38.0%	32.4%	7.0%	100.0%

			Planning with modular plans					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	3	4	11	14	2	34
		% within Area of IT-function	8.8%	11.8%	32.4%	41.2%	5.9%	100.0%
		% within Planning with modular plans	27.3%	9.5%	19.0%	36.8%	22.2%	21.5%
		% of total	1.9%	2.5%	7.0%	8.9%	1.3%	21.5%
	Project Management	Amount	2	5	10	4	0	21
		% within Area of IT-function	9.5%	23.8%	47.6%	19.0%	.0%	100.0%
		% within Planning with modular plans	18.2%	11.9%	17.2%	10.5%	.0%	13.3%
		% of total	1.3%	3.2%	6.3%	2.5%	.0%	13.3%
	Management	Amount	4	21	23	9	4	61
		% within Area of IT-function	6.6%	34.4%	37.7%	14.8%	6.6%	100.0%
		% within Planning with modular plans	36.4%	50.0%	39.7%	23.7%	44.4%	38.6%
		% of total	2.5%	13.3%	14.6%	5.7%	2.5%	38.6%
	User Help Desk	Amount	1	1	1	0	0	3
		% within Area of IT-function	33.3%	33.3%	33.3%	.0%	.0%	100.0%
		% within Planning with modular plans	9.1%	2.4%	1.7%	.0%	.0%	1.9%
		% of total	.6%	.6%	.6%	.0%	.0%	1.9%
	Quality Management	Amount	0	1	0	0	1	2
		% within Area of IT-function	.0%	50.0%	.0%	.0%	50.0%	100.0%
		% within Planning with modular plans	.0%	2.4%	.0%	.0%	11.1%	1.3%
		% of total	.0%	.6%	.0%	.0%	.6%	1.3%
	Development	Amount	0	1	4	1	0	6
		% within Area of IT-function	.0%	16.7%	66.7%	16.7%	.0%	100.0%
		% within Planning with modular plans	.0%	2.4%	6.9%	2.6%	.0%	3.8%
		% of total	.0%	.6%	2.5%	.6%	.0%	3.8%
	Operations	Amount	0	4	0	0	0	4
		% within Area of IT-function	.0%	100.0%	.0%	.0%	.0%	100.0%
		% within Planning with modular plans	.0%	9.5%	.0%	.0%	.0%	2.5%
		% of total	.0%	2.5%	.0%	.0%	.0%	2.5%
	Test	Amount	0	0	1	0	0	1
		% within Area of IT-function	.0%	.0%	100.0%	.0%	.0%	100.0%
		% within Planning with modular plans	.0%	.0%	1.7%	.0%	.0%	.6%
		% of total	.0%	.0%	.6%	.0%	.0%	.6%
	Others	Amount	1	5	8	6	1	21
		% within Area of IT-function	4.8%	23.8%	38.1%	28.6%	4.8%	100.0%
		% within Planning with modular plans	9.1%	11.9%	13.8%	15.8%	11.1%	13.3%
		% of total	.6%	3.2%	5.1%	3.8%	.6%	13.3%
	Consulting	Amount	0	0	0	4	1	5
		% within Area of IT-function	.0%	.0%	.0%	80.0%	20.0%	100.0%
		% within Planning with modular plans	.0%	.0%	.0%	10.5%	11.1%	3.2%
		% of total	.0%	.0%	.0%	2.5%	.6%	3.2%
Total		Amount	11	42	58	38	9	158
		% within Area of IT-function	7.0%	26.6%	36.7%	24.1%	5.7%	100.0%
		% within Planning with modular plans	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	7.0%	26.6%	36.7%	24.1%	5.7%	100.0%

			Convertible bonds				Total
			very low	low	medium	high	
Area of IT-function	Controlling	Amount	9	8	5	0	22
		% within Area of IT-function	40.9%	36.4%	22.7%	.0%	100.0%
		% within Convertible bonds	19.6%	27.6%	23.8%	.0%	22.4%
		% of total	9.2%	8.2%	5.1%	.0%	22.4%
	Project Management	Amount	4	2	6	1	13
		% within Area of IT-function	30.8%	15.4%	46.2%	7.7%	100.0%
		% within Convertible bonds	8.7%	6.9%	28.6%	50.0%	13.3%
		% of total	4.1%	2.0%	6.1%	1.0%	13.3%
	Management	Amount	21	14	3	0	38
		% within Area of IT-function	55.3%	36.8%	7.9%	.0%	100.0%
		% within Convertible bonds	45.7%	48.3%	14.3%	.0%	38.8%
		% of total	21.4%	14.3%	3.1%	.0%	38.8%
	User Help Desk	Amount	2	0	1	0	3
		% within Area of IT-function	66.7%	.0%	33.3%	.0%	100.0%
		% within Convertible bonds	4.3%	.0%	4.8%	.0%	3.1%
		% of total	2.0%	.0%	1.0%	.0%	3.1%
	Quality Management	Amount	0	1	0	0	1
		% within Area of IT-function	.0%	100.0%	.0%	.0%	100.0%
		% within Convertible bonds	.0%	3.4%	.0%	.0%	1.0%
		% of total	.0%	1.0%	.0%	.0%	1.0%
	Development	Amount	1	1	0	0	2
		% within Area of IT-function	50.0%	50.0%	.0%	.0%	100.0%
		% within Convertible bonds	2.2%	3.4%	.0%	.0%	2.0%
		% of total	1.0%	1.0%	.0%	.0%	2.0%
	Operations	Amount	3	0	1	0	4
		% within Area of IT-function	75.0%	.0%	25.0%	.0%	100.0%
		% within Convertible bonds	6.5%	.0%	4.8%	.0%	4.1%
		% of total	3.1%	.0%	1.0%	.0%	4.1%
	Test	Amount	1	0	0	0	1
		% within Area of IT-function	100.0%	.0%	.0%	.0%	100.0%
		% within Convertible bonds	2.2%	.0%	.0%	.0%	1.0%
		% of total	1.0%	.0%	.0%	.0%	1.0%
	Others	Amount	5	2	4	1	12
		% within Area of IT-function	41.7%	16.7%	33.3%	8.3%	100.0%
		% within Convertible bonds	10.9%	6.9%	19.0%	50.0%	12.2%
		% of total	5.1%	2.0%	4.1%	1.0%	12.2%
	Consulting	Amount	0	1	1	0	2
		% within Area of IT-function	.0%	50.0%	50.0%	.0%	100.0%
		% within Convertible bonds	.0%	3.4%	4.8%	.0%	2.0%
		% of total	.0%	1.0%	1.0%	.0%	2.0%
Total		Amount	46	29	21	2	98
		% within Area of IT-function	46.9%	29.6%	21.4%	2.0%	100.0%
		% within Convertible bonds	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	46.9%	29.6%	21.4%	2.0%	100.0%

			Sale-and-lease-back					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	5	8	13	4	0	30
		% within Area of IT-function	16.7%	26.7%	43.3%	13.3%	.0%	100.0%
		% within Sale-and-lease-back	14.7%	21.1%	32.5%	20.0%	.0%	22.6%
		% of total	3.8%	6.0%	9.8%	3.0%	.0%	22.6%
	Project Management	Amount	4	5	4	3	1	17
		% within Area of IT-function	23.5%	29.4%	23.5%	17.6%	5.9%	100.0%
		% within Sale-and-lease-back	11.8%	13.2%	10.0%	15.0%	100.0%	12.8%
		% of total	3.0%	3.8%	3.0%	2.3%	.8%	12.8%
	Management	Amount	15	14	13	10	0	52
		% within Area of IT-function	28.8%	26.9%	25.0%	19.2%	.0%	100.0%
		% within Sale-and-lease-back	44.1%	36.8%	32.5%	50.0%	.0%	39.1%
		% of total	11.3%	10.5%	9.8%	7.5%	.0%	39.1%
	User Help Desk	Amount	2	0	1	0	0	3
		% within Area of IT-function	66.7%	.0%	33.3%	.0%	.0%	100.0%
		% within Sale-and-lease-back	5.9%	.0%	2.5%	.0%	.0%	2.3%
		% of total	1.5%	.0%	.8%	.0%	.0%	2.3%
	Quality Management	Amount	0	1	0	0	0	1
		% within Area of IT-function	.0%	100.0%	.0%	.0%	.0%	100.0%
		% within Sale-and-lease-back	.0%	2.6%	.0%	.0%	.0%	.8%
		% of total	.0%	.8%	.0%	.0%	.0%	.8%
	Development	Amount	2	1	2	0	0	5
		% within Area of IT-function	40.0%	20.0%	40.0%	.0%	.0%	100.0%
		% within Sale-and-lease-back	5.9%	2.6%	5.0%	.0%	.0%	3.8%
		% of total	1.5%	.8%	1.5%	.0%	.0%	3.8%
	Operations	Amount	1	1	2	0	0	4
		% within Area of IT-function	25.0%	25.0%	50.0%	.0%	.0%	100.0%
		% within Sale-and-lease-back	2.9%	2.6%	5.0%	.0%	.0%	3.0%
		% of total	.8%	.8%	1.5%	.0%	.0%	3.0%
	Test	Amount	1	0	0	0	0	1
		% within Area of IT-function	100.0%	.0%	.0%	.0%	.0%	100.0%
		% within Sale-and-lease-back	2.9%	.0%	.0%	.0%	.0%	.8%
		% of total	.8%	.0%	.0%	.0%	.0%	.8%
	Others	Amount	3	6	5	2	0	16
		% within Area of IT-function	18.8%	37.5%	31.3%	12.5%	.0%	100.0%
		% within Sale-and-lease-back	8.8%	15.8%	12.5%	10.0%	.0%	12.0%
		% of total	2.3%	4.5%	3.8%	1.5%	.0%	12.0%
	Consulting	Amount	1	2	0	1	0	4
		% within Area of IT-function	25.0%	50.0%	.0%	25.0%	.0%	100.0%
		% within Sale-and-lease-back	2.9%	5.3%	.0%	5.0%	.0%	3.0%
		% of total	.8%	1.5%	.0%	.8%	.0%	3.0%
Total		Amount	34	38	40	20	1	133
		% within Area of IT-function	25.6%	28.6%	30.1%	15.0%	.8%	100.0%
		% within Sale-and-lease-back	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	25.6%	28.6%	30.1%	15.0%	.8%	100.0%

			Stakeholder-specific reporting					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	1	3	10	11	11	36
		% within Area of IT-function	2.8%	8.3%	27.8%	30.6%	30.6%	100.0%
		% within Stakeholder-specific reporting	16.7%	20.0%	22.7%	16.7%	44.0%	23.1%
		% of total	.6%	1.9%	6.4%	7.1%	7.1%	23.1%
	Project Management	Amount	0	2	6	9	2	19
		% within Area of IT-function	.0%	10.5%	31.6%	47.4%	10.5%	100.0%
		% within Stakeholder-specific reporting	.0%	13.3%	13.6%	13.6%	8.0%	12.2%
		% of total	.0%	1.3%	3.8%	5.8%	1.3%	12.2%
	Management	Amount	2	8	18	24	8	60
		% within Area of IT-function	3.3%	13.3%	30.0%	40.0%	13.3%	100.0%
		% within Stakeholder-specific reporting	33.3%	53.3%	40.9%	36.4%	32.0%	38.5%
		% of total	1.3%	5.1%	11.5%	15.4%	5.1%	38.5%
	User Help Desk	Amount	1	0	0	2	1	4
		% within Area of IT-function	25.0%	.0%	.0%	50.0%	25.0%	100.0%
		% within Stakeholder-specific reporting	16.7%	.0%	.0%	3.0%	4.0%	2.6%
		% of total	.6%	.0%	.0%	1.3%	.6%	2.6%
	Quality Management	Amount	0	0	1	1	0	2
		% within Area of IT-function	.0%	.0%	50.0%	50.0%	.0%	100.0%
		% within Stakeholder-specific reporting	.0%	.0%	2.3%	1.5%	.0%	1.3%
		% of total	.0%	.0%	.6%	.6%	.0%	1.3%
	Development	Amount	0	0	2	4	1	7
		% within Area of IT-function	.0%	.0%	28.6%	57.1%	14.3%	100.0%
		% within Stakeholder-specific reporting	.0%	.0%	4.5%	6.1%	4.0%	4.5%
		% of total	.0%	.0%	1.3%	2.6%	.6%	4.5%
	Operations	Amount	1	1	2	0	0	4
		% within Area of IT-function	25.0%	25.0%	50.0%	.0%	.0%	100.0%
		% within Stakeholder-specific reporting	16.7%	6.7%	4.5%	.0%	.0%	2.6%
		% of total	.6%	.6%	1.3%	.0%	.0%	2.6%
	Test	Amount	0	0	1	0	0	1
		% within Area of IT-function	.0%	.0%	100.0%	.0%	.0%	100.0%
		% within Stakeholder-specific reporting	.0%	.0%	2.3%	.0%	.0%	.6%
		% of total	.0%	.0%	.6%	.0%	.0%	.6%
	Others	Amount	1	0	4	12	1	18
		% within Area of IT-function	5.6%	.0%	22.2%	66.7%	5.6%	100.0%
		% within Stakeholder-specific reporting	16.7%	.0%	9.1%	18.2%	4.0%	11.5%
		% of total	.6%	.0%	2.6%	7.7%	.6%	11.5%
	Consulting	Amount	0	1	0	3	1	5
		% within Area of IT-function	.0%	20.0%	.0%	60.0%	20.0%	100.0%
		% within Stakeholder-specific reporting	.0%	6.7%	.0%	4.5%	4.0%	3.2%
		% of total	.0%	.6%	.0%	1.9%	.6%	3.2%
Total		Amount	6	15	44	66	25	156
		% within Area of IT-function	3.8%	9.6%	28.2%	42.3%	16.0%	100.0%
		% within Stakeholder-specific reporting	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	3.8%	9.6%	28.2%	42.3%	16.0%	100.0%

			Variable credit interests					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	7	9	3	8	1	28
		% within Area of IT-function	25.0%	32.1%	10.7%	28.6%	3.6%	100.0%
		% within Variable credit interests	22.6%	28.1%	10.3%	33.3%	50.0%	23.7%
		% of total	5.9%	7.6%	2.5%	6.8%	.8%	23.7%
	Project Management	Amount	2	3	6	5	0	16
		% within Area of IT-function	12.5%	18.8%	37.5%	31.3%	.0%	100.0%
		% within Variable credit interests	6.5%	9.4%	20.7%	20.8%	.0%	13.6%
		% of total	1.7%	2.5%	5.1%	4.2%	.0%	13.6%
	Management	Amount	15	11	11	7	1	45
		% within Area of IT-function	33.3%	24.4%	24.4%	15.6%	2.2%	100.0%
		% within Variable credit interests	48.4%	34.4%	37.9%	29.2%	50.0%	38.1%
		% of total	12.7%	9.3%	9.3%	5.9%	.8%	38.1%
	User Help Desk	Amount	2	1	0	0	0	3
		% within Area of IT-function	66.7%	33.3%	.0%	.0%	.0%	100.0%
		% within Variable credit interests	6.5%	3.1%	.0%	.0%	.0%	2.5%
		% of total	1.7%	.8%	.0%	.0%	.0%	2.5%
	Quality Management	Amount	0	0	1	1	0	2
		% within Area of IT-function	.0%	.0%	50.0%	50.0%	.0%	100.0%
		% within Variable credit interests	.0%	.0%	3.4%	4.2%	.0%	1.7%
		% of total	.0%	.0%	.8%	.8%	.0%	1.7%
	Development	Amount	1	1	1	0	0	3
		% within Area of IT-function	33.3%	33.3%	33.3%	.0%	.0%	100.0%
		% within Variable credit interests	3.2%	3.1%	3.4%	.0%	.0%	2.5%
		% of total	.8%	.8%	.8%	.0%	.0%	2.5%
	Operations	Amount	1	0	1	1	0	3
		% within Area of IT-function	33.3%	.0%	33.3%	33.3%	.0%	100.0%
		% within Variable credit interests	3.2%	.0%	3.4%	4.2%	.0%	2.5%
		% of total	.8%	.0%	.8%	.8%	.0%	2.5%
	Test	Amount	0	0	0	1	0	1
		% within Area of IT-function	.0%	.0%	.0%	100.0%	.0%	100.0%
		% within Variable credit interests	.0%	.0%	.0%	4.2%	.0%	.8%
		% of total	.0%	.0%	.0%	.8%	.0%	.8%
	Others	Amount	3	5	5	1	0	14
		% within Area of IT-function	21.4%	35.7%	35.7%	7.1%	.0%	100.0%
		% within Variable credit interests	9.7%	15.6%	17.2%	4.2%	.0%	11.9%
		% of total	2.5%	4.2%	4.2%	.8%	.0%	11.9%
	Consulting	Amount	0	2	1	0	0	3
		% within Area of IT-function	.0%	66.7%	33.3%	.0%	.0%	100.0%
		% within Variable credit interests	.0%	6.3%	3.4%	.0%	.0%	2.5%
		% of total	.0%	1.7%	.8%	.0%	.0%	2.5%
Total		Amount	31	32	29	24	2	118
		% within Area of IT-function	26.3%	27.1%	24.6%	20.3%	1.7%	100.0%
		% within Variable credit interests	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	26.3%	27.1%	24.6%	20.3%	1.7%	100.0%

			Different communication platforms providing the same content					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	6	10	13	5	1	35
		% within Area of IT-function	17.1%	28.6%	37.1%	14.3%	2.9%	100.0%
		% within Different communication platforms providing the same content	16.2%	21.3%	33.3%	17.2%	14.3%	22.0%
		% of total	3.8%	6.3%	8.2%	3.1%	.6%	22.0%
	Project Management	Amount	4	9	3	4	2	22
		% within Area of IT-function	18.2%	40.9%	13.6%	18.2%	9.1%	100.0%
		% within Different communication platforms providing the same content	10.8%	19.1%	7.7%	13.8%	28.6%	13.8%
		% of total	2.5%	5.7%	1.9%	2.5%	1.3%	13.8%
	Management	Amount	15	17	13	12	2	59
		% within Area of IT-function	25.4%	28.8%	22.0%	20.3%	3.4%	100.0%
		% within Different communication platforms providing the same content	40.5%	36.2%	33.3%	41.4%	28.6%	37.1%
		% of total	9.4%	10.7%	8.2%	7.5%	1.3%	37.1%
	User Help Desk	Amount	1	1	1	1	0	4
		% within Area of IT-function	25.0%	25.0%	25.0%	25.0%	.0%	100.0%
		% within Different communication platforms providing the same content	2.7%	2.1%	2.6%	3.4%	.0%	2.5%
		% of total	.6%	.6%	.6%	.6%	.0%	2.5%
	Quality Management	Amount	1	0	0	1	0	2
		% within Area of IT-function	50.0%	.0%	.0%	50.0%	.0%	100.0%
		% within Different communication platforms providing the same content	2.7%	.0%	.0%	3.4%	.0%	1.3%
		% of total	.6%	.0%	.0%	.6%	.0%	1.3%
	Development	Amount	0	4	2	1	0	7
		% within Area of IT-function	.0%	57.1%	28.6%	14.3%	.0%	100.0%
		% within Different communication platforms providing the same content	.0%	8.5%	5.1%	3.4%	.0%	4.4%
		% of total	.0%	2.5%	1.3%	.6%	.0%	4.4%
	Operations	Amount	3	0	1	0	0	4
		% within Area of IT-function	75.0%	.0%	25.0%	.0%	.0%	100.0%
		% within Different communication platforms providing the same content	8.1%	.0%	2.6%	.0%	.0%	2.5%
		% of total	1.9%	.0%	.6%	.0%	.0%	2.5%
	Test	Amount	0	1	0	0	0	1
		% within Area of IT-function	.0%	100.0%	.0%	.0%	.0%	100.0%
		% within Different communication platforms providing the same content	.0%	2.1%	.0%	.0%	.0%	.6%
		% of total	.0%	.6%	.0%	.0%	.0%	.6%
	Others	Amount	6	4	5	5	1	21
		% within Area of IT-function	28.6%	19.0%	23.8%	23.8%	4.8%	100.0%
		% within Different communication platforms providing the same content	16.2%	8.5%	12.8%	17.2%	14.3%	13.2%
		% of total	3.8%	2.5%	3.1%	3.1%	.6%	13.2%
	Consulting	Amount	1	1	1	0	1	4
		% within Area of IT-function	25.0%	25.0%	25.0%	.0%	25.0%	100.0%
		% within Different communication platforms providing the same content	2.7%	2.1%	2.6%	.0%	14.3%	2.5%
		% of total	.6%	.6%	.6%	.0%	.6%	2.5%
Total		Amount	37	47	39	29	7	159
		% within Area of IT-function	23.3%	29.6%	24.5%	18.2%	4.4%	100.0%
		% within Different communication platforms providing the same content	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	23.3%	29.6%	24.5%	18.2%	4.4%	100.0%

			Preparation of individual communication modules					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	4	10	10	7	1	32
		% within Area of IT-function	12.5%	31.3%	31.3%	21.9%	3.1%	100.0%
		% within Preparation of individual communication modules	16.7%	18.9%	22.7%	21.9%	50.0%	20.6%
		% of total	2.6%	6.5%	6.5%	4.5%	.6%	20.6%
	Project Management	Amount	6	6	4	4	1	21
		% within Area of IT-function	28.6%	28.6%	19.0%	19.0%	4.8%	100.0%
		% within Preparation of individual communication modules	25.0%	11.3%	9.1%	12.5%	50.0%	13.5%
		% of total	3.9%	3.9%	2.6%	2.6%	.6%	13.5%
	Management	Amount	6	21	19	14	0	60
		% within Area of IT-function	10.0%	35.0%	31.7%	23.3%	.0%	100.0%
		% within Preparation of individual communication modules	25.0%	39.6%	43.2%	43.8%	.0%	38.7%
		% of total	3.9%	13.5%	12.3%	9.0%	.0%	38.7%
	User Help Desk	Amount	1	1	1	1	0	4
		% within Area of IT-function	25.0%	25.0%	25.0%	25.0%	.0%	100.0%
		% within Preparation of individual communication modules	4.2%	1.9%	2.3%	3.1%	.0%	2.6%
		% of total	.6%	.6%	.6%	.6%	.0%	2.6%
	Quality Management	Amount	0	1	0	1	0	2
		% within Area of IT-function	.0%	50.0%	.0%	50.0%	.0%	100.0%
		% within Preparation of individual communication modules	.0%	1.9%	.0%	3.1%	.0%	1.3%
		% of total	.0%	.6%	.0%	.6%	.0%	1.3%
	Development	Amount	1	3	2	1	0	7
		% within Area of IT-function	14.3%	42.9%	28.6%	14.3%	.0%	100.0%
		% within Preparation of individual communication modules	4.2%	5.7%	4.5%	3.1%	.0%	4.5%
		% of total	.6%	1.9%	1.3%	.6%	.0%	4.5%
	Operations	Amount	1	3	1	0	0	5
		% within Area of IT-function	20.0%	60.0%	20.0%	.0%	.0%	100.0%
		% within Preparation of individual communication modules	4.2%	5.7%	2.3%	.0%	.0%	3.2%
		% of total	.6%	1.9%	.6%	.0%	.0%	3.2%
	Test	Amount	1	0	0	0	0	1
		% within Area of IT-function	100.0%	.0%	.0%	.0%	.0%	100.0%
		% within Preparation of individual communication modules	4.2%	.0%	.0%	.0%	.0%	.6%
		% of total	.6%	.0%	.0%	.0%	.0%	.6%
	Others	Amount	4	8	4	4	0	20
		% within Area of IT-function	20.0%	40.0%	20.0%	20.0%	.0%	100.0%
		% within Preparation of individual communication modules	16.7%	15.1%	9.1%	12.5%	.0%	12.9%
		% of total	2.6%	5.2%	2.6%	2.6%	.0%	12.9%
	Consulting	Amount	0	0	3	0	0	3
		% within Area of IT-function	.0%	.0%	100.0%	.0%	.0%	100.0%
		% within Preparation of individual communication modules	.0%	.0%	6.8%	.0%	.0%	1.9%
		% of total	.0%	.0%	1.9%	.0%	.0%	1.9%
Total		Amount	24	53	44	32	2	155
		% within Area of IT-function	15.5%	34.2%	28.4%	20.6%	1.3%	100.0%
		% within Preparation of individual communication modules	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	15.5%	34.2%	28.4%	20.6%	1.3%	100.0%

			Increase knowledge base by inter-functional communication					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	1	3	5	13	12	34
		% within Area of IT-function	2.9%	8.8%	14.7%	38.2%	35.3%	100.0%
		% within Increase knowledge base by inter-functional communication	33.3%	27.3%	20.8%	17.3%	23.1%	20.6%
		% of total	.6%	1.8%	3.0%	7.9%	7.3%	20.6%
	Project Management	Amount	0	3	3	10	5	21
		% within Area of IT-function	.0%	14.3%	14.3%	47.6%	23.8%	100.0%
		% within Increase knowledge base by inter-functional communication	.0%	27.3%	12.5%	13.3%	9.6%	12.7%
		% of total	.0%	1.8%	1.8%	6.1%	3.0%	12.7%
	Management	Amount	2	1	10	31	20	64
		% within Area of IT-function	3.1%	1.6%	15.6%	48.4%	31.3%	100.0%
		% within Increase knowledge base by inter-functional communication	66.7%	9.1%	41.7%	41.3%	38.5%	38.8%
		% of total	1.2%	.6%	6.1%	18.8%	12.1%	38.8%
	User Help Desk	Amount	0	1	0	1	2	4
		% within Area of IT-function	.0%	25.0%	.0%	25.0%	50.0%	100.0%
		% within Increase knowledge base by inter-functional communication	.0%	9.1%	.0%	1.3%	3.8%	2.4%
		% of total	.0%	.6%	.0%	.6%	1.2%	2.4%
	Quality Management	Amount	0	0	1	0	1	2
		% within Area of IT-function	.0%	.0%	50.0%	.0%	50.0%	100.0%
		% within Increase knowledge base by inter-functional communication	.0%	.0%	4.2%	.0%	1.9%	1.2%
		% of total	.0%	.0%	.6%	.0%	.6%	1.2%
	Development	Amount	0	0	2	4	1	7
		% within Area of IT-function	.0%	.0%	28.6%	57.1%	14.3%	100.0%
		% within Increase knowledge base by inter-functional communication	.0%	.0%	8.3%	5.3%	1.9%	4.2%
		% of total	.0%	.0%	1.2%	2.4%	.6%	4.2%
	Operations	Amount	0	1	0	2	2	5
		% within Area of IT-function	.0%	20.0%	.0%	40.0%	40.0%	100.0%
		% within Increase knowledge base by inter-functional communication	.0%	9.1%	.0%	2.7%	3.8%	3.0%
		% of total	.0%	.6%	.0%	1.2%	1.2%	3.0%
	Test	Amount	0	1	0	0	0	1
		% within Area of IT-function	.0%	100.0%	.0%	.0%	.0%	100.0%
		% within Increase knowledge base by inter-functional communication	.0%	9.1%	.0%	.0%	.0%	.6%
		% of total	.0%	.6%	.0%	.0%	.0%	.6%
	Others	Amount	0	1	3	12	7	23
		% within Area of IT-function	.0%	4.3%	13.0%	52.2%	30.4%	100.0%
		% within Increase knowledge base by inter-functional communication	.0%	9.1%	12.5%	16.0%	13.5%	13.9%
		% of total	.0%	.6%	1.8%	7.3%	4.2%	13.9%
	Consulting	Amount	0	0	0	2	2	4
		% within Area of IT-function	.0%	.0%	.0%	50.0%	50.0%	100.0%
		% within Increase knowledge base by inter-functional communication	.0%	.0%	.0%	2.7%	3.8%	2.4%
		% of total	.0%	.0%	.0%	1.2%	1.2%	2.4%
Total		Amount	3	11	24	75	52	165
		% within Area of IT-function	1.8%	6.7%	14.5%	45.5%	31.5%	100.0%
		% within Increase knowledge base by inter-functional communication	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	1.8%	6.7%	14.5%	45.5%	31.5%	100.0%

			Improved employee's communication abilities					Total
			very low	low	medium	high	very high	
Area of IT-function	Controlling	Amount	0	5	4	17	10	36
		% within Area of IT-function	.0%	13.9%	11.1%	47.2%	27.8%	100.0%
		% within Improved employee's communication abilities	.0%	45.5%	13.8%	20.7%	22.2%	21.2%
		% of total	.0%	2.9%	2.4%	10.0%	5.9%	21.2%
	Project Management	Amount	0	1	5	8	9	23
		% within Area of IT-function	.0%	4.3%	21.7%	34.8%	39.1%	100.0%
		% within Improved employee's communication abilities	.0%	9.1%	17.2%	9.8%	20.0%	13.5%
		% of total	.0%	.6%	2.9%	4.7%	5.3%	13.5%
	Management	Amount	2	3	12	30	17	64
		% within Area of IT-function	3.1%	4.7%	18.8%	46.9%	26.6%	100.0%
		% within Improved employee's communication abilities	66.7%	27.3%	41.4%	36.6%	37.8%	37.6%
		% of total	1.2%	1.8%	7.1%	17.6%	10.0%	37.6%
	User Help Desk	Amount	1	0	0	2	1	4
		% within Area of IT-function	25.0%	.0%	.0%	50.0%	25.0%	100.0%
		% within Improved employee's communication abilities	33.3%	.0%	.0%	2.4%	2.2%	2.4%
		% of total	.6%	.0%	.0%	1.2%	.6%	2.4%
	Quality Management	Amount	0	0	1	0	1	2
		% within Area of IT-function	.0%	.0%	50.0%	.0%	50.0%	100.0%
		% within Improved employee's communication abilities	.0%	.0%	3.4%	.0%	2.2%	1.2%
		% of total	.0%	.0%	.6%	.0%	.6%	1.2%
	Development	Amount	0	0	1	4	2	7
		% within Area of IT-function	.0%	.0%	14.3%	57.1%	28.6%	100.0%
		% within Improved employee's communication abilities	.0%	.0%	3.4%	4.9%	4.4%	4.1%
		% of total	.0%	.0%	.6%	2.4%	1.2%	4.1%
	Operations	Amount	0	1	0	3	1	5
		% within Area of IT-function	.0%	20.0%	.0%	60.0%	20.0%	100.0%
		% within Improved employee's communication abilities	.0%	9.1%	.0%	3.7%	2.2%	2.9%
		% of total	.0%	.6%	.0%	1.8%	.6%	2.9%
	Test	Amount	0	1	0	0	0	1
		% within Area of IT-function	.0%	100.0%	.0%	.0%	.0%	100.0%
		% within Improved employee's communication abilities	.0%	9.1%	.0%	.0%	.0%	.6%
		% of total	.0%	.6%	.0%	.0%	.0%	.6%
	Others	Amount	0	0	6	14	3	23
		% within Area of IT-function	.0%	.0%	26.1%	60.9%	13.0%	100.0%
		% within Improved employee's communication abilities	.0%	.0%	20.7%	17.1%	6.7%	13.5%
		% of total	.0%	.0%	3.5%	8.2%	1.8%	13.5%
	Consulting	Amount	0	0	0	4	1	5
		% within Area of IT-function	.0%	.0%	.0%	80.0%	20.0%	100.0%
		% within Improved employee's communication abilities	.0%	.0%	.0%	4.9%	2.2%	2.9%
		% of total	.0%	.0%	.0%	2.4%	.6%	2.9%
Total		Amount	3	11	29	82	45	170
		% within Area of IT-function	1.8%	6.5%	17.1%	48.2%	26.5%	100.0%
		% within Improved employee's communication abilities	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of total	1.8%	6.5%	17.1%	48.2%	26.5%	100.0%

A.2.5.3.2 EVALUATION METHOD CATEGORY ASSIGNMENT

Controlling & Finance

		Frequency	Percentage	Valid percentage
Valid	Accounting-oriented methods	57	16.5	41.6
	Market-oriented methods	52	15.0	38.0
	Multi-dimensional methods	17	4.9	12.4
	Surrogate methods	11	3.2	8.0
	Process oriented	137	39.6	
Missing	not answered	9	2.6	
	I do not know.	24	6.9	
	System	176	50.9	
	Total	209	60.4	
Total		346	100.0	

Infrastructure & Operations

		Frequency	Percentage	Valid percentage
Valid	Accounting-oriented methods	92	26.6	65.2
	Market-oriented methods	29	8.4	20.6
	Multi-dimensional methods	8	2.3	5.7
	Surrogate methods	12	3.5	8.5
	Total	141	40.8	100.0
Missing	not answered	10	2.9	
	I do not know.	19	5.5	
	System	176	50.9	
	Total	205	59.2	
Total		346	100.0	

Risk & Security

		Frequency	Percentage	Valid percentage
Valid	Accounting-oriented methods	7	2.0	5.0
	Market-oriented methods	7	2.0	5.0
	Multi-dimensional methods	2	.6	1.4
	Surrogate methods	123	35.5	87.9
	Process oriented	1	.3	.7
	Total	140	40.5	100.0
Missing	not answered	10	2.9	
	I do not know.	20	5.8	
	System	176	50.9	
	Total	206	59.5	
Total		346	100.0	

People & Organization

		Frequency	Percentage	Valid percentage
Valid	Accounting-oriented methods	38	11.0	32.5
	Market-oriented methods	8	2.3	6.8
	Multi-dimensional methods	22	6.4	18.8
	Surrogate methods	17	4.9	14.5
	Process oriented	32	9.2	27.4
	Total	117	33.8	100.0
Missing	not answered	12	3.5	
	I do not know.	41	11.8	
	System	176	50.9	
	Total	229	66.2	
Total		346	100.0	

IT Processes

		Frequency	Percentage	Valid percentage
Valid	Accounting-oriented methods	20	5.8	16.3
	Market-oriented methods	14	4.0	11.4
	Multi-dimensional methods	36	10.4	29.3
	Surrogate methods	42	12.1	34.1
	Process oriented	11	3.2	8.9
	Total	123	35.5	100.0
Missing	not answered	10	2.9	
	I do not know.	37	10.7	
	System	176	50.9	
	Total	223	64.5	
Total		346	100.0	

Innovationen

		Frequency	Percentage	Valid percentage
Valid	Accounting-oriented methods	14	4.0	10.8
	Market-oriented methods	42	12.1	32.3
	Multi-dimensional methods	21	6.1	16.2
	Surrogate methods	52	15.0	40.0
	Process oriented	1	.3	.8
	Total	130	37.6	100.0
Missing	not answered	10	2.9	
	I do not know.	30	8.7	
	System	176	50.9	
	Total	216	62.4	
Total		346	100.0	

IT-Services

		Frequency	Percentage	Valid percentage
Valid	Accounting-oriented methods	52	15.0	37.4
	Market-oriented methods	36	10.4	25.9
	Multi-dimensional methods	26	7.5	18.7
	Surrogate methods	22	6.4	15.8
	Process oriented	3	.9	2.2
	Total	139	40.2	100.0
Missing	not answered	9	2.6	
	I do not know.	22	6.4	
	System	176	50.9	
	Total	207	59.8	
Total		346	100.0	

Communication

		Frequency	Percentage	Valid percentage
Valid	Accounting-oriented methods	32	9.2	31.1
	Market-oriented methods	11	3.2	10.7
	Multi-dimensional methods	14	4.0	13.6
	Surrogate methods	41	11.8	39.8
	Process oriented	5	1.4	4.9
	Total	103	29.8	100.0
Missing	not answered	11	3.2	
	I do not know.	56	16.2	
	System	176	50.9	
	Total	243	70.2	
Total		346	100.0	

Flexibility

		Frequency	Percentage	Valid percentage
Valid	Accounting-oriented methods	13	3.8	12.7
	Market-oriented methods	12	3.5	11.8
	Multi-dimensional methods	17	4.9	16.7
	Surrogate methods	54	15.6	52.9
	Process oriented	6	1.7	5.9
	Total	102	29.5	100.0
Missing	not answered	9	2.6	
	I do not know.	59	17.1	
	System	176	50.9	
	Total	244	70.5	
Total		346	100.0	

A.2.6 QUALITY ASSURANCE

A.2.6.1 GENERAL QUALITY CRITERIA

To assess the quality of the executed survey, its validity, reliability, objectivity and practicality need to be investigated (Olbrich, Battenfeld and Buhr, 2011).[195]

Validity refers to the validity of measurements. Validity exists when the research instrument measures what it is supposed to measure. Thus, validity is an instrument to measure the usability of the survey results. Regarding an online survey, it is necessary that the dimensional analysis is complete, correct and that the formulated questions are able to provide valid indicators of desired information (Mayer, 2013). Within this online survey, the validity was established with the help of well-known constructs and indicators as well as the previously performed pre-test.

Reliability refers to the formal precision of measurement. The reliability indicates whether a second survey would reach the same conclusions. A survey is more reliable if the questions are formulated clearly and without misunderstandings. A standardized survey, like the one in this research paper, contributes to the reliability (Mayer, 2013).

Mayer indicates that objectivity means that the data collection and the associated survey results may be executed by different scientists. According to Mayer, a survey is more objective the less the appearance or the opinion of the interviewer influences the survey participant. In an online survey, the interviewer does not appear. Furthermore, the survey is more objective when the analysis of the results has a lesser degree of flexibility (Mayer, 2013). As an online survey is highly standardized, there is less room for interpretation.

The practicability, however, describes the applicability of the research instrument used for the intended purpose of the investigation (Olbrich, Battenfeld and Buhr, 2011). Thus, this criterion strongly overlaps with the validity criterion.

[195] Weichbold points out that the conception of survey quality cannot be fully measured with the above stated quality criteria. They refer to the fact that there are deviations from a true value. Thus it is assumed, however, that a true value of quality exists. Cp. Weichbold, 2008.

A.2.6.2 CONTENT-ORIENTED QUALITY

To apply adequate quality to the online survey and the online questionnaire, further external recommendations and guidelines were used. Besides the recommendations of diverse scientists (e.g. Mayer, 2013; Porst, 2000 or Kornmeier, 2006), the standards of the Association of German Market and Social Research Institute were applied.[196]

A.2.6.3 TECHNICAL DATA QUALITY

The technical provider of the online survey provides additional variables to manage the data quality. These indicators have been used to control the quality of the received data.[197]

Table 17: Overview of the quality indicators and application

Variable	Description	Avg of all records
DEG_MISS	Negative points for lacking answers	24
DEG_TIME	Negative points for very fast completion	29.7
DEGRADE	Total of negative points (DEG_MISS plus DEG_TIME	53.7
LASTDATA	Time when the participant most recently clicked the "next" button and updated the data case.	The average time to populate the online questionnaire was 8.5 minutes.
FINISHED	The participant reached the last page (1). The participant did not reach the last page (0).	
LASTPAGE	The page when the last click of the participant was recorded.	9
MAXPAGE	The last page in the questionnaire that the participant reached.	9
MISSING	The percentage of answers submitted by the participant. Only such questions and items are counted that have been shown to the participant.	10.5
MISSREL	Percentage of missing answers weighted	8.9

[196] Cp. Arbeitskreis Deutscher Markt- und Sozialforschungsinstitute e.V., 2001.

[197] The following description of the quality indicators relate to the technical manual of the online platform (SoSci, 2013).

Variable	Description	Avg of all records
	by the other participants' answering behavior. Questions that are rarely answered are irrelevant for this figure, questions that most participants have answered weight worse.	

The points system implemented by SoSci indicates that DEGRADE values of more than 200 points show low-quality data. As data quality is not a dichotomous attribute, the points are continuously distributed by showing a characteristic.

Furthermore, there are quality indicators that identify cases when participants lost their motivation and quit the online questionnaire. The variables LASTPAGE and FINISHED show if the participant dropped out too early. The percentages of the variables MISSING or MISSREL indicate whether the participant answered the questions carefully or if he/she was "just looking". Although the time that is required to populate the survey is less accurate to indicate data quality, it provides insights whether the participants even read through the questions.

Based upon these quality requirements 28 data records were removed from the sample. These data records did not meet the defined quality requirements. The DEGRADE value was more than 200 points.

A.3 DEVELOPMENT APPROACH OF THE REFERENCE MODEL

A.3.1 DEFINITION

Based upon the derived requirements and the identified components, a reference model should be designed. The objective of this chapter is to describe the approach used to craft the model. Reference models are a subset of information models. As they are not developed for a specific context, they rather formulate recommendations and claim to be universally valid within any abstract application context. They provide the foundation for solutions that can be modified by the need of the user. Thus they support the transfer of business knowledge (Becker et al., 2002). Wilde and Hess describe the objective of reference modeling as the illustration of an optimized reality (Wilde and Hess, 2006). Thomas emphasizes that reference models are tools to support business informatics as an integrator between informatics and business (Thomas, 2006).

A reference model is described as particularly adaptable when it is possible to adapt it to the needs of the user with reasonable effort. The degree of adaptability increases when it is easier to identify affected components and more convenient to implement the modifications. The degree of adaptability depends essentially on the choice of selected modeling language as well as on the functionality of the tools used (Becker, Rosemann and Schütte, 1997).

Although there is no generally accepted definition within the scientific community, reference modeling[198] has been established as a recognized method in German-speaking countries (Cp., e.g., Wilde and Hess, 2006; Johannsen and Goeken, 2006).

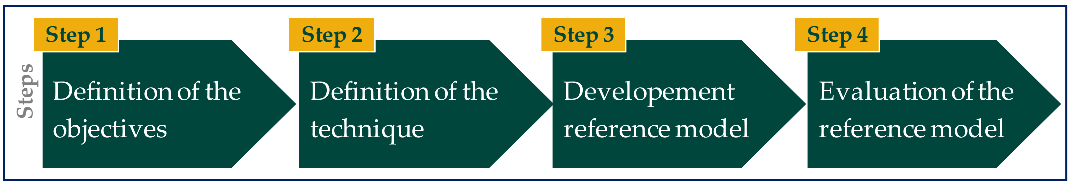
[198] The term reference model and framework are used interchangeably. Cp., e.g., Johannsen and Goeken, 2006. Fettke and vom Brocke see frameworks as a special type of reference models. Cp. Fettke and vom Brocke, 2011

A.3.2 REFERENCE MODELING APPROACH

The approach to the reference model within this research appraisal utilizes, in particular, the recommendations of Becker et al. Becker et al. emphasize that these recommendations may be specifically adapted. However, based upon these recommendations, an inter-subjective traceable research process was established (Becker et al., 2002).

Becker et al. recommend dividing the development of the model into multiple steps as shown in Figure 72.[199]

Figure 72: Reference modeling approach



Source: According to Becker et al., 2002

A.3.2.1 STEP 1: DEFINITION OF THE OBJECTIVES

In the first step, Becker et al. recommend developing a very crude reference model which will lead to a more concrete model later on. This broad model allows compiling the problem area. Following this, a requirement-analysis supports the concretization of the model and limits its focus to the development goals (Becker et al., 2002).

Within this research appraisal, the general guidelines to design the model have been defined by the model's objectives and quality criteria.[200] Although this

[199] Rather than a consecutive phase model, Becker et al. defined a phase model that represents a circuit. This circuit-oriented presentation of the phase model has been omitted here as the circuit will be only used once within this research appraisal. Furthermore, the suggested final phase of "marketing of the reference model" has been left out. As the developed model is subject to this scientific research appraisal, the model's marketing is pre-defined. The methodology by Becker et al. was also used, for example, by Neumann (2011).

[200] For an overview of the defined objectives and the quality criteria cp. Chapter 7.2.1.

does not correspond to a very crude reference model at the beginning, these general guidelines limit the direction and the focus of the to-be model accordingly.

A.3.2.2 STEP 2: DEFINITION OF THE TECHNIQUE

Based upon the results of Step 1, the following step defines the technique used to develop the model. Becker et al. stress that there can be no universal technique to reference modeling. However, they recommended using a modeling technique that is useful to meet the defined objectives in Step 1. To meet the objectives defined in Step 1, the modeling technique to craft the model uses the elements derived from literature or empirical studies.[201] Furthermore, the steady usage of elements that have already been used in literature (e.g. the capability construct) supports the traceability of the model's development on the one hand side. On the other hand, this also supports the readability and applicability by the user. This also ensures that there is no loss of information while converting the reference model into other modeling techniques (e.g. the entity-relationship model etc.).

A.3.2.3 STEP 3: DEVELOPMENT OF THE REFERENCE MODEL

Using the results of the previous steps, the third step is the development of the model itself. Becker et al. point out that the final model can only be represented by one consistent model variant to the user. An indifferent comparison of a variety of different models reduces the normative character of the developed model (Becker et al., 2002). This requirement was followed in the present research appraisal. Based upon the chosen modeling technique, the developed content and the underlying meta model, one variant of the model was created.[202]

A.3.2.4 STEP 4: EVALUATION OF THE REFERENCE MODEL

After developing the model, the next step was evaluation. Becker et al. note that the evaluation of all possible combination of the model's elements is desirable. However, due to the large amount of possible combinations and available resources, this is not feasible. Among others, the application of the model within an appropriate scenario seems to be suitable.

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[201] An overview of the elements used may be found in chapter 7.2.2.
[202] The developed model is presented in chapter 7.2.3.

The evaluation of the model was initially contemplated by expert interviews. Due to the existing disadvantages of expert interviews (e.g. lack of results' validity, high costs due to additional interviewers, etc.), the usage of this instrument was not pursued any longer.[203] Nevertheless, the evaluation was performed based upon the discussion of the pre-defined quality criteria, the model's objectives in chapter 7.3, and the integration of smaller case studies within the model. Its applicability could then be recognized.[204]

[203] For further disadvantages of expert interviews cp. e.g. Kornmeier (2006). Mayer also notes that the results of expert interviews cannot be generalized (via induction) easily. A generalization must be justified carefully in each specific case (Mayer, 2013).

[204] This approach was also noted by Becker et al. (2002). According to them, an objective evaluation of the model is impossible. An evaluation of the model can only be made in regard to the suitability of the quality criteria. Becker et al. suggest, *inter alia*, using general quality recommendations that may be found in literature. This was considered in chapter 7.2.1.

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Doctoral Thesis

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