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Business Intelligence (BI) strategy development: a grounded action research

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Abstract

Objectives of the Study

The research objective is to build a framework for the development of BI strategy in accordance with strategic business goals. The study seeks to understand the components of a BI strategy: the strategic alignment between BI and business, the strategy content, the critical success factors and the ideal methodology.

Theoretical background and methodology

The theoretical background of the research discusses strategic alignment and information management frameworks. The proposed theoretical framework combines the theories of Strategic Alignment Model by Henderson and Venkatraman (1999) and its extension by Maes (1999) to analyze strategic alignment. The diamond model of information management by Kaario and Peltola (2008) is used to define the BI strategy components. The critical success factors of BI systems by Yeoh and Koronios (2010) and phases of action research by Baskerville and Wood-Harper (1996) manage and structure the development process. As is typical in action research, the theory building and practical problem solving were conducted concurrently. The empirical study is based on data collected in workshops, interviews and steering committee meetings in the case company. Data is analyzed by using the methods of grounded theory: open coding and axial coding.

Findings and conclusions

The framework for the development of BI strategy, based on theory and readjusted according to empirical findings, is the main contribution of this thesis. The framework proposes an alteration to the diamond model, which is utilized in explaining the components of BI strategy content. Based on empirical results, one of the components suggested by theory, *roles*, is revised and relabeled as knowledge. Otherwise, the proposed framework complies with previous research, as theories concerning IT and information management are found significant also in the field of BI. Other conclusions concern the increased communication between information producers and users as a result of BI strategy, the tendency of project participants to emphasize development on short term over long term, and the effect of participants' personal relevance on the results.

Keywords Business Intelligence, strategic alignment, action research, grounded theory

Tekijä Tiia Järvinen

Otsikko Business Intelligence (BI) strategian kehittäminen: ankkuroitu toimintatutkimus

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Abstrakti

Tutkimuksen tavoitteet
Tutkimuksen tavoitteena on kehittää viitekehys Business Intelligence (BI)- eli liiketoimintatiedon hallintastrategian luomiseen linjassa liiketoiminnan strategian kanssa ja ankkuroidun toimintatutkimuksen keinoin.

Kirjallisuuskatsaus ja metodologia
Tutkimuksen kirjallisuuskatsaus tarkastelee strategista linjakkuutta, BI-strategian osatekijöitä, menestystekijöitä ja metodologioita. Teoreettinen viitekehys pohjautuu Hendersonin ja Venkatramanin (1999) strategisen linjakkuuden malliin, jota täydentävät Maesin (1999) jatkotutkimus samasta aiheesta, Kaarion ja Peltolan tiedon hallinnan timanttimalli (2008), Yeohin ja Koronioksen (2010) BI-järjestelmien tunnistetut menestystekijät ja Baskervillen ja Wood-Harperin (1996) toimintatutkimuksen eri vaiheet. Toimintatutkimukselle ominaisesti tutkimuksen empiirinen osuus toteutettiin yhdenaikaisesti teoreettisen viitekehyksen rakentamisen kanssa. Empiirinen osuus pohjautuu työpajoissa, ohjausryhmäkokouksissa ja haastatteluissa kerättyyn aineistoon kohdeyrityksessä. Aineiston analysointiin käytettiin ankkuroidun teorian menetelmiä: avointa koodausta ja akselikoodausta.

Tulokset ja päätelmät
Tutkimuksen merkittävin tulos on teoriaan pohjautuva ja empiirisesti testattu viitekehys BI-strategian kehitykselle. Viitekehys esittää muutosta timanttimalliin, joka käsittelee tutkimuksessa BI-strategian sisältöä neljän tiedon hallinnan näkökulman kautta. Empiiristen tulosten mukaan yksi näkökulmista, roolit, on liian kapea kattamaan kaikkia merkitseviä konsepteja. Roolit korvattiin tutkimuksessa tietämyksellä (knowledge). Muut teoreettisen viitekehyksen osatekijät todistetusti myötäilevät aiempaa tutkimusta. Tutkimuksen tuloksia ovat myös lisääntynyt kommunikaatio tiedon käyttäjien ja tiedon tuottajien välillä, strategiatyön osanottajien taipumus painottaa lähitulevaisuuteen sijoittuvaa kehitystyötä ja osanottajien henkilökohtaisen merkityksen havaittu vaikutus kehitysideoihin.

Avainsanat: liiketoimintatiedon hallinta, strateginen linjakkuus, toimintatutkimus, ankkuroitu teoria

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1 INTRODUCTION

Companies in today's world compete on analytics. The conscious management of information has gained more managerial focus than ever, because the bottleneck of organizational success is no longer financial capital or raw materials or other physical resources, but knowledge assets (Pirttimäki 2007). Furthermore, the sheer speed whereby a global economy operates today necessitates a fast and easy access of the management to operative information, which can be used to evaluate performance metrics, understand customer behavior and forecast market trends (Hedgebeth 2007). Davenport (2006) uses the term intelligent companies to describe organizations that not only know what products their customers want, but they are able to determine the prices they are willing to pay, how many items each customer segment will buy in a lifetime and what triggers them to buy even more. Many organizational functions that have traditionally depended on creativity and human insight can today be improved with sophisticated quantitative techniques, which Business Intelligence (BI) among other tools of information technology can provide. Pirttimäki (2007) defined BI fittingly as "a support tool of extensive, relevant, and proactive management and decision-making in companies in which shaping the future is considered more important than reacting to it." By implementing BI, the organization can learn from the data already gathered into their operational systems, turn that information into strategic knowledge and stay ahead of the competition within their industry sector (Ramakrishnan et al. 2012). Consequently, by taking advantage of superior intellectual resources – both human and IT – one can exploit and develop its traditional resources better than its rivals do (Sharma and Dijaw 2011). As companies today are forced to utilize information more effectively than before, advanced BI and analytics tools have become a prerequisite for competitive advantage.

However, the amount of information available for users increases slower than the number of business decisions that should have thorough information support (Popovic et al. 2010). BI initiatives cannot thus be deployed without a business case. The haphazard implementation of BI projects without prioritization or proper specifications from business can lead to overlapping and

therefore partly redundant project outcomes. Responding to only who shouts the loudest can promote suboptimization without the best possible coordination between different information user needs, which is wasteful of resources and cannot be reasonably explained with business strategy. The user base for BI tools is growing due to increase in the availability of easy to use self-service BI solutions, and therefore a long-term plan for accommodating the information needs in an organization with proper coordination is important.

Business Intelligence, as an academic term, is rather young even if the underlying business activities related to gathering market data and analyzing industry structure have existed already since 1960's, but systematic use of intelligence in strategic decision making has been of academic interest from not until 1990's (Pirttimäki 2007). The strategic alignment of IT strategy has been abundantly researched (e.g. Avison et al. 2004, Coleman and Papp 2006, Hirschheim and Sabherwal 2001), but less attention has been paid on the development of BI strategy, or in other words on the strategy that discusses information management, data warehousing and information usage in relation to each other. Data warehousing strategies are often systems implementation related and focus on technical attributes (eg. Sen and Sinha 2005). However, the development of overall information management strategy supporting strategic decision-making requires a link to business objectives and to business activities besides the technical solutions. Thus, this thesis approaches the development of a practical framework for creating BI strategy from the viewpoint of the strategic alignment of business and BI.

In order to get BI strategy the momentum it needs for it to be adopted across an organization, the organization needs to understand how strategic alignment is created and sustained, and what are the different viewpoints that should be taken into account in the process. Another highly discussed aspect related to the process of strategy development in theory is the critical success factors (CSFs) in BI initiative planning and implementation. Therefore, the objective of this thesis is to study the viewpoints, methods and CSFs for creating a BI strategy roadmap that is aligned with the strategic business objectives.

The empirical research of the thesis was conducted in collaboration with IWMC Insurance Company. Business Intelligence steering committee in IWMC recognized the lack of long-term

strategy for improving information content and quality in their centralized data warehouse, and they needed a roadmap for managing new BI initiatives that would follow the prioritization approved and agreed on by the responsible business owners. The study was carried out as an action research project, in which the thesis researcher was an active member of the project team of three in IWMC. This thesis is not only a contribution to practical problem solving in the client system organization, but also an exploration into the issue of BI strategy creation process that is of general managerial interest, and a reinforcement of existing academic theory on BI frameworks.

1.1 Research objectives

The objective of this thesis is to build a framework for the development of BI strategy in accordance with strategic business goals. The study seeks to understand the components of a BI strategy: different viewpoints to approach it, CSFs to manage it and methods of creating it. Thus the main research question of this thesis is:

How to create a Business Intelligence strategy that is successfully aligned with an organization's business strategy?

In order to solve the main research problem, a number of supporting questions are answered:

- How to recognize the information needs of various decision makers in an organization?
- How can the strategic alignment of business and BI be achieved?
- What are the different viewpoints and critical success factors (CSFs) on the development of BI strategy?
- What methods should be used?

In order to answer these questions, existing literature about strategic alignment and information management frameworks are examined to build a comprehensive theoretical framework. The framework is then used and enhanced during the empirical part of the study to find out how well theory fits reality, and how the existing theoretical models can be reinforced or redefined. Most

theories about strategy creation in the domain of information management focus on overall IT strategies, so one objective of this thesis is also to study their fit in the field of BI.

1.2 Methodology

The study presented in this paper was conducted as an action research. Action research is a variant on the qualitative case study method with the difference that in action research, the researcher in not an external observer of the phenomenon under examination, but an active participant contributing to the content. It has proved to be a valid and popular research methodology in information systems research although originally designed to examine social and behavioral sciences. It is a qualitative, iterative research approach with usually three or more cycles of five different process phases. The cycles are generally called interventions to the status quo of the subject under research. In this study, four iteration cycles were gone through until the results were found exhaustive.

The data collection methods include semi-structured interviews, workshops and BI steering committee meetings in the case company. The purpose was to interview the IT and business domains in the company both together and separately, who both were responsible for developing the BI environment. In that way, the researcher was able to understand how both sides saw the process and the results gained, and how the communication between the two domains was perceived. Interviewing both domains separately also showed how objectives, experiences and demands differed or resembled each other. In addition, material from conferences and meetings held prior to the official BI strategy project launch (i.e. survey and group assignment results) was also included in the study to enrich the data.

Data analysis was conducted with the methods of grounded theory that support the simultaneous building and enriching of theoretical framework along with the practical problem solving. The analysis methods of open coding and axial coding were used to study the theoretical elements emergent from the empirical data, which either supported or contradicted the assumptions proposed by theory. Therefore, as Baskerville and Pries-Heje (1999) called it, the research

method can also be labelled as grounded action research, a hybrid of action research and grounded theory.

1.3 The structure and scope of the thesis

The structure of this paper is as follows. First, the theoretical background of the thesis is presented. Due to different interpretations of the term, the definition of BI used in this thesis is elaborated after discussing the varying information needs of strategic, tactical and operational decision making, which are the basis of every executive reporting system. Theories behind business-IT alignment are gone through with the focus on strategic alignment. In addition, the viewpoints to information management, CSFs and methodologies of BI strategy development are examined.

Before going through the theoretical foundations for the framework used and developed during the empirical study, the choice for the research method is justified in Chapter 3. Action research as a research method is presented along with its connection to grounded theory, and its validity in terms of generalizability and reliability is critically assessed. Besides attempting to describe the strategy building process in the analysis part of the thesis, the efforts made to ensure validity at all phases are emphasized. After the research method and the conceptual framework have been explained this thesis concentrates on introducing the client system structure, which refers to presentation of BI in the case company Insurance &Wealth Management Company (IWMC, a pseudonym). Details related to data collection methods are examined and finally the results of the empirical study are analyzed, summarized and reviewed. At last, the transferable results of this study are discussed from the academic and managerial point of view. Practical implications drawn from the results are introduced with the reminder of limitations to this study. Suggestions for future research conclude the thesis.

The main research question allows for multiple perspectives. Firstly, the process of strategy making can be business-oriented such as the mapping of information needs against business process structure. Secondly, the process can be Information technology (IT) -oriented such as an improvement of data warehousing structure and management reporting interfaces. This thesis

addresses both, but the focus is business-oriented, which is an approach supported by theory. Technical details such as characteristics of and comparisons between different BI providers are omitted. Thirdly, the process could be about the initial implementation of BI in an organization and about examining the critical factors in choice of a data warehouse, or it could be about examining the development of an existing BI environment. This choice of an approach is found irrelevant in the creation of a BI strategy framework. BI environment can be still in the making when applying the researched BI framework, but the critical success factors and processes of initial BI implementation, specifically, are not in scope.

Overall, the study is more focused on providing insight how BI strategy process is conducted with adherence to business strategy and the factors behind its success rather than measuring the outcomes of strategy creation. Performance management through the balanced scorecard by Kaplan and Norton (1992), for instance, is a concept generally incorporated to BI, which could be used to measure the subsequent changes in information usage in an organization, its effect on business objectives and thus the success of BI strategy. However, the results and learning from this thesis subject are largely long term. Thus, the scope of managerial results of this research is limited to managing the strategy development process.

2 THEORETICAL BACKGROUND

This part of the thesis discusses the theoretical background of the study and goes through the theoretical frameworks, which build and support the empirical research. The first section defines the information relevant in management decision making. Information needs on different organizational levels are elaborated. The following section presents the concepts of BI and BI strategy. Then the theoretical foundations of business-IT alignment are gone through with a special focus on the strategic alignment. Finally, the last two sections of this literature review present the viewpoints and methodologies to BI strategy development. The purpose is to create a deeper understanding about the existing theory concerning BI governance with the support of strategic alignment theories.

2.1 From data to intelligence

In academic literature, there are several definitions for and opinions about the relationship between data, information, knowledge and intelligence. The most common idea is that there exists a hierarchy, data being the lowest building block towards knowledge. According to this idea, data embodies a compilation of simple observations and facts, which we need to have before information can be created, and only after these two stages, knowledge can be attained (Tuomi 1999-2000). Thus, data alone is considered having the least value, consisting of mere numerical, textual and signal characters. In the information value chain, it acts as raw material for the upper, more sophisticated levels of information elements. It is easily transferred from operating systems to various databases without losing its content. Then, it is compiled in a data warehouse and further used as the basis for reference or analysis (Kaario and Peltola 2008).

Information is considered one level higher in the hierarchy. Davenport and Prusak (1998) define information as data that is given a meaning. Depending on the receiver, information always contains some kind of message, which can be subjectively interpreted, and thus, Pirttimäki (2007) concludes it is more valuable to the receiver than data. Information is also more difficult to transfer via information systems from one user to another and consequently, it presents a

challenge for the automation of information processes (Kaario and Peltola 2008). When information is given significance, it turns into knowledge. Knowledge is determined as the most valuable type of information in the value chain, because it is closer to the decision making process and utilized as the basis of both operative and strategic actions (Pirttimäki 2007). At this stage, the simple facts in data have been given a context. As Tuomi (1999-2000) put it, the facts now exist within human mental structure and have the potential of becoming part of organizational memory that can lead to conscious predictions of future consequences or other conclusions of the present state, rendering decision-making behavior intelligent. Unlike two lower building blocks in the hierarchy, knowledge can be structured or unstructured, and tacit or explicit depending on whether it can be easily disseminated and represented by numbers and text or if it is related to personal experiences and knowhow (Pirttimäki 2007). When measured by information content, knowledge is the greatest information resource in an organization, but it is also the most difficult one to harness and share between information users due to its subjective nature (Kaario and Peltola 2008). It is also more difficult to protect and maintain in the organization, because it is often reliant on employees and their motivation to use it and pass it forward.

Business Intelligence (BI) as a process and as an organizational function actively takes part in the information value chain by processing data and information into intelligence that can be exploited on all levels of an organization leading to better, timely business decisions (Kaario and Peltola 2008, Clark et al. 2007). Intelligence is knowledge and foreknowledge of the internal and external business environment the organization operates in (Herring 1988). To draw a difference between knowledge and intelligence, intelligence can be said to include information about critical trends and patterns as well as relationships between the organization's and customers' actions that signify certain causalities and anticipated changes. These changes could point towards new opportunities and threats in business, which steer strategic decision-making (Pirttimäki 2007).

The conventional information hierarchy has been critiqued. Tuomi (1999-2000) states that there can be "no isolated pieces of simple facts unless someone has created them using his or her knowledge. Data can emerge only if a meaning structure, or semantics, is first fixed and then

used to represent information." This idea suggests a reverse hierarchy, which is relevant research when designing information systems and building a semantically defined database. In BI however, the conventional hierarchy of information value creation can be considered appropriate, as the objective is to make new observations from preexisting data inside and outside the organization.

2.1.1 Information needs on three levels of decision making

To manage daily operations and to face the external competitive pressure, business decisions need to be made on three levels: strategic, tactical and operational. Strategic decisions look ahead to longer time horizons, larger expenditures, greater uncertainty and therefore greater deviations from the current business model (Ramakrishnan et al. 2012), whereas operational decisions concern short-term day-to-day activities. With the right information available for the right person at the right time, an organization can make conscious, fact-based decisions (Popovic et al. 2010). It is able to compare its past performance against targets and set new managerial objectives in strategic decision-making. It can protect itself from business risk with tactical management and finally cut costs with more efficient operations. Thus, BI serves the information needs of all three levels of decision-making (Pirttimäki 2007). Business intuition has not lost its importance, but its role has shifted to being a more supplementary element within the more structured decision process enabled by BI (Popovic et al. 2010).

At the beginning of every information management project such as the development of BI strategy, the information needs on all levels of decision-making should be identified and agreed upon across the organization (Watson et al. 2004). Watson et al. emphasize that this is especially true when developing an integrated data warehouse and information systems around it. Diverse information needs direct what type of data is stored in the data warehouse, what level of granularity is needed and how far into the past the data should reach. Furthermore, Pirttimäki (2007) discusses the importance of relating the intelligence needs to specific business objectives and to the overall business strategy. The need for this alignment is easily justified, as improved business decisions and more systematic information utilization processes determine the value of the delivered information (van Roekel et al. 2009).

Van Roekel et al. (2009) recognize four levels of information services within an organization that describe the information needs of each organizational level. In their work, the operational information directed to operational workers and operational management is discussed separately. These four levels of information services are as follows:

- *Information services for operational workers*: the everyday administration of product, customer, financial and process data that is usually in a structured form to enable efficient, fast and reliable transactional processing.

- *Information services for operational management*: monitoring and managing the primary business processes and up-to-date reporting of results. Data is structured and segmented by product type, organizational function, or business process.

- *Information services for tactical management:* indicating trends and comparing the results across product groups, processes and departments.

- *Information services for strategic management*: the development of business models based on past and future market development and internal capabilities. Different information is needed during different phases of the strategic planning cycle and it is structured according to various business objectives such as customer value, financial analysis or risk management.

It can be concluded that the information needs of strategic management are the most extensive and varied. Nowadays the information to support executive decision-making is gathered from various sources both internal and external, in a structured and unstructured form (Hovi et al 2009, Kaario and Peltola 2008). Internal information is company specific information about the company's performance and capabilities, such as sales data, financial information and customer records (Pirttimäki 2007). In its most tacit form, it can also be firm-embedded know-how only shared by the employees of the company. Internal information, in the form of statistics and company internal reports, is often structured, focused and closely aligned to operational information services (Swash 1997), and therefore more easily processed and analyzed via BI tools.

External information, on the other hand, is gathered from outside the company in publications such as reports, conference proceedings, trade literature, external databases, and in legal and technical documents, concerning the business environment, technological advances and competitors (Swash 1997). More often than not, it has diverse sources and it involves documents in an unstructured form, which makes automated information systems processing and the use of traditional BI tools challenging (Kaario and Peltola 2008). External information is also more difficult to process and requires interpretation to assess its value in terms of relevance and usability (Swash 1997). Nonetheless, Uusi-Rauva (1994) argues that the value of external information grows remarkably in significance as decision-making moves from operational to strategic. Most of the information presented in operational enterprise applications is about the current state of business (Popovic et al 2010). To transform this information from operational to strategic a vigilant attitude towards historical data is needed. Historical data is foremost an indication of past performance with only some value in forecasting future scenarios (Gilad and Gilad 1988), and as the pace of decision-making is ever accelerating, the value of timely, forward-looking information continues to increase (Hovi et al. 2009). Due to the greater impact of strategic decisions on a company, the quality requirements of strategic information and its sources are higher than in operational decisions (Pirttimäki 2007).

As mentioned, identifying information needs is the starting point of any information management project, but unfortunately, it is also one of the most problematic tasks. Decision makers and intelligence users who act as data stewards by determining the specifications for the wanted information can find articulating their needs demanding. Some of the information needs are unconscious or change rapidly (Pirttimäki 2007). In addition, decision-makers are not always aware of all the possibilities information management can provide. Another issue is the difference between subjective and objective information needs, recognized by Höglund and Persson (1985). Subjective needs are those an individual thinks he has, but that are not necessarily relevant in objective terms. Subjective needs can thus also be called information wants. Objective needs are more common, and they involve information that is generally needed in the decision-making process in question. Pirttilä (1997) concludes that the most significant information exists where the information needs and wants or the objective and subjective needs

overlap. When it comes to recognizing both types, Hovi et al. (2009) suggest that information needs could be collected, discussed and prioritized by conducting surveys or workshops with the most essential stakeholders of an organization. This is suggested to ensure interaction between the decision-makers and information producers and to reduce misinterpretations.

2.1.2 Information gaps

The difference between the actual information needs and the amount and content of information gathered is called *the information gap* (Pirttimäki 2007). It exists between the information received, the information wanted and the information needed by the decision maker. According to the author, during an information management project, these gaps should be recognized and reduced by successfully mapping the information needs, and by using appropriate BI tools. Another example of the information gaps in literature focuses on information quality, discussed by Popovic et al. (2010). The authors state that efforts for reducing the information gap should aim at balancing the amount of data gathered in an organization against the amount of quality information available to users on all levels of business decisions. They recognized the most common reasons behind information gaps as 1) the lack of integration between enterprise applications, 2) overly extensive reports that are not in line with the current information needs or are too time-consuming to make use of, 3) the amount of unexplored data in an organization, 4) the time wasted on gathering the required information instead of its analysis and 5) the lack of external and/or valuable competitive information to support strategic decision-making. The authors conclude that a higher level of information quality alone does not generate business value, but it often leads to higher information usage and therefore has an indirect impact on the profitability, maturity and success of the information management process. (Popovic et al. 2010)

2.2 Business Intelligence

For a while now, Business Intelligence (BI) has been one of the hottest buzzwords within information management industry. Though, what was initially considered a mere consulting fad is today recognized as a potential source of competitive advantage (Wieder et al. 2012). Organizations today collect data on a finer granularity and larger volumes, so the real challenge

of information management has shifted from gathering a sufficient amount of data to effective analysis and utilization (Chaudhuri et al. 2011). Information embedded in an organization is usually scattered across various operational systems. The sources of external information are in plenty. However, the structure of information is often incompatible and without proper description how it can be used, which results in lack of overall view about a given subject of interest (Hovi et al. 2009). Via BI systems, the scattered, fragmented information is integrated, processed and distributed across the organization to support operational, tactical and strategic decision making (Hovi et al. 2009). Hervonen (2010) summarized the purpose of BI to be "*about the power of shared information*".

The industry origins of the term BI can be said to have done its academic research a disservice as consultant organizations and software vendors have all used a different definition of BI to better suit their own products (Popovic et al. 2010). Wieder et al. (2012) claim that due to the absence of a generally accepted definition and consequent academic caution there has been an observable research time lag on BI. Even today, almost every author in academic literature promotes his own idea of the content and meaning of BI (Pirttimäki, 2007), which makes synthesizing a universal definition difficult. Pirttimäki (ibid.) further suggests that various intelligence activities, which have existed as long as there have been companies, have now been conceptualized, but the boundaries between these different concepts are not yet well established. Allen (1995) seconds this by arguing that not only the terms are ambiguous, but the relationship between the terms is unclear.

In this section, before discussing the purpose of BI strategy, the definition of BI used in this thesis is elaborated. After its definition, the business value of BI, or a BI project such as BI strategy, is determined. Finally, the purpose of a BI strategy is reviewed.

2.2.1 Definition of BI

As mentioned, BI as a term is used rather ambivalently. Its definition can vary from an umbrella term for all DSS related concepts to serving as a synonym for knowledge management (KM), competitive intelligence (CI) and market intelligence (MI) (Popovic et al. 2010). In Finland, the term BI is used broadly encompassing all concepts related to systematic and continuous

collection, analysis and sharing of internal and external business information (Pirttimäki 2007). According to this definition, other intelligence activities such as CI and MI are considered its subgroups. However in North America, international IT market research companies such as Gartner and International Data Corporation (IDC) make a clear distinction between BI and CI (Hovi et al. 2009). They use BI only in relation to internal information management, which compiles data from operational systems and provides an organization with a historical, current, and the predictive view of its business operations. CI and MI, on the other hand, are perceived to focus solely on external market information (Hovi et al. 2009). Sharma and Dijaw (2011) and Herschel and Jones (2005) in turn claim that BI should be viewed as a part of a larger KM effort. Whereas BI enables an organization to make the best use of its internal and external information capital, KM helps an organization to gain insight from its experience (Herschel and Jones 2005). Given all these different intelligence activities that closely resemble each other by content and purpose, it can be concluded that there is a need for elaboration of the term BI used in this thesis.

Gilad and Gilad (1988) in their early work of BI suggested that the term Business Intelligence could be used to denote three different concepts: a process, an organizational function, and a product. What they meant is that BI is an activity carried out by the individuals working in the organizational function of BI to produce the product of BI. Firstly, from the *process* point of view, BI combines systematic activities directly related to decision-making support, such as acquiring, compiling and storing data from diverse parts of the organization, evaluating it and transforming it into actionable information for further use (Smith and Lindsay 2012, Herring 1988). The process can be ad hoc or systematic in nature, targeted at enhancing the performance of both primary and supporting business activities (Elbashir et al. 2008, Pirttimäki 2007). Pirttimäki (2007) describes an ad hoc process as an activity of obtaining specific information to satisfy a precise one-time information need, and a systematic BI process as an ongoing cycle of five key tasks: specification of information needs, gathering, processing, dissemination and utilization of information. In the specification of information needs, an organization analyzes what kind of information is necessary in solving business problems and ensures that only relevant information is utilized in decision-making (Lönnqvist and Pirttimäki 2006). The second process phase, information gathering is driven by these business information needs, and in the

information processing phase, the acquired information is analyzed and packed into different BI products (Lönnqvist and Pirttimäki 2006). In dissemination, the BI product is stored and communicated to the critical decision makers. The ultimate goal of a BI system is to empower decision makers and enable them to access the required business information as efficiently as possible (Lönnqvist and Pirttimäki 2006). The final phase, utilization, is highly dependent on the efficiency and quality of the earlier phases in the BI process. Therefore, Lönnqvist and Pirttimäki (2006) put emphasis on the importance of user feedback in optimizing each phase of the BI cycle.

The organizational function of BI is responsible for coordinating the BI process. Gilad and Gilad (1988) argue that although BI can also be deemed an informal activity carried out by all employees who utilize the information to serve their own needs, an organizational function should be implemented and managed as a formal, systematic activity closely connected with strategic management. Thus, a continuous BI process can be ensured, less data is likely to get lost, duplicates can be minimized, and above all, data in various forms, from various sources can be integrated into a coherent whole for strategic planning (Choo 2002). Garrett (2012) also found that depending on the size of the organization, diversified BI activities could lead to an overhead in personnel. Forming a BI Competency Center (BICC) can especially be profitable in a large organization and it can affect the maturity of BI solutions (Garret 2012).

Hervonen (2010) recognized five different levels of BI maturity that measure how far BI has spread in an organization and how extensively it is utilized in organizations. Table 2 shows five levels and the percentage of organizations the author observed that operate in a given level. Centralized BI efforts can help an organization to make the leap from shortsighted tactical BI, which provides mostly reactive intelligence, towards more proactive strategic and pervasive BI.

Table 1 Levels of BI maturity (Hervonen 2010)

Five levels of maturity	% of organizations
1. Unknown – scattered spreadsheets in use	**6 %**
2. Tactical BI – Information unified and ad hoc queries	**82 %**
3. Focused BI – Focused BI solution for a business function	
4. Strategic BI – Strategic goals drive BI solutions	**12 %**
5. Pervasive BI – BI becomes part of business infrastructure and business portals	

Greene (1966) defined *the end product of BI* as "processed information of interest to management about the present and future environment in which the business is operating". This definition has two important implications. The reported information is processed, which implies to analyzed and user targeted information, not just any bulk data, as discussed in the previous section 2.1. The other implication is that the management, to which the information is reported, is essentially involved in BI. The management outlines the specifications of the BI product, and decides what is in scope. The management either makes or breaks the purpose of BI, as their involvement will resolve whether the gathered information is relevant intelligence or only redundant rows of data. There is no meaningful BI without the people to interpret the meaning and significance of the information provided and to act on their knowledge gained (Popovic et al.

2010). Thomas (2001) called BI the eyes and ears of the organization, but only if the intelligence is used in strategic planning.

Traditionally, the use of BI in decision-making was mainly the privilege of a designated group within an organization (Kaario and Peltola 2009, Elbashir et al. 2008). Through advances in information technology, BI applications today include built-in functionalities for point-and-click data visualization and analysis, instead of pure programming, which requires comprehensive skills (Hovi et al. 2009). These so called management user interfaces such as dashboards have broadened the user base for BI applications and introduced entirely new information management concepts like self-service BI. Moreover, specialized BI applications support heavy user activities such as querying, data mining, data warehousing, online analytical processing (OLAP), and reporting with scorecards and dashboards (Hedgebeth 2007, Elbashir et al. 2008). Based on these technical BI functionalities, some authors' definition for BI is more technology-oriented. According to Pirttimäki (2007), the term BI relates to all technical applications, software, and tools that enable effective processing and analysis of business information. Wieder et al. (2012) draw a difference between BI software, BI tools and BI system. The authors state that BI software describes the software products primarily designed to support BI activities (e.g. data warehouse software, data mining software, digital dashboards software). BI tools are BI software products in use in an organization, and a BI system is a collective set of BI tools and related technologies, applications and processes.

Architecturally, a BI system can be divided into two parts: back-end technologies of data warehousing and front-end technologies of data access including data analysis, reporting and distribution tools (Popovic et al. 2010). Firstly, data warehousing activities integrate, cleanse and validate the data extracted, transformed and loaded (i.e. via the ETL process) from operational systems according to a set logic, and collect relevant data into a repository (Hovi et al. 2009, Herschel and Jones 2005). Sen and Sinha (2005) define an enterprise data warehouse to be "a subject-oriented, integrated, time-variant, and nonvolatile collection of data that supports managerial decision making". It enables the disparate operational systems to communicate with each other (Isik et al. 2011), and provides a uniform and integral view on the organizational data (Popovic et al. 2010). Secondly, the front-end technologies provide the business users with an

access to the data warehouse via tools such as dashboards, SQL query clients and relational cubes (Hovi et al. 2009).

A typical BI architecture is illustrated in Figure 1. Hovi et al. (2009) restrict their definition of BI to data access and analysis, and discuss data warehousing as a separate activity encompassing the ETL process and the design and implementation of the data warehouse. In this thesis, a broader definition for BI systems is in use and it includes both data warehousing and data access and analysis solutions. According to this definition, a data warehouse and other BI software are only the technology executing the BI process, so both the organizational and technological aspects of BI are taken into account. This is in line with the definition of BI generally used in Finland (Pirttimäki 2007).

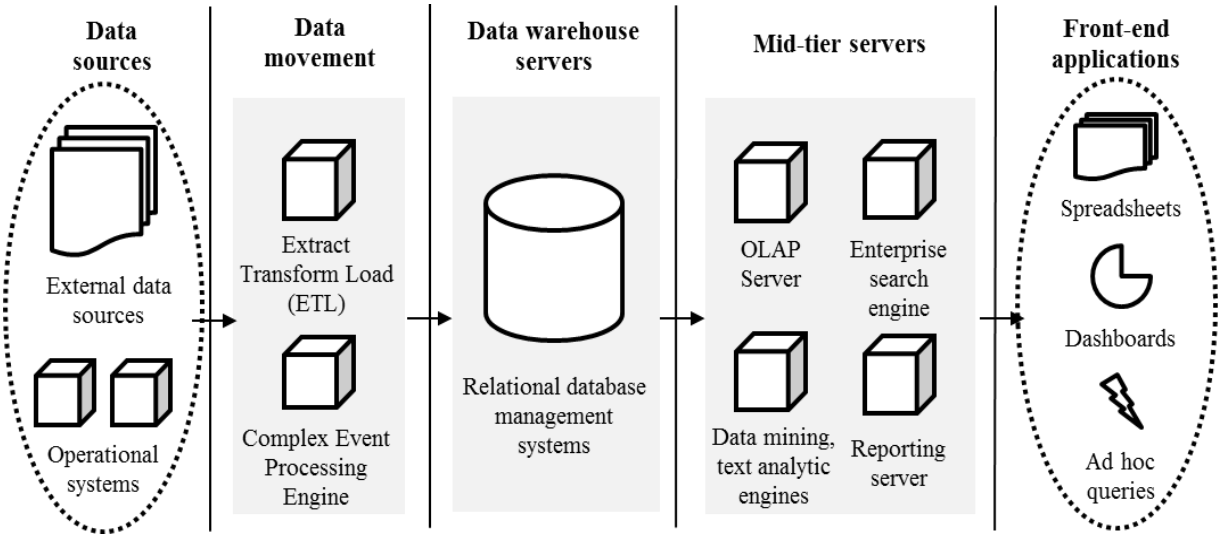

Figure 1 BI architecture (Chaudhuri et al. 2011)

In summary, BI is a management philosophy, which is often referred to as the technologies, processes, practices and functions that analyze critical business data to help an organization to increase its business-awareness, obtain a holistic view of its capabilities and business environment and therefore make better, timelier decisions (Chen et al. 2012, Kaario and Peltola 2008, Lönnqvist and Pirttimäki 2006). It comprises methods such as strategic performance management and competitive intelligence and provides tools for visualization and data mapping that aid presenting the results in an information rich, actionable form (Smith and Lindsay 2012).

According to Thomas (2001) the primary goals of BI operations are avoiding surprises, identifying threats and opportunities, understanding where the organization is vulnerable, decreasing reaction time to changes in the operating environment, out-thinking the competition, and protecting the intellectual capital. In other words, the objective is to provide the senior management a 360° health status of the organization. In the thesis, this definition is referred to when using the term BI. BI is seen to include CI and MI, but exclude the management of tacit knowledge and experiences that belong to the field of KM. As mentioned before, this definition allows BI to be treated as a part of a larger KM effort, but the focus of BI is on explicit information and on the stakeholders, technologies and the processes related to its value chain.

2.2.2 The business value of BI

Ramakrishnan et al. (2012) discuss the three general purposes for which BI is implemented. Firstly, an organization wants to gain insight. The competitive pressure in the market increases uncertainty, and the authors argue that BI systems are fast becoming a necessity for an organization to be able to deal with the more and more dynamic business environment (Ramakrishnan et al. 2012). BI has become the key activity assisting chief information officers (CIOs) in forecasting market behavior, so that an organization can adapt to changing business conditions (Smith and Lindsay 2012). BI provides the management with a better understanding about the underlying trends and dependencies that affect the environment they operate in.

The other two purposes of BI Ramakrishnan et al. (2012) offered are related to the coherence of organizational information. The authors state that BI provides an organization with a single version of truth and it can also facilitate organizational transformation. Enterprise data is under constant change especially as companies go through mergers and acquisitions. Organizational changes bring in new information consumers with possibly brand new information needs. Obtaining a single version of truth facilitates the communication between these individuals when all have access to the same information. The clear business logic of figures, calculations and terms also improves the quality of data and saves time for better analysis. (Ramakrishnan et al. 2012)

BI also assists organizations to tackle the tightening regulatory demands (Hervonen 2010). For example, Basel III regulatory standard on bank capital adequacy, stress testing and market liquidity risk in the banking industry and the Solvency II directive in the insurance industry require increased transparency of reporting and rigorously coordinated processes in information management (Hovi et al. 2009). Kaario and Peltola (2008) divide the benefits derived from better information management into three categories: 1) increased efficiency (i.e. higher automation levels, faster access to information and the better utilization of information capital), 2) improved information quality and risk management (i.e. error reduction, better compliance to the required standards and system security), and 3) higher service levels (i.e. added value to existing services, increased availability and faster processes). Cooper et al. (2000) add that BI enables the more efficient utilization of customer information, the identification of the most profitable customer segments, and the development of pricing structures and strategies to expand customer relationships (e.g. cross-selling).

2.2.3 BI strategy

The development of organizational objectives, structures and processes aims at maintaining the competitiveness of an organization and improving its performance in order to meet the requirements of the industry and other external stakeholders, and ultimately to surpass them. Without the systematic efforts of corporate planning, business is merely drifting reactively from crisis to crisis. Thus, a strategy is required. With a strategy in place, an organization is able to prepare for the upcoming changes in its business environment beforehand and thus minimize the amount of improvised business maneuvers that are often costly and disruptive. In other words, a strategy can transform an organization from reactive to proactive. (Kaario and Peltola 2008)

There are several academic models and frameworks that discuss the definition and development of business strategy. Amongst the most prevalent are Porter's five-forces (Porter 1980), the value chain model (Porter 1985), and the core competency theory (Prahalad and Hamel 1990). According to Mintzberg's (1987) well-known five Ps model, a strategy can be defined as 1) a plan (i.e. a decided course of action), 2) a ploy (i.e. a specific action used to achieve competitive advantage), 3) a pattern (i.e. a list of actions and the logic behind them), 4) a position (i.e. a

standing within the external environment) and 5) a perspective (an ingrained way of perceiving the business shared among the members of an organization) (Chen et al. 2012). Business strategy aligns with the trends of the external environment and acts as a blueprint for the organizational structure (Bergeron et al. 2004).

However, strategy design has not survived without criticism, as some authors see that creating strategy frameworks and planning strategic actions could lead to underestimating the value of business intuition and creative thinking. Indeed, Mintzberg (1994) emphasizes the role of strategic thinking over analytical strategic planning by numbers and "hard facts" by stating that "the most successful strategies are visions, not plans". The role of analysis and planning should be complementary, not determining. Mintzberg sees planning as a formalized process of breaking down business goals into specific actions and phases that take place under carefully forecasted circumstances. Of these rationally deliberated, intended strategies, only 10 – 30% is realized (Mintzberg 1978). Grant (2005) therefore advices that the objective of developing strategy frameworks is not to offer direct answers, but to assist in identifying, classifying and understanding the concepts and issues related to it. Grant argues that in practice, management of strategies almost always includes both rational, centrally driven planning and spontaneous, decentralized adaptation. This is referred to as "planned emergence". Which one is more dominant in strategy design, planning or adaptation, is essentially dependent on the external environment (Grant 2005). As a result, the author proposes that the balance between stability and unpredictability of business could be managed through theoretical frameworks for "organizing discussion, processing information and developing consensus" within the organization.

Changes in business strategy create information needs, which in turn can lead to changes in information management and finally in IT architecture. It is thus implied that there should be a match between the information requirements of the business strategy and the information processing capacity of IT (Bergeron et al. 2004). Information requirements are translated into a BI strategy, which is then aligned with the more extensive IT strategy. The information processing capacity, in turn, is reflected in the BI and IT architecture (Bergeron et al. 2004). Therefore, BI/IT strategy should bring together the business aims of an organization, an

understanding about the information needed to support those aims and the technology to provide the information required (Allen 1995).

Just like there are many terms to describe different intelligence activities in an organization, there is also a plethora of terms for different strategies concerning information. Earl (1989) suggests that an overall strategy for knowledge-intensive organizations consists of three subdomains related to information: 1) a strategy for what needs be done; 2) a strategy for how it needs to be done; and 3) a strategy for determining who should do it. Respectively, Earl (ibid.) calls these subdomains as information systems (IS), information technology (IT), and information management (IM) strategy. IS strategy deals with the information systems applications, IT strategy with the technology deployed and IM strategy with the management of the entire information systems function (Ragu-Nathan et al. 2001). BI strategy is the management framework which guides the organization of BI activities and is aligned with all of the three information related strategies.

According to Davenport (2006), strategy drives the organization's resources into the right direction and helps the management of BI activities maintain the right focus, build a right culture of information management and hire the right individuals to make optimal use of data produced. Boyer et al. (2010) determined that many of the biggest issues in information management stemmed from having no strategy to direct the BI efforts or no organizational structure for BI in place to offer the skills, manage the program, and provide the needed momentum for development. Thus, BI strategy is a roadmap for BI projects, stakeholder management, BI technology deployment and capabilities improvement (Garrett 2012). It brings together stakeholders involved in BI from diverse parts of the organization in a collaborative environment, thus transforming the BI roadmap into a collective effort in an organization (Pant 2009). In other words, its purpose is to act as the backbone of all BI related projects.

As mentioned before, some authors like to separate BI and data warehousing (DW) from each other, and when it comes to discussing strategy, they tend to focus on the importance of a DW strategy (Hovi et al. 2009, Sen and Sinha 2005). According to Hovi et al. (ibid.), the purpose of a DW strategy is to determine the DW architecture and processes, and how the DW development

projects should be prioritized and coordinated. It includes different areas such as data design, technical design, and hardware and software infrastructure design, and it can be classified into enterprise wide DW design and smaller scale data mart design (Sen and Sinha 2005). The development of DW strategy has three key factors: the scope of the DW, the needs of the business users and the information content and sources available (Hovi et al. 2009). DW strategy should address issues such as the choice of technology, implementation, maintaining the business sponsorship, managing expectations and avoiding scope creep (Watson et al. 2004). As this thesis uses a broader definition of BI that encompasses both back-end and front-end technology, DW strategy can be included in a BI strategy.

The need for a long term BI strategy is justifiable, as organizations now face the challenge of balancing the cost and quality of their BI efforts. The focus should be on lowering the total cost of ownership (TCO) without compromising the quality of service delivered to business users. To succeed, organizations need a more structured approach to managing BI initiatives and they must choose where to direct resource-intensive efforts. Having a BI strategy in place also improves the time-to-market of BI solutions - especially of those that reduce the most "business pain". The strategic alignment ensures that the prioritization of activities fits the organizational goals and there is business justification for the costs involved and the benefits gained. (van Roekel at al. 2009)

The main context for determining the needed BI initiatives is the organization's business strategy (Pant 2009). It assists in predicting the needs of the business for future intelligence resources and provides a framework for prioritizing the initiatives that most support the organization's mission (Pant 2009). Therefore, a feasible BI strategy takes into account the organization's:

1. Business environment (industry, stakeholders, ownership structure, competition)
2. Objectives (strategy, vision)
3. Official organizational structure (organization chart, size, global dispersion)
4. Unofficial organizational structure (culture, values)
5. Laws, standards (Kaario and Peltola 2008, Pant 2009).

Boyer et al. (2010) stressed the need for the continuous review of BI strategy. It should be tweaked and realigned with business strategy on a regular basis to ensure it is meeting the current and future information needs of corporate planning. In the following section, the alignment between BI strategy and business strategy is reviewed.

2.3 Strategic alignment of business and BI

In their research of the impact external pressures might have on BI and data collection strategies, Ramakrishnan et al. (2012) presumed that competitive pressure of the business environment would have significant influence on an organization's BI implementation goals. Although the authors succeeded in proving a positive relationship between institutional pressures (e.g. financial regulatory authorities) to adopt BI and implementing BI for consistency, they found their hypothesis of competitive pressure unsupported. Finally, they observed that the mismatch between an organization's competitive strategy and BI implementation was mostly due to lack of strategic alignment.

Strategic alignment in information management relates to the fit between business and IS strategies (Hirschheim and Sabherwahl 2001), or more specifically to "the degree to which the IS mission, objectives, and plans support and are supported by the business mission, objectives, and plans" (Reich and Benbasat 1996). In the field of BI, it denotes the linkage between BI and business, which aligns BI roadmap with business priorities. It provides direction and flexibility for information management to react to changes and new opportunities (Avison et al. 2004). The strategic alignment of BI steers operations towards knowledge-led decision-making, as it enables the penetration of BI into business processes bringing information closer to the end user (Pant 2009).

The theory of strategic alignment has evolved in academia already during a number of decades through the work of several authors all contributing to the justification of its importance in realizing value from IT investments and achieving competitive advantage (Luftman and Brier 1999, Henderson and Venkatraman 1999). In literature, strategic alignment is often conceptualized as a process and an outcome. Reich and Benbasat (2000) see it as a desired state

of integration reached through communication and joint planning, whereas Hirschheim and Sabherwahl (2001) define it as continual efforts to establish and maintain a reciprocal relationship between business and IS. Regardless of the viewpoint, all definitions share the same idea of improving both business and information management performance by information sharing (Avison et al. 2004). To illustrate strategic alignment, the conceptual model used by Chan et al. (1997) is shown in Figure 2. They examined the effects of strategic alignment on business performance and IS effectiveness by defining strategic alignment as the fit between business strategic orientation and IS strategic orientation. As shown in the figure, strategic alignment has a direct effect on both performance metrics.

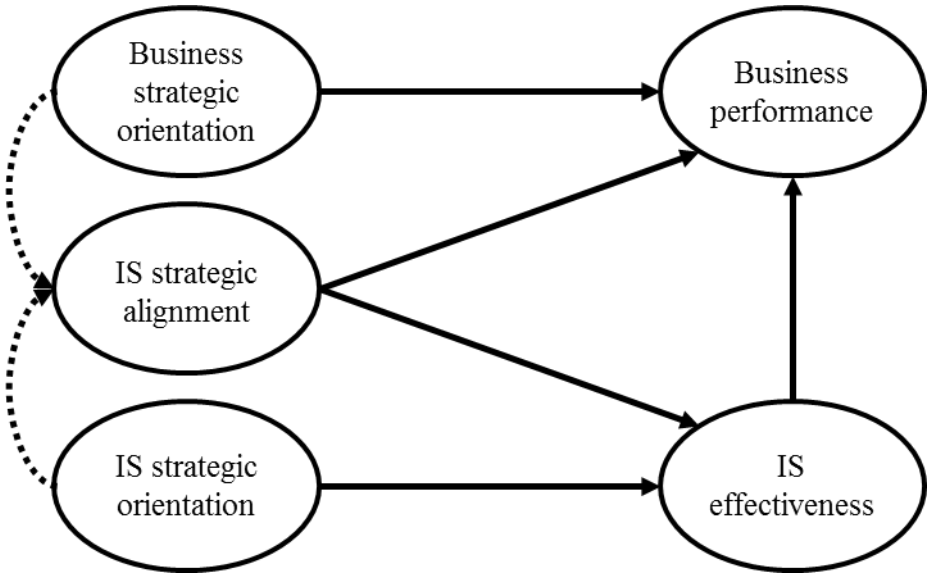

Figure 2 Strategic alignment affects business performance and IS effectiveness (Chan et al. 1997)

Strategic alignment is often presented as the consequence of a multivariate fit between business strategy, business structure, IT strategy and IT structure (Bergeron et al. 2004). In the following section, strategic alignment model (SAM) is introduced, which studies the alignment between all four domains. Considering BI as an IT related activity and an organizational function that usually exists in the junction between IT and business makes it possible to discuss the application of the theory also in the context of BI. Especially, as BI is sometimes seen as a business-driven IT service which should align with organizational strategy in order to evolve along with the information needs of business (Pant 2009).

2.3.1 Strategic Alignment Model

Among the most well-known and widely used frameworks for describing the interrelationship between an organization's business strategy and organizational structure, and its IT strategy and IS architecture is the Strategic Alignment Model (SAM) by Henderson and Venkatraman (1999). It has been used as the basis of several subsequent studies on strategic alignment (Luftman and Brier, 1999; Coleman and Papp, 2006; Burn and Szeto 2000) and it is recognized as one of the first models to feasibly accommodate the results of long history of research and practice on the subject and conceptualize the potential of IT for tomorrow's organizations. As mentioned in the previous section, SAM is originally used to explain the linkage between business and IT/IS strategy, but its assumptions can be found equally relevant in the field of BI. Therefore in this thesis SAM is extended to the strategic alignment of BI strategy. SAM is first introduced in the context of IT, and then comparisons are made to link it more closely to the BI environment.

In their article, Henderson and Venkatraman (1999) question the traditional, internal IS bound views on strategic alignment and propose a new framework for directing the strategic management of IT/IS, *SAM*. According to them, these traditional managerial views more often than not tend to treat IT/IS strategy as "a functional, internal response to the business strategy" instead of considering it as a contributor to the organization's overall strategic choices. Even more rarely it is has been viewed as an enabler of business transformation. Earl (1989) argues that IS strategies should both support and question business strategy. Furthermore, Chen et al. (2010) state that IS strategies can also lead business strategy. In this mindset, IS becomes not only a success factor for business survival and profitability, but also offers an opportunity to differentiate and achieve competitive advantage (Van Grembergen et al. 2004). IS moves from being a mere service provider to the role of a strategic partner (Van Grembergen et al. 2004).

Henderson and Venkatraman (1999) continue that if the IT strategy is built simply on internal demands, it shuts its eyes to the opportunities offered by the external market. Their fundamental conclusion is that the IS field needs a shift of focus from mere internal orientation towards a genuine strategic fit between the internal domain of IS and the external domain of IT that takes into account the ever-evolving IT marketplace. The IT marketplace, in itself, consists of the

current and emerging technical solutions, IT competencies such as system reliability or optimized cost-performance levels, and interfirm relationships such as licensing contracts, vendor alliances and joint ventures that should all be managed to obtain and maintain the target level of IS performance. In other words, the components of IT marketplace help to map the long term IT strategy. Just as in the area of business, managing all three aspects of strategy – business scope, distinctive competencies and governance mechanisms – is imperative for achieving sustainable competitive advantage. Relying the IT strategy on just one technical solution or competency no matter how advanced it might be is at its best shortsighted IS management. (Henderson and Venkatraman 1999)

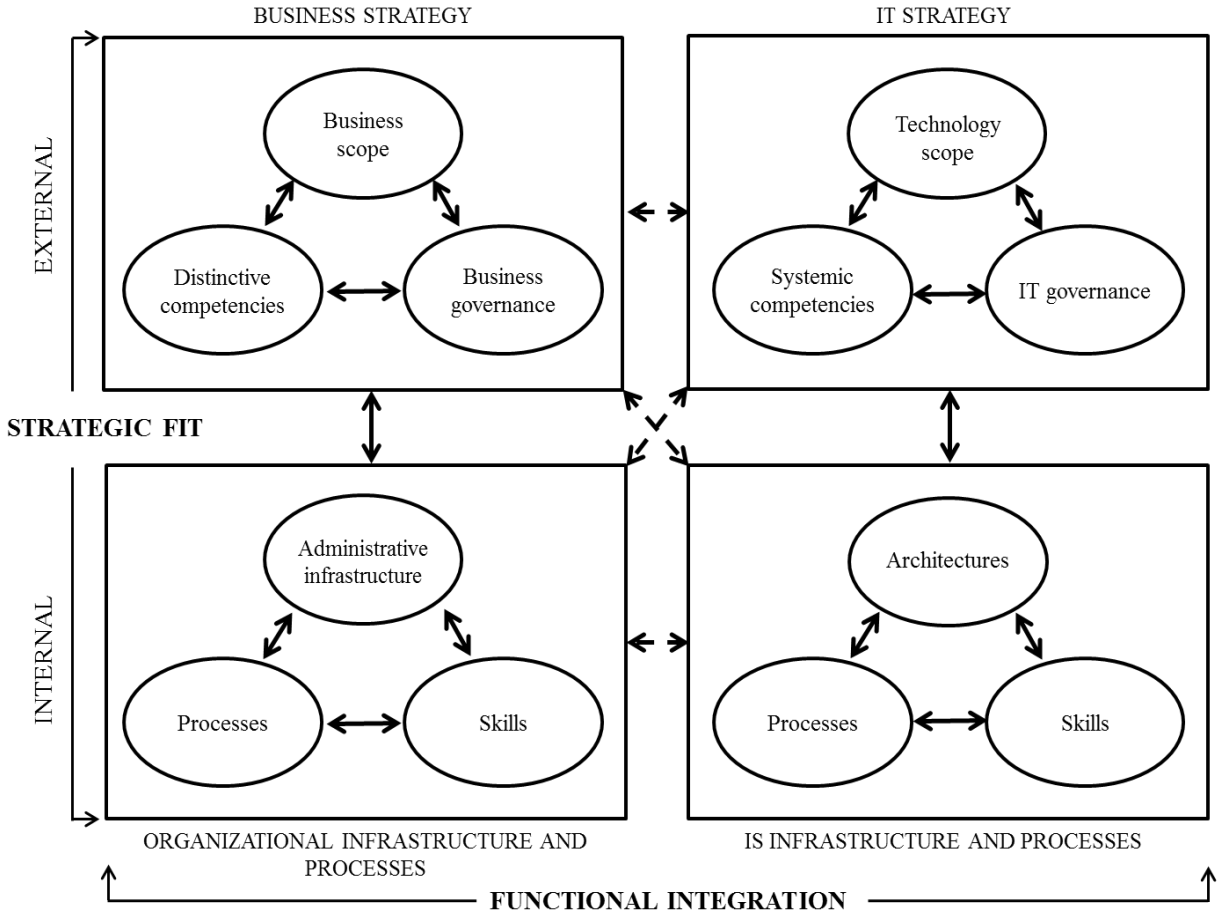

Figure 3 The Strategic Alignment Model (SAM) (Henderson and Venkatraman, 1999)

SAM is illustrated in Figure 3 above. As can be seen in the figure, the strategic alignment in SAM is based on two levels of integration within a fourfold framework of the organization's business and IT strategy components and the corresponding administrative structures. The first level of integration, *the strategic fit*, addresses the need for a dynamic relationship between the organization's internal and external domains both in the area of business and IT. In the business domain, the strategic fit determines how well and to what extent the organization's administrative infrastructure, human resources and processes respond to changes in the business strategy and then again, how this existing organization, in turn, supports or limits the business scope, its competencies and governance. It supports the claim that not only should the top management be interested in the organization's ability to execute a given business strategy, but they should also take into account its ability to cultivate new distinctive competencies from within. In a similar manner, in the IT domain, the strategic fit is articulated in terms of integration between the IT marketplace and IT strategy, and the prevailing IS configuration. The authors discovered that an inadequate strategic fit is, in fact, the primary reason for a failure at deriving value from IT investments. Therefore, a sound strategic fit could also help to justify a business case for new IT initiatives. (ibid.)

The second level of integration in SAM is the *functional integration* of business and IT. This dimension measures how the choices made in the area of business affect the objectives, governance and resources in the IT domain, and vice versa. The integration can be examined on two dimensions: 1) as *strategic integration* between the business strategy and IT strategy evaluating with the capability of IT to both shape and support business decisions, and 2) as *operational integration* between the corresponding administrative structures emphasizing the importance of internal coherence between the requirements and expectations of business and the delivery capability of IT. (ibid.)

The extent of the alignment is determined by how well the three different components within the four quadrants of the model interact with each other. The three components of SAM describe the different choices an organization has to make in its business and IT strategies both in the external and internal domain to manage the strategic alignment successfully. In the IT domain, the choices concerning IT marketplace are related to the current and upcoming technological

solutions (*Technology scope*), functionalities and performance attributes (*Systemic competencies*), and in-house capabilities and partnerships (*IT governance*) that support the existing business strategy or help in modeling entirely new business prospects. The choices concerning the IS administrative quadrant refer to the configuration of both technical and data architectures (*Architectures*), operations and responsibilities (*Processes*), and the training and knowledge of individuals operating the IS infrastructure (*Skills*). (ibid.)

As in the field of IT/IS, the choices in the external and internal domain are also applicable to BI strategy and BI infrastructure and processes, because of the similar functionalities and system attributes. The descriptions of the choices made in the business and BI environment can be found in Table 3, which summarizes the main components of SAM.

Table 2 Summary of SAM components' definitions in the organization's external and internal domain (Modified from Henderson and Venkatraman, 1999)

Business strategy	Business scope	Product-market offering	BI Strategy	Technology scope	Information technologies offering (e.g. datawarehousing, OLAP, self-service BI)
	Distinctive competencies	Pricing, quality, value added services, distribution channels		Systemic competencies	System reliability, cost-performance levels, flexibility
	Business governance	Make-versus-buy decisions, strategic alliances, marketing exchange		BI governance	Licensing, joint ventures, consultant services
Organizational infrastructure and processes	Administrative infrastructure	Roles, responsibilities and authority structures	BI infrastructure and processes	Architectures	Configuration of hardware, software and communication, data architecture
	Processes	Design of business processes, critical and supporting business processes		Processes	BI operations, systems development, maintenance, control
	Skills	Acquisition, training, and development of the knowledge and capabilities		Skills	Acquisition, training, and development of the BI knowledge and capabilities

2.3.2 Critique on and extensions to the model

Regardless of the praises for being the first model to succeed in describing the strategic alignment in a comprehensible way, SAM has been critiqued for not providing a practical framework for implementing it (Van Grembergen et al. 2004, Van der Zee and De Jong 1999). In addition, Smaczny (2001) criticized the basic assumptions on which the model was built. According to him, Henderson and Venkatraman's (1999) view of an organization is mechanistic, which assumes that business management and strategy development is sequential; i.e. business uses "structured, planning oriented approaches to achieve business objectives". The author finds that mechanistic foundations are not suited for an organization in today's business if it wishes to survive the rapid dynamics of the external environment. In fact, Smaczny (2001) disregards the whole concept of alignment, as the term implies a "master-slave" relationship between business and IT strategies, in which one strategy is always created beforehand and the other is then synchronized to fit the former. This relationship makes rapid changes difficult, the model inflexible and incapable of accommodating as much communication that would be required in the fast evolving business environment (Smaczny 2001). Instead, Smaczny proposes that IT strategy and business strategy should be developed concurrently and intertwined so that IT related ideas would induce business opportunities, and business would innovate IT solutions.

However, these problems do not solely apply to SAM, but it is a problem plaguing the whole field of strategic alignment studies. Despite its importance in organizational success (Hirschheim and Sabherwal, 2001), and its ever-growing managerial interest, the research in the field has been mostly restricted to theoretical problem settings and generalizations (Bhansali, 2010). What is more, Van Der Zee and De Jong (1999) claim that mere alignment is not enough anymore, but the capabilities of IT should be fully integrated with business strategies and business processes, and vice versa. Popovic et al. (2010) also state that organizations should not only align BI to support business goals, but they should align their business processes accordingly to leverage BI capabilities. In order to ensure the alignment is successful also in practice, work practices and processes at a social level, which influence the way IT systems are actually used, should be examined in more detail (Dulipovici and Robey 2013).

Partly because of these problems, several subsequent alignment concepts have been built on SAM and several authors have enhanced SAM to better suit dynamic market conditions, practical settings and IT/business integration, for example (Leonard and Seddon 2012). However, Leonard and Seddon (2012) emphasize that new definitions of alignment have mostly broadened rather that replaced former theories. One of the most renowned extensions of SAM is of Maes (1999), who enhanced SAM to better serve as a generic frame of reference for positioning and analyzing the relationship between business, information, communication and technology (Figure 4). The author added two more functional and strategic layers into the original model in an attempt to incorporate the idea that business and IT strategies today are becoming more integrated. Technology is becoming more pervasive, and so the relationship between IT and business becomes closer. In the updated model, information acts as a buffer between the business and IT strategy domains. The additional layer reflects the information requirements and benefits of information utilization to business (Maes 1999). It can be thus concluded that in the strategic alignment of BI and business, where information needs and processes play a key role, the added layer of information is especially significant. A year later after its publication, Maes et al. (2000) contributed to Maes' (1999) work by adding another domain in the model that represents the knowledge, communication and coordination of information. These two enhancements to SAM were melted together into a unified framework, which brought the model closer to serving as a practical method of creating alignment (Maes et al. 2000).

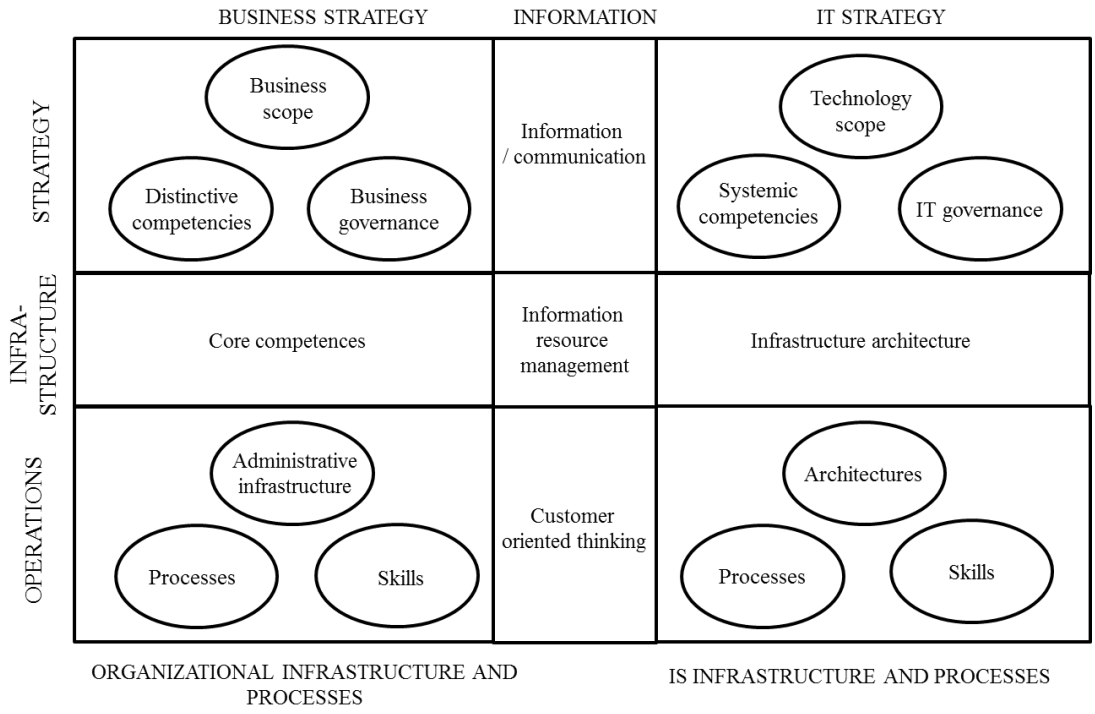

Figure 4 A generic framework for information management (Maes 1999)

2.4 Viewpoints to BI strategy development

Development and implementation of an organization-wide strategy for coordinating intelligence requires an extensive planning process that takes into account the social, organizational and technical aspects of information management. It is the social and organizational viewpoints to BI strategy that force its focus from mere technological initiatives on the development of processes and practices. Therefore, Kaario and Peltola (2008) promote the use of a so-called diamond model in coordinating the planning of information management. The principle of the diamond model is rather straightforward and it can be used as a checklist to ensure all relevant components of BI strategy have been considered during the strategy development process. In the model, organizational information exists in the interface of the organizational and technological frameworks, and in the center of three information management components; *processes*, *roles* and *technology*. The three components are directly connected to each other and form a shape of a

diamond around information in the middle of the model, which is illustrated below in Figure 5. (Kaario and Peltola 2008)

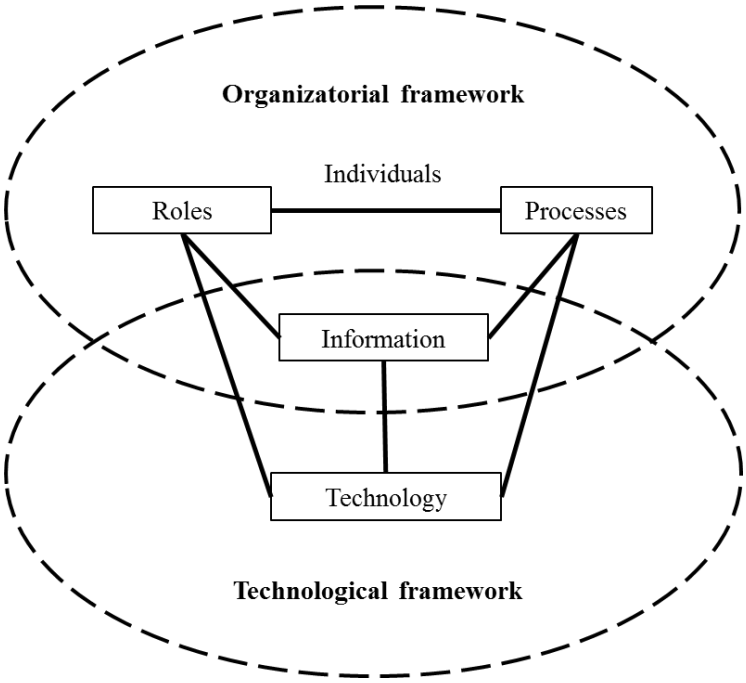

Figure 5 Diamond model of information management (Kaario and Peltola 2008)

Kaario and Peltola argue that measuring the connections between the three components and information is one of the most important tasks in the primary phases of an information management development project. For instance, the connection between roles and information is used as the basis of systems personalization, user targeting and the forming of user groups with varying degrees of access rights. Generally access to information content in BI systems is directly related to role hierarchies identified in an organization. At the same time, analyzing the connection between information and processes gives insight into what type of information is needed, handled and produced in a given process. The connection between technology and other components facilitates the identification of needed IS capabilities in each process and user group. The components and frameworks which constitute the three viewpoints of information management development should be included in BI strategy. (Kaario and Peltola 2008)

Organizational framework

An organization is a social entity based on formal and informal contracts, overt and tacit rules of action, and human interaction (Kaario and Peltola 2008). Therefore Kaario and Peltola emphasize the importance of the social organizational dimension and its influences in the planning and development of information management. The social forces have a significant impact on the organization's ability and willingness to adopt new operational practices and accept new information systems. This is justified also in the most mature upgrade of the technology acceptance model (TAM) that is the Unified Theory of Acceptance and Use of Technology (UTAUT) by Venkatesh et al. (2003) which measures the influence of different cognitive factors and social influences on an individual's decision to accept and use technology. In the diamond model, the social factors are included in the organizational framework in the form of two key components: individuals' roles and processes (Kaario and Peltola 2008).

When determining the needs, uses and attitudes individuals or organizations have towards information, one should focus on identifying their *roles* in information management. Therefore by roles, Kaario and Peltola (2008) refer to the individuals, teams, departments and authorities in an organization's external and internal environment who should be identified as stakeholders in the development of information management. Roles can be categorized according to a stakeholder's experience, responsibilities, job description, departmental role or function (e.g. supplier, customer, communications department). It facilitates the assignment of tasks concerning information content specifications, administration and publication. (Kaario and Peltola 2008)

Among the typical roles in information management are information owners, information consumers, controllers, administrators and producers (Kaario and Peltola 2008). The first three include BI users in the field of business and the last two are the roles usually assigned to the IT department. According to Hovi et al. (2009), the most important stakeholder role affecting information content is the information owner. Information owners are responsible for the information validity and the access rights given to each user (Hovi et al. 2009). They should have the skill to determine whether the information meets the information quality requirements

presented earlier in section 2.1.2., and whether the information is pertinent in decision-making. Consequently, the role of an information owner should always be assigned to an individual in management position within the most active business user group (Hovi et al. 2009). As Kimball and Ross (2002) stated, in BI, business is always right. Therefore, the term business owner is also generally used in BI. Another important role considering BI strategy development is that of a controller. Controllers or data stewards are personally responsible for determining information content, inspecting information quality and confirming its validity (Hovi et al. 2009). In practice, controllers can be found in the interface of IT and business. They are usually considered BI and analytics professionals in an organization (Chen et al. 2012). They have skills that draw from both statistics and computer science for managing and analyzing structured numerical data and unstructured text (Chen et al. 2012). In order to provide useful insights and decision-making support to the management, they must be capable of understanding business issues and framing the appropriate analytical solutions. In other words, they have to have the skills to turn raw data into meaningful and actionable knowledge, but also the know-how to communicate this knowledge to the business domain management (Chen et al. 2012).

According to Kaario and Peltola (2008), role analysis should answer questions like what type of information content is of interest to each role, and how can members belonging to different roles access the information the most efficiently. It should examine change management, i.e. how the roles and responsibilities change as information matures, and how changes in the business model, processes or organizational structure affect them. It should also discuss user rights, as in should the access of a given user group be somehow restricted. After proper role analysis, information needs among different user groups can be described in detail and the related projects can be better prioritized. (Kaario and Peltola 2008)

The high demand points and bottlenecks of information management are best identified through *business processes*. The process view of BI makes it possible to understand information utilization across the functional boundaries of an organization. In an ideal situation, mapping processes and the respective information flows creates a framework on which the different BI initiatives can be built. It also assists in recognizing the issues in need of development. By connecting the roles of information users and process descriptions, the process owners and

interested parties of related development projects can be identified and listed in the strategy. (ibid.)

Information

In the diamond model, information is situated in the interface of the organizational and technological frameworks. IT enables efficient gathering, storing and analysis of information, whereas organizational framework with its processes and stakeholders is supported by information. When developing BI strategy, Kaario and Peltola (2008) suggest that a map of organizational information architecture can be used to determine the locus of administration for each information type, their sources, categories, structure, and uses both in the internal and external environment. Information architecture should encompass the whole organization and its points of interaction with the external stakeholders (authorities, customers, suppliers etc.). It covers the whole systems architecture of information management and examines issues for development from the business driven point of view both in short term and long term. As with BI strategy, information architecture should align with the business strategy. (Kaario and Peltola 2008)

According to Pant (2009), information governance improves information quality, increases confidence in decision-making and makes information generally visible across the organization. The author stated that the greatest challenges of BI development are usually data-related; data quality issues, issues in supporting complex data models and developing access to real-time data. Many authors found that information consistency, comprehensiveness and traceability are among the most important BI success factors (Van Roekel et al. 2009, Ramakrishnan et al. 2012, Isik et al. 2011). All the attributes are necessitated in risk and financial reporting by the regulating authorities, as all industries are subject to compliance requirements (Smith and Lindsay 2012). Although information is compiled from many vertical sources and at times from outside the organization, it is analyzed in a commensurate form. When integrated from various operational systems from different eras of technology, valid integration and data quality inevitably become an issue (Hovi et al. 2009).

What is more, information value declines rapidly as it ages. This justifies why the concept of real-time BI is rising in popularity. Watson et al. (2006) discuss the topic of information latency in data warehousing. Low latency data, or in other words the more recent data, has more value than high latency data when examined on three different levels. Data latency refers to the time lag between the recorded event and the time when the associated data is loaded in the data warehouse. Analysis latency is the time between information upload in the data warehouse and when it is made available to users and finally analyzed. At last, decision latency means the time from when the information has been made available for decision making until decisive action is taken on it. These three levels of latency are additive and result in total latency. The authors conclude appropriately that "providing fresher data does not create business value unless it is used in a timely manner. Dealing with decision latency is usually more challenging than data and analysis latency". Value in information is only realized when the information is enacted by individuals. (Watson et al. 2006)

Technological framework

The second dimension in the diamond model is the technological framework which includes the software and hardware for information integration, data warehousing, and information delivery and analysis. The rapid evolution of technologies makes planning and developing a long-term strategy for technological framework problematic. Forecasting trends in the external market for technology is only feasible within a few years' time span. Kaario and Peltola (2008) claimed that during one year of business evolution, IT evolves four. The objective in developing information management technologies is to advance process automation and quality by leveraging the existing and future IT capabilities. The social and organizational frameworks and the information capital determine the need for technology development. Too often development is IT driven and restricted to status quo, instead of building long-term solutions for business process support in conformity with actual information needs. Therefore, the information management strategy should include a realistic but ambitious roadmap of technological deployments that should be benchmarked against technological trends. (Kaario and Peltola 2008)

Henderson and Venkatraman (1999) argue that no single functionality or application of IT is able to provide sustainable competitive advantage, and thus, the focus of an organization should be on leveraging the capabilities of technology to differentiate its operations from those of competitors. Isik et al. (2011) pointed out that "the wide selection of BI platforms and applications available in the market today shows that there is a demand for a variety of BI functionalities. One size does not fit all with BI. -- Whether the organization prefers to use best-of-breed applications or a single BI suite, matching the tool capabilities with user types is always a good strategy." Therefore, technology should be assessed in accordance with stakeholder roles.

2.5 Critical success factors in planning and implementation

Yeoh and Koronios (2010) proposed a framework for outlining the critical success factors (CSFs) for BI systems initiatives, such as BI strategy development. Their conclusion was that an organization, which addresses the CSFs from a business orientation point of view rather than technical, is more likely to achieve feasible results from its initiative. This is in line with the conclusion made earlier that business strategy should be the driving force behind the BI strategy development. Business orientation along with the IS infrastructure performance and the overall process performance lead to implementation success that generates distinctive business benefit. The CSFs and the performance factors create a loop together with the process re-evaluation phase after the project implementation. The loop-like structure ensures that the BI systems evolve constantly in sync with dynamic business goals. BI systems implementation is thus viewed as an organic cycle that allows for continuous system modification, optimization and improvement via user feedback. This cycle is illustrated in Figure 6 below. (Yeoh and Koronios 2010)

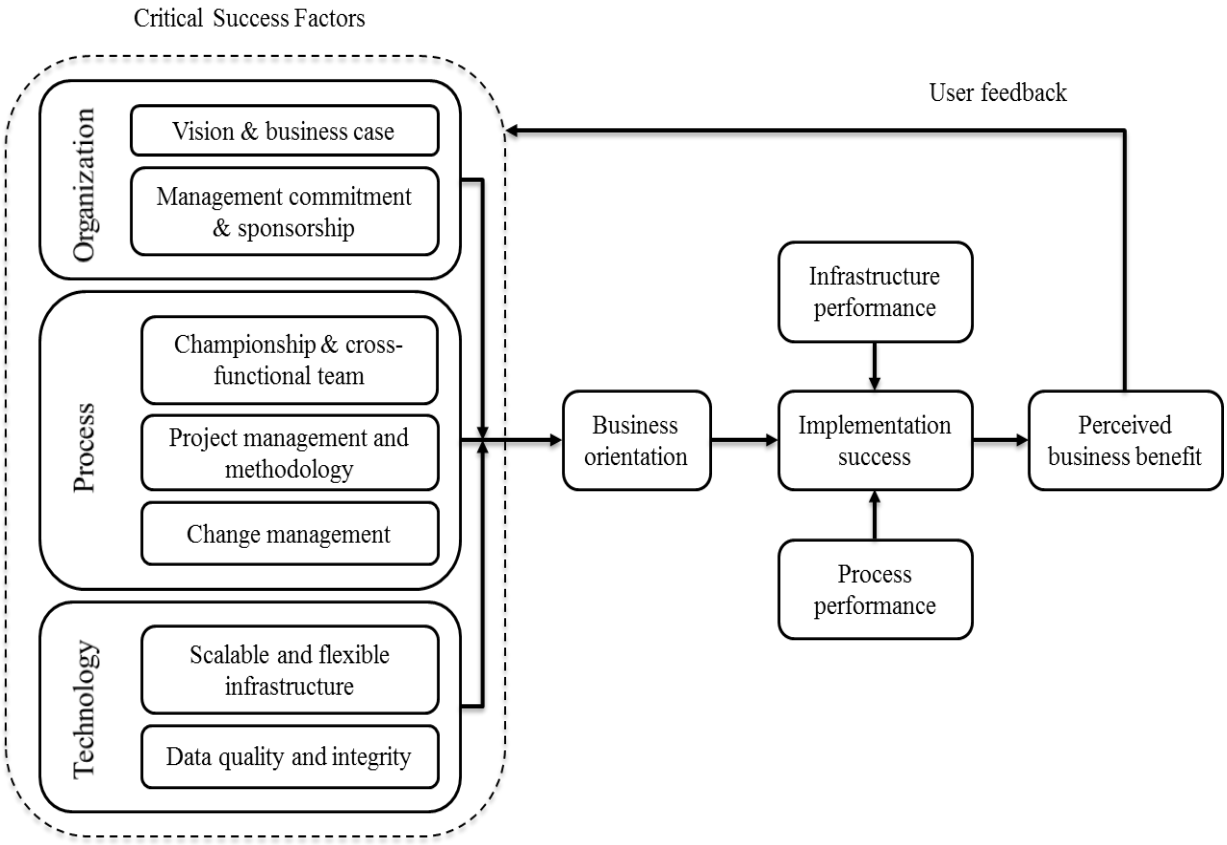

Figure 6 CSFs for implementation of BI initiative (Modified from Yeoh and Koronios 2010)

Yeoh and Koronios categorized the CSFs into three major dimensions of interest: organization, process, and technology. First in the organizational dimension, committed management support and sponsorship is imperative, when securing the necessary operating resources for the BI initiative such as funding and human skills and work time. The authors found that sponsorship from the business domain of an organization rather than from the IT sector is more effective, especially in change management and in creating a favorable "state of mind within the organization". The BI initiative also needs a clear vision and a well-established business case for obtaining and sustaining organizational commitment. Long-term, strategic business vision directs the implementation efforts and a solid business case assists in identifying the strategic benefits, the resources needed, risks, costs, and timeline of the initiative. (ibid.)

For the initiative to succeed in aligning with business objectives, the BI project team needs a business-centric champion. In the process dimension, business-centric championship and

balanced team composition improve the collaboration between business and IT units and help to foresee relevant organizational challenges. As the project team needs to deal with diverse technical platforms, varying information needs, multiple interfaces and connections to legacy systems, it requires competent team members from both IT and business domain. A cross-functional team is better equipped to design a robust and maintainable BI architecture that can accommodate the emerging and changing business requirements. Project management and methodology of the BI initiative should have a clear and well-communicated scope to facilitate the required flexibility, and the process method should be incremental and iterative given the substantial variables in the initiative to be managed simultaneously. In addition, focusing on user-oriented change management was deemed critical by the authors. This could be ensured through better user participation. (ibid.)

In the technological dimension, there are two CSFs, which have a significant impact on BI systems success. First is the technical environment of BI, which needs to be flexible and scalable in line with the dynamic business needs. It has to have the capability of extracting, transforming and loading additional internal data sources and attributes for fact based analysis, and it should be able to accommodate external data from suppliers, market analysis providers, regulatory bodies and industrial benchmarks. Secondly, the data stored should have high quality and integrity. Data quality issues at data sources have a direct effect on the quality of executive reports, which in turn affect the quality of management decision-making. In a large organization, it is not uncommon for the data in operational systems to be in silos and thus in need of integration. Furthermore, data may have many terms with slightly different meanings depending on the organizational department examined, because different business units tend to define the terms in ways that best serve their purposes. Therefore, the BI initiative should support common measures of data quality and data definitions for representational consistency and interpretability. (ibid.)

Similarly, Lönnqvist and Pirttimäki (2006) concluded that the most important issues in BI process management are the efficiency of the BI personnel, effective allocation of available resources, quality of BI products and the satisfaction of the users. The authors also emphasize the role of a feedback system to optimize each phase of a BI process cycle. They applied the

Performance Prism by Neely et al. (2002) to discover which aspects of BI should be measured in order to prove BI is worth the investment and to ensure that the BI products are efficiently produced and satisfy the end users' needs. The key aspects are stakeholder's satisfaction and contribution (who are the key stakeholders, what do they want and need and what is needed from them), BI strategy (how to achieve the goals the users of intelligence have set), BI process (what are the process phases) and capabilities (the resources available, BI personnel's competencies and the availability of suitable technology) (Lönnqvist and Pirttimäki 2006). These aspects are similar to Yeoh and Koronios' (2010) CSFs and aligned with the viewpoints of information management development by Kaario and Peltola (2008) that were discussed in the previous section.

2.6 Approaches to BI strategy development

The most critical phase in BI strategy development, which might influence the success of all other phases, is the information requirements analysis (Abai et al. 2013). Through requirements analysis, the base for information management design can be constructed and the project scope can be estimated (Abai et al. 2013). Kaldeich and Oliveira e Sá (2004) present three approaches to data warehouse development methods, which help to match the future information requirements with available information supply. The approaches can be differentiated based on whether information demand or information supply guides the matching process. Deriving the information specifications for a data warehouse from existing information supply leads to a data-driven (or supply-driven) approach, whereas information needs of business guide a demand-driven approach (Kaldeich and Oliveira e Sá 2004).

The data-driven approach ignores the information needs of business in decision support development until the data warehouse has been populated with organizational data and results of queries have been analyzed. By following this approach, BI strategy development is based on the analysis of existing organizational data models and the respective transactions that produce it in order to generate data mapping. This approach is much criticized by the authors, because it does not reflect the organizational goals and it risks to waste resources by storing ultimately redundant

data. In contrast, a demand-driven approach constructs the strategy based on the needs of the business. With the involvement of business users, information is gathered and restructured from various sources and then validated with business goals. Business users determine the organizational goals the data warehouse should align with and prioritize as well as define the initiatives supporting these goals. Thus, business affects the identification of data elements, terms and hierarchies. (Kaldeich and Oliveira e Sá 2004)

The previous two approaches are also called bottom-up techniques, because the data is gathered beforehand and only then the BI initiative is aligned with business strategy. The third approach is named a goal-driven approach, which in turn applies a top-down technique (Kaldeich and Oliveira e Sá 2004, Abai et al. 2013). Top-down techniques are used in information management especially when building an overall, integrated, organization-wide data warehouse (Ponniah 2001). A top-down technique is a collective effort in an organization that employs stakeholders from various departments of the organization with comprehensive cross-functional skills in business, reporting and IT in order to provide an enterprise view of information (Ponniah 2001). The goal-driven approach starts with the alignment between business objectives and the data warehouse by involving also the top management in the development process (Abai et al. 2013). Business goals are derived from business strategy, which in turn affects the data schema. Business goals should be then transformed into a data model with the support of appropriate measurement characteristics of each business question (Abai et al. 2013).

The three approaches all share the same weakness. End users are rarely able to define the business goals the data warehouse should be aligned with (Kladeich and Oliveira e Sá 2004). Furthermore, they are generally incapable of specifying the information needs that are currently unsatisfied or unknown. Kladeich and Oliveira e Sá claim that the users' view is "subjective by definition", which means that they only have their own specific interpretation of information and they are unaware of all available information sources. Therefore, they often overlook the possibilities of data warehousing (Kladeich and Oliveira e Sá 2004). Sen and Sinha (2005) suggest techniques such as user interviews, brainstorming and JAD sessions for eliciting information requirements of business. Information requirements can be collected in the form of business questions, which refer to decision support situations or analysis problems managers

usually face (Sen and Sinha 2005). The business questions are then prioritized according to their information value or risk profile, and the resultant conceptual model of information requirements serves as a blueprint for the information management project (Sen and Sinha 2005). The authors state that for enterprise wide data warehouse development, determining all information requirements is impractical, which is required in traditional systems development approaches (e.g. waterfall). They propose that an iterative spiral-like approach should be adopted.

Stakeholder involvement in a BI initiative is most valuable at its beginning, when information needs are identified, and at its end, when business intuition and intrinsic know how have an essential impact on the process outcome (Pirttimäki 2007). Pant (2009) argues that the ultimate goal of BI development is to bring value to business by empowering all stakeholders of information management. Inmon et al. (1997) recognize supporting the users' access to information as one of the top priorities in data warehouse development. Therefore, BI strategy should address the education and communication regarding BI initiatives to help information consumers derive value from BI tools and to develop the current BI solutions towards a more pervasive BI environment (Pant 2009). Information requirements of business change continuously and the BI environment should maintain a sufficient level of readiness to react to these changes (Vassiliadis et al. 2000). Abrupt changes in an organization often include business mergers, acquisitions, establishment of a new organizational department and changes in regulation, for example (Vassiliadis et al. 2000). According to Pant (2009), it is common for an organization to develop a BI strategy only to find it on the shelf later, because it was not updated regularly enough to sustain the alignment with business strategy. Therefore, it should be constantly tweaked and adjusted to reflect the needs of business, or as Pant (2009) stated, "BI strategy should be treated as a living artifact."

3 METHODOLOGY AND THEORETICAL FRAMEWORK

This chapter is dedicated for the development of the theoretical framework and for justifying the choice of research method based on the theoretical foundations reviewed in Chapter 2. Due to the nature of the research, the research method is academically defined, analyzed and critiqued

before the theoretical framework and its supporting theories are presented. The research method is essentially connected to the framework, and the founding theories were studied during the empirical research process, not in advance. In other words, the work process of this thesis focused on both theory building and practical problem solving simultaneously, which is in line with the academic directions for the research method. After the introductions to both the method and the theoretical framework, section 3.5. sums up the structure for data collection. Finally, the client structure of the empirical study of this thesis is presented.

3.1 Choice of research method

Moss and Atre (2003) state that as BI is an organization-wide, constantly evolving decision support environment, the traditional IT systems development practices such as the straightforward waterfall methodology are inadequate. According to them, traditional IT systems projects always have a beginning and an end and are never built with broad integration of cross-organizational activities in mind. They do not cover strategic planning, cross-organizational business analysis, or evaluation of new technologies, which are essential in developing a dynamic, integrated BI environment. They are driven by business need rather than by business opportunity. As BI applications implement an organization-wide strategy, traditional IT systems projects generally satisfy the needs of a single organizational department and thus create functional decision support silos. Therefore, BI initiatives should apply different methodologies than traditional, transactional IT. According to the authors, BI initiatives should promote iterative development practices instead. New data and functionalities in BI should be rolled out in iterative releases with each outcome of an iteration round likely to trigger new requirements for the next. This ensures that BI environment is continually enhanced based on feedback from the business users. (Moss and Atre 2003)

Sprague and Carlson (1982) are of similar opinion. According to the authors, decision support systems related projects require a different approach to design than traditional, transactional IS due to the rapidity of change in business conditions and thereby derived requirements. Decision makers are rarely able to specify in advance what is ultimately needed from the BI product.

Therefore, DSS systems projects such as BI strategy must be developed in short sprints with the opportunity of feedback from business users to ensure that the development is proceeding correctly. The usual process steps for developing IS are combined into a single step that is then iterated. The project is evaluated, modified and incrementally expanded. (Sprague and Carlson 1982)

Hovi et al. (2009) promote the use of an iterative *spiral model* in data warehousing development projects. It is characteristic for data warehousing that initially the project objectives are only directional and tend to clarify as the project progresses. Especially after the first results are presented. In order to give clear specifications of information needs, the stakeholders often need to know what can be expected. Therefore, in Hovi et al.'s (2009) spiral model the developers present the first version of the data warehousing project for commentary and modification. The project is iterated until the results are exhaustive. Iteration rounds can also be carried out concurrently (Hovi et al. 2009). Due to the driving force of business objectives in BI strategy development, the research method chosen should also be a goal-driven approach, which refers to a top-down technique of gathering and analyzing information needs. Business strategy defines the data model used. (Kaldeich and Oliveira e Sá 2004, Abai et al. 2013)

Based on this rationale, an iterative, qualitative research method was chosen for this study. A study of action research was conducted in a single case organization to develop a comprehensive view of the BI strategy building process. Confronted with the dual goal of contributing both to the practical problem solving of the business environment, in which the research was conducted, and to the academia in form of a master's thesis, action research is suited for a study that is self-reflective, iterative and makes use of observations during the research process. It is participatory work that involves the investigation of actual practices in the area of interest and actively aims to strengthen theory. It consists of several iteration rounds with the activities of planning, acting, observing and reflecting on results, which form a process model of a spiral. This method was also chosen because of the limited prior knowledge of the subject and the related theory. When focusing on the strategy development process of only one organization, it is possible to make more detailed observations and expand the researcher's knowledge further than in a multiple

case study, for example. The definitions, benefits and disadvantages of action research as a research method are discussed in the following section. (Kemmis and McTaggart 2007)

3.2 Action research

Initially originating in the work of Kurt Lewin in 1940s, action research is a post-positivistic, qualitative research method, which merges scientific research and practical problem solving thus producing exceedingly relevant results for the subject organization while enhancing public knowledge and theory for the academia (Baskerville and Wood-Harper 1996). It rejects the presumptions of positivistic research methods, which hold that in order to attain credibility, the researcher must remain objective, detached and value-free in his approach (Brydon-Miller et al. 2003). In contrast, action research favors an explicitly political, socially engaged, and democratic research process that goes beyond belief that theory only informs practice, to acknowledging that theory can indeed be generated through practice (Brydon-Miller et al. 2003). It is an appropriate method for solving a complex problem or for describing a process with an unfolding series of actions over time, which requires a cyclical, iterative approach (Coughlan and Coghlan 2002). Avison et al. (2001) state that action research has proven to be an especially useful and popular method in the field of information systems research. Borrowing the words of Baskerville and Wood-Harper (1996), action research as a research method is "empirical, yet interpretive. It is experimental, yet multivariate. It is observational, yet interventionist." Thus, it can be concluded that action research is a suitable method for studying the BI strategy development process.

Coughlan and Coghlan (2002) discussed the characteristics that distinguish action research from other traditional qualitative research methods. The most significant difference is the researcher's role during the study. In action research, the researcher becomes an insider and an agent of change rather than a detached observer of the events. The researcher actively takes part in solving the social or organizational issue. The authors remark that action research "focuses on research in action, rather than research about action." Its central idea is that a resolution to an important problem in practice is worked together with the members of the system who experience the problem directly. Therefore, action research is participative and interactive. It

requires cooperation between the researcher and the personnel in the subject organization, so that the research settings allow for continuous adjustment of the theoretical framework and the organizational norms to new information. Action research also demands some pre-understanding of the business environment, organizational structure, IT architecture, processes and the dynamics of operations. (Coughlan and Coghlan 2002)

Baskerville and Wood-Harper (1996) summarize the key points of action research with three distinctive characteristics. Firstly, as mentioned, the researcher is actively involved in the study with the expectation of bringing value to both the scientific community and the organization studied. Secondly, the knowledge gained during the research is immediately applied with the use of an explicit, clear conceptual framework and thus utilized in problem solving. The ethical framework, which the researcher imposes on the study, is mutually accepted, followed and improved throughout the research. Finally, action research is a cyclical, iterative process linking theory and practice in its repetitive iteration rounds. To maintain its scientific rigor, action research usually follows a process structure with five identifiable phases that are iterated until the research is deemed finished. These phases are 1) diagnosing, 2) action planning, 3) action taking, 4) evaluating and 5) specifying learning (illustrated in Figure 7). In advance to these five phases, an ideal approach to action research requires the establishment of a client system infrastructure, which determines the scope of the research and specifications for the research environment. It establishes the authority under which the researchers specify and carry out actions and ensures that those actions are in agreement with the objectives of the client organization. (Baskerville and Wood-Harper 1996)

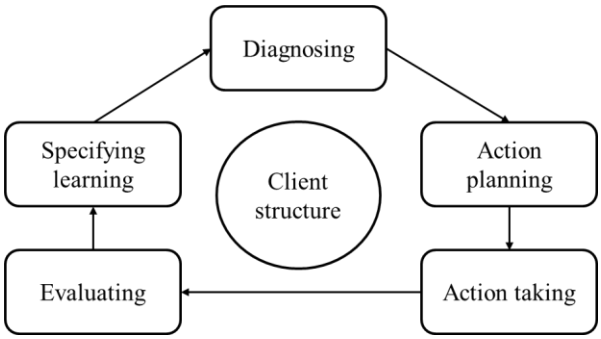

Figure 7 The action research cycle (modified form Baskerville and Wood-Harper 1996)

In the *diagnosing* phase, the primary problems that triggered an organization's desire for change are identified and initial theoretical assumptions about the nature of the research environment and problem domain are drawn based on the results. The problem under study is usually complex, and thus its self-interpretation is carried out in a holistic manner; not by reducing it to subparts and simplifications, which is customary in positivistic and natural sciences. In *action planning*, organizational actions that will solve or improve the primary problems are specified. These actions are planned according to a mutually acceptable theoretical framework, which includes both the desired future state of the problem area (target) and the changes needed to achieve it (approach). Next, the *action taking* phase implements these changes and after the completion, results are *evaluated*. At this stage, it should be determined whether the theoretical effects of the actions taken were realized and solved the problem. If the changes made were unsuccessful and the research cannot be deemed finished, a theoretical framework for the next iteration round is adjusted and established based on the analysis of the results. At last, when the *learning from the actions is specified*, the new knowledge gained can be utilized in three different ways. Organizational norms and processes can be adjusted to reflect the new knowledge. The new learning also provides foundation for diagnosis during further action research rounds and finally, the success or failure of the theoretical framework provides knowledge for the scientific community. (Baskerville and Wood-Harper 1996)

Theory building takes place concurrently with problem solving. In the first phase of the action research cycle, the researcher gathers and analyzes existing theory as foundations upon which to build the theoretical framework that guides the action planning and action taking (Baskerville

and Pries-Heje 1999). After the evaluation of results at the end of the each cycle round, this theoretical framework is reinforced, abandoned or modified to reflect the outcomes of the research (Baskerville and Pries-Heje 1999). The action research cycle can be continued despite the results of the actions taken. Even if the process was successful, it can contribute to both the organizational development and to the validity of relevant theoretical assumptions (Baskerville and Wood-Harper 1996). Baskerville and Pries-Heje (1999) propose a more rigorous approach for theory development via grounded theory method. Its objective is to develop a theory that is "closely and directly relevant to the particular setting under study". Grounded theory integrates well with the action research cycle, because its process stages begin with studying the area of interest instead of introducing theory and then seeking proof. It assists in maintaining a reciprocal relationship between data collection, practical analysis and theory formulation in action research. Grounded theory utilizes coding to create a core category and connecting subcategories of theory captured from the field notes and transcripts until the categories under development reach saturation (Baskerville and Pries-Heje 1999).

In action research, the data is contextually interpreted. The method is empirical despite the fact that the collected data might be highly unstructured (Baskerville and Wood-Harper 1996). To achieve and maintain validity in data analysis, the researcher should choose methodical data collections techniques, such as audiotaped observations, interviews, action experiments and cases (Baskerville and Wood-Harper 1996). Coughlan and Coghlan (2002) promote journal keeping as a good mechanism for developing reflective skills of the researcher. It assists in integration of experiences and information, enables reasoning the process and imposes discipline. Methodical data collection techniques also help maintain rigor, and the data can be easier produced for examination if the public demands it. Coughlan and Coghlan (2002) suggest that an action research report should include:

- Purpose and rational of the research
- Context
- Methodology
- Outcomes
- Self-reflection and learning of the researcher both in the light of practice and theory

- Extrapolation to a broader context of study and articulation of usable knowledge.

Due to the cyclical nature of the method, action research report should also record the repetitive planning, action taking and evaluation phases. Baskerville and Wood-Harper (1996) also highlight that negative effects of those actions should not be excluded in favor of positive effects as they often provide even richer learning. In action research, failures in iterative rounds are just as important as accomplishments. (Baskerville and Wood-Harper 1996)

3.3 Grounded action research in theory formulation

Baskerville and Pries-Heje (1999) spoke in favor of grounded theory developed by Glaser and Strauss, when building and refining theoretical framework during an action research study. The authors claimed that grounded theory method combined with action research evaluation cycles would improve rigorous formulation of theory from the basis of practical observations. Grounded theory units of analysis - open coding and axial coding – assist in holding the practical problem solving and theory formulation in reciprocal relationship by providing means of data collection and analysis of qualitative empirical data. Furthermore, action research benefits from the concept of saturation of categories, as it is an appealing mechanism for determining when the results of the study could be deemed exhaustive and the research can be concluded to have reached its end. (Baskerville and Pries-Heje 1999)

Lingard et al. (2008) discussed grounded theory, action research and the mix of these two methods within one research. The argued for using the mixed method, when the strategy for mixing is clear, meaning the sequence and nature integration of methods is justified (full or partial mixing, during data collection, analysis or interpretation). Similar to action research, grounded theory is an iterative study design with cycles of data collection and analysis, in which the results of analysis phase inform the next cycle of data collection, thus enabling feedback (Lingard et al. 2008). The matching key features of grounded theory and action research make the idea of grounded action research acceptable (Baskerville and Pries-Heje 1999 and Lingard et al. 2008).

It is in analyzing the empirical data where action research can benefit most from grounded theory. Grounded theory uses a group of three coding procedures: open coding, axial coding and selective coding. With open coding the essential ideas in the data can be discovered, labelled into concepts, grouped together and categorized. Axial coding is used to analyze the relationships in the research phenomena (e.g. causal, sequential, dependencies) by connecting data categories found by open coding. Selective coding generates core-categories and eventually the theoretical framework to the study by identifying "a story" that reveals them. The process of grounded theory is illustrated in Figure 8.

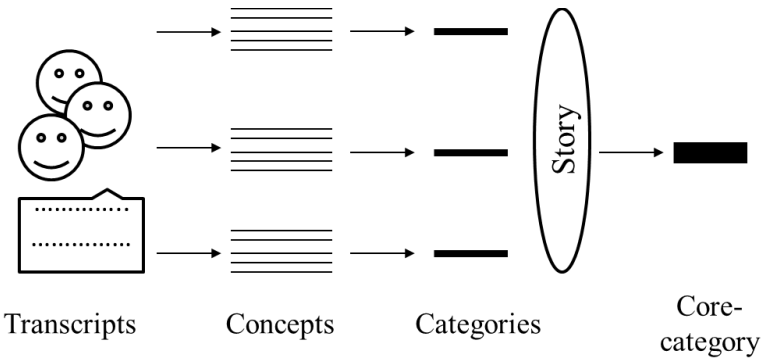

Figure 8 The process of open coding

However, the directions of comprehensive analysis in grounded theory contradict some with the assumptions made about the structure and content of action research cycles, as the tenet of grounded theory states that theory must be given the opportunity to fully emerge from the selective coding of data. This means that no initial theoretical foundations should be crafted in beforehand. By contrast, as some theoretical assumptions are already made in the diagnosing phase of action research, in this case about strategic alignment, the viewpoints of information management and the project CSF's, action research should utilize grounded theory components selectively. Therefore, the authors argued that using only open coding of grounded theory is more feasible in action research than starting with selective coding, which is usually performed only after the data is collected to identify the core-categories. In this study the core-categories were already designed with reference to theory prior to analysis, as it is elaborated in analysis phase of the study (chapter 4). (Baskerville and Pries-Heje 1999)

3.4 Assessing validity

There are some problems of concern related to action research, although most of these problems generally also apply to other qualitative research methods. First of all, action research is situational and context-bound as it usually involves only one specific organization as its subject. The context of the research can lead to rather narrow learning due to the uniqueness of the research environment, researcher or methodology. On the other hand, Baskerville and Wood-Harper (1996) claim that theory arises from these particular needs and action research is a well-suited method for theory discovery and cultivation. Some authors argue that action research lacks in rigor, which refers to scientific discipline and to the use of multiple methods to produce valid structure for the research. The researcher should address this problem by using methodical data collection techniques and the five-stage action research cycle for additional structure. As mentioned, in reality action research shares these problems with other methods, but one distinctive problem arises from impartiality of research. The researcher actively takes part in the process under study and can thus influence the results better than in other more observational methods. Due to its lack of impartiality, action research is often referred to as consulting rather than research. However, the authors found at least four characteristics that separate those two. Firstly, research requires theoretical justifications and more rigorous and exhaustive documentary than consultancy. In general, action research is also a process without tight time and budget constraints and consultancy is usually a linear process from problem identification to a proposal for solution whereas action research is cyclical and allows for experimentation. (Baskerville and Wood-Harper 1996)

Checkland and Holwell (1998) discussed validity of action research in the light of defensibility and transferability of its research results. According to them, there are three fundamental principles that characterize a scientific research method and establish its credibility: 1) reductionism, which holds that a complex problem can be reduced to several individual constituents, 2) repeatability of its results and 3) refutation, which refers to the destruction of its hypotheses. All these attributes fail to apply in action research. Most of the criticism on action research as a plausible research method centers around the replicability of its results.

Replicability turns findings of a single study into valid public knowledge. A single organizational situation at a particular time with its particular research participants cannot guarantee that the results are applicable to other organizations. This puts repeatability beyond action researcher reach. However, Checkland and Holwell (1998) state that a well-organized process of action research can indeed yield defensible generalizations, but "achieving credibility, consensus, and coherence does not make a 'truth claim' as strong as that derived from replicability of results independent of time, place, and researcher." Therefore, the authors press on the research criterion of recoverability, which means including much of the research content (i.e. notes, transcripts and conceptual maps) in reporting the work and providing a statement of epistemology. Epistemology is defined by the authors as "the set of ideas and the processes in which they are used methodologically", which depict the knowledge researcher acquired in the study. If the public is given the opportunity to recover the research content and appraise the conclusions made by the researcher, generalizations made in the study can be better justified. This improves the transferability of the results. (Checkland and Holwell 1998)

According to Coughlan and Coghlan (2002), validity in action research is enforced with conscious and deliberate enactment of the research cycle. They also argue that action research requires its own quality criteria separate from positivist research methods. This thesis will use criteria of seven arguments suggested by Baskerville and Wood-Harper (1998) to enforce its validity. The authors studied IS action research paradigm specifically, so the criteria can be deemed applicable. These seven arguments are the following: 1) the research should be set in a multivariate social situation, 2) the made observations are recorded and analyzed in an interpretive frame, 3) researcher's actions should intervene in the research setting, 4) Data collection method includes participatory observation, 5) changes in the social setting should be studied, 6) the immediate problem in the social setting must be resolved, and finally, 7) the research should illuminate a theoretical framework that explains how chosen actions led to the favorable outcome (Baskerville and Wood-Harper 1998). Despite fulfilling the criteria, certain restraint should be exercised when analyzing and drawing conclusions for generalization from a limited number of observations (Baskerville and Wood-Harper 1996). As action research accepts that research subjects are "not homogeneous through time", the ending of a research is fully

dependent on the research team's judgment. This means that despite the fact that the events and ideas revolving around the research subject continuously evolve, the team can judge if the chosen methodology and its framework have already yielded significant learning within the area of interest (Checkland and Holwell 1998).

3.5 Theoretical framework

The theoretical framework of this thesis was built on literature reviewed in Chapter 2. In this section, the theoretical foundations for the proposed framework are gone through by looking over the choices made regarding the combination of different theories behind the model. Theoretical discussion on the subject of developing a BI strategy revolved around three main topics: 1) strategic alignment of business and BI, 2) viewpoints and CSFs of the development process and 3) different methodologies to achieve it. Finding an answer to the research question of this thesis, *How to create a Business Intelligence strategy that successfully aligns with the organizational strategy?*, requires studying all the three aforementioned topics.

In literature review, it is seen that business driven objectives should be the driver in BI strategy development (e.g. Pant 2009, Garrett 2012). These business objectives can be translated into information needs that are communicated to the BI function. Through strategic alignment between the two domains, the communication is reciprocal, supporting knowledge-led decision making on both sides (Hirschheim and Sabherwahl 2001, Avison et al. 2004). Thus, BI strategy takes into account the dynamics of business and enables the penetration of BI into business processes bringing information closer to the end user. It is developed by paying close attention to four key viewpoints of information management: stakeholder roles, processes, information and technology (Kaario and Peltola 2008), and by managing these viewpoints through a cycle of five separate phases (Baskerville and Wood-Harper 1996). Figure 8 visually presents the theoretical framework that summarizes the key points of theory for the empirical research.

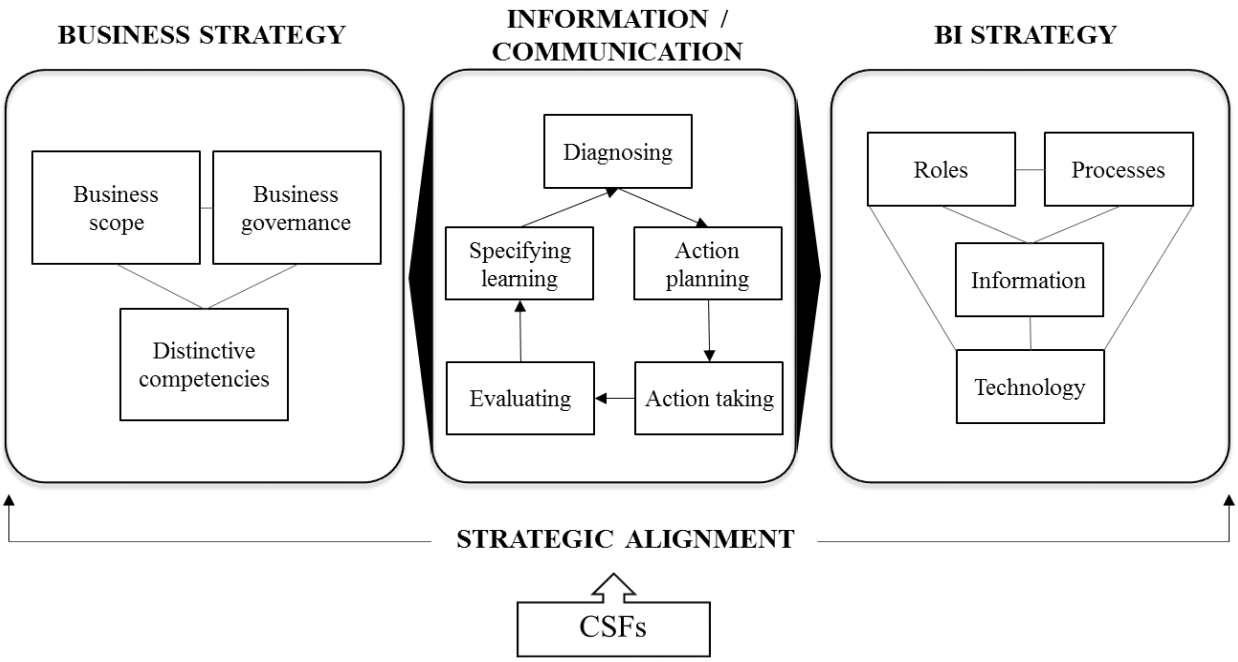

Figure 9 Theoretical framework

This paper suggests, based on the academic literature, that there are four elements in the process of developing BI strategy and the strategic alignment required for its success. Firstly, the project team should be aware of the different components of *business strategy* proposed by Henderson and Venkatraman (1999) in their Strategic Alignment Model. Business scope deals with questions about the organization's market position and its product-market offering, which points to, for example, what level of information granularity according to product complexity is significant in organizational decision making. Distinctive competencies refer to e.g. pricing strategies and to choices of distribution channels, whereas business governance issues deal with strategic alliances the organization maintains. Among other effects on information management, these choices determine the actual end user base for BI and the appropriate choice regarding technology.

In the second building block of the framework, according to Maes (1999), there are the information requirements brought up by demands and changes in the business strategy, and communication by which strategic alignment is created. Information/communication, which exists between business strategy and BI strategy, reflects the information needs and benefits of

more comprehensive information usage that were discussed in the literature review in sections 2.1 and 2.2.. This added strategic level is an extension of SAM that incorporated the idea of pervasiveness of technology into the original model (Maes 1999). In the framework, business strategy acts as a blueprint for organizational decision making, and from the business strategy can be derived the information needs of different stakeholder roles. The information needs of business are met via BI and the recognized information gaps between the information received, the information wanted and the information needed are addressed by the BI strategy. Finally, BI strategy answers to the questions of what is needed, when and how intelligence should be provided. Information/communication element also encompasses the five phases of BI strategy development in accordance to the most critical stages of action research (diagnosing, action planning, action taking, evaluating and specifying learning) proposed by Baskerville and Wood-Harper (1996).

In the third building block, there are different viewpoints of BI strategy that are drawn directly from the diamond model proposed by Kaario and Peltola (2008). By analyzing the BI strategy from all four points of view, the social, organizational and technical aspects of information management are taken into consideration. This forces the focus of BI strategy from mere technological initiatives on the improvement of processes and practices (Kaario and Peltola 2008).

The fit of all three building blocks is to be tested in practice during empirical research. The objective of the thesis is to develop a theoretical framework for BI strategy creation reinforced by practical observations. Consequently, theoretical framework was compiled during the empirical research, which is also characteristic for the chosen method. This initial framework informed by theory is to be adjusted based on empirical findings. The framework it solidified to its final form only after the fourth and final iteration round. In addition to these building blocks, CSFs of BI project development are applied according to Yeoh and Koronios (2010). CSFs can be seen as an important step in using the theoretical framework, since as Reponen (1994) stated, "there are different methods and frameworks for strategy generation, but these frameworks as such do not guarantee integration with business goals. The most important factor is the way these frameworks are used." Their relevance in case of BI strategy process is analyzed during each

iteration round, and their influence in conclusions of this thesis is reviewed along with the theoretical framework.

3.6 Data collection

Four different approaches for collecting data were used; semi-structured interviews, workshops, steering committee meetings and reviewing material from previously held conferences concerning the BI strategy project launch. Semi-structured interviews were chosen because they combine the coordinated structure of predefined questions with the opportunity of the interviewees raising new issues, which also allows for unstructured exploration into the subject (Wilson 2014). The interviews were held in the beginning of the research and in its end. Workshops were chosen in order to increase interaction between information stakeholders from different organizational departments. Workshops are a participatory, informal, time limited and self-contained way of learning about a complex subject (Developing a Strategic Plan and Organizational Structure, 2013). They can assist in creating "a sense of community or common purpose among its participants" (ibid.), which was essential for making the BI strategy a collective effort amongst its stakeholders and gaining top management support. Finally, the material from previous meetings was collected in a conference of the most active BI users of IWMC in June 2012. During the conference, the participants were asked to propose and rate the most important targets for development in relation to information management in order to increase knowledge of the most critical objectives for the project in the stakeholders' opinion. Based on these objectives, the vision for information management in 2016 was created. The results are shown in Appendix 1.

There were twelve workshops and semi-structured interviews held in total that are listed in Table 4 below. The table shows the interviewees and workshop participants, their positions in the case company IWMC and the abbreviations used later in the analysis part of the thesis.

Table 3 Summary of workshops and interviews

Subject	Participants/interviewees and their position	Date	Abbreviations
Workshop 1: Business requirements	14 participants from business and IT	23.4.2013	WS1
Workshop 2: Information and processes	19 participants from business and IT	3.5.2013	WS2
Workshop 3: Roles and technology	13 participants from business and IT	12.9.2013	WS3
Workshop 1 & 2 review	BI steering committee	29.8.2013	STECOM1
Final review of results	BI steering committee	13.12.2013	STECOM2
Initial interview (BI architecture)	IT development manager	20.12.2012	INT1
Final interview with IT department	IT development manager; IT development manager in charge	29.4.2014	INT2
Final interview with business representatives	BI manager; Head of corporate planning; Director of reporting and internal accounting	6.5.2014	INT3
Status check after workshop 2	Business development manager; Service director	18.9.2013	INT4
Status check after workshop 3	Mathematician	5.12.2013	INT5
Status check after workshop 3	Customer analyst; Development manager	11.12.2013	INT6

3.7 Client structure presentation

Insurance & Wealth Management (a pseudonym, IWMC) is a Finnish life insurance company and a fully-owned subsidiary of one of the most solvent financial institutions in Finland. In 2008, the life insurance company founded its own wealth management service operations and simultaneously changed its name. Today, the company summarizes its vision and strategy in two sentences: "IWMC's vision is to be the most respected manager of customer assets and provider of protection from financial risks in Finland. IWMC's strategy is to bring its customers financial security by combining innovative wealth management and life insurance." (IWMC, 2013)

IWMC is a provider of cover for life and health risks as well as a well-respected manager of financial assets including investments, savings, and pension insurance. IWMC Group also operates in the Baltic countries through a registered office in Estonia and branch offices in Latvia and Lithuania. In addition to life insurance business, IWMC has a subsidiary in Finland, Personnel Fund & Pension Services, which is focused on incentive and reward solutions through

personnel funds and foundations. Today, IWMC Group employs over 540 people with the annual gross written premiums of over €1,000 million (2013). IWMC complies with the legislation governing the insurance industry, and with regulations and guidelines issued by the Finnish Financial Supervisory. (IWMC, 2013)

3.7.1 Information needs at IWMC

Insurance and wealth management business is highly information intensive (INT3), which means the business requires intensive and intellectual processing of information to be efficient in its services and stay profitable. The output is not necessarily information, but information intensive services usually offer expertise in problem solving, and the core value of the service provided is information based (Ojasalo 2002). The head of corporate planning in IWMC therefore argues that information leadership should very soon become one of the key operations in the company's business strategy, especially as the importance of web service in sales distribution grows (INT3).

With business intelligence, information can be utilized in both steering and follow up (INT2). Not only does it provide powerful tools to measure past performance, it also indicates what type of operations and strategies could work in future (INT2). It allows for making observations about a specific area of focus in business strategy and indicates how successful the operations executed to support it have been (INT3). Ideally, it also enables more accurate forecasting of the KPIs and it could even generate sales opportunities (INT2). In other words, BI gives feedback on the choices made in business and points to the areas that require improvement. However, the maturity of BI environment at IWMC is only focused. Information is unified as opposed to scattered spreadsheets. Information can be analyzed by ad hoc queries and there are focused BI solutions provided for business operations, e.g. sales scorecard for sales performance follow-up. BI is not yet strategic or let alone pervasive, which would require integrated, organization wide use in business processes. Before the beginning of BI strategy, strategic goals of business did not drive BI solutions systematically.

The so-called heavy users of information in IWMC are corporate planning, customer analytics, sales support and actuaries. These departments analyze information gathered from internal and external sources and report it to in-house sales force and partners and above all, for executive

decision making. For instance, customer analytics create target segments for sales campaigns, sales force and partners are interested in monthly sales figures and commissions, and actuaries manage profitability calculations and reimbursement rates. Another two significant users of information are the web service and the internal CRM system. As the information distributed to the web service is directly in the end customers' use, standards for data quality in that end are the highest. CRM is used for analysis and storing customer information. (INT1)

The sources of information utilized in IWMC's reporting are in plenty, information reported for executive decision-making being the most varied in form and content. Top management is interested in internal data in reference to insurance premiums, savings, expenses and the development of different components of the company's result etc., which are compared to budgets, forecasts, trends, and performance metrics of rivals. External information is collected across the organization, but most of it that is used in executive decision-making comes from a centralized BI competency center (BICC) in the corporate planning department. BICC surveys the market for trends in order to enable quick reaction to a reported change in market dynamics, and measures the company's performance against direct competitors on various multidimensional metrics to benchmark it. Raw data for analysis comes from several external sources of which some of the most important ones are The Federation of Finnish Financial Services (FFI), Investment Research Finland, Bloomberg and Reuters. This information is entirely manually collected. Another important source of external information is the authorities of market regulation. This information is handled by the compliance department, which monitors the development of industry legislation. Finally, besides top management reporting, the operational and tactical decision-making rely on internal data sources via operational systems, CRM, and database reporting services. The most important criteria on those levels are accuracy, access speed and ease of use. Only, the significant difference between top management targeted information and operational information is the need for higher data granularity. Top management is interested in big numbers on summarized levels; the operational management needs a deeper access into specific accounts. (INT3)

Information types especially relevant for insurance business are e.g. service profitability ratios, reimbursement ratios, and customer information. Information about service profitability affects

pricing decisions. It is a direct indicator of what products should the company sell via each distribution channel, when they should be campaigned, and on what level should the management fees be set. The ratio of paid reimbursements against collected risk insurance premiums affects the company's risk selection, which in turn facilitates a balanced business. Information about the company's clientele, their buying behavior and demographics help in contacting the right customer, understanding the customer's needs, offering the right solution at a right time and perfecting the sales process. (INT3)

3.7.2 BI architecture

BI architecture at IWMC is visually presented in Figure 10. There are 17 operational systems in total, each dedicated for managing the basic and transactional data of one or more insurance policy type. These are the source of most internal information that is extracted transformed and loaded into the central data warehouse, INFO. By using partly Informatica and partly SAS, ETL process is run daily, weekly and monthly depending on the operational system in question. The objective is to provide the company's employees with data extensively to support a wide array of business processes with the shortest time frequency still feasible. This ensures the information that is used in all levels of decision making is current and easily available. During the ETL process, data is inspected, cleansed and processed according to a set logic. Data types and their categorization often vary across different operational systems. For instance, the same insurance policy type may be presented in Optimi with letters ABC and in LIPE with numbers 123. These inconsistencies are standardized in INFO, and they may be used as raw data for derived information such as ratios and formulas. Data quality is then cross-checked with the operational systems according to set quality measures, which are constantly increased and developed as part of the BI strategy. (INT1)

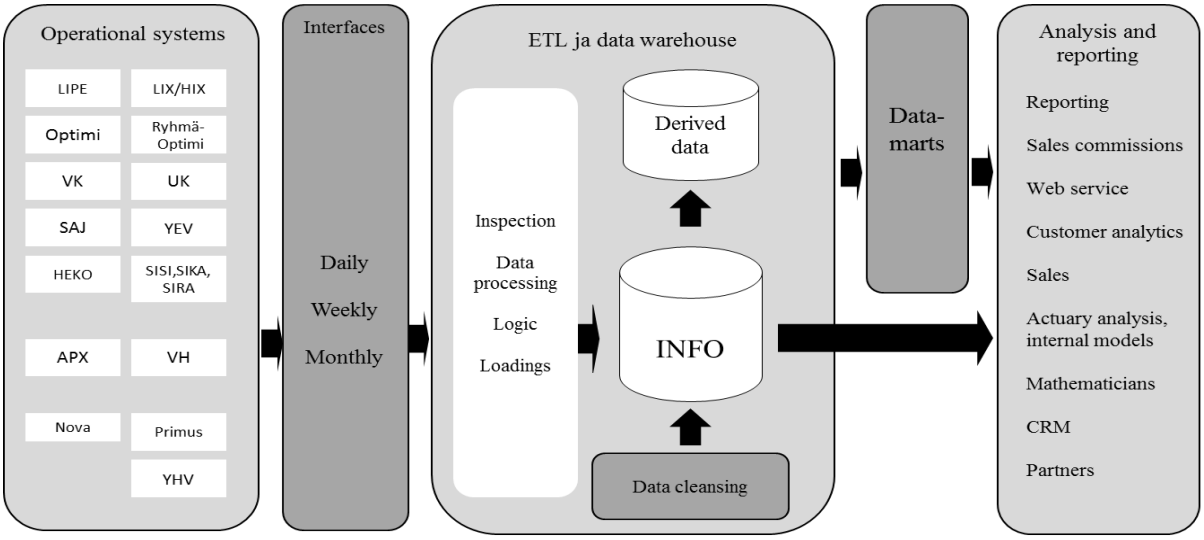

Figure 10 BI architecture at IWMC

INFO is the central data warehouse with the technology provided by Teradata. All data in INFO is storage in data tables with fine granularity without any summary level data. Data directories are categorized according to subject (e.g. campaigns, sales, written premiums, and customer data). Based on INFO, data marts are created for the use of analysis and reporting activities, which require quicker and easier access to information than accessing the data warehouse would provide. The information in data marts is preprocessed so the analysts can better find the information they are looking for without having to combine columns from various data tables. Thus, analysts can spend more time analyzing than merely gathering data. In addition to data marts, information can be accessed directly from INFO with the use of SQL and SAS clients. Besides SQL and SAS, other tools used in reporting include Microsoft Reporting Services (SSRS), Microsoft Office and Talgraf. (INT1)

BI steering committee prioritizes the issues in backlog and oversees the project execution. The amount of work directed to BI development has grown in short time and the proper coordination of the workload is vital (INT1). The steering committee founded only just in 2012 includes representatives of all organizational departments labeled as the heavy users of INFO. Soon after its implementation, the committee realized that BI operations lacked a long-term plan for developing INFO and overall information utilization in IWMC (INT1). BI strategy was required

to address the systematic management of information quality, data warehousing and BI applications (INT3). All stakeholders wanted to ascertain that BI development was conducted in alignment with business objectives, not only in sprints of several separate initiatives with distinct project objectives detached from each other (INT3). BI strategy project was started to ensure continuity (INT1).

4 ANALYSIS AND DISCUSSION

In this chapter, the BI strategy formulation process is presented to the extent that it can be considered relevant to academia and managerial interest in general. The objective of this empirical research was to develop and test the fit of the theoretical framework, while providing a solution to practical problem setting in IWMC insurance company. Thus, the results should provide both academic and managerial implications. The aim in the use of action research as the means of data collection was to ensure interaction and bring interdependencies and a broader view of the topics into BI strategy generation. The strategy was intended to be generated through learning and several group meetings so that it would naturally become a part of BI steering committee's routine agenda. Therefore, the data gathered is analyzed here one iteration round at a time.

The research process was broken down into four consecutive iteration rounds after the project initiation. The iteration rounds were structured according to the theoretical framework with a process illustrated in Figure 10. By following the five phases of rigorous, scientific action research proposed by Baskerville and Wood-Harper (1996) – diagnosing, action planning, action taking, evaluating and specifying learning - the analysis of each iteration round is structured similarly. First, the problem setting was diagnosed and the ensuing action to solve the problem was planned. In the next action taking stage, a workshop was organized with participants from different organizational departments, who as a whole represented all stakeholders of information management in IWMC. After the workshop, the results gained were analyzed by methods of grounded theory in project team sessions and BI steering committee meetings to finally specify learning.

As can be seen in Figure 10, the first iteration round was dedicated to the business strategy and analyzing information needs of business, which ensured that the strategy was built according to business objectives. As it was the consensus between business and IT that objectives of business should determine and coordinate the content for BI strategy, information needs of business were gathered and analyzed before moving on to the subsequent viewpoints of the strategy (INT2). The first iteration round also provided the most material for analysis in the following rounds, which all built upon data generated during the previous cycle. The second iteration round conjointly covered BI processes and information content and quality. The third one addressed stakeholder roles and technology. After the fourth and final iteration round, when the results were deemed exhaustive, the draft of BI strategy as a whole was reviewed. Final adjustments to the BI roadmap were made prior to presenting it to the operational executive board and to the rest of the organization.

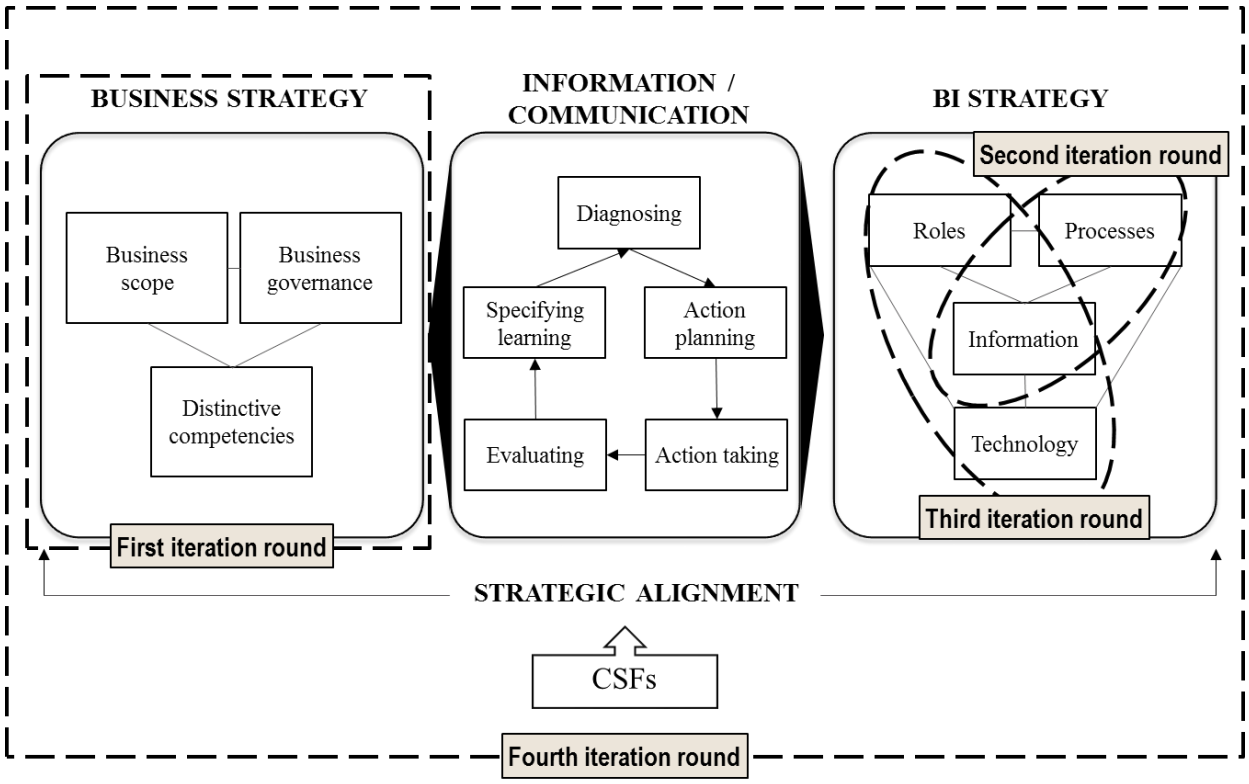

Figure 11 Iteration rounds

4.1 First iteration round: Business requirements

Here the first iteration round used to structure the foundation and methodology of the research is described in phases. During this first round, an intensive business requirements analysis was performed. Project management was established with adherence to CSFs of BI project initiation, and IT and business departments came together to map out linkages of BI to business strategy that would generate the agendas for the following iterations rounds.

4.1.1 Diagnosing

The objective of the diagnosing phase is to identify the primary problem, or as Baskerville and Pries-Heje (1999) described it, "a story, a descriptive narrative that reveals the central phenomenon (the main problem) under study." In the story, there is a research environment, initial theoretical assumptions and an agreement between the active parties concerning what role should each of them should play.

The initiative for the BI strategy formulation project came from BI steering committee, who after internal audit recognized the lack of long-term plan in the development of data warehousing and information management (INT1). BI steering committee kick-started the project, but invited the present researcher to study what would be the best practices in strategy development in theory. They had already recognized three main factors that ensure INFO's success in supporting organizational goals: data correctness, easy availability and accordance to standards (both legal and IWMC's internal codes) that should be included some way in the strategy (INT1). They also had created a vision for information management in the year 2016 and once sat down together with the representatives of IT and business departments to think about the goals and targets that should be met in order to achieve it. The vision included three main objectives for information management in 2016: *"In the year 2016 information management in IWMC will align with both short term and long term business objectives, steer and measure strategic actions, and support key business processes."* Therefore, the research environment including its actors was informed of the project, but still without an actual team to carry it out. That is how the present author

became the business-centric champion of a cross-functional team of three, and was first introduced to both technical and conceptual issues in BI at IWMC.

Central phenomenon in the problem concerning BI in IWMC seemed to be related to inadequate coordination and prioritization of BI projects and the lack of awareness of its potential benefits in business that prevented it from becoming pervasive in business operations. The development manager in IT department (INT1) argued that the main problem is the lack of knowledge about INFO and what it contains and how it could be used. The head of corporate planning (INT3) agreed and stated that IWMC has a thoroughly developed central data warehouse in INFO, but still too few people in business make use of it in their operations. Many operations that today require manual labor and integration of data from many transactional systems could be streamlined with more comprehensive reporting systems that read data directly from INFO and its data marts, and thus is better structured. Director of reporting and internal accounting (INT3) is of the opinion that efficient independent use of information is still business of only a few people in the company, whose title demands it. These are analysts and specialists, whose primary job is producing meaningful information to other departments. Too few decision makers themselves actively use BI tools. Thus, the culture of making use of information across the organization is missing (INT3). He continued that people do not know where they could get it, what is there to get, and how they could properly use it. In other words, IWMC now has the tools, the flexible BI environment, but no systematic work has been done to implement them into business and exploit the results.

It is to be concluded in the diagnosing phase that the following is expected of BI strategy development in IWMC:

- Recognition of information needs across the organization
- Solutions to information bottlenecks
- Rethinking existing operations especially in departments with information intensive work and high manual work hours put into information processing
- Ensuring the data in INFO is consistent with accounting information, extensive for richer analysis and readable with minimal deeper knowledge of coding rules

As the development manager of IT (INT1) put it, there are many technical details in INFO that affect the information context and usability. "There are many details that you just have to know" and without knowing them, the data in INFO is of no use. Director of reporting and internal accounting (INT3) also brings up the shortcomings in data quality. In order to maintain a coherent 360° view of the company's performance, information should be more coherent and compatible. "Single metrics can be easily analyzed as it is, but few information categories can be reliably treated as a whole."

Initial theoretical assumptions about BI strategy in diagnosing phase included the CSFs of strategy development and implementation. According to Yeoh and Koronios (2010), these were: 1) vision and business case, 2) management commitment and sponsorship, 3) championship and cross-functional team, 4) project management and methodology, 5) change management, 6) scalable and flexible infrastructure and 7) data quality and integrity. Many of the CSFs should be supported already in the beginning of the project, such as top management support and project management, so the study of different theories was found relevant already during the first steps of the process. What many theories had in common was the business driven project management (e.g. Pant 2009, Yeoh and Koronios 2010). Therefore, it was decided that the BI strategy should be business orientated rather than technical, and the main responsibility of project championship fell on the shoulders of corporate planning (business domain).

The business orientation of project management prompted discussion about strategic alignment between business and IT departments in terms of BI. Business authorizes that the projects carried out by IT and BI units of IWMC are focusing on right things and done on a correct schedule with the right amount of resources (INT2). Information management, on the other hand, gives feedback on made business choices and helps the follow up of KPIs. It is necessary in ensuring compliance and maintaining effective customer relationship management (INT2). Business strategy should be taken into account when setting the project goals of BI strategy. Information needs and possibilities were decided to be studied from the business point of view, i.e. by asking questions "What is wanted?" instead of "What is possible with the provided tools at this age and time?" (WS1).

Since one of the goals in action research is to simultaneously search for solutions to practical problems while building and reviewing a theoretical framework for the said problems, only a few theoretical assumptions were made at this point of the study. Some authors have even found it counterproductive (McTaggart 1991) or highly unlikely that a researcher should study the exact theory needed for the project in advance and then feasibly apply in the research (Cunningham 1993). Therefore, building the theoretical framework for this research was only begun in the diagnosing phase of the first iteration round and continued concurrently with the strategy creation.

In addition, the project scope and methods for data collection were determined during this phase. The researcher had unrestricted access to all pertinent data concerning the project and to the personnel who were able to comment on the progress of the strategy development and provide insight into matters in their area of expertise. During diagnosing, it was also decided that the data from representatives of each department in business and IT domains would be best collected during workshop sessions, because of interactivity of group work (INT1). An agreement was however made that proprietary information and details of business strategy that could be deemed harmful for the organization should they leak into public were excluded from the thesis and its appendices (INT3). Strategic details of IWMC's business plan fortunately were not found relevant to the study.

4.1.2 Action planning

In action research, the next step after the problem has been identified and initially self-interpreted is action planning, in which actions to solve the problem are specified (Baskerville and Pries-Heje 1999). With directions and good experience from the IT development manager (INT2), it was decided that three separate workshops would be held. After studying the viewpoints to information management by Kaario and Peltola (2008), the workshops were themed after the different fields. The first focused on business requirements, the second one encompassed processes and information content and quality, and the final one would discover what is needed of technology, role differentiation and know-how to support the found business requirements (INT2).

Business requirements and information needs being the theme of the first workshop, the team needed to familiarize itself with the company strategy approved by the operative board of directors. Strategic Alignment Model (SAM) by Henderson and Venkatraman (1999) was used to analyze the different components of business strategy and to find specific themes in the strategy that could be better supported with BI. Therefore, business strategy is gone through in this section with the amount of detail relevant for the study, but still harmless for the client company.

Analysis of business strategy: business scope

SAM encompasses three components of business strategy: business scope, business governance and distinctive competencies (Henderson and Venkatraman 1999). As a recap of theory, business scope involved the market that the company was occupying, the choice of product offering and the target customer segment. In business scope of IWMC are its products and new service opportunities.

Traditionally, the insurance business in general was focused on selling pure, direct insurance products to mass markets as efficiently and profitably as possible. IWMC served its customers by using several strategic business partners as its main distribution channels. The term widely used among the employees of IWMC which appropriately describes this orthodox way of doing business is the business model of an *insurance factory*. Along with the introduction of the new company name in 2008, the work towards recreation of IWMC's business model began and now, the company identifies itself as the provider of financial, insurance and incentives related services. The product offering is bundled with services with the intention of providing the customer with solutions instead of mere products.

Currently, IWMC's core product areas in new sales are unit linked capital redemption and endowment policies, group pension insurance and risk insurance. Investment services are implemented through the use of various insurance contracts. As mentioned, during the recent years IWMC has expanded its business towards a wider offering of rewarding and incentive solutions that support the sales of other product segments. The company has also supplemented services that include tax consultancy and advisory services concerning personnel rewards. The

need for service diversification outside the traditional life insurance sector has grown since the regulation related to e.g. retirement age in corporate pension insurance and enabled tax advantages via endowment tightened in 2009 and again in 2013. As a result to these changes in legislation, IWMC ceased the new sales of individual pensions altogether in the end of 2012. In future, IWMC will continue to look into new opportunities to support its current service portfolio as a part of its strategy.

In conclusion, what is important for growth in IWMC's business scope is *service innovations*. Although the company terminated new sales of individual pension policies, managing existing accounts has not lost its importance. Maintaining the flow of investments into existing policies has become even more vital now when new accounts are no longer opened. IWMC strives for being innovative in releasing brand new investments products and investment objects that can be added to the investment portfolio of current and new customers in all segments. In addition, among the with-profit products that are still relevant in the company's business strategy are risk insurances. (INT3)

Analysis of business strategy with the use of SAM: distinctive competencies

In SAM, distinctive competencies involves pricing decisions, value added services and other capabilities that could source competitive advantage (Henderson and Venkatraman 1999). In IWMC, it is recognized that besides products and services those are active sales and customer centricity. IWMC's key customers are affluent private individuals, institutions, corporate (< 250 employees) and major corporate customers (> 250 employees). These customers are served directly by IWMC's own sales force, which is divided into four different channels with each their own target customer segment. These channels are wealth management (investments over 250 t€/policy), customer service (small businesses and private customers with investments under 250 t€), corporate customers and web service. However in retail customers' segment, the strategic alliance with a Nordic bank has a major role in the sales of investments insurance and risk policies, especially loan insurance. The operations that execute and support business strategy include above all else cooperation in sales with multiple strategic partners and cross selling. Thus, the first determinant distinctive competency can be identified as *effective sales*. (INT3)

The second distinctive competency is *customer relationship management*. IWMC sees that during the next couple of years especially the role of online services in customer service and sales distribution will grow exponentially when it comes to providing cover for life and health risks. New sales models for increasing the risk insurance sales are needed. Information about the company's clientele, their buying behavior and demographics help in contacting the right customer, understanding the customer's needs, offering the right solution at a right time and perfecting the sales process. Though, there are a few issues in utilizing customer information effectively. In retail sales, for example, using a mass market distribution channel can generate abundantly information about customer traits. Head of corporate planning explained: "When there is a large customer segment available for analysis, statistics providing client averages are significant. However in case of a segment of mere 100 accounts, analytics lose some of the significance as the sales force usually is in closer contact to their customer base." IWMC's customer base is somewhat diffused as the company uses the Nordic bank as a strategic partnership in retail sales, and therefore loses the advantages of a larger mass market sales channel and the related information supply. (INT3)

Analysis of business strategy: business governance

Business governance consists of production, administrative choices and strategic alliances (Henderson and Venkatraman 1999). In IWMC's strategy these are called core business activities. They include increasing the unit linked gross written premiums to new and existing insurance policies while diminishing the share of with-profit premiums and assets. This has instigated a few product and systems conversions to improve *operative efficiency*. In addition, *governance* is an obligatory key business activity. IWMC's industry is highly regulated and legislation is a significant force in its macro environment. Currently, the most prominent project in exacting industry regulation and taking up most resources from across the organization is the Solvency II directive. In terms of information management, Solvency II demands more transparent reporting, better data quality and processes for ensuring continuity. In general, it primarily sets the minimum amount of capital that an insurance company operating in Europe must hold to reduce the risk of insolvency. (INT3)

Strategic business partners still play a significant role in the company's new sales. Products and services are sold via IWMC's own sales units, the Nordic bank (especially through Private Banking and Retail) and a indemnity insurance company, which is the strategic partner for corporate customers and the other subsidiary of the group. However, IWMC now puts emphasis also on the growth of its own sales channels. Finally, another operation that supports the strategy execution and operational efficiency is cost surveillance program. The company's objective is to maintain the total expense level that prevailed in 2012 until the year 2015. (INT3)

Translating strategy into key themes

In summary, IWMC's strategy falls under five themes that can be supported by better business intelligence: service innovations, effective sales, customer relationship management, operative efficiency and governance. These themes were connected to the three business strategy components provided by the theory of SAM to build a theoretical framework for business strategy analysis. Service innovations are part of the business scope. Effective sales, which means guiding more resources into sales enforcement and providing capable sales support, can be connected to distinctive competencies along with customer relationship management. Finally, operational efficiency (i.e. cost efficiency and profitability of operations and services) and governance, that is compliance, were regarded as part of business governance.

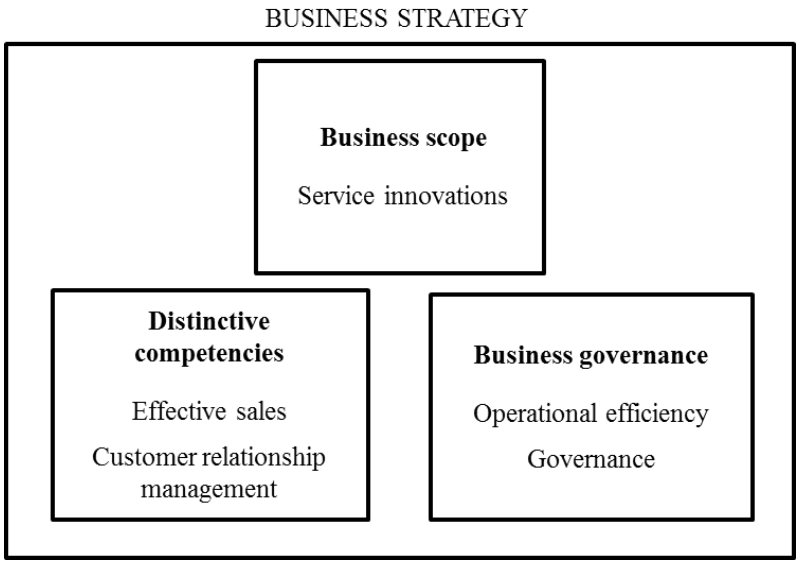

Figure 12 Analysis of business strategy according to SAM

The objective of the workshop 1 was to identify business requirements that could be translated into BI projects to be added to the BI strategy roadmap. These BI projects could then be compared against the five strategic themes. This was done to verify their linkage to business objectives and to achieve alignment. Because there are so many employees that are working in back office operations without everyday contact to business strategy, the team members from the IT department felt that this strategy should be mapped out, summarized and presented to the workshop participants as a part of the workshop agenda (INT2).

4.1.3 Action taking

The role of the researcher in this phase was to act as a workshop facilitator. In action taking, the workshop 1 for business requirements was held as the first intervention into the organization. The agenda was structured in the following way: (1) introduction to the project, focal points of business strategy, and presentation of the BI environment today, (2) group assignment, and (3) discussion about results. The introductory part was a facilitator-led presentation that was open for comments, designed to guide participants into the subject. First of all, the participants needed to be aware of what IWMC as a company was trying to achieve. The company's business strategy was presented to explore to what extent the participants were aware of the strategic

motivations behind business operations and the objectives that BI should be supporting. By displaying the current BI environment, it was ensured that participants knew what BI provides today. It also ignited discussion of what BI meant to each participant and to their department in their everyday work. However, the research team wanted to be careful not to set too strict mind frames to what BI could possibly offer in three years' span. BI strategy was set to cover the years 2014 to 2016.

The second part of the workshop was group assignments. The objective was to get representatives of various departments discussing about how they could use information more efficiently in their work, what type of information was still unavailable or difficult to process, or more importantly, in the light of IWMC's strategy, how could producing and utilizing information better support business operations in future. Their assignment was to identify information needs and to generate propositions for projects to be included in the BI strategy. They were also asked to prioritize their projects according their own knowledge of the subject matter and its importance/urgency. Priorities were set from one to three, one being the most important or urgent need. The results of the group discussions were finally gone through together in the third part of the workshop.

Workshop 1 was held 23.4.2013 and it involved seven departments from both business and IT domains from which 14 people took part in the workshop. The theme of the session was business centric, so more people from business domain participated. The participants for each workshop (1-3) are listed in Appendix 2. In total, 37 information needs and project proposals were generated. Their division to priority classes was 66 % for the first priority projects, 22 % for the second and 12 % for the third. If priority classes were to represent the expected time for project completion, the projects would skew towards the first year of BI strategy roadmap, which at this point of strategy formulation seemed unrealistic to the project team. The projects and their priorities, or in other words, the raw, untouched output of workshop 1 is listed in Table 4. In the table, the skew becomes even more noticeable.

Table 4 Raw output of workshop 1

	Priority I	Priority II	Priority III
Group 1	Sales funnel	Benchmarking information in marketing materials	Mobile BI
	Utilization of internal and external customer information (especially corporate and affluent)	More in-depth analysis of competitor information, especially in wealth management	Web service analytics
	Systematization of customer targeting and segmentation processes	Proactivity in case of changes in data related to KPIs	Estimation of customer segment profitability
	Communication of BI activities and tools		
	INFO based analysis of risk result		
	Increase in data marts (summary level data etc.)		
	Development of information content and quality		
	Availability of basic reports (aggregate numbers, frequently needed information content)		
	Development of forecasting models		
	Reporting trends and forecasts instead of history		
	Improved customer data analysis: parameters for recognizing business potential (especially in corporate customers)		
	Development of easy-to-use and accessible reporting environment for the entire organization		
Group 2	INFO content: investment objects	Matching accounting data with INFO	
	Utilization of diverse information sources (both internal and external, local and international)	Separation of wealth management policies (997/991) in written premiums	INFO content: Basic information of Innova contracts
	Matching of written premiums with INFO	Cross selling to customers of IF P&C	
	INFO content: savings of existing pensions	Streamlining monthly ETL operations	
	Automation of reporting	Communication of data quality, matching, errors	
	Overlapping executive reporting		
	Better, more active BI promotion		
	INFO content: risk policies		
	BI missionaries; stakeholder training		
Group 3	Prevalent management of information: past, present, future. Emphasis on forecasting		
	Customer centricity in reporting		
	Specifications of internal information needs, hands on account on needs in operative units		
	Resources in ensuring data quality and availability		

4.1.4 Evaluation

The results achieved in action taking were evaluated by using open coding, familiar from the analysis techniques of grounded theory. The objective was to recognize certain categories (i.e. themes or recurrent occurrences) within the data, which could be linked to their principal core-category and then construed to projects in BI strategy roadmap.

Firstly, as it is characteristic for grounded action research, the core-categories were predefined based on theory. Four core-categories were chosen to represent the viewpoints of information management by Kaario and Peltola (2008), information, roles, technology, and processes.

Secondly, with open coding, the data collected in workshop 1 was analyzed. The arguments and ideas discovered in the data were labelled and interpreted into concepts, which were then matched and grouped with other similar concepts to develop a category. To provide an example, the full derivation of category "data quality" is presented. The arguments found in the data are put in bold and italicized. Occurrences are also numbered.

(1) As development manager specializing in risk policies and product analysis stated during the workshop, "prerequisite for all information management is that our data warehousing processes produce data that is ***correct and sufficient*** for running business operations. More attention should be paid to ***quality*** in our information." For BI strategy, he suggested a project named data accuracy and adequacy in INFO. (WS1)

(2) Director of reporting and internal accounting suggested a project he called "matching of gross written premiums". He explained, "this goes to include ***matching*** of all other types of information as well [in INFO]. We should be able to ***trust*** information we are provided." Process of matching means comparing data that is extracted, transformed and loaded in INFO with accounting information and with the data in transactional systems. The process is done to ensure there exists few differences in data to be reported, and those that do exists should be there only due to rounding and justified warehousing logic. (3) Also, the head of corporate planning added a project proposition of "***matching*** accounting information to data in INFO". (4) Development manager in IT projects and data warehousing requested "information about what has been ***matched*** in INFO and what type of ***corrections*** has been made. [We could receive this] always after the monthly runs have been completed." This type of a report could promote trust in data. (5) Development manager in charge of IT data warehousing projects also mentioned trust in his suggestion by saying that "we should always strive for ***flawlessness in our data***, especially in a subject as big as sales commissions. People should be able to ***trust*** our data before it can be used in large scale… We have to make sure there are as little as possibly places where manual handling of data is used, as ***human errors*** are bound to occur by accident. The availability, ***reliability and straightforwardness of data***." (WS1)

(6) Mathematician working in actuary operations reminded how long reaching the effects of data accuracy are. "***Matching*** needs more resources. Its slow, but necessary. The result should be that for every product there is data about premiums written, savings, and account transactions that is ***correct*** in every system we use for reporting. Analysis and product pricing comes after data is loaded and in use. So that we can make right decisions, this process has to be ***up to snuff***. Then there is all types of compliance and reporting to authorities."

To conclude, all concepts mentioned by six different participant were either activities, adjectives, synonyms or opposites related to data correctness and data reliability. According to theory, data correctness can be grouped as one aspect of data quality (Van Roekel et al. 2009), and thus the team grouped all the suggested projects under a category named "data quality". During the second iteration round, as explained in the following section 5.3., the researcher set to enforce this assumption. Seven categories of BI projects in total were identified:

1. better analytics (covering 25 % of the projects) under core-category Processes
2. increasing information content (21 %) under Information
3. process automation (18 %) under Processes
4. data quality (11 %) under Information
5. sales support (11 %) under Information
6. BI tools (7 %) under Technology
7. active promotion of BI (7 %) under Roles

The respective division of projects into core-categories was Processes 43 %, Information 43 %, Techonology 7 % and Roles 7 %. The results suggest that WS1 participants, who work mainly in the business domain, had less needs in terms of technology and stakeholder roles, which according to theory covers roles differentiation and better assignment of tasks and responsibilities. The two recognized projects were related to user training and better communication. Although these subjects are not directly related to role differentiation, they are connected to improving BI maturity and prevalence by empowering the role of the end users, hence the categorization under Roles. However, few project proposals to Roles and Technology can at this point be explained by the strong business perspective of the first iteration round.

Business users are better able to recognize their information needs than the tools to provide it. Due to lower prior knowledge of technology, they can also be less aware of the possibilities self-service BI and user training can provide. Also, as they are mostly end users of information, their perception of other roles up the information value chain, where information is created from data, is poorer than that of an IT specialist's. It was concluded from this observation that WS3, which was going to deepen the viewpoint of roles and technology, should involve more participants from the IT department than WS1. Furthermore, this observation highlights the importance of cooperation between the two domains.

In addition, the alignment of categories to recognized business strategy themes was analyzed. To reiterate, the five themes in IWMC's business strategy were operative efficiency, customer relationship management, effective sales, service innovations, and governance. In a similar vein, business themes were identified through conceptual codes, such as *manual labor*, *automation*, and *cost effectiveness* for the theme operative efficiency. The team made initial assumptions about the effect and benefit of different suggested project for business, and produced a draft for BI strategy content. The output of the first iteration round of action research can be seen in Table 5.

Besides using open coding for identification of categories, the team checked project suggestions for duplicates, which were then merged together in the evaluation phase. Development manager specializing in risk policies proposed a project about reporting practices that focused on reporting trends and forecasts in contrast to mere performance milestones from historical information. Development manager of IT had a similar idea in reference to prevalent information management covering all history, present and the future, emphasis on forecasting. These subjects were merged, as they both included the same idea of presenting information from all points of view related to time. Some projects were also redefined after separate discussions with their business owners.

Table 5 Results of workshop 1 after evaluation

BI STRATEGY					BUSINESS STRATEGY	
Project ID	**Core-category**	**Category**	**Project**	**Priority**	**Component**	**Theme**
F1	Process	Process automation	Reporting automation	1	Business governance	Operative efficiency
F2	Process	Process automation	Systematization of customer targeting and segmentation processes	1	Business governance	Operative efficiency
F3	Process	Process automation	Proactivity in case of changes in data related to KPIs	2	Business governance	Operative efficiency
F4	Process	Process automation	Streamlining monthly ETL-process	2	Business governance	Operative efficiency
F5	Process	Process automation	Specifications of internal information needs, hands-on account on needs in operative units	1	Business governance	Operative efficiency
F6	Process	Better analytics	Development of forecasting models	1	Business governance	Governance
F7	Process	Better analytics	Utilization of external information sources (both local and international)	2	Business scope	Service innovations
F8	Process	Better analytics	Improved customer data analysis: parameters for recognizing business potential	1	Distinctive competency	Customer relationship management
F9	Process	Better analytics	Reporting trends and forecasts instead of mere history	1	Business governance	Operative efficiency
F10	Process	Better analytics	Estimation of customer segment profitability	3	Distinctive competency	Customer relationship management
F11	Process	Better analytics	Web service analytics	3	Distinctive competency	Customer relationship management
F12	Process	Better analytics	Increasing data marts	1	Business governance	Operative efficiency
F13	Information	Data quality	Development of information content and quality	1	Business governance	Governance
F14	Information	Data quality	Matching of INFO content	1	Business governance	Governance
F15	Information	Data quality	Communication of data quality, matching reports, errors	2	Business governance	Operative efficiency

BI STRATEGY					BUSINESS STRATEGY	
Project ID	Core-category	Category	Project	Priority	Component	Theme
F16	Information	Sales support	Sales funnel	1	Distinctive competency	Effective sales
F17	Information	Sales support	Benchmarking information in marketing materials	2	Distinctive competency	Effective sales
F18	Information	Sales support	Cross selling to customers of IF P&C	2	Distinctive competency	Effective sales
F19	Information	Increasing information content	INFO based analysis of risk result and risk policies	1	Business governance	Operative efficiency
F20	Information	Increasing information content	New content to INFO: Basic information of Innova contracts	3	Distinctive competency	Customer relationship management
F21	Information	Increasing information content	New content to INFO: Savings of existing pensions	1	Distinctive competency	Customer relationship management
F22	Information	Increasing information content	New content to INFO: Investment objects	1	Distinctive competency	Customer relationship management
F23	Information	Increasing information content	Customer centricity in reporting and availability of information in web service	1	Distinctive competency	Customer relationship management
F24	Information	Increasing information content	Separation of wealth management policies (997/991) in written premiums	2	Business governance	Operative efficiency
F25	Technology	BI tools	Development of easy-to-use and accessible reporting environment for the entire organization	1	Business governance	Operative efficiency
F26	Technology	BI tools	Mobile BI	3	Business governance	Operative efficiency
F27	Roles	Active promotion of BI	Communication of BI activities and tools	1	Business governance	Operative efficiency
F28	Roles	Active promotion of BI	BI missionaries; stakeholder training	1	Business governance	Operative efficiency

4.1.5 Specifying learning

During the last phase of an iteration round, the evaluated results are specified as learning. In this research, specifying learning means making conclusions about the fit of the theoretical framework and CSFs of BI strategy development.

After iteration round one, the results were communicated to stakeholders of BI strategy development. The theoretical framework was still found applicable for the second iteration round without any changes prompted by practice. At this point, the framework consisted of SAM by Henderson and Venkatraman (1999), the phases of action research by Baskerville and Wood-Harper (1996) and the diamond model by Kaario and Peltola (2008). SAM was used for analyzing the strategic alignment and business strategy components, whereas viewpoints of information management formed the predefined core-categories of BI strategy in open coding. The connections to business objective and the suitability of core-categories was set to be tested in the following iteration rounds.

Summarizing and explaining the focal points of the company's strategy in the beginning of action taking was relevant, especially for IT department. Development manager of IT projects and data warehousing made a comment that concretizing the strategy made business more understandable (INT2). Development manager of IT in charge pointed out that it helped to perceive what the company is trying to achieve in larger entities, which on the other hand helps in prioritizing BI projects and allocating resources accordingly (INT2). It can be thus concluded that it helped to set and maintain business orientation, which belongs to the listed CSFs.

Some of the CSFs such as project management, championship and cross-functional team were set in the diagnosis and action planning of the first iteration round and they were expected to be followed without remarkable changes made throughout the research. The suitability of these factors as part of the CSFs is analyzed after the project conclusion. For example, one of these more constant CSF involves flexible BI environment. Although IWMC had just changed its reporting environment from IBM Cognos to Microsoft, the BI systems and other technology were seen as flexible (INT3). This means, the existing environment could be able to accommodate new types of information needs. In the course of the project, few significant

technical changes were made to the BI environment, so the fit of this CSF is also going to be addressed in the final review of results. However, the fit of some CSFs could be evaluated after each iteration round. Active promotion of BI was seen to influence change management, as better communication of BI solutions was claimed to increase the use of serf-service BI and overall information usage. Active promotion was therefore raised as one of the categories under BI strategy. Management commitment was agreed to be one of the most important success factors (INT2, INT3). In action planning, approval was sought for the key strategy themes, but unfortunately management members were unable to attend WS1. Finally, after the workshop, the team evaluated that the business case and clear communicated vision for each iteration round were important for the project credibility. One of the initial problems in developing BI strategy was the lack of visible results from the previous projects related to information management strategies. This became apparent at the end of WS1, when the team was wondering where to collect the project proposals that were written on A5 papers, one of the participants said jokingly "let's do what we always do. Let's collect the papers, place them on the corner of your desk and after a month of collecting dust, let's throw them in the trashcan." (WS1)

In addition to conclusion made about theoretical framework and CSFs, the observations made during the workshop proved significant. The team noticed that participants more easily proposed projects within small and practical subject areas with technology already in place at IWMC as opposed to bigger and more abstract subject areas. For example, the discussion around subjects related to adding certain types of information to the data warehouse or streamlining information processing operations was lively. However when a more abstract subject area was proposed, e.g. using BI reporting in mobile devices such as iPads or developing a more customer centric reporting system for web services, discussion was limited. Group 3 had approached the group assignment from a different point of view than the other two. Namely, they focused on larger subject areas such as customer centricity and prevalent management of information, and after the others' presentations of their results, group 3 was almost apologetic for their different perspective: "We had few people in our group that had deep knowledge of our business, so our topics are a bit more conceptual, upper level stuff. There's only four of them. You others have done a nice job." Few BI trends (e.g. master data management, big data or BI in cloud) were

mentioned, although there were people present with good prior knowledge of BI as a field. To analyze the speech, participants used a lot of jargon only understandable for INFO users in IWMC. Especially, when people felt that the conversation revolved around normal business communication, they gave their opinion with less noticeable restraint.

When analyzing the choice of participants, the team agreed that there could have been a few things done differently. Some participants hoped that the agenda could have been better explained in the workshop invitation, so they could have prepared better and asked around opinions from their colleagues. So, it can be concluded that, in addition to a more detailed agenda, the invitation could have included a wider group of workers both in middle management and in operations, even those with no prior knowledge of information management. After the WS1, a few people openly addressed their interest in participating to the next ones. However, as Baskerville and Wood-Harper (1996) stated, negative results and observations are as welcome in action research as the positive ones. Negative experiences enhance learning and point out that research is unfinished and another iteration round is called for.

4.2 Second iteration round: Processes and information

While the first action research iteration round focused on structuring the project management and mapping out preliminary BI project proposals, the second action research cycle sought to refine the results achieved from the viewpoints of processes and information. Besides trying to identify new projects, the second iteration round aimed at generating concrete solutions and validating the already found projects with a justifiable connection to business strategy to ensure alignment. The team also wanted the participants to think about the potential project schedule to bring ideas one step closer to practice. The second cycle is analyzed here in three sections, in which the new intervention was planned, executed and evaluated.

4.2.1 Diagnosing and action planning

The beginning of the first iteration round was fully informed by theories, but the second cycle tackled issues prompted by practice (i.e. WS1). There were two tasks, the first one being testing of the WS1 results found by open coding and the second one being testing of the fit between BI

projects and the assigned business strategy themes. If the results gained from the second iteration round would prove contradictive, the categories and strategy themes should be revised. If not, the results could be considered reinforced.

During the first iteration round, it was decided that the next round should look into core-categories of Processes and Information, and in them the categories of process automation, increasing information content, data quality, better analytics and sales support. To test validity of the results found with open coding, these categories were planned to be used as specific themes of the second workshop (excluding the category sales support, which was to be analyzed during the steering committee meeting with the respective business owners present). The hypothesis was that the fit being incorrect, the conversation about a project in that specific category would float and arguments for a potential new category would arise. As for testing the fit of business strategy themes, the team planned to add a new question to the group assignments concerning the potential benefits of each BI project as seen by the business owners of the idea. "*How would business benefit from developing each subject area?*" Answers to that question were to be compared against the previously assigned business strategy theme.

Other hypotheses for the second iteration round were related to CSFs and observations specified at the end of the previous iteration round. To solve the central problem, that is creating a BI strategy that would aid the company to make better use of information in the future and improve BI maturity from tactical to strategic or even to pervasive, action taking should:

- maintain business orientation.
- have a justifiable business case to enhance credibility.
- have management support to improve change management.
- involve the right people.
- allow participants to prepare well.

Thus, the agenda for WS2 was built and participants interested in developing each subject area were identified from both business and IT. New departments that took part in action taking were web analytics from business development, accounting and management from customer service.

Participant were sent a detailed agenda in beforehand, and they were encouraged to bring their colleagues along.

4.2.2 Action taking

Action taking consisted of a workshop session from the viewpoints of information and processes, and of a meeting with the BI steering committee to check up on the proposed BI projects and their assigned priorities. Workshop 2 (WS2) was held in a similar manner to the first one on 3.5.2013, but with two specific differences. Besides adding the question about the benefits of a certain category or project for the organization to the agenda, the group assignments now divided the participants into three groups, of which each had their own category to discuss. Group 1 focused on data quality, group 2 on process automation with special emphasis on supporting the work of operative units with BI solutions, and group 3 on better analytics with emphasis on utilizing data marts, external information and web service analytics. This change was made due to time restrictions and clear differences in participants' specific areas of expertise. For example, mathematicians were expected to bring added value to discussion about data quality, as they had brought up and contributed to the issue during WS1. Business analysts were more eager to solve the problem of utilizing various information sources in analytics. Management of operative units had a special interest in process redesign and so on. However, the participants were encouraged to wander and comment on others' work before the group results were gone through together. Appendix 2 shows a table of workshop participants, their title and assigned group.

In BI steering group meeting (STECOM1), priorities were rechecked according to feedback from WS2. Priority of data marts was lowered from the first to the second, as the project start was only dependent on limited resources. Sales funnel was also lowered to second class, but as opposed to this the projects of web analytics were risen from the third priority to the second. In total, seven new projects (S1-S7) in the category data quality and increasing information content emerged and another five projects in categories of better analytics and process automation were revised as a result from the two sessions. The revised projects are labelled with "FS" to indicate change in the project after the first iteration round when it was first proposed. Table 6 describes the new project titles, arguments for revision and the origin of the project.

Table 6 WS2 outcome

BI STRATEGY					
Project ID	**Core-category / category**	**Project**	**Project status**	**Argument for revision / removal**	**Source**
S1	Information / Data quality	Increasing quality check points and comparative materials	New		WS Group 1
FS15	Information / Data quality	Creating a portal to the company homepage for INFO related communication and publishing the report on data differences	Revised	Refining the former F14 "Communication of data quality, matching reports, errors" with the decided action.	WS Group 1
S2	Information / Data quality	Rules for data corrections	New		WS Group 1
S3	Information / Data quality	Report on current quality status on each data type	New		WS Group 1
S4	Information / Data quality	Data protection by rights of use	New		WS Group 1
S5	Information / Data quality	INFO user group	New		WS Group 1
S6	Information / Increasing information content	New content to INFO: Offers	New		STECOM1
S7	Information / Increasing information content	New content to INFO: Campaign	New		WS Group 3
F13	Information / Data quality	Development of information content and quality	Removed	Divided into projects S1-S5 because of too wide content to be managed as singular	STECOM1
F1	Processes / Process automation	Reporting automation	Removed	Parallel to many other projects under process automation.	STECOM1
FS5.1	Processes / Process automation	Supporting steering and follow up in operative units	Revised	The original F5 was divided in two. FS5.1 is for executing the found information needs in reporting in operative units.	WS Group 2
FS5.2	Processes / Process automation	Improving processes of operative units with BI	Revised	FS5.2 is for hands-on account on replacing manual work in operative units with BI	STECOM1
FS23	Information / Information content	Customer centricity in web service: adding history data to show savings development	Revised	Project F10 was redefined with a more specific information need.	WS Group 3
FS12	Technology / BI systems	Increasing data marts: stock of Sesam insured, risk cover, savings per instrument, changes to customer data marts	Revised	Core-category and category were changed, as the project was only in need of resources from IT. Work concerns BI systems, not tools, and therefore a new category emerged. Priority lowered to P2.	WS Group 3

4.2.3 Evaluating and specifying learning

During the second cycle evaluation, now that the categories for projects had been found by open coding, the data could be analyzed not only to recognize new categories and BI projects, but also to adjust, refine and possibly remove the existent ones. Furthermore, their alignment with

business strategy themes could be reassessed and axial coding could be used to further validate them.

First, the team re-evaluated the categories. The new found projects S4 and S5 were adjusted to cover a more extensive meaning. S4, alias data protection by rights of use, concerned user rights to reports that had never before been specified (WS2). Data warehousing administrator described the project: "We have to decide who is privy to what? What information each user is allowed handle?" Thus, the project became more of an issue of stakeholder roles than data quality. S5, INFO user group, was presented as a regular, informal meeting of information users, in which people could share ideas, solve problems together or ask for advice from others in information management related subjects (WS2). A new category was formed for the former, which was labelled as stakeholder roles. S5 was added to the category active promotion of BI, since it shared the concepts of ***sharing information*** and ***communication*** with the existing projects. Both of the categories exist under the core-category Roles. Project F1, reporting automation, was removed, since its content was found too abstract and its category process automation already represented the idea behind it.

Secondly, the alignment between BI categories and business strategy themes was reassessed. The added question to the group assignment, *How would business benefit from developing each subject area?*, and the discussions during STECOM1 generated a list of benefits per project that could be linked to several business strategy themes. Initially, the team had assigned only one business strategy theme to each project, but now after evaluation, connections to several business objectives were found by open coding the lists. For example, customer analyst argued that benefits for increasing and developing data marts (project FS24) were related to analysts' ability to create extensive and comprehensive reports with ***minimal manual work*** (operative efficiency) and their ***trust*** in data, which ensues ***single version of truth*** (governance) (WS2). Concepts previously related to certain business strategy themes by open coding are the ones in bold and italicized. The conclusion about multiple links between BI and business strategy components was backed up by theory, as Henderson and Venkatraman (1999) described strong strategic integration as the capability of IT to both shape and support business decisions. The stronger the

integration, the stronger the capability. Cooper et al. (2000) who studied SAM in practice also concluded that an extensive alignment allows for a bigger strategic influence from IT.

Third phase in evaluation was axial coding. Axial coding was used to develop a better understanding of how the different categories were related to each other, and if there were any causalities and conditions between the categories. This was performed to justify the linkages between core-categories initially proposed by theory (Kaario and Peltola 2008). For example, a category under core-category Information is named increasing information content, which consists of six projects, all of which have the same argument connected to them: a specific type of information is still missing from the data warehouse. This particular category has a causal relationship to many other categories as was proven during action taking. When considering project scheduling and priorities to form a BI strategy roadmap, the projects of this category form a sequential relationship with projects from categories data quality, sales support and better analytics. The information missing is needed as a resource in another project. Data warehousing administrator said, "[For data quality matching to essentially work,] we have to add more information per product to INFO, because we just do not have all the material from the transactional systems we need." (WS2) BI manager gave the team an update on project F15, the sales funnel, and stated that the project is not progressing anywhere until there is information about offers per product that they could use (STECOM1). Director of reporting and internal accounting agreed, and stated that project F18, the development of forecasting model, is delayed until more accounting information is made available in the data warehouse (STECOM1). The category data quality, also under the core-category of Information, shares a similar attribute. Many other projects and their success are dependent on good data quality (WS1). Axial coding was undergone by specifying arguments alike about shared contexts, causalities and consequences in the data. It produced a relationship map of all categories illustrated in Figure 14. The respective core-categories are also represented.

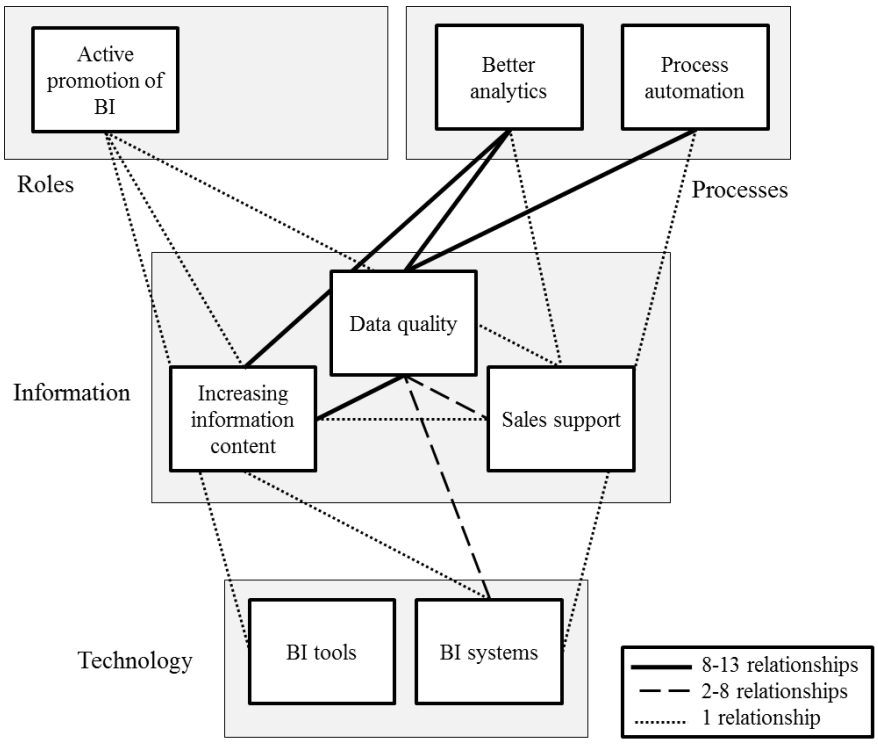

Figure 13 The results after first round of axial coding

This evaluation led to the learning that Kaario and Peltola's (2008) relationships between components could be found relevant. However, the axial model still needed to be improved by closer analysis on viewpoints of technology and roles, since the category relationships were still weaker between those core-categories. Thus, the third iteration round, which would tackle the needed subject areas, was called for. The project was passed on to the next iteration round after the results of second cycle were communicated to the project stakeholders.

4.3 Third iteration round: Roles and technology

As the third iteration round followed a similar action research structure to the first two rounds with only minor changes in the action research agenda building, this section will focus on evaluation of results and specifying learning.

4.3.1 Evaluating

The open coding of this round of action taking introduced a new category knowledge management. It also led to a change in a core-category Roles.

Baskerville and Pries-Heje (1999) recognized that as grounded theory in action research is best begun with predefined core-categories, these core-categories may well evolve or dissolve during the research. As mentioned, this thesis utilized core-categories predefined by theory. Kaario and Peltola (2008) described the core-category Roles as a viewpoint of information management consisting of stakeholders, who if defined, facilitate the assignment of tasks concerning information content specifications, administration and publication. Of their description of the content of stakeholder role analysis, BI strategy after WS3 addressed: 1) the access of different user roles to information (projects F25 and F26 in category BI tools), 2) analysis about type of information content is of interest to each role (Project F5 under process automation), how do changes in business model, processes or organizational structure affect them (project T3 under stakeholder roles) and user access rights (project ST4 under category stakeholder roles). The changes and additions to BI strategy after third iteration round are presented in Table 7. The project identification code "ST" or "FT" refers to the iteration round, on which the project has been revised.

Table 7 WS3 outcome

BI STRATEGY					
Project ID	**Core-category / category**	**Project**	**Project status**	**Argument for revision / removal**	**Source**
T1	Knowledge / Knowledge management	Increasing organizational knowledge capital	New		WS Group 2
T2	Knowledge / Stakeholder roles	Change management	New		WS Group 2
T3	Knowledge / Stakeholder roles	Role differentiation	New		WS Group 2
T4	Knowledge / Knowledge management	BI user trainings	New		WS Group 1
T5	Technology / BI systems	Update on ETL process from transactional system SAJ	New		WS Group 1
ST5	Knowledge / Knowledge management	INFO user group	Revised	Moved from Information core-category to Knowledge, because of content expansion	STECOM2
ST4	Knowledge / Stakeholder roles	Data protection by rights of use	Revised	The original S4 was moved from Information core-category, as it incorporated more information management through roles definition.	WS Group 2
T6	Technology / BI systems	One service provider tool for each BI process (ETL, analytics etc.)	New		WS Group 1
T7	Technology / BI systems	INFO documentation	New		WS Group 1
T8	Information / Better analytics	Customer segmentation	New		INT4
T9	Technology / BI tools	Report for analysis of customer information in its entirety	New		INT4
FT3	Process / Process automation	Proactivity in case of changes in KPIs and customer information	Revised	Content expanded. Triggering data to inform more about customer. Development of NBO	INT4

Overall, it can be concluded that Kaario and Peltola's definition of roles have been addressed in full. However, after WS3, there are new projects and categories under the core-category Roles that cannot be traced back to roles analysis by open coding. The open coded projects that could be directly connected to roles differentiation and management contained the concepts such as ***role***, ***defining***, and ***outlining***. For example, group 2 in WS3 stated in their proposal that "***Roles*** have to be ***defined***. […] Basic ***roles*** are now ***intersecting***. There has been very clear ***limits*** to responsibilities concerning reports administration. Who in ***responsible*** for maintaining content?" These same concepts were not so clear in case of projects under categories active promotion of BI and the new knowledge management.

In its place, all of projects under previous core-category Roles were found to comprise concepts of ***knowledge***, ***know-how*** and ***understanding*** in the transcripts. The project of diminishing process and information dependence on individuals and increasing organizational knowledge was supported as follows by data warehousing administrator (WS3): "We have now let go of IBM Cognos and moved onto Microsoft SSRS in reporting. Hopefully, more people in both the IT and business organization can ***learn*** to administrate and create reports in this new environment. In case of Cognos, the ***knowhow*** rested solely on one person."

What was interesting, the projects that directly addressed roles management were found to contain the same concepts. For example, role differentiation project (T3) was defended by development manager in charge (WS3) stating that "Namely there are many overlapping roles in both domains, business and IT when it comes to BI and at some points they intersect in what we are doing and what ***knowhow*** have we got. […] How can these roles work efficiently in future? When there exists similar kind of ***knowledge*** in different roles, how can we exploit it?" Data warehouse administrator agreed: "There are three types of roles with different ***skillsets***." He talked about what "each role should ***understand*** and what processes and entireties should they ***know how to handle***."

Therefore, new categories of stakeholder roles and knowledge management emerged, and the core-category of Roles was relabeled as Knowledge. Knowledge was a concurring concept in each of the categories. Stakeholder roles were dependent on what type of knowledge is needed to handle each information management role. Projects in knowledge management had the objective of sharing knowledge between stakeholders, thus transforming information into organizational knowledge. Active promotion of BI covered projects that dealt with communicating BI related information and enhancing knowledge of BI across the organization.

Justification for new label arise also from core-category Technology, which was analyzed with axial coding to have a strong relationship to knowledge. Data warehousing administrator explained this by bringing out in-house administration and maintenance of data warehouse environment Teradata, which requires specific knowhow (WS3). Also maintaining ETL processes and SQL server connections to transactional systems and CRM require in-house skills

(WS3). However, this new core-category was decided to be tested further. It was decided to continue research on the fourth iteration round.

In regard to CSFs hypotheses, third round of action taking proved different from the first two in one significant way. The team had observed before that the difference in discussion between practical problem solving and introducing trends and more theoretical subjects for development was noticeable. Participants were also much more reserved when encouraged to generate ideas to a more distant future, even if the roadmap was designed to cover only three years. Since IWMC had recently made significant changes to its BI environment, the team assumed that the ideas related to technology would be more inclined to involve trends and focus more on long term changes. As presumed, the participants in this round were more eager to propose subjects that were more theoretical with no specific practical actions defined (e.g. projects increasing organizational knowledge capital T1, role differentiation T3, change management in BI T2). In opposed to the previous iterations, WS3 provided more strategic directions than explicit practical solutions.

Participants also proposed projects and objectives that could not be executed in the near future, but were put in the third priority class and planned to be scheduled in 2016 (e.g. project one tool for every BI system action T6). This was partly because of the recently made changes to BI environment and the cost surveillance policy on organizational level that restricted great investments in BI systems in near future. However, this round of action taking also involved people with great personal interest in matter, who also had good prior knowledge of the subject at hand.

4.3.2 Specifying learning

Iteration round three brought up a change to the theoretical framework, when viewpoint of Roles evolved into Knowledge. In addition, axial coding of transcripts from action planning and action taking reinforced the relationships between core-categories. This evaluation led to the learning that Kaario and Peltola's (2008) relationships between components are relevant and Information core-category should exist in the center between organizational and technological framework, since it has most connections to other viewpoints.

Furthermore, WS3 brought up conversation about the communication between IT and business. It was identified that there are best practices that could be useful if used more broadly (WS3). BI design manager expressed that he had had significant help, when user training was arranged with both business and IT users in attendance (WS3). Information needs and information sharing related processes are also in the center of BI strategy as proved with axial coding and contribute substantially to strategic alignment. At that moment in its current form, theoretical framework did not cover the importance of continuous information sharing. Therefore an extension of SAM was added to the framework, that is, a generic frame of reference for analyzing the relationship between business, information, communication and technology by Maes (1999). As the concept of Maes' work incorporates the ever-increasing pervasiveness of technology, it also supports the vision of improving BI maturity (e.g. related project FS5.2).

4.4 Fourth iteration round: Review of strategy draft

Fourth iteration round studied the BI strategy and its projects as a whole. A draft of strategy roadmap was constructed, reviewed amongst BI steering committee (STECOM2), and then presented to the operative steering committee consisting of top management of the company in charge of strategic directions. At this stage, few changes were proposed to the draft. Rough subcategories, the projects, were detailed, but the prevailing core-categories and categories remained. Achieving top management commitment was crucial, since many projects and even useful BI tools before had been left underused and finally abandoned due to lack of communication and support from managerial level (INT3). Development manager of business projects stated that there are many information needs and wants in IWMC, but top management is the only forum that can put those needs in relevant order and exercise their power of selection in case of excess (INT4). IT development manager in charge found the idea of using resources into projects, which are only ignored or, in the worst case, found even annoying by their business users, abhorrent (e.g. related project FT3: getting BI systems propose next best offers (NBOs) to sales managers when they access customer data) (STECOM2). Therefore, strategic directions and reinforcement from top management was necessary. After top management approval was

granted, the BI strategy was presented at an organization-wide meeting. Appendix 3 shows the final version.

Besides top management approval and communication of BI strategy to its stakeholders, one other significant action took place during the fourth cycle. Overall IT strategy was being crafted concurrently, and it was necessary to align BI strategy with the projects and concepts on hand in IT department as well as with business. This was to ensure IT management's commitment, which has an effect on priorities and resources available. BI strategy was incorporated into the IT strategy and as one of the programs in the portfolio of information management development (STECOM2).

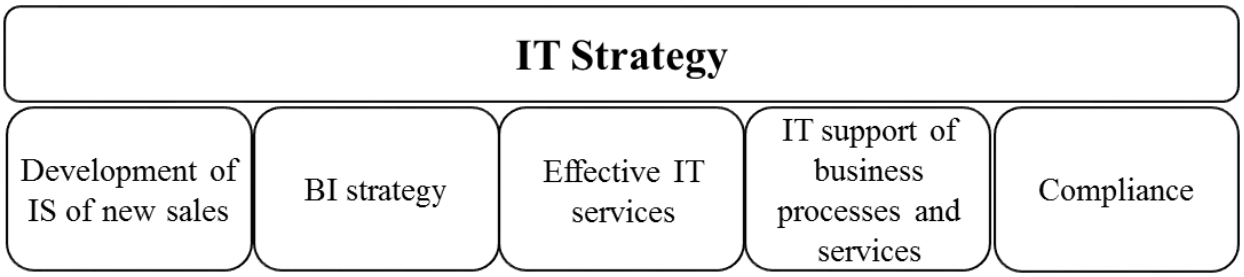

Figure 14 IT strategy

As Baskerville and Pries-Heje (1999) stated, "the action research cycle can be continued, regardless of whether the action proved successful or not, to develop further knowledge about the organization and the validity of relevant theoretical frameworks." In case of BI strategy development, this statement is true. Although the team now found the BI strategy in its first form complete before updating it at the end of each half-year to come (STECOM2), the discussion about the subjects could go on and valid points about the project details could still be made. However, no new categories emerged and no significant changes to the roadmap arose. After this conclusion, open coding and axial coding of the categories was completed. In addition to alignment with IT strategy, it seemed that little new learning was emerging from the research. At this point, categories could be considered saturated and the results exhaustive. This provided the rationale for concluding the BI strategy project.

4.5 Summary and review of the results

This last section of analysis focuses on discussion on the accrued results. First, there are the main findings that concern the results drawn from the progress of four iteration rounds. These findings affect the fit of the theoretical framework, the suitability of the hypothesized, theory based CSFs in the light of practice, and the feasibility of the chosen method for this study. In the secondary findings, other relevant observations and deductions about the BI strategy development, arisen from the empirical study, are reviewed. The discussion is concluded with a validity assessment of the research.

4.5.1 Main findings

The main findings of this thesis suggest that the research method of practical problem solving and concurrent theory building through grounded action research was successful in generating a theoretical framework, which covers all relevant areas in the development BI strategy. The theoretical framework was brought together through an interplay between multiple theories and practical observations concerning strategic alignment, the viewpoints of information management and CSFs of a BI project initiation. Due to the neutrality of the research subject, devoid of the any industry context, the results can be deemed generalizable also in other approaches to BI strategy creation outside of this particular case setting.

The first iteration round of empirical research was concluded with an open coded outcome of business requirements, which were then reinforced, completed or redefined from the viewpoints of information, processes, technology and roles during the subsequent cycles. The grounded action research study generated 39 projects in total, which were identified and grouped into nine categories under four core-categories of BI strategy. These core-categories were originally predefined by theory (Kaario and Peltola 2008), but in the course of the empirical research, they were either revised according to the results from practice, or considered reinforced. To better describe the process progression, all four iteration rounds with five phases of rigorous action research are summarized in Figure 15 on the following page.

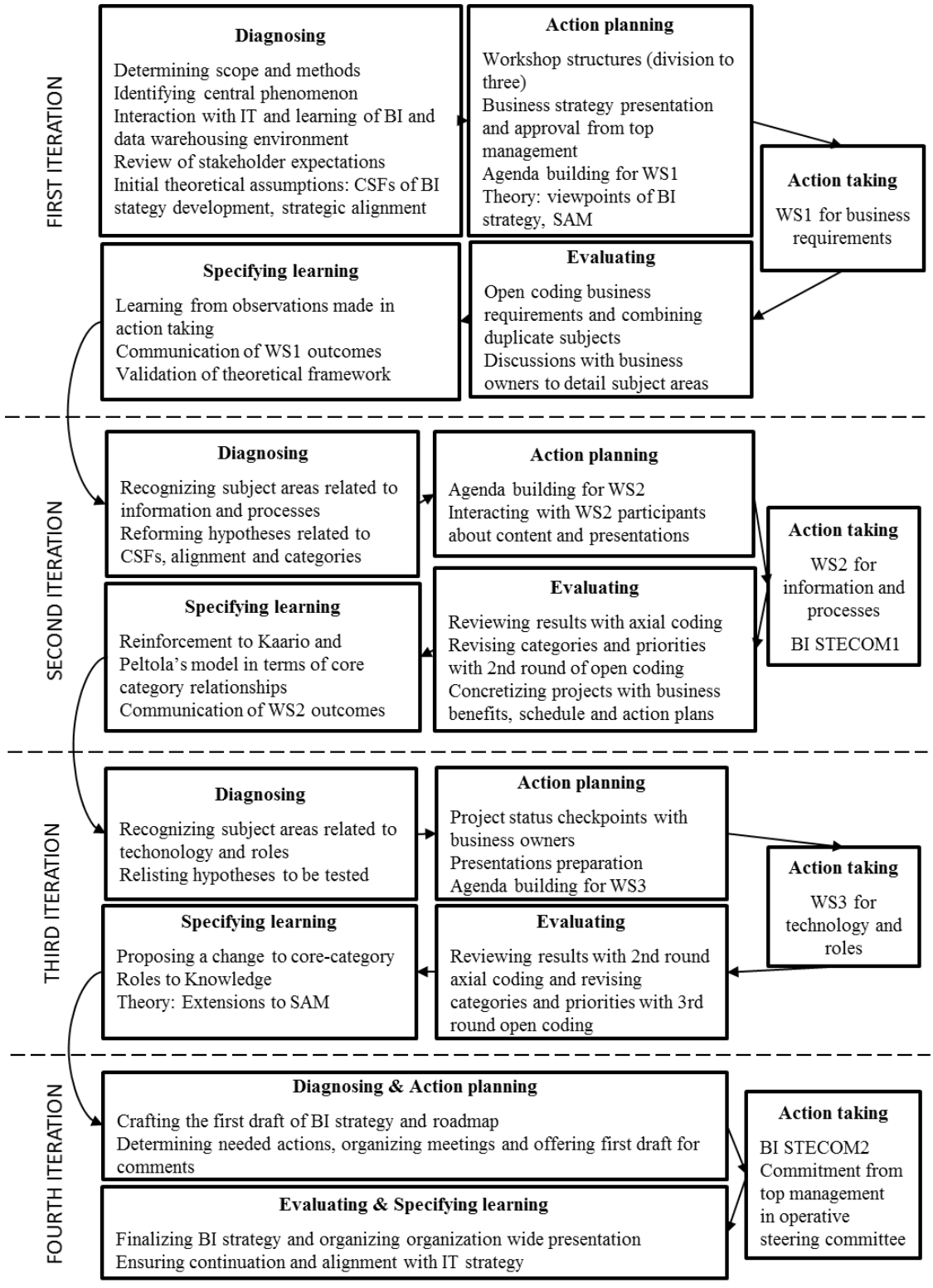

Figure 15 Summary of iteration rounds

The theoretical framework, readjusted based on the empirical findings, is the main contribution of this thesis. The reviewed framework is illustrated in Figure 15.

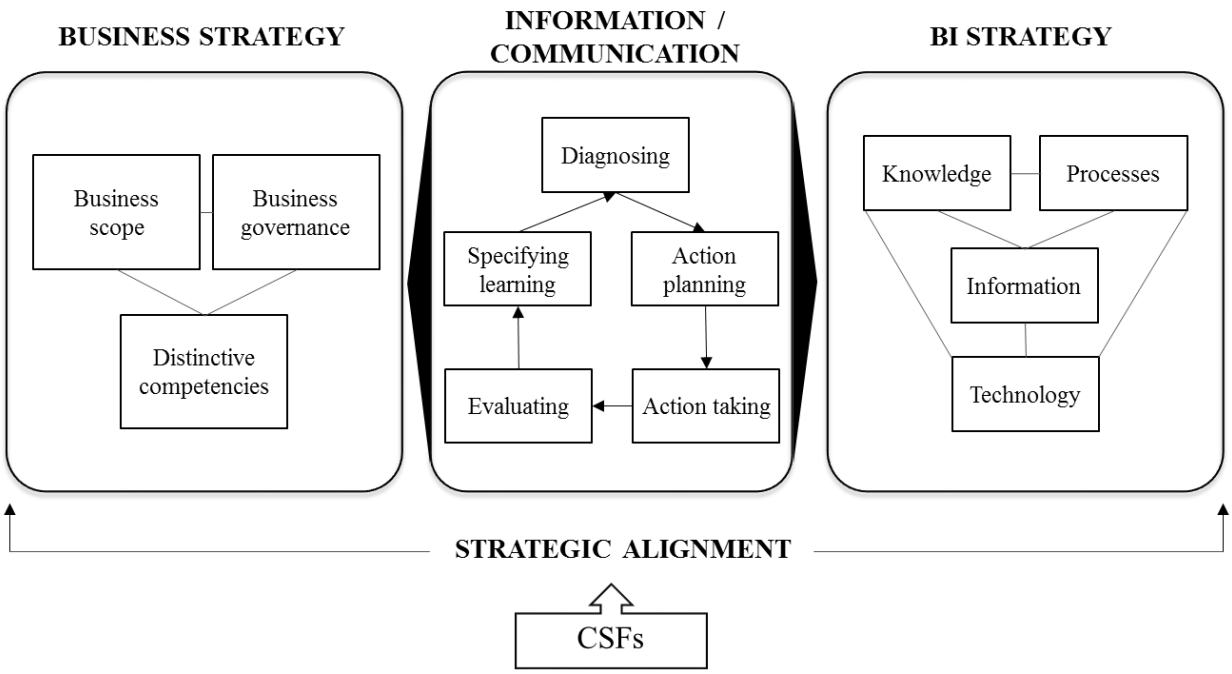

Figure 16 The reviewed theoretical framework

The founding theory of the framework is strategic alignment. During the diagnosis of the first iteration round, the central phenomenon in IWMC's problem was identified as a lack of proper coordination and prioritization of BI projects. The long-term focus of BI development was undocumented and thus open to interpretations and vulnerable to suboptimization. Theories on information strategy development alike (e.g. Pant 2009) are in agreement with the conclusion that strategic alignment between BI and business strategy is needed. The strategy building should be business orientated and the implementation of BI projects should be driven by business need. In the theoretical framework, SAM by Henderson and Venkatraman (1999) was chosen to outline the business strategy components and to identify the respective business objectives to guide the process of alignment. These objectives were operative efficiency, effective sales, service innovations, governance and customer relationship management.

Open coding as a method of data analysis was utilized when justifying the links between BI strategy components and business strategy objectives. In other words, open coding was used to ensure the strategic alignment between the two strategy domains. BI projects were evaluated against the five recognized business objectives of IWMC, which provided the following results. These findings about business value of BI were in accordance with theory reviewed in the section 2.2.2. of the thesis.

- The business objective of operative efficiency was supported by 74 % of the BI projects.
- Governance by 41 %
- Customer relationship management by 31 %
- Effective sales by 21 %
- Service innovations by 15 %.

The open coding and axial coding of the empirical data also provided the reasoning for accepting the diamond model by Kaario and Peltola (2008) in the theoretical framework. Whereas SAM was used to define the components for analyzing business strategy, the viewpoints of information management represent the main components of BI strategy. However, the empirical findings indicated that one alteration to the model should be made. Kaario and Peltola (2008) used a viewpoint of Roles in their model, which was then replaced with the viewpoint of Knowledge during the action research. The original viewpoint was found too narrow and unable to explain all the significant concepts emergent from practice. Knowledge and its synonyms were a recurrent theme in the concepts both related to the management of organizational knowledge and, surprisingly, to the original core-category, the management of stakeholder roles. Therefore, while the core-category was relabeled due to these findings, the results also suggested that stakeholder roles analysis should still be maintained as a category under the new core-category of Knowledge.

Kaario and Peltola (2008) also highlighted the importance of measuring the connections between the components of information management. In the model, these relationships place Information

at the intersection of organizational and technological frameworks, as it is argued to have the most connection points to the other information management components. In the empirical study of this thesis, these relationships were tested through axial coding. The results (shown in Figure 17) suggest that not only should Information be placed at the center of the diamond, but its relationship to the component of Processes is stronger than its relationship to the rest of the components. The number of projects that connect these two components is higher. The relationship between Technology and Knowledge is also stronger in comparison to their relationship to any other component. Thus, the results also provide insight about the strength of the relationships between different components.

However, the results can also be interpreted from another angle. In the action planning of first iteration round, these components were divided into groups of two. Processes were discussed together with Information in WS2, and Technology was discussed with Knowledge in WS3. This division to iteration rounds, which grouped two viewpoints together for action taking, can either be considered advised in further research of the subject due to the respective strength of their relationships, or it can be expected to have influenced the results. Therefore, no scientifically valid conclusions about the suitability of core-category grouping in action taking can be made based on this research. This bias could be removed by discussing each subject individually.

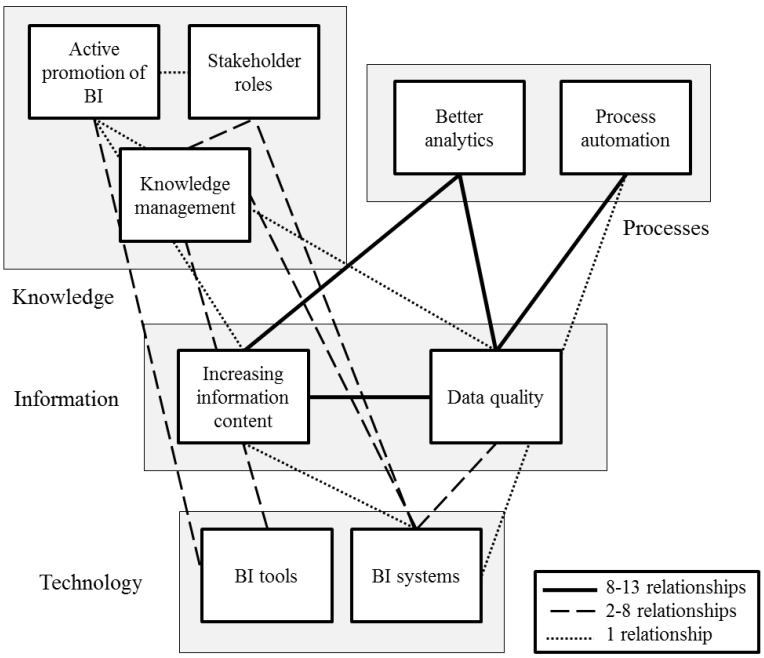

Figure 17 Results after final round of axial coding

Finally, the theoretical framework was improved by including the theory of information sharing and communication between the business strategy and BI strategy building blocks. This intermediary is an extension to SAM proposed by Maes (1999), which highlights the role of communication in achieving alignment. The empirical findings supported this theory. After the BI strategy launch, an IT development manager in charge commented that "finally there is some interaction and both parties, business and IT, seem to speak the same language." (INT2) He had noticed a positive change in communication since the BI strategy project started. Another IT development manager was not that optimistic (INT2), but emphasized the importance of communication all the same. She argued that many of the business owners during workshops, where the BI strategy content was created, brought up requirements that they necessitated to be in the first priority class, meaning they require attention and resources without a greater delay. However, after the launch, there had not been any communication about the project schedule or specifications. "We have these business requirements now, and we have the corresponding BI projects to support them on the roadmap, but we are still in the dark about what should we do about those projects. [BI strategy] demands activity. This is a two-way road. The business people need to be active and communicate their plans. I am afraid they now think that as they have once

expressed their needs, we the information producers should automatically start working on them without direction. People should communicate more." (INT2)

Communication can be argued to have significant, positive influence also on the CSFs of BI strategy development. Yeoh and Koronios (2010) listed seven key factors that affect the success of a BI project initiation. The empirical results in relation to these factors are next discussed in the following order: 1) change management, project management and management commitment, 2) business championship, vision and business case, and 3) scalable, flexible technology and data quality. The results evaluate the importance of each factor in the case of IWMC, and their generalizability.

Change management, project management and management commitment

The results suggest that change management and management commitment are among the most important CSFs to influence the project outcome. The way the said project is managed, on the other hand, is directly related to the effectiveness of these two factors. The combination of these three CSFs was also recognized as the biggest challenge by the project team (INT2, INT3). Moreover, they could be influenced the most by increased communication between the IT and business domains.

Change management in the case of BI strategy development refers to the level the strategy is generally accepted and utilized in the coordination of BI projects and to the level of commitment it achieves across the organization. IT development manager in charge described the challenge it proposes as follows: "We have to ensure that our organization commits to the strategy, otherwise it remains as a type of proclamation only followed by a definite group of people. This group cannot fight this fight alone. It is a recurring problem that business owners do not interact with each other about project priorities and they walk in BI steering committee meetings loyal to none but their own agenda." (INT2) As a solution, the development manager proposes increase in communication. "We need more ongoing discussion about the BI strategy so that people remember that it exists, for one. This leads to general acceptance. This is the roadmap we follow, none other. It demands perpetual work." (INT2) Change management is thus related to the importance of continuity in developing BI strategy. The work is not finished after this thesis

reaches its end. Only the first version of it for the next three years is created. An iterative, incremental approach to project management can thus be concluded to influence the project success. In the case of Insurance X, it was therefore decided that BI strategy is to be revisited in BI steering committee meetings at least once a year, in unison with overall budgeting (INT2, INT3, STECOM2).

Active promotion of BI, which is a factor influencing information usage in business operations and thus the development of organizational knowledge, was seen to be dependent on management communication (WS1). BI manager also believed that BI tools were best implemented through middle management, especially in sales departments (STECOM1). IT department agreed and saw that achieving management commitment to BI solutions was necessary, since many projects and even useful BI tools had before been left underused and finally abandoned due to a lack of communication and support from managerial level (STECOM2). Also, since top management has exercising power over business strategy, approval for BI strategy roadmap is required to achieve strategic alignment (INT4).

Management commitment also helps to build a business case for the project, in order to involve the right people. As the director of internal accounting and reporting noted, traditionally it had been the regulatory and external directives, which have had the most effect on BI development (INT3). Only obligatory requirements had managed to bring together departments across the organization to develop data quality and information content. However, compliance to the regulative requirements generates no added value to the company, whereas strategic alignment could, on the strength of the open coded results of business value.

Based on this rationale, the empirical results support the role of management commitment, project management and change management as the CSFs of BI strategy development.

Business championship, vision and business case

After the three workshops, the introduction to the subject of BI strategy through the focal points of the company's business strategy gained praise (INT2). It was found to be an effective way of setting each round of action taking its objective, connecting it to the vision of BI strategy project

and maintaining business orientation. This was especially due to differences in participants' perspectives. To some, business strategy of IWMC was more tangible in their work than to others. Business orientation was also retained throughout the research by seeking a business case for each project proposal in form of feasible business value. The business owners were asked to argue for the expected benefits of their projects (WS2, WS3). The results showed that a single project could affect the work of many different departments (INT2), which reinforced the business case of a project and thus facilitated the prioritization process. Business orientation and estimation of consequent business value that make the strategic alignment between business strategy and BI projects more transparent were also seen as a way of empowering BI steering committee (INT2). IT development manager in charge stated that "[BI strategy] increases understanding. We can question the proposed priorities given by business owners. We are not totally blind to business priorities anymore."

Thus, the results prove that business case is a reasonable CSF in BI strategy development. Clear, communicated business case of the whole BI strategy project was also seen to affect the credibility of the project and the enthusiasm of its participants (WS1). In addition, allowing the participants the opportunity to prepare and communicate with their colleagues prior to action taking by explaining the agenda in beforehand, was seen to positively affect the results. The project vision, "*In the year 2016 information management in IWMC will align with both short term and long term business objectives, steer and measure strategic actions, and support key business processes",* was accordingly created in cooperation with all of the project stakeholders in its initiation. First, the stakeholders were encouraged to communicate with each other, and then vote for the most important objectives to be added in the vision according to their own preferences (INT1).

Scalable, flexible infrastructure and data quality

The flexibility of the current BI architecture was reviewed after WS3, when the viewpoint of technology had been discussed in action taking. Flexibility refers to the capability of utilizing the current BI environment in response to new business requirements, and scalability to the possibility of adding new solutions to complement the existing technology (Yeoh and Koronios

2010). The discussion in WS3 was focused on processes that strived for making BI tools more user-friendly (e.g. INFO documentation T7 for increasing transparency, increase in data marts FS12 for making the data warehouse more practical), efficient (e.g. updating ETL process T5) and generally accepted by spreading the know-how of BI tools (e.g. user training T4). No new investments were proposed. Based on these results, the environment could be declared flexible to accommodate new types of requirements. Scalability, however, was restricted by the cost surveillance program, which affected the mindset of WS3. At the beginning of WS3, IT development manager in charge reminded all participants that cost efficiency is now a big part of the business strategy, and thus to be followed also in case of BI investments. He asked people to keep this in mind when thinking of solutions to business requirements in short term. In this case, it can be concluded that the objective of strategic alignment affected the level of scalability. However, the head of corporate planning (INT3) was of the opinion that IWMC now had the tools and a sophisticated data warehouse, but their potential was still underexploited. This was recognized as a bigger problem than the lack of budgeting. These findings are generalizable to the extent that the flexibility and scalability of BI environment are among the key factors to affect the potential of BI strategy.

The role of data quality as one of the CSFs was defended by the results from open coding and axial coding. Data quality was identified as one of the categories under the core-category of Information, and it had the most relationships to all other components of BI strategy (19 connections to other projects in total).

4.5.2 Secondary findings

The secondary findings of this thesis are based on observations made about the skew of the project priorities towards the first priority class and the effect of personal relevance and normal business communication on the participants' motivation.

Of all the projects on the BI strategy roadmap, 62 % represents the share of the first priority class projects. The first priority class was defined as a critical information need, which demands resources in the near future. These results suggest that deciphering long term business needs could be found more challenging than forecasting the needs for the upcoming year. The fact that

many of the proposed BI projects (43 %) were already launched before the BI strategy project was concluded supports this interpretation.

Also, the nature of the project suggestions could have affected the prioritization. IT development manager in charge (INT2) described the project outcome as follows: "The discussion about BI strategy was focused on tangible, practical needs. There was almost no discussion at all about any theoretical concepts related to the subject. People wanted to express their everyday needs, which I think made the dialogue natural. Then again, one could argue that our BI strategy is too down-to-earth, composed of small bolts and nuts." In other words, the participants focused more on subjects that were of concrete personal relevance, than on large-scale strategic directions. Similarly, few trends were discussed. IT development managers (INT2) were skeptical of their relevance. "Following BI trends is more like hit-and-miss forecasting."

4.5.3 Validity assessment

Before concluding the thesis with managerial and academic implications of the study, the empiric research is to be validated. The validity of this thesis is defended with explaining and fulfilling the seven criteria proposed by Baskerville and Wood-Harper (1998) for action researchers. The first five arguments describe the characteristics of action research. The last two, however, reflect the characteristics typical for qualitative research in general. Criterion 6 explains internal validity with the assumption that action research should be primarily validated through immediate relief of the problem under study. Criterion 7 explains external validity, which is familiar also to case studies, for example. Understanding or knowledge developed from the study should be generalized to a theory that has potential use in other problem setting alike. The arguments and explanations on how each criteria was met in the course of this thesis are presented in Table 8. (Baskerville and Wood-Harper 1998)

Furthermore, the research followed what Baskerville and Wood-Harper (1998) called a rigorous research structure, which is best described with delineated stages. These stages are carried out in a sequence or, as in this case, in the form of iteration rounds, for which activities to be implemented are selected according to predefined and accepted rules. (ibid.)

Table 8 Justification of research validity (based on Baskerville and Wood-Harper 1998)

	Validity criteria	Elaboration how the present research met the criteria
1	The research should be set in a multivariate social situation.	The research was conducted mainly as workshops, in which participated representatives from various departments of the organization in group discussions and small group assignments. The participants represented management, middle management, analytics and operative workers.
2	The made observations are recorded and analyzed in an interpretive frame.	The observations, workshops, interviews and steering committee meetings were recorded both by making notes and in audio, which was then transcribed. Theory-based framework supported the structuring of data collection and its analysis.
3	Researcher's actions should intervene in the research setting.	The researcher worked actively as a part of a team of three to work on the development of strategy. The researcher had the main responsibility in organizing the iteration rounds, in planning and delivering the agendas, and in conducting interviews.
4	Data collection method includes participatory observation.	The researcher took actively part in the discussions, but also took notes of the results and observations. The researcher however was not among the main contributors to the strategy content.
5	Changes in the social setting should be studied.	Representatives of project owners from both business and IT were asked to describe the changes BI strategy had instigated during interviews after the final iteration round. All agreed to having recognized a change in dynamics and strategy communication between business and IT. As the change involves business relationships across the company it also fulfills the requirement of a change in social setting.
6	The immediate problem in the social setting must be resolved.	BI strategy was developed in the research time frame and during action research iterations. After iterations round three, the results were deemed exhaustive.
7	The research should illuminate a theoretical framework that explains how chosen actions led to the favorable outcome.	Theory was linked to the iteration rounds in phases, starting with CSFs of BI project implementation (e.g. Yeoh and Koronios 2010) and viewpoints of information management (Kaario and Peltola 2008), which structured the agendas for workshops. Theoretical framework defined parts of the strategic alignment and explained the process structure for strategy development.

5 CONCLUSIONS

This thesis discusses the topic of improving information usage and BI pervasiveness through the creation of BI strategy. The main results of the thesis stress the importance of strategic alignment, business orientation and continuous information sharing in reaching consensus in BI development. Strategic alignment ensures that BI objectives reflect those of business, and on the other hand, it enables BI solutions to create added value and contribute to the success of business operations. Business orientation helps in creating a vision and a feasible business case for BI development. If the development process is business oriented, appropriately managed and sponsored by the top management, change management need not become an issue. Information sharing between the information producers and users is critical in achieving all this, but it was also seen to improve as a result of implementing a BI strategy project.

In other words, this research discusses BI strategy development in alignment with the objectives of overall business strategy. The objective was to study strategic alignment and BI development through the method of grounded action research to build a practical, theoretically reviewed framework for BI strategy creation. This objective was achieved with a concurrent study of previous literature and empirical research in the BI environment of a Finnish life insurance and wealth management company.

The theoretical framework is based on five founding theories: Strategic Alignment Model (SAM), a succeeding extension of SAM concerning the ole of communication, the diamond model, CSFs of BI project implementation and the five phases of rigorous action research. The theoretical framework was tested and revised through grounded action research interventions. The results suggest that four of these theories were found applicable without revision, and only one, the diamond model, was refined in the light of empirical findings. To conclude, this thesis generated two types of results: a theoretical framework of both academic and managerial interest, and other practical implications drawn from the project progression. These results are discussed from both the academic and managerial point of view.

5.1 Academic contribution

The research contributed to previous academic research by compiling the theories of strategic alignment and the development of information management strategies in a theoretical framework and testing it in an empirical setting from the point of view of BI. Previous research had largely focused on the alignment between IT strategy and business strategy, without much thought given to its use in the field of BI. To address this deficiency in previous literature, one of the objectives was to study the suitability of the founding theories when applying them to the development of information management, data warehousing and information utilization in analytics and reporting.

The theoretical framework produced by this thesis shows that the content of BI strategy should be constructed from the viewpoints of knowledge, processes, information and technology. Previous research into the viewpoints of information management suggested that instead of knowledge, stakeholder roles should be analyzed. However, the viewpoint of knowledge is more extensive, and thus found more appropriate considering BI.

Even with the results gained about the subcategories of these four viewpoints, such as data quality and information content categories under the viewpoint of information, the principal factors of the theoretical framework are presented at the core-category level. It allows for intuitive strategic thinking with broader concepts rather than providing exclusive answers. Furthermore, it improves the generalizability of the framework. Even if the empirical results are based on a single case study, the framework is general in its applicability, devoid of any specific industry context or situation.

5.2 Managerial implications

The managerial implications of this research offer insight about the development process of BI strategy, its content and success factors. The proposed framework for strategy creation is supposed to offer understanding about the principal factors relevant in strategic decisions concerning BI development. It assists in organizing the gathered business requirements and

exploring them from all relevant viewpoints of BI. It gives guidance in managing the process so that business orientation is maintained and strategic alignment is achieved.

This thesis suggests that the business value of creating a BI strategy lies in increased information sharing. The development process alone allegedly gathers people from different organizational departments together to discuss information needs and other business requirements. The results suggested that BI strategy development provides better understanding about the overall business strategy for employees without everyday contact to business objectives, and by contrast, it informed the employees in the business domain about the potential benefits of more efficient information usage. For instance, business processes, which now require a lot of manual work in information management and reporting, were recognized as potential targets for development by the means of BI. Of the strategic business objectives in the case organization, the planned BI initiatives supported operative efficiency, governance and customer relationship management the most.

The theoretical framework can be applied to determine the key factors in project management and the structure for analyzing both business and BI strategy content. Both previous literature and empirical findings in this thesis support a business driven approach to project management. To ensure strategic alignment between business and BI, business objectives should form a valid business case for each BI initiative and thus dictate the prioritization process. Discussing the business value in concrete benefits also assists in recognizing the correct business owners. The most attention should be focused on the development of information content and data quality, as the most BI initiatives have either a causal, dependent or a complementary relationship with the said factors.

The success of change management and management commitment are essentially connected to each other. Management commitment can better ensure that BI strategy gets the momentum it needs and consequently, advances change management. Management commitment ensures compliance across the organization with the changes the BI strategy imposes and empowers the prioritization process against suboptimization. Management commitment is especially crucial in BI initiatives, which are more complex in terms of human resources management. As BI

becomes more pervasive, automation of information management processes replaces manual human labor with logic.

Active communication and reciprocal information sharing between information users and producers maintains the strategic alignment. Due to the challenge of imperfect information about end user needs, the development process of BI strategy should be iterative in nature, allowing for feedback and revision. Iterative development supports continuity and makes the progress of change management more transparent. Furthermore, as proposed by theory, all feasible strategies should include both planned and emergent qualities. Iterative process allows for flexible learning. To conclude, there should be a policy for making the further development of BI strategy a continuous process as opposed to it being a single, forced effort.

5.3 Limitations and suggestions for future research

Every research has its limitations, and a single case study conducted through grounded action research, in particular, requires clarification of the limitations to applying the proposed framework and conclusions of this thesis to other contexts. The results are thus formed based on a qualitative single-subject study that has generally argued limitations related to validity and generalizability despite the rigorous approach to data collection and analysis. The basic limitations of interpreting qualitative data (i.e. subjective opinions, comments and statements) and generalizing the deductions into conclusions apply to this research. What is more, it should be taken into consideration that BI environment is constantly evolving and IT systems are increasingly becoming more embedded into business processes. The results of this study are tied to this particular time, and thus have limited potential to be generalized concerning the far-reaching future state of BI solutions.

This study took place in Finnish insurance company with BI environment and competence center already in place. Therefore, further research is needed to evaluate the requirements of a large global organization and the effects of centralized, or decentralized, BI systems on the CSFs. The usefulness of the proposed framework should also be explored when the BI environment is only in the progress of being implemented. In addition, the present study focused on BI strategy development alone. Hence, BI performance measurement and the quantitative evaluation of the

effect of these results on business objectives were left out of scope. Further research could address this by examining the suitable performance metrics to evaluate the effectiveness and feasibility of BI strategy.

In the subject organization of this study, the attitude towards implementing market trends concerning BI systems and tools, such as online data warehousing or big data, was skeptical. Future research could study the general attitudes towards adoption of external BI innovations. How many of the so called "consultancy fads" succeed in diffusion and how long does it generally take for organizations to accept them into their BI environment? Last, another interesting aspect is the factors that affect utilization of information in business processes and the development of BI maturity. That is, the factors that hinder or facilitate the organization's transformation from tactical BI to strategic BI, in which BI becomes a pervasive part of business infrastructure.

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APPENDICES

Appendix 1. The results of the group assignment in the project initiation conference of BI strategy

Subject	Goal/Target	Points	Percentage
Data utilization	Information closer to the user	8/84	
	Suitable tools for end users' analysis	11/84	
	Better tools for information producers	0/84	
	Predictive reporting	11/84	
	Automation	8/84	
	TOTAL	**38/84**	**45,2 %**
Skills development	User training	0/84	
	Info user group	5/84	
	Communication of best practices	3/84	
	TOTAL	**8/84**	**9,5 %**
Data quality improvement	ETL process quality	9/84	
	Data quality measurements	11/84	
	INFO cross checks and documentation	0/84	
	TOTAL	**20/84**	**23,8 %**
Masterdata management		**0/84**	**0 %**
Data content development		**18/84**	**21,4 %**

Appendix 2. The participants in WS1-WS3

	WORKSHOP 1 (WS1)			
#	Participant title	Department	Domain	Group
1	BI specialist	Corporate planning	Business	1
2	BI manager	Corporate planning	Business	1
3	BI design manager	Corporate planning	Business	2
4	BI design manager	Corporate planning	Business	3
5	Head of corporate planning	Corporate planning	Business	2
6	Development manager	Projects and data warehousing	IT	2
7	Development manager in charge	Projects and data warehousing	IT	3
8	Customer analyst	Business development	Business	1
9	Development manager in charge	Business developmet	Business	1
10	Development manager	Business development	Business	1
11	Director of reporting and internal accounting	Internal accounting	Business	2
12	Development manager	Wealth management	Business	3
13	Mathematician	Actuary operations	Business	2
14	Mathematician	Actuary operations	Business	3

	WORKHSOP 2 (WS2)			
#	Participant title	Department	Domain	Group
1	BI specialist	Corporate planning	Business	3
2	BI manager	Corporate planning	Business	3
3	BI planning manager	Corporate planning	Business	2
4	BI planning manager	Corporate planning	Business	2
5	Head of corporate planning	Corporate planning	Business	3
6	Development manager	Projects and data warehousing	IT	2
7	Development manager in charge	Projects and data warehousing	IT	3
8	Customer analyst	Business development	Business	3
9	Development manager	Web services, Business development	Business	3
10	Development manager	Web services, Business development	Business	3
11	Director of reporting and internal accounting	Internal accounting	Business	1

12	Mathematician	Actuary operations	Business	1
13	Mathematician	Actuary operations	Business	1
14	Development manager	External accounting	Business	1
15	Accounting designer	External accounting	Business	1
16	Data warehousing specialist	Projects and data warehousing	IT	1
17	Data warehousing specialist	Projects and data warehousing	IT	1
18	Service director	Customer services	Business	2
19	Service manager	Customer services	Business	2

WORKSHOP 3 (WS3)				
#	**Participant title**	**Department**	**Domain**	**Group**
1	BI specialist	Corporate planning	Business	1
2	BI manager	Corporate planning	Business	1
3	BI planning manager	Corporate planning	Business	1
4	BI planning manager	Corporate planning	Business	2
5	Development manager in charge	Projects and data warehousing	IT	2
6	Customer analyst	Business development	Business	1
7	Development manager	Business development	Business	2
8	Mathematician	Actuary operations	Business	1
9	Mathematician	Actuary operations	Business	2
10	Data warehousing specialist	Projects and data warehousing	IT	1
11	Data warehousing specialist	Projects and data warehousing	IT	1
12	Data warehousing specialist	Projects and data warehousing	IT	2
13	Data warehousing specialist	Projects and data warehousing	IT	2

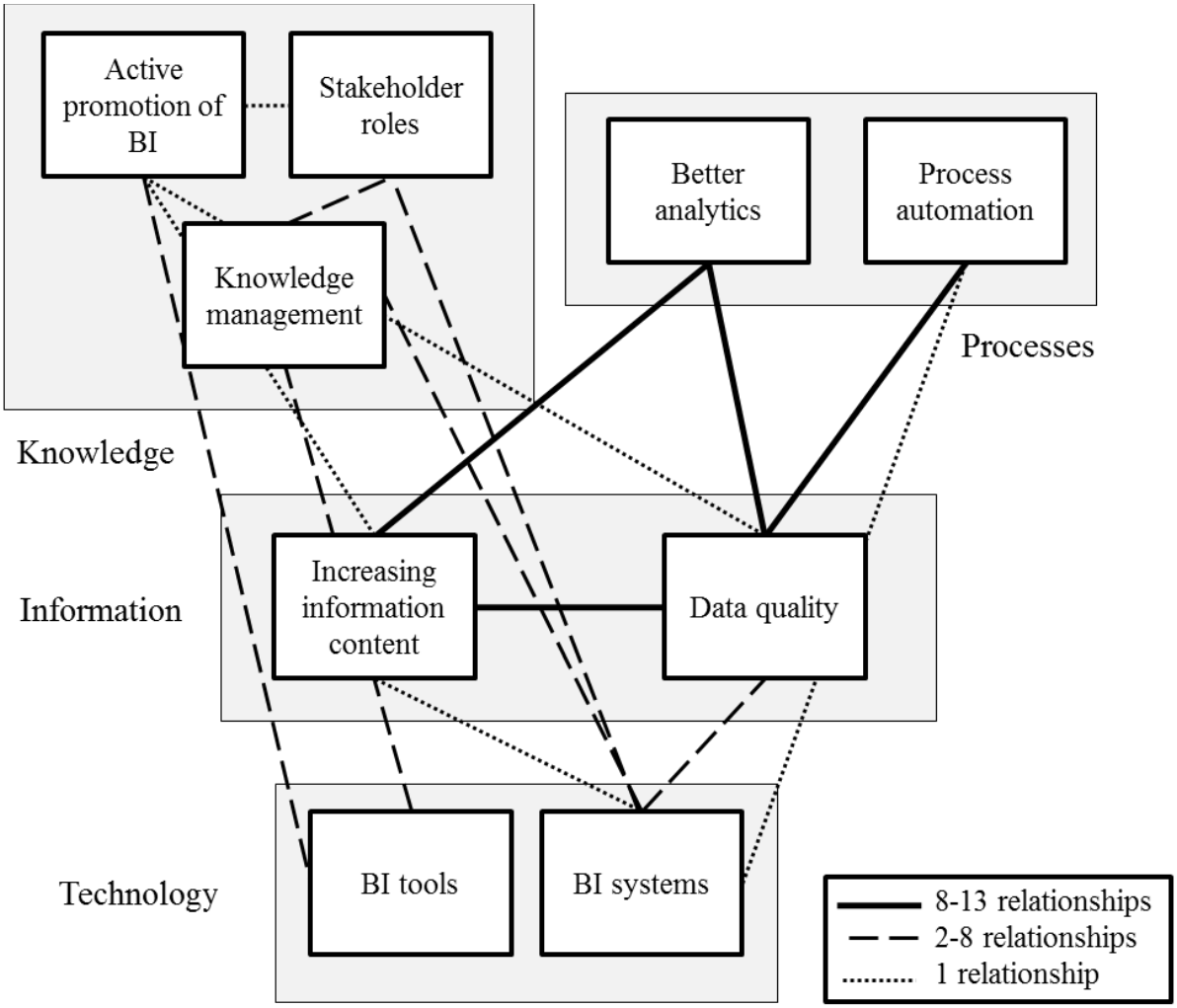
Appendix 3. Final BI strategy outcome

BI STRATEGY					BUSINESS STRATEGY	
Project ID	**Core-category**	**Category**	**Project**	**Priority**	**Component**	**Theme**
FT2	Process	Process automation	Systematization and servitization of customer targeting and segmentation processes	1	Business governance	Operative efficiency
FT3	Process	Process automation	Proactivity in case of changes in KPIs and customer information	2	Business governance	Operative efficiency, Effective sales, Service innovation
F4	Process	Process automation	Streamlining monthly ETL-process	2	Business governance	Operative efficiency
FS5.1	Process	Process automation	Supporting steering and follow up in operative units	1	Business governance	Operative efficiency, Governance
FS5.2	Process	Process automation	Improving processes of operative units with BI	1	Business governance	Operative efficiency, Customer relationship mgmt.
F6	Process	Better analytics	Development of forecasting models	1	Business governance	Governance, Operative efficiency
F7	Process	Better analytics	Utilization of external information sources (both local and international)	2	Business scope	Service innovations
F8	Process	Better analytics	Improved customer data analysis: parameters for recognizing business potential	1	Business scope	Service innovations, Customer relationship mgmt., Effective sales
F9	Process	Better analytics	Reporting trends and forecasts instead of mere history	1	Business governance	Operative efficiency, Effective sales, Service innovations
F10	Process	Better analytics	Estimation of customer segment profitability	3	Distinctive competency	Customer relationship mgmt., Operational efficiency
F11	Process	Better analytics	Web service analytics	3	Business scope	Service innovations, Customer relationship mgmt., Effective sales
T8	Process	Better analytics	Customer segmentation	1	Distinctive competency	Customer relationship mgmt., Effective sales
F14	Information	Data quality	Matching of INFO content	1	Business governance	Governance
FS15	Information	Data quality	Creating a portal to the company homepage for INFO related communication, publishing report on data differences	2	Business governance	Operative efficiency, Governance
S1	Information	Data quality	Increasing quality check points and comparative materials	1	Business governance	Governance
S2	Information	Data quality	Rules for data corrections	2	Business governance	Operative efficiency
S3	Information	Data quality	Report on current quality status on each data type	1	Business governance	Governance, Operative efficiency

BI STRATEGY					BUSINESS STRATEGY	
Project ID	Core-category	Category	Project	Priority	Component	Theme
F16	Information	Increasing information content	Sales funnel; new INFO content: offers	1	Distinctive competency	Effective sales, Customer relationship mgmt.
F19	Information	Increasing information content	INFO based analysis of risk result and risk policies, new INFO content	1	Business governance	Operative efficiency, Governance, Customer relationship mgmt.
F20	Information	Increasing information content	New INFO content: Basic information of Innova contracts	3	Distinctive competency	Customer relationship mgmt., Governance, Operative efficiency
F21	Information	Increasing information content	New INFO content: Savings of existing pensions	1	Distinctive competency	Customer relationship mgmt., Governance, Operative efficiency
F22	Information	Increasing information content	New INFO content: Investment objects	1	Distinctive competency	Customer relationship mgmt., Governance, Operative efficiency
FS23	Information	Increasing information content	Customer centricity in web service: adding history data to show savings development	1	Distinctive competency	Customer relationship mgmt.
F24	Information	Increasing information content	Separation of wealth management policies (997/991) in written premiums	2	Business governance	Operative efficiency
FF25	Technology	BI tools	Development of Sharepoint to provide easy-to-use, comprehensive reporting environment	1	Business governance	Operative efficiency, Effective sales
F26	Technology	BI tools	Mobile BI	3	Business governance	Operative efficiency
T9	Technology	BI tools	Report for analysis of customer information in its entirety	1	Distinctive competency	Effective sales, Customer relationship mgmt., Operative efficiency
FS12	Technology	BI systems	Increasing data marts: stock of Sesam insured, risk cover, savings per instrument, changes to customer data marts	2	Business governance	Operative efficiency, Governance
T6	Technology	BI systems	One service provider tool for each BI process (ETL, analytics etc.)	3	Business governance	Operative efficiency
T7	Technology	BI systems	INFO documentation	2	Business governance	Operative efficiency, Governance
T5	Technology	BI systems	Update on ETL process from transactional system SAJ	2	Business governance	Operative efficiency

BI STRATEGY					BUSINESS STRATEGY	
Project ID	Core-category	Category	Project	Priority	Component	Theme
FT27	Knowledge	Active promotion of BI	Communication of BI activities and tools	1	Business governance	Operative efficiency
FT28	Knowledge	Active promotion of BI	BI missionaries; stakeholder training	1	Business governance	Operative efficiency
ST4	Knowledge	Stakeholder roles	Data protection by rights of use	1	Business governance	Governance
T2	Knowledge	Stakeholder roles	Change management	2	Business governance	Governance
T3	Knowledge	Stakeholder roles	Role differentiation	1	Business governance	Operative efficiency, Governance
ST5	Knowledge	Knowledge management	INFO user group	1	Business governance	Operative efficiency, Service innovations
T1	Knowledge	Knowledge management	Increasing organizational knowledge capital	1	Business governance	Operative efficiency, Governance
T4	Knowledge	Knowledge management	BI user trainings	1	Business governance	Operative efficiency

Appendix 3. Results after final round of axial coding



Appendix 4. Table of axial coding results: connecting projects and categories

BI STRATEGY					
Project ID	**Core-category**	**Category**	**Project**	**Connected project (relationship type)**	**Connected category**
F2	Process	Process automation	Systematization of customer targeting and segmentation processes	FS12 (Causal), S1, S3 (Dependent)	BI systems, Data quality
F6	Process	Better analytics	Development of forecasting models	F14, F19, F21, F22, S1, S3 (Dependent)	Data quality, Increasing information content
F7	Process	Better analytics	Utilization of external information sources (both local and international)	F8, F17 (Complement), S1, S3 (Dependent)	Better analytics, Sales support, Data quality
F10	Process	Better analytics	Estimation of customer segment profitability	F8 (Complement), F19-22 (Causal), S1, S3 (Dependent)	Better analytics, Increasing information content, Data quality
F11	Process	Better analytics	Web service analytics	S7 (Dependent)	Increasing information content
FS12	Technology	BI systems	Increasing data marts	F2, F21 (Causal), S1, S3, T3 (Dependent)	Process automation, Increasing information content, Data quality
F16	Information	Sales support	Sales funnel	S6, FT28 (Causal), S1, S3 (Dependent)	Increasing information content, Active promotion of BI, Data quality
FF25	Technology	BI tools	Development of easy-to-use and accessible reporting environment for the entire organization	F15, F27 (Complement), S4, T4, T1, FT28, T3 (Dependent)	Data quality, Active promotion of BI
FT28	Knowledge	Active promotion of BI	BI missionaries; stakeholder training	S6, FF25 (Dependent)	Increasing information content
S1	Information	Data quality	Increasing quality check points and comparative materials	FT2. FT3, FS5.1, FS5.2, F6-F10, T8, F14, F16, F19-FS23, T9, FS12 (Dependent)	Process automation, Better analytics, BI systems, Data quality, Sales support, Increasing information content
S3	Information	Data quality	Report on current quality status on each data type	FT2. FT3, FS5.1, FS5.2, F6-F10, T8, F14, F16, F19-FS23, T9, FS12 (Dependent)	Process automation, Better analytics, BI systems, Data quality, Sales support, Increasing information content
T3	Knowledge	Stakeholder roles	Role differentiation	S4, T4, FS12, FF25, T6 (Dependent)	Active promotion of BI, Knowledge management, BI systems, BI tools
T6	Technology	BI systems	One service provider tool for each BI process (ETL, analytics etc.)	F4, T3 (Complement)	Process automation, Stakeholder roles
T7	Technology	BI systems	INFO documentation	FS15, S3, T4, T1, FF25, FT28 (Complement)	Data quality, Knowledge management, Active promotion of BI
T2	Knowledge	Stakeholder roles	Change management	T1, T3 (Complement)	Knowledge management, stakeholder roles