

**Holistic Execution of Corporate Business Intelligence Strategy in  
a Heterogeneous Information Management Environment**

Case: Landis+Gyr

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Master's Thesis of the Degree Programme in International Business Management

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## ABSTRACT

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<p>The main objective of the thesis is to study the prerequisites for holistic execution of corporate BI strategy in the case company's heterogeneous IM environment. The focus is on finding out a unified way for managing the business information to support management decision-making in the case company. Additionally, the thesis investigates which technical and organizational prerequisites are necessary for corporate-wide BI strategy execution. The case company, Landis+Gyr, headquartered in Zug, Switzerland, is a global leader in energy management solutions for utilities.</p> <p>The research method in this study is qualitative. The theoretical framework was created by relevant articles, books and studies. The empirical information was collected through interviews and the writer's own observations and experiences.</p> <p>The results of this study suggest that seamless senior management engagement is the key to a successful BI strategy execution. Consistent business information can be achieved through common definitions and increased integration. The value of centralized BI organization and the utilization of standardized BI technology on a corporate level are also relevant findings of the research.</p> <p>According to the findings, increasing senior management and business engagement in BI initiatives is suggested in the case company. The alignment of BI initiatives with business strategy enhances the strategic importance of BI and enables the creation of information culture. Furthermore, achieving consistency through common definitions, harmonization of the core business processes, source system landscape, and master data, are of significant importance. The establishment of empowered corporate BICC with sufficient resources is equally suggested. Finally, improved BI technology standardization and the implementation of an easy-to-use integrated business information platform to facilitate the growing user expectations are of significant importance.</p> <p>Further study is required to show if the execution of BI strategy supported by the key prerequisites presented in this research will enable a more optimized approach for consolidating and integrating heterogeneous IM environments.</p> <p>Chapters containing empirical information are not published in their full length in the Library version, since the case study analysis is regarded as confidential information.</p>
Keywords: business intelligence, information management, strategy, process

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## 1 INTRODUCTION

The motivation for this thesis work is discussed in this introduction chapter. Similarly, research objectives for the study and the case company background are presented.

### 1.1 Motivation

Optimized utilization of business information to support management decision making and the execution of Business Intelligence (hereinafter BI) strategy has become a current topic in many organizations. Spreadsheet-centric reporting culture and ever increasing complexity of Information Management (hereinafter IM) environments as well as rapidly growing amount of available data have created demand for managing business information in a holistic way.

Instead of using the information managed centrally in BI systems, business users extract data from various source systems independently. The data is loaded into spreadsheets for performing individual calculations without sharing the end result throughout the organization. The heterogeneous IM environments and the spreadsheet-centric reporting culture addressed above are central factors behind the growth of uncontrolled and unorganized data silos, which often result in poor data quality and in multiple versions of truth increasing confusion among business. In addition to data quality-related downsides, manual data collection requires a remarkable amount of workforce to carry out the reporting processes while increasing the probability of human errors.

Furthermore, storing unsecured sensitive data on local PCs, instead of a data warehouse, is also a potential security risk for an organization (Gartner 2008). Regardless of BI vendors' and IT organizations' continuous efforts to replace spreadsheets by central BI solutions, it is estimated that up to 90 percent of BI end users utilize spreadsheet applications (Atos 2011), such as Excel, by exporting information from Enterprise Resource Planning (hereinafter ERP) systems and BI tools and working with the acquired information locally. Despite the fact that spreadsheet-centric reporting culture has evolved over time to bridge the gap between the business needs and the BI offering,



the explosion of time consumed to manual data processing has resulted in increased Total Cost of Ownership (hereinafter TCO) of BI (Applebaum 2010, 6).

By drifting to inconsistent data silos, “many organizations have found themselves with silos of knowledge that are difficult to reconcile, complex to comprehend, and limited in their ability to provide the needed insight” (Boyer & Frank & Green & Harris & Van De Vanter 2010, 1). In order to avoid data silos and enable secure sharing of the data, the aim of BI initiative is to create a single version of the truth, but many organizations have not even agreed on the definition of basic fundamentals (Gartner 2008). Evelson, one of the leading BI evangelists, emphasizes that a BI implementation can rarely succeed without common definitions. In some organizations, different departments define same key performance indicators (hereinafter KPI) differently, which means that the figures between the two functions do not match and have a negative impact on the value of automation (Evelson 2007 cited in CIO by Diann 2007).

Achieving the single version of truth requires “cross-departmental agreement on how business entities such as customers, products, KPIs, metrics are defined” (Gartner 2008). In addition to insufficient definitions, other reasons for challenges in BI implementations can be related to low data quality (Gartner 2008).

After all, two of the most fundamental factors risking the success of a BI initiative are the lack of business engagement outside of IT and the lack of vision or documented BI strategy (Gartner 2013). If BI strategy has been documented, it has been poorly developed, implemented and managed. Such a poorly documented BI strategy may consider only the technical perspective (Gartner 2008) and completely ignore the business and organizational perspectives.

Despite the fact that there are many guidelines on implementing a BI strategy available, the guidelines do not offer a holistic solution of the core prerequisites and best practices for an organization with heterogeneous business processes, heterogeneous IM landscape as well as inconsistent Master Data Management (hereinafter MDM). Moreover, another significant perspective missing from the BI strategy planning and execution guidelines is the successful integration of spreadsheet-centric reporting culture and its

numerous data silos to the centrally managed BI. Therefore, to offer further insight into this business problem, this study aims to take a new perspective from the theoretical ideas of BI strategy implementation in an ideal business and IM landscape to a BI strategy implementation in a highly heterogeneous and complex business and IM landscape.

This research also considers the fact that traditional BI is currently in the middle of a rapid transformation, as the amount of available structured and unstructured information is increasing. Therefore, utilizing unstructured data from social media in BI and especially in Business Analytics (hereinafter BA) has become a strategic topic in many organizations. This phenomenon has been universally named as 'Big Data' (hereinafter without emphasis). According to Gartner's IT Glossary (2013), Big Data "is high-volume, high-velocity and high-variety information assets that demand cost-effective, innovative forms of information processing for enhanced insight and decision making."

Based on a recent survey by Bloomberg (2012), 97 percent of large enterprises are utilizing BA to some extent. Despite the fact that large enterprises trust in fact-based decision-making, there is still a gap between current and optimal state. Only one in four organizations confirm that its BA utilization has been "very effective" in decision making. The reason to this is that data is often discarded, because the business users find it too difficult to distinguish key information from the massive amount of available data.

In order to facilitate the ongoing transformation of BI and to better connect business users and data, the software giant SAP has introduced (2013) a vision, called Network of Truth, which emphasizes the importance of creating an analytics driven information culture in the organizations to engage business users with BI and help them collaborate. Moreover, the leading data visualization software provider Qlikview (2012) has presented a vision for creating Qlikview.Next, a business discovery platform which enables the ecosystem of people, services, and applications to reinvent BI. Furthermore, Devlin (2013), one of the leading BI evangelists, has launched a concept of Biz-Tech Ecosystem, which is built on people, processes and information. All these visions discuss the same core idea, the growing demand for business user collaboration in BI.

Traditionally, business users have only consumed information from the centrally managed systems. However, the real-time data platforms, which have been developed for harnessing the Big Data, enable the business users to get better engaged through collaboration and contribution of information. Due to these reasons, it is also relevant to recognize the increasing new trends and the growing role of BA within BI strategy implementation. All these factors together have a drastic impact on the holistic execution of BI strategy in a heterogeneous IM environment.

The general development area of the thesis is to study the prerequisites for holistic execution of corporate BI Strategy in the case company's heterogeneous IM environment. Furthermore, finding an optimal and a unified way for managing business information on a corporate level in the case company is the main objective of the research.

The personal motivation for carrying out this Master's thesis project comes from the writer's professional background in BI. The writer has been working as a Consultant, Application Manager, Business Analyst and Project Manager in various consulting and in-house positions for more than nine years of which the last three years in the case company. In the current role, as Business Analyst and Application Manager of global BI systems at Landis+Gyr, the responsibilities in BI projects range from collecting business requirements from the business users to engineering the requirements to BI applications. Moreover, the role consists of project management duties including the management of external consultants. The writer is also involved in implementing, managing and supporting the BI systems in Landis+Gyr's SAP Competence Center (hereinafter SAP CC). The responsibilities cover logistics BI applications retrieving data from SAP Enterprise Resource Planning (hereinafter SAP ERP) system to SAP Business Warehouse (hereinafter SAP BW). Additionally, management of the SAP BusinessObjects BI platform (hereinafter SAP BO) used as a global front-end tool for combining data from various operational source systems and databases is one of the key responsibilities.

## 1.2 Case Company Background

The case company, Landis+Gyr, established in 1896 and headquartered in Zug, Switzerland, is present in over 30 countries worldwide and is an independent growth platform and consolidated subsidiary of Toshiba Corporation. The case company employs over 5000 people globally and generated net sales of USD 1.6 billion in 2011. The global business consists of four regions, namely Europe/Middle East/Africa (hereinafter EMEA), APAC, North America and South America. This case study concentrates on region EMEA, which generated net sales of USD 587 million in 2012. (Landis+Gyr 2013.)

The case company has become the global market leader in Smart Metering through organic growth and acquisitions. The case company has deployed or contracted over 25 million smart grid-enabled endpoints, of which over 15 million endpoints are actively managed in long-term contracts. The number of deployed endpoints is the largest installed base globally, with more than 300 million metering devices deployed through 3,500 utility relationships. (Landis+Gyr 2013.)

The case company is running a regional business model consisting of North America, South America, EMEA and Asia & Pacific with regional bottom line responsibilities. The company is organised in several regional Business Lines including Heat, Gas, Commercial, Industrial and Smart Grid, Smart Energy Solutions and Services with one common Sales Force, all reporting to the CEO of each Region. The case company has a global network of 16 manufacturing sites and dedicated R&D centers with almost 1000 engineers working in 17 locations globally. There are also 73 sales offices world-wide. (Landis+Gyr 2013.)

Figure 1 illustrates the locations in region EMEA. The case company has multiple competence centers and manufacturing sites within the region as well as the regional headquarters in Switzerland, which is also the global headquarters of the company.

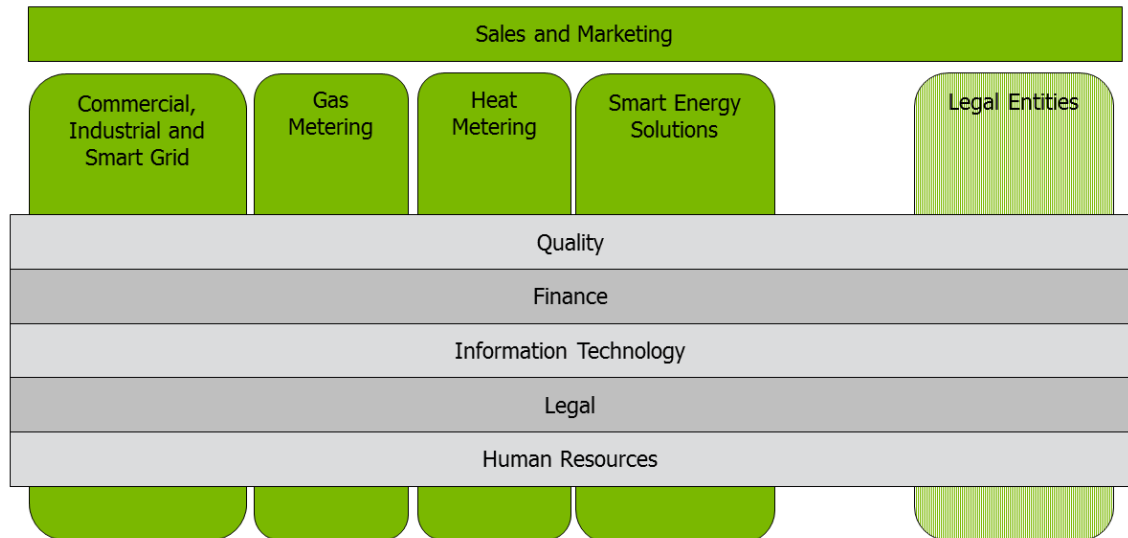


**Figure 1.** Landis+Gyr Region EMEA (Landis+Gyr 2013)

In addition to the headquarters in Switzerland, the manufacturing sites in the UK and Germany are central in case company's business management, because all these manufacturing sites are also business line headquarters. The headquarters of business line Gas is in Manchester, whereas the headquarters of business line Smart Energy Solutions (hereinafter SES) is located in Peterborough. The headquarters of business line Heat is located in Nuremberg Germany. In addition to global and EMEA headquarters, Switzerland is the home of business line Commercial, Industrial and Smart Grid.

Business organization in region EMEA consists of six Business Lines and is supported by Quality, Finance, IT, Legal and Human Resources departments. The business organization is illustrated in the organization chart to follow:

## EMEA Business Organization



**Table 1.** Landis+Gyr EMEA Business Organization (Landis+Gyr 2013)

The case company's business organization is a matrix organization which has grown as a result of multiple mergers and acquisitions. Each column of the matrix organization has their individual business processes and technology to support those processes. This has led to data silos and inconsistent master data within the organization due to multiple separate ERP systems and spreadsheet-centric reporting culture.

According to Barlett and Ghoshal (1990), matrix management has been proved to be difficult to manage in practice, particularly in an international environment. This is due to the fact that dual reporting has led to conflict and confusion as the increasing number of channels has created informational silos. In addition to functional barriers, a matrix organization is often separated by barriers of distance, language, time, and culture increasing the complexity in management processes.

However, matrix organizations perform well in general, as "multi-dimensional organizational design (Matrix) is the best way to restructure a business" (Bloomberg Business Week 2009). Even though a matrix organization may be a challenging environment from the IM perspective, it does not mean that a matrix organization would necessarily be unsuccessful from a business perspective.

### 1.3 Objectives of the research

The main reason for studying the system architectural, process related and organizational prerequisites for implementing a corporate BI Strategy in Landis+Gyr is to find a holistic and consistent approach for managing the business information. The goal of implementation and execution of corporate BI strategy is to lead to high user adoption and better informed and faster decision making processes in the business management.

The scope of the study is to research what the required changes are in terms of business processes and practices throughout the case company for migrating the organization from heterogeneous data silos and inconsistent business information management processes to a lean corporate BI strategy execution on a corporate level. The main purpose of the BI strategy execution is to facilitate management's decision making aligned with business strategy execution. In addition, the research aims to find out which technical and organizational prerequisites should be met until the corporate BI strategy can be executed on a corporate level in the heterogeneous IM landscape of the case company.

The main objective of this study is to find an optimal and a unified way for managing business information on a corporate level in the case company. This includes revealing the current limitations of the BI environment from operational and strategic perspectives of the business management.

The second objective is to study the technical prerequisites and components of the BI system architecture and BI processes to enable successful BI strategy execution. The third objective is to identify the components of the organizational strategy, such as the necessary human capital and organizational infrastructure. This is necessary for successful BI strategy execution which supports gaining high user adoption of BI initiatives.

Finally, the fourth objective of the study is to discover a standard set of methodologies, definitions, processes, practices, tools and technologies which help achieve these targets

and will result in improved decision-making processes aligned with business strategy execution. These best practices will facilitate the creation of a development plan which enables the implementation and execution of BI Strategy in the case company. Moreover, as the case company's BI strategy has been developed in 2010, it does not consider the recent developments of the BI world discussed earlier. Therefore, it is necessary to review the existing BI strategy and update the strategy accordingly.

In the first phase, the reviewed BI strategy will be rolled-out within the region EMEA. In the second phase, the case company aims to roll out the EMEA-wide BI strategy on a global scale.

#### 1.4 Structure of the Thesis

Chapter two focuses on presenting the research questions and the methodology used in the thesis. Chapters three and four present the theoretical framework of this study. The concept of BI strategy is discussed first, followed by a discussion on the currently ongoing transformation of the BI. The fourth chapter presents market best practices in implementation of a BI strategy considering various perspectives having an influence in the implementation. Subsequently, the fifth chapter presents the current BI strategy in the case company, which has been developed prior to the recent changes in the BI world. Furthermore, the sixth chapter describes the current IM and BI environment in the case company. In addition to this, the sixth chapter discusses the current challenges and the problem areas of the IM and BI environment in the case company. Chapter seven presents the prerequisites for corporate strategy and discusses the main findings of the case study. Finally, the eighth chapter concludes the thesis.



## 2 RESEARCH QUESTIONS AND METHODOLOGY

The research questions are presented and discussed below. Moreover, the methodology of the thesis is characterized here. The motivation for the methods and techniques chosen are discussed too. Additionally, the data collection and analysis processes are explained.

### 2.1 Research Questions

The aim of this work is to produce a holistic approach for BI strategy execution on corporate level in the heterogeneous IM environment of the case company. Deriving from the general aim stated above, the following research questions are defined:

1. What are the role and the current level of utilization of BI in the strategic and operational management of the case company?

This question looks into the benefits of improved utilization of BI in the case company from the business management's perspective. The main focus is on the identification of the time critical business requirements or business problems which are weakly addressed by the present management control systems, including information system architecture and business processes. Based on the findings, possibilities for improvement will be identified. The main assumption in this question covers the insufficient effectiveness of the current BI processes. This assumption is empirically supported by the information in the case company and it is the main motivating factor for undertaking this research work.

2. What are the main prerequisites and conditions for the IM architecture and processes necessary for the efficient execution of the corporate BI strategy?

This question examines the challenges caused by the heterogeneous IM system architecture and the inconsistent business processes from IT management's perspective. The main focus is on the identification of the critical business processes, practices and definitions as well as system architectural shortages impeding efficient implementation of BI strategy. Additionally, there is a need to study whether the required changes have

an impact on current system architecture in enabling a high level of data access and data quality. The hypothesis in this question concentrates on the assumption of insufficient level of harmonization in the business processes, practices, definitions and system architecture. This hypothesis is empirically supported by the internal information in the case company.

### 3. Which modifications to the organization are necessary to support the corporate BI strategy in the case company?

This question looks into the benefits of centralized BI organization in the case company. Currently, there is no global BI Competency Center (hereinafter BICC) in the case company. BI resources are working either regionally or partially globally based in the global headquarters in Switzerland. This research question is to study which roles and minimum resources are required for running a global BICC and define the responsibilities of BICC in respect of global BI Governance. The assumption in this question is that the BICC in Switzerland is not currently fully able to respond to current business needs due to insufficient resources. This assumption is empirically supported by the information in the case company and by benchmarking the size of BICC in similar organizations.

## 2.2 Methodology

The main research methodology used in this thesis research is a single case study method, as case study method enables the researcher to fully understand the behavior pattern of the concerned unit (Kothari 2004, 115). Case study method also deepens the perception of the observer and gives a clearer insight into life. The method also looks at behavior directly and not by an indirect and abstract approach (Cooley 1929 cited in Kothari 2004, 115).

Moreover, Schramm (1971 cited in Yin 2003) argues that the central tendency among all types of case studies is that “case study tries to illuminate a decision or set of decisions: why they were taken, how they were implemented, and with what result”. For this reason, the case study method is a relevant method to be used in this thesis as it will

study the current status of BI strategy implementation in the case company, and possible improvement in implementing the BI strategy on a global scale.

Case study method is technically similar to history study but it differs from it remarkably in terms of two sources of evidence, as case study includes direct observation of the studied events as well as interviews of the involved persons. According to Yin (2003), the benefits of case study method reside in its ability to utilize documents, interviews and observations. The writer includes also direct observations of the BI strategy implementation in the case company.

This thesis includes both research and development work. The theoretical part of the study consists of relevant literature reviews and utilizes existing research done into the implementing the BI strategy. The previously conducted research supports in creating an in-depth understanding of the topic. The theoretical part of the thesis project is a crucial phase in the whole process and it was carried out before the collection of any empirical data. The theoretical part also guided towards the empirical data collection.

The literature used in the theoretical framework mainly consists of studies on market best practices for implementing BI strategy from technology research organizations such as Gartner and Forrester as well as leading consulting companies including Accenture and IBM. White papers on the subject from the business software company SAP also forms a part of the theoretical framework, mainly because SAP is the strategic business software vendor of the case company.

Semi-structured interviews were used as a research technique to collect the empirical data. The main focus of the data collection was on studying the strategic role of BI and the current level of utilization of BI in the strategic management of the case company. Moreover, semi-structured interviews were used to discover possible BI-related shortages from business management's perspective in the case company. Finance and marketing executives, business line vice presidents and business controllers as well as members of IT management were interviewed. These interviewees were selected, because they utilize BI in their decision making processes.

Additionally, semi-structured interviews were used to gain deep understanding of the main prerequisites and conditions for the IM architecture and processes which are necessary to efficiently implement the corporate BI strategy. The data collected from the interviews were supported with subject-related confidential documents such as the case company's BI strategy, which were reviewed and analyzed. The IT executives and IT managers interviewed for this research were selected due to their understanding of the case company's BI processes and IM architecture.

Moreover, the semi-structured interviews of the IT management in the case company were used to find out the necessary modifications to the current BICC for increased support of the corporate BI strategy in the case company. This was supported by benchmarking the size of BICC in similar organizations based on the theoretical information available.

As the interviews did not provide all the necessary information, the analysis of relevant literature and relevant research on the subject as well as specific documents were used to reflect theoretical ideas into the practical case study. The fact that the writer works in the case company and knows the general challenges was found useful in discussing the subject with the interviewees. Furthermore, the writer's extensive BI experience supported data collection, analysis and making conclusions as well as creating development ideas for the future.

The main focus of the analysis was to compare the outcome of the semi-structured interviews, as different people in IT and business management were interviewed. Thematic analyses were used for analyzing the data for identifying, coding and categorizing the patterns or themes discovered from the data for identifying common features.

The thematic analysis used in this study consisted of six phases. In the first phase it was necessary to become familiar with the collected data. In the second phase, the initial codes were generated. The process continued in the third phase by searching for themes. The fourth phase consisted of reviewing themes whereas in the fifth phase the themes

were defined and named. In the final phase of the thematic analysis, the analysis was concluded by processing the final report.

### 3 TRANSFORMATION OF BI

This chapter focuses on discussing the concept of BI and the emerging new trends and the ongoing transformation driven by Big Data. These changes have a drastic impact on the concept of BI as well as on the implementation and the execution of BI strategy.

#### 3.1 Concept of BI

Gartner's (2013) definition to BI is "an umbrella term that includes the applications, infrastructure and tools, and best practices that enable access to and analysis of information to improve and optimize decisions and performance." Turban, Sharda, Delen and King (2011, 28) define BI as "an umbrella term that combines architectures, tools, databases, analytical tools, applications, and methodologies". However, the authors highlight that there is a possibility that such broad definition might be comprehended in various ways by different people. Turban et al. (2011, 28) state that the main purpose of the BI is to offer interactive access to the data, and through manipulating, processing and analyzing the data, extract the insightful information to support decision-making.

In addition to the definitions discussed above, Evelson (2008) defines BI as "a set of methodologies, processes, architectures, and technologies that transform raw data into meaningful and useful information." The main benefit of such information is that it allows business users to make informed business decisions based on real-time data that has the power to place a company ahead of its competition.

Moreover, Negash (2004, 177) suggests that "BI is used to understand the capabilities available in the firm." These capabilities include the state of the art, trends, and future directions in the markets as well as firm's technological capabilities. In addition to these, the regulatory environment in which the firm competes and the actions of competitors as well as the implications of these actions can be better understood by utilizing BI. Negash (2004, 178) concludes that "BI systems combine data gathering, data storage, and knowledge management with analytical tools to present complex internal and competitive information to planners and decision makers." Lönnqvist,

Pirttimäki and Karjaluoto (2006, 83) summarize BI as “a managerial concept and tool that is used to help organizations to manage business information and to make effective decisions.”

The definitions discussed above are supported also by Taylor and Raden (2007, 110), who correlate the core ingredients of BI to following statements “better data for improved decision making”, “getting the right information to the right person at the right time” and “the single version of the truth.” All these descriptions can be included in the main purpose of a BI environment, which is to transform data to information. This information can be evaluated from different perspectives by the decision-makers and utilized to support the decision-making processes in accordance with the business management strategy execution.

According to Kalakota (2012), it is easy to confuse BI with BA and it is a general mistake to mix these two different terms in many firms. On one hand, BI focuses on data retrieval delivery, monitoring and identifying exceptions by means of reporting, dashboards, scorecards, OLAP for bounded exploration and analysis. On the other hand, BA focuses on generation of new data and creation of insight or foresight through data exploration. BA expects uncertainty, probability and pattern rather than specific data and utilizes computational and probabilistic techniques such as algorithms.

In order to draw a line between BI and BA, it is helpful to review the questions they produce. BA focuses on the root cause and forecasting events by presenting questions such as “why has this happened” or “what if these trends remain the same.” BA also addresses questions such as “what do we expect to happen next” or “what is the best scenario outcome” whereas BI focuses more on the past and the present. The questions presented by BI often consist of the following: “what has happened”, “how many times has it happened”, “where the problems are”, or “what are the possible solutions to the problem”.

### 3.2 Transformation of BI and the emerge of Big Data

BI has been a mainstream concept in the enterprise world already for the last two decades. As a result of this, many companies' BI environments consist of multiple data warehouses and data marts. Although the market is rapidly maturing, BI initiatives remain at the front line of IT investment. Ferguson (2012, 4) notes that "much of this demand can be attributed to the fact that more and more data is being created."

The rapid growth of structured and unstructured data and the intent to utilize the data for redefining decision-making and operational processes has created the need to harness the Big Data. Moreover, there is a growing demand for data utilization to discover insights and predict future outcomes. The emergence of analytics, Big Data as well as the growing importance of mobility and collaboration, are moving traditional BI to a new era.

An important driver for change is that the business users require added agility in information consumption to improve innovating capabilities within businesses (Abhyankar 2013). Furthermore, the rapid growth of mobile devices and the volume of data increase pressure on IT in managing the growing environment (Abhyankar 2013). Moreover, another crucial development is that many businesses are moving from educated guessing towards running their businesses on detailed factual information (Ferguson 2012, 4).

Based on the definition by SAP (2013), "Big Data refers to the challenges of capturing, storing, managing, and analyzing large volumes of various types of data with great velocity." However, SAP (2013) also highlights that Big Data involves the aspects of driving business value, which organizations can use to re-imagine what is possible.

According to Manyika, Chui, Brown, Bughin, Dobbs, Roxburgh and Hung Byers (2011, 1) Big Data refers to "datasets whose size is beyond the ability of typical database software tools to capture, store, manage and analyze." Ferguson (2012, 7) associates Big Data "with the new types of workloads and underlying technologies needed to solve



business problems that could not previously be supported due to technology limitations, prohibitive cost or both.”

Furthermore, Manyika et al. (2011, 1) emphasize that while technology develops in the future, the datasets qualified as big will also be bigger compared to the levels that are currently considered as Big Data. Manyika et al. (2011, 1) also highlight that the definition of Big Data can vary by sector, depending on the software tools commonly available as well as the common sizes of datasets in an industry.

The initial purpose of BI has been to facilitate management in organizations through connecting business users and the information they need to improve decision-making (Abhyankar 2013). By having the necessary information available, business users can avoid making assumptions based on their knowledge (Yuk 2013). Furthermore, many companies have been building data warehouses for analyzing business activity and producing insights for decision makers to act on to improve business performance (Ferguson 2012, 4).

The initial goal for achieving the single version of truth has stood for data warehouses, data marts and BI platforms which have been widely used for managing enterprise core data. These systems have been utilized to make the scalable, repeatable and trusted business information available for business users (Abhyankar 2013). The traditional data warehouses and analytical systems have often been based on a classic pattern where data from multiple operational systems is captured, cleaned, transformed and integrated before loading it into a data warehouse. BI tools have been used to analyze, compare and report on business performance over time. In many cases, subsets of data have been extracted from data warehouses into data marts that have been optimized for detailed multi-dimensional analysis (Ferguson 2012, 4).

In many cases, IT has been driving the deployment and management of enterprise BI systems to enable companies to use data as a strategic asset. However, as BI has become more popular within organizations, IT has faced it challenging in serving changing business requirements. Ad-hoc reporting has bridged the gap between IT and business

users but it is not sufficient anymore due to the success of BI and the rapid growth of user adoption. (Abhyankar 2013.)

The new challenges related to Big Data which were discussed above, require a completely new approach. Bridging the gap between the business and IT is not enough to fulfill the emerging requirements of the growing user base. As stated by Devlin (2013), the emerging biz-tech ecosystem demands that business and IT start working together. Such an ecosystem will require a completely new collaborative approach in terms of technology, processes and organization.

A system that provides extremely fast answers to users' questions across all the information assets of the company evidences the real business value of Big Data. Such a system has the ability to quickly search across the information network and return meaningful answers to business users, which is the ultimate goal of an ever-improving BI system. (Abhyankar 2013.)

Devlin (2012, 1) discusses the ever increasing importance of Big Data and proclaims that "Big Data is probably the single most important trend in information usage for both business and IT in the past decade." This is due to the fact that Big Data is changing the way companies make decisions, do business, succeed or fail (Devlin 2012, 1). Companies which are using information and insights intelligently to anticipate and profit from change, will benefit from it. Furthermore, Big Data is driving IT to look beyond traditional technologies, to new tools to process larger data volumes of a variety of types faster than ever before required (Devlin 2012, 1).

Devlin (2012, 4) also highlights the enormous potential of Big Data, which can enable businesses to reinvent business processes. For example, innovative use of sensor-generated data can offer the possibility to reconstruct entire industries. Furthermore, Manyika et al. (2011, 5) have identified several widely applicable ways Big Data can create significant value for business. Big Data creates transparency by facilitating the access to the most relevant data (Manyika et al. 2011, 5). Big Data also enables experimentation to discover needs, expose variability and improve performance (Manyika et al. 2011, 5). Big Data makes population segmentation possible which can

be used for customization of actions (Manyika et al. 2011, 5). Moreover, human decision-making can be replaced by or at least supported with automated algorithms to improve the decision-making (Manyika et al. 2011, 5). Finally, Big Data can help businesses to innovate new business models, products and services (Manyika et al. 2011, 5).

It is relevant to emphasize that the current transformation of BI does not only concern large companies, as the technology for enabling the utilization of Big Data is now available for smaller companies too. Access to Big Data technology is affordable for a wider range of organizations, as the TCO of a Big Data platform is decreasing in the market. In the very near future, a real-time Big Data platform will not be an exception in the enterprise world; it will rather be the standard approach for BI and BA.

### 3.3 From Data Consumption to BI Ecosystems

Due to the growing importance of Big Data, it is relevant to find out the holistic way for managing all business information, including Big Data. Regardless of all the opportunities Big Data can offer, Devlin (2012, 1) emphasizes the importance of understanding that data is still data, regardless of its size. Therefore, data must be consistently managed and integrated across the entire enterprise to extract its full business value and maximize its long-term impact to business development and innovation.

Devlin (2012, 10) also discusses the challenges in Big Data management and compares them to the familiar issues in the spreadsheet reporting culture. According to Devlin (2012, 10), Big Data presents similar types of problems for data management as spreadsheets have created. The main reason for this is that “Big Data, as often implemented today, is similarly uncontrolled, unmanaged and centered around individual data scientists and their tools and data sets” (Devlin 2012, 10).

In order to manage the Big Data efficiently and overcome similar problems that have been caused by the uncontrolled and unmanaged spreadsheet reporting culture, there is a need for an integrated information platform. According to Devlin (2012, 1), this is the

first step in integrating the data from heterogeneous sources, and harness the Big Data in an ecosystem which is formed by business and technology together. Devlin (2012, 1), also emphasizes that the foundation for extracting the maximum business value from Big Data is a technically diverse and deeply integrated platform for all information, both Big Data and traditional transactional data. Such an approach enables long-term business benefit and potential to develop innovations faster.

Traditional BI, which has been a one-way street from the data warehouse to the business user, has provided means for information consumption. A business-technology ecosystem in turn, allows users to collaborate by providing information, comments and feedback. According to Devlin (2012, 8), such an ecosystem can be defined as “virtual unification of Big Data and traditional business information.”

The importance of implementing an integrated platform to fulfill the core business requirements in the future is also highlighted by Qlikview (2013). The business software company has launched a vision Qlikview.Next which aims at an integrated business discovery platform. SAP’s (2013) vision for managing the Big Data, the Network of Truth, presents a similar approach as discussed above. According to Abhyankar (2013), the optimal way to manage Big Data and the changing user requirements is “an information system where both IT and end users can contribute to the information assets.” Result of such an approach is a network of information which generates added value with every interaction as each user provides their unique contribution to the system.

Figuratively, traditional BI data warehouse, which has represented the single version of truth in organizations, has rather been a ‘BI encyclopedia’ than a dynamic collaborative search engine. The business-technology ecosystem involves business users to create a ‘Wikipedia-kind’ (hereinafter without emphasis) collective platform that engages users for managing business information. However, such a Wikipedia-kind collective governance model requires data stewards, as data remains the number one issue. (Rose 2013.)

Therefore, the role of IT is to become the steward of the business-technology ecosystem. In traditional BI, IT has done all the work by facilitating information, whereas the end users have consumed the information what they have been allowed to consume. The business-technology ecosystem generates a model where the contribution from IT will be enriched and extended by the user community (Rose 2013). The growing importance of enabling end user collaboration is also supported by Qlikview (2013), as the business discovery platform allows the business users to communicate their insights.

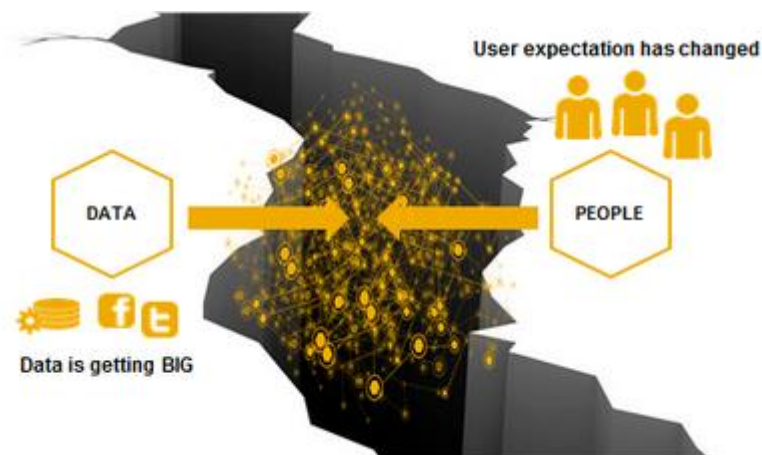
A key prerequisite for building a business-technology ecosystem is to first have one version of the truth in terms of understanding and organizing information. According to Rose (2013) achieving the single version of truth, a data warehouse with consistent definition of information, is required to ensure that the users will get the right information. Moreover, Rose (2013) emphasizes that creating business-technology ecosystem is a journey, which has to be supported by a real-time platform. Platform-approach is also supported by Devlin (2012, 11), who states that "central to this evolution is the creation of a Big Data platform supporting many types of big and small data in an integrated, enterprise-grade environment with business analytics that can operate directly on data in its native format, and as close to the data sources as possible."

In terms of most relevant business benefits of an integrated platform, it provides "predictive insights to future outcomes by grounding social media and customer behavior analysis in real, quality customer data that the enterprise has long collected for daily use" (Devlin 2012, 11). Therefore, utilization of integrated data platform helps organizations integrate the disconnected data silos and enables the creation of new insights from the data. Furthermore, an integrated platform drives "real-time operational decisions with faster insights in a broader context from machines and sensors in the external environment, used in conjunction with traditional transactional data" (Devlin 2012, 11). Finally, an integrated platform helps "reinvent business processes for faster, innovative action and game-changing business models by closing the loop between informational and operational activities" (Devlin 2012, 11).

Moreover, an enterprise-level approach, which includes platform, products and processes, is mandatory to ensure long-term quality and use of Big Data in concert with existing data from BI and other systems. A core prerequisite for an integrated business information network is also a corporate BI strategy aiming towards long-term utilization of BI. Additionally, a holistic BI strategy drives the participation of the whole enterprise to the integrated business information network. (Devlin 2012, 1.)

In addition to the technology, a holistic BI strategy has to consider also people, culture and processes within the organization, as the integration, user adoption and collaboration can only be achieved by optimizing the integrated business information network for people. Abhyankar (2013) discusses the importance of having a critical mass of users craving enterprise information, as that is the prerequisite for achieving the network effect.

Figure 2 illustrates the ability of the business-technology ecosystem, or the network of truth as called by SAP (2013), to connect people with data.



**Figure 2.** Network of Truth (SAP 2013)

As illustrated above, the fact that a business-technology ecosystem elevates the users to have a contribution to the overall value of the system makes it unique. However, as the people are in the core of such a network, it has to be optimized for them. Furthermore, such a network requires also a cultural change towards an information culture including

the required skills, management incentives, communication and organization. (Rose 2013.)

To conclude the discussion on the emerging changes in BI, it is relevant to note that "rapid deployment of Big Data projects is needed to take earliest advantage of emerging business opportunities and is achieved by introducing Big Data capabilities incrementally into the current data management framework based around data warehousing" (Devlin 2012, 1). However, it is important to notice that "utilizing only traditional data on the integrated platform will not maximize its potential benefits. To take advantage of these very real opportunities, collaboration between business and IT is vital for an immediate start to plan and deploy a comprehensive but incremental Big Data strategy" (Devlin 2012, 11).

It is also important to react to the changing BI world, because "starting small with agile project methods will deliver early business value and bring analytics and data scientists into the mainstream" (Devlin 2012, 11). Finally, the fact that current technological development is extremely rapid and Big Data tooling has matured and becomes more closely integrated with existing data management platforms, this is the right moment for innovative companies to make a move and gain the most immediate and long-lasting competitive lead (Devlin 2012, 11).

As discussed above, moving from traditional data warehousing towards a BI ecosystem which runs on a real-time Big Data platform is the move for organizations to make, or at least consider, in the near future. Such a move is relevant for organizations to be able to maintain their position and gain competitive advantage. To increase understanding on the foundations supporting the implementation and execution of BI strategy, the next chapter discusses the strategic aspects of a BI initiative.

## 4 STRATEGIC APPROACH TO BI

The general issues in implementation and execution of a corporate-wide BI strategy are discussed in this chapter. This discussion creates the basis for benchmarking the case company specific challenges to market best practices. Additionally, the chapter presents the foundation for a BI strategy implementation and execution.

### 4.1 Successful Implementation of BI Strategy

Jack Welch, the former CEO of GE has stated that “an organization's ability to learn, and translate that learning into action rapidly, is the ultimate competitive advantage” (cited in Gibbs & Humphries 2009, 71). If an organization aims at translating its knowledge into action rapidly, and thus gaining competitive advantage, this can be underpinned by utilizing BI and BA to streamline and improve management decision-making. Due to strategic importance of BI and BA in management decision-making, their value has been recognized by many organizations during the recent years. According to a global CIO study carried out by IBM in 2009 (cited in Boyer et al., 2010, 1), “BI and analytics is the number one priority for CIOs.”

Business and IT leaders have realized that BI and BA provide the best opportunity to gain insight and improve decision-making capabilities to help organizations uncover new opportunities, increase efficiency and reach corporate strategic goals. As stated by Ramakrishnan (2010, 1), “with the promise of increased return on investment and improved customer satisfaction, BI is being embraced by many organizations to support decision-making throughout the enterprise.” The high Return on Investment (hereinafter ROI) of BI initiatives is supported by recent study of Nucleus Research (2011). The study revealed that organizations earn an average of \$10.66 for every dollar spent on deployments of analytics applications such as BI, performance management, and predictive analytics.

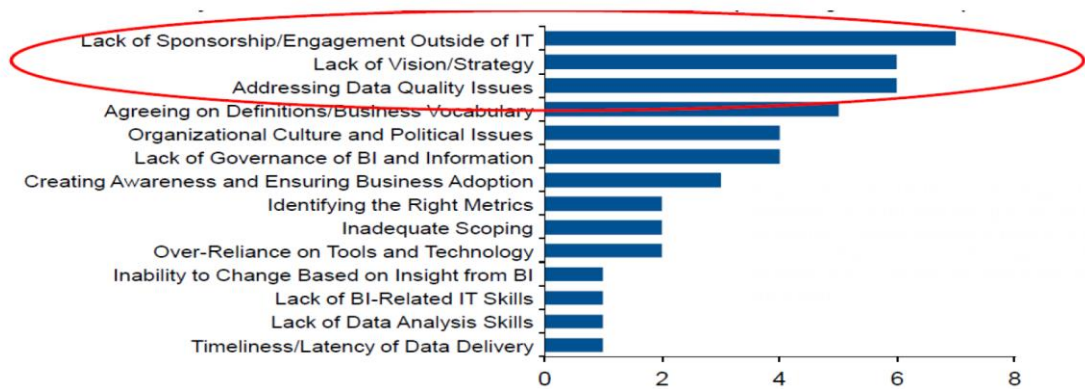
However, many enterprises face severe challenges when implementing BI solutions in their organizations while the popularity of BI is growing rapidly. Based on a study by Gartner (2008), the US based IT research and advisory firm, the road to successful BI



implementation is often covered with obstacles. Before companies are able to fully utilize the benefits of BI the road to successful BI implementation, the learning curve to a holistic management of BI initiatives is steep in many cases.

In order to avoid these mistakes and to succeed in these initiatives, it is beneficial for the companies to be aware of the underlying risks that can risk their BI implementation. This needs to be considered, especially, if the company's IM environment is highly complex and heterogeneous and there is no centralized BI management within the organization. In such an environment several isolated data silos increase the complexity of the IM landscape and decrease the trust in information, as the single version of truth is not available.

Despite the fact that companies have extensively invested in BI, many IT organizations face challenges integrating BI with the business. BI implementations struggle with at least one major issue, most often caused by people and processes rather than technology (Boyer et al. 2010, 1). Failure can be caused by lacking business management sponsorship, the politics and the culture within the organization or insufficient data quality, rather than technological factors, such as deployed infrastructure, tools and applications supporting BI (Gartner 2008). This is supported by Boyer et al. (2010, 1), who argue that IT organizations are struggling with involving the business users to adopt the BI implementations by forgetting the importance of promotion and ignoring the influence of company politics and culture. Mayer (2009, 29) suggests that in addition to lacking business ownership of a BI project as such, another issue is often lack of clear stewardship of information which leads to data inconsistencies. Moreover, heterogeneous master data across business functions is often an obstacle to system and BI integration (Mayer 2009, 29). Figure 3 below illustrates the main reasons for failure in BI projects as suggested by Gartner (2013).



**Figure 3.** The Most Common Reasons for Failure in BI Projects (Gartner 2013)

According to a research by Gartner (2013), 70-80 percent of corporate BI projects fail. As illustrated above, the main reasons for failure are either related to lack of sponsorship or engagement outside of IT. Lack of vision or strategy and data quality issues are also common reasons for failure. Ross and Weill (2011, 2) highlight that in many cases, problems have taken place because senior executives failed to realize that adopting a system poses, in addition to technology challenge, also a business challenge. Ross et al. (2011, 2) reveal that companies which manage their IT investments most successfully, generate over 40 percent higher returns than their competitors who have failed in their projects.

One of the keys to successful BI initiatives is within the business users who should be involved in writing or revising of the BI strategy document. Richardson (cited in Gartner 2008) emphasizes that business users have to take a leadership role in the BI initiatives, for only with full engagement of business the BI investment can achieve its full potential.

In order to better understand what is required for successful implementation and execution of BI strategy, this thesis continues to discuss the most relevant influencing factors. The foundation of successful BI strategy consists of business alignment, organizational behavior, processes, and BI organization as well as BI technology.

## 4.2 Business Strategy Alignment

For a BI initiative, it is challenging to reach the goal without knowing what or where the goal is. A failure is probable if the BI initiative does not have a business sponsor or a justified demonstration of the initiative's business value. Achieving excellence in BI requires primarily business strategy alignment, senior management engagement and a concrete business case.

“Without a clear vision of the connection to strategy, operating in silos and within communities or cultures is a natural instinct” (Boyer et al. 2010, 17). Such a disconnected approach is not a rarity, as a study conducted by technology consulting enterprise IBM (cited in Boyer et al. 2010, 14) reveals that only 22 percent of organizations are successfully linking business strategy to execution with BI and performance management.

“In order to achieve business effectiveness, BI needs to be connected to the goals of the organization and aligned with the business strategy” (Boyer et al. 2010, 107). Therefore, organizations that successfully align their BI initiatives with business strategy can collect the benefits of overall performance improvements. This results in gaining competitive advantage, discovery of new opportunities, and creation of business impact that is aligned with their goals (Boyer et al. 2010, 14). Moreover, successful linking business strategy to execution with BI and performance management enables visibility into the relevant information and has the ability to improve decision-making capabilities. “With the ability to understand, forecast, and configure outcomes through innovative technologies, an organization can help to increase efficiencies and effectiveness throughout the key areas of the organization” (Boyer et al. 2010, 14).

It is vital that BI initiatives are aligned with corporate business strategy to enable successful execution of the initiatives, which is the first critical step in a strategic approach to BI. To achieve this, assessing the current situation is necessary for understanding the corporate strategy to identify how the organization manages its business strategy. It is also relevant to understand how the organization monitors and

measures outcomes on the journey towards successful business alignment strategy. (Boyer et al. 2010, 14.)

Once the first crucial step discussed above has been completed, strategies which link the business strategy to BI initiatives have to be recognized. In order to achieve this, the existing strategies need to be examined, as this supports the definition how the organization can develop an effective business alignment strategy that improves outcomes and results. Involvement of key stakeholders and priority business areas is also equally important. The process requires understanding how to determine, prioritize, and involve key stakeholders who can influence the business and execution strategies. Finally, implementation of sound solutions by learning how proven practices can transform the effectiveness of the organization is also relevant in achieving effective business alignment strategy. (Boyer et al. 2010, 14.)

Without applying strategic management approach it is difficult to measure corporate business performance. To support corporate business performance management, there are multiple methods available for measuring business performance such as Balanced Scorecard and Six Sigma (Boyer et al. 2010, 15). However, regardless of the management tactic or method, certain common themes arise. These common themes include the definition and selection of strategic objectives and/or goals as well as measurements to consolidate the measurement information. This information is relevant to organization's progress against the defined strategic objectives and/or goals (Boyer et al. 2010, 16). The importance of measuring the business performance is also supported by Mayer (2011, 11) as identifying the business strategy and KPIs should be the drivers of a BI initiative.

Once the organization has defined the KPIs and metrics with specific targets, these are linked to specific objectives. Finally, the actual performance consists of the interactions and/or interventions by the managers in response to these indicators to apply corrective actions and improve future performance against the defined goals (Boyer et al. 2010, 16). The core purpose of aligning BI initiatives with business strategy is to support an organization to transform the strategy definition into strategy execution utilizing BI, analytics and performance management (Boyer et al. 2010, 17).

Furthermore, successful BI strategy execution requires the utilization of agile BI methodology. Boyer et al. (2010, 23) suggest that “an agile BI delivery via a series of smaller successes is the key to maintain momentum on the project and demonstrate the value to the organization.”

The importance of starting small is also supported by Mayer (2009, 28). Wanting too much too soon is often the first pitfall of a corporate BI initiative, which needs to be considered as a multi-year endeavor instead. Mayer (2009, 28) recommends a ‘rolling snowball’ approach, as starting small, building awareness, building competency for both BICC and business, focusing priorities, establishing quick wins and avoiding the ‘avalanche’ are critical steps towards successful BI strategy. Furthermore, Mayer (2009, 28) suggests avoiding simultaneous go-live with multiple projects that include BI deliverables. It is beneficial to phase out implementations instead.

Moreover, BI strategy should be dynamic enough to evolve over time and change accordingly as technology changes (Boyer et al. 2010, 107). In addition to the technical aspects of the BI strategy, there should be enough flexibility in BI strategy to make it adjustable with the changes in business management strategy. Therefore, it is vital that BI strategy remains agile and can transform based on the business needs.

#### 4.2.1 Executive engagement

Without a C-level, senior management, sponsor, it is impossible to make BI a strategic initiative for the organization. According to Boyer et al. (2010, 2), the biggest threat for a BI initiative is insufficient executive buy-in. Therefore, in order to succeed in a BI initiative, the first step towards success is to obtain a business sponsor from the C-level (Evelson 2007 cited in CIO by Diann 2007). The importance of finding a C-level sponsor for BI initiatives is also supported by Gartner (2011).

Evelson (2007 cited in CIO by Diann 2007) also recommends that the business sponsor should preferably not be the Chief Information Officer (hereinafter CIO) from the IT organization but one of the senior business executives instead. Moreover, Evelson (2007 cited in CIO by Diann 2007) argues that BI initiatives should be sponsored by an

executive with bottom-line responsibility and a clear picture of the company's objectives, strategy and goals. It is important that the business sponsor knows how to translate the company's mission into KPIs to support that mission. In many cases, this specific executive is the Chief Financial Officer (hereinafter CFO) responsible for a company's financials.

To achieve success in business alignment strategy, identifying the stakeholders who have an interest to ensure that BI strategy moves smoothly to execution is highly recommended. In addition to executive involvement, general business involvement needs to be covered. The executive representative champions the initiative and helps define the business alignment strategy through setting priorities and enabling the performance management culture. Business involvement consists of business line representatives or subject matter experts who define the business processes and metrics that are linked to corporate strategy. Furthermore, the business line representative(s) support and champion the management and execution of the strategy. (Boyer et al. 2010, 19.)

The importance of business executive sponsorship is also highlighted by Ross et al. (2011, 20). To achieve success, it is relevant to assign business executives to take responsibility to realize the business benefits of the initiative. Such sponsors need to have the required authority to assign resources to projects and also the time to control the implementation of those projects. It is also necessary to define metrics that determine the success of the initiative in addition to the close communication with the BI organization. Without business sponsors it is difficult to ensure that the initiative delivers real business value. Blaming the IT department only reflects a misunderstanding what IT can deliver to business. Ross et al. (2011, 21) emphasize that managers have to take responsibility for the success and failure of BI initiatives, as without the responsibility, the implemented technical solutions will not have an impact on the business itself, as in the end business brings the value to the solution.

What applied yesterday, applies even more today. Nothing has changed in terms of executive sponsorship and engagement as Big Data requires the management buy-in similarly as the traditional BI. Devlin argues that "as in the case of BI, business buy-in

and executive sponsorship are the most important success factors for big data implementation (2010, 10).”

Big Data initiatives often consist of substantial and often highly visible business benefits which can make executive buy-in at the highest levels to facilitate and accelerate than in the case of classic BI initiatives (Devlin 2010, 10). Devlin (2010, 10) emphasizes that “such enthusiasm can and must be used to support the implementation of an integrated information platform - learning from prior experience, in a staged, incremental approach that delivers business benefit at each step.” Moreover, associating Big Data initiatives with previously successful data warehouse and BI initiatives is the best approach to gain confidence with the business (Devlin 2010, 10).

#### 4.2.2 Business Case

A holistic BI strategy must address the information needs of the entire organization (Boyer et al. 2010, 7). A business oriented BI initiative not only improves the user adoption but it also supports business in achieving its targets. The fact that inconsistent and disconnected initiatives do not deliver the vital trust in the information or the promised ROI, only emphasizes the importance of a robust vision and strategy. Instead, based on the interviews by Boyer et al. (2010, 1), rather than having a hefty ROI, such failed initiatives build up high TCO. Therefore, IT has to be able to determine the ROI and to communicate the tangible and intangible benefits of BI to decision makers.

For gaining business value from Big Data, Devlin emphasizes the importance of linking Big Data to business needs, as Big Data is much more than just social media feeds (Devlin 2012, 4). Data from social media is also important, but primarily in the context of the real customers and actual business transactions that are traditionally recorded in operational systems and measured in BI systems (Devlin 2012, 4).

Furthermore, Devlin (2012, 4) highlights that the analysis of sensor data retrieved from the growing 'Internet of Things' must be included within existing or reinvented business processes; “Big Data offers new and vital analytic and predictive opportunities enabling the business to significantly outperform their competitors” (Devlin 2012, 2).

Due to the reasons discussed above, it is relevant to scope the audience by strategic, tactical and operational user classes. Strategic users make few decisions, but each one can have a profound effect. Further, the information used by the strategic users is often highly aggregated. Tactical users make many decisions a week, and use both aggregated and detail-level information, and the information has to be updated on a daily basis. The operational users are the front-line employees using data within their own set of applications to execute the daily business transactions (Evelson 2007, cited in CIO by Diann 2007). Therefore, it is of significant importance to understand who uses BI and for what purpose.

#### 4.2.3 Scoping

As soon as the cornerstones of business alignment strategy are in place enabling management sponsorship for a defined business case, the BI strategy has to identify the other factors within the strategy. This includes identification of scope, audience and analysis of BI landscape, processes and organizational behavioral and the structures around the BI implementation. This analysis should involve both IT and business, because business user engagement is extremely important from the start.

It can be challenging to map the various operational needs of the managers and departments to the requirements and strategic goals of an organization. Therefore, it is relevant to decide whether top-down, i.e. strategic, or bottom-up, i.e. tactical, approach would better suit company's needs in terms of business alignment strategy. The decision has to be made whether the focus is on individual business problems and solutions, or is the strategy directed from the top. In the former case the strategy is rolled upward to a corporate-wide strategy, whereas in the latter case the executive goals cover the whole organization. (Boyer et al. 2010, 21.)

The main benefit of the bottom-up approach is that the implemented solution can create a domino effect within the organization and encourage other departments to implement similar solutions. On the other hand, the main downside is that such a solution is not necessarily directly linked to any organizational strategy (Boyer et. al 2010, 21). Applebaum (2010, 9) argues that the challenge with bottom-up approaches which are



not centrally managed is that they have the power to create disjointed and overlapping data silo structures. In the worst case, the bottom-up approach leads to duplicated efforts in data collection, storage and analysis leading to higher TCO of BI.

The main benefit of the top-down approach is that the strategy of the organization becomes directly linked to the operations of the organization and the executive support is easier to achieve. However, the main challenge in such an approach is that they are time consuming. The top-down approach also requires a culture in which “overall executive goals supplant the immediate tactical preoccupations of individual decision-making entities” (Boyer et al. 2010, 22).

However, both top-down and bottom-up approaches are practiced by large enterprises. Boyer et al. (2010, 23) state that “it is rarely lack of business strategy and execution methods that results in less-than-successful initiatives.” On the contrary, “it is too many disparate strategies and initiatives operating in a disconnected and un-prioritized business approach that result in a long time-to-value process or produce less successful results” (Boyer et al. 2010, 23). This means that melting the top-down with the bottom-up into a hybrid approach that works within an organization, is what the business alignment strategy presents. Such a hybrid approach enables managers to define their own metrics but it aligns priority and consistency in an organization through a business alignment strategy.

Business alignment strategy enables effective prioritization and linking of corporate strategy from the top-down strategic approach to the bottom-up tactical approach with BI. It is an efficient way to measure, monitor, plan and execute on corporate strategy. Therefore, successful utilization of BI can help organizations achieve better outcomes. (Boyer et al. 2010, 32.)

#### 4.3 Behavioral Aspects of BI Strategy Execution

Success in BI initiatives is hard to achieve if an organization’s BI strategy document or BI roadmap concentrates solely on technical aspects of BI, as the BI strategy will not be

good enough without holistic approach. In order to achieve success in a BI initiative, it is important to understand the impact of behavior in the business organization.

#### 4.3.1 Culture and Politics

As discussed earlier, senior management sponsorship and business strategy alignment are the most important success factors of a BI initiative. However, ignoring the impact of organizational politics and culture has the power to endanger user adoption, which is vital for a successful BI initiative. Therefore, a holistic BI strategy has to consider also the behavioral aspects of a business organization. These critical behavioral factors consist of culture and politics, which can have a drastic impact on user adoption. Rose (2013) suggests that holistic BI strategy execution requires an analytics-driven information culture as “there is a high probability that culture eats strategy for lunch.”

Politics and culture enter the picture in many forms. For instance, in many cases end users are not willing to use the tools they are provided with. The main reason to this kind of behavior is resistance to change, as the end users are not always willing to change their old habits. Moreover, the value of the change may be misunderstood. The end users may be concerned about the accountability and the fact that if they have to change their familiar processes, it could uncover something they would rather not reveal. (Boyer et al. 2010, 37.)

Understanding how the new process benefits the whole organization is not necessarily enough because the end users may fear that the change will reduce the value they are already bringing to the organization (Boyer et al. 2010, 37). Another reason for resisting change may be that the end users feel abandoned because they were not consulted in the process or they had different needs than the rest of the organization (Boyer et al. 2010, 38).

The natural fears discussed above can become real obstacles to success of a BI initiative, which need to be understood as part of the dominant corporate culture. Each individual and functional area has to understand how the change will benefit their own team, and in the end, the entire organization (Boyer et al. 2010, 38).

Boyer et al. (2010, 35) highlight the importance of successful navigation within company politics and culture for a strategic BI initiative. Such a navigation is necessary in gaining user adoption, change management, acceptance, support and consensus across executives, line-of-business managers, and IT. Additionally, promoting and enforcing technology standards through strong governance and oversight by the various management teams is also important. Rose (2013) also emphasizes that “it is as important to plan the cultural changes as it is to plan the rest of BI deployments.”

The larger the organization, the harder it is to create substantial change. The same applies if the organization has been operational for a long time. However, the benefit of BI is that it is capable of facilitating the change, although change will take time and successful change occurs in small steps (Boyer et al. 2010, 37). Therefore, it is important that in order to overcome the challenges discussed above, both stakeholders, i.e. business and IT, understand the plan and the value of the plan and the meaning of it to the stakeholders.

Learning and understanding the unique business culture is important, as the culture is different in every company. Equally relevant is to understand how business culture influences the BI strategy (Boyer et al. 2010, 70). In order to overcome cultural challenges, it is necessary to identify key stakeholders and engage them. Moreover, understanding who are the biggest obstacles and supporters are vital (Boyer et al. 2010, 70).

Another extremely important prerequisite is to find a common language between IT and business (Boyer et al. 2010, 35). The importance of asking the right questions using language that business understands is also supported by Yuk (2013). IT needs to communicate with business in business terms and avoid technology vocabulary.

In every organization, there are people who run against corporate strategy, because the larger goals of the organization are too distant from their daily processes. Boyer et al. (2010, 38) have found out that the reason for such an opposition is that the connection from the corporate strategy to their individual expertise is not clear. Therefore,

communicating and translating the strategy to all levels of an organization is extremely important.

To overcome the challenges discussed above, Boyer et al. (2010, 38) highlight the importance of effective communication, as the stated strategic goals have to be communicated using the language that each individual understands. Explaining how the new process will help achieving those strategic goals will also support in communicating the core message.

To achieve effective communication, it requires a communication strategy, as communication has to be constant and consistent. The communication should be consultative instead of prescribed. The organization should be provided with open forums for discussion and encourage collaboration, which will support in overcoming the cultural challenges and engaging users. (Boyer et al. 2010, 71.)

To conclude the culture and politics discussion, senior management is the key player also in terms of culture. The senior management is responsible for communicating the business strategy to the staff. Culture is being built top-down and the senior management has the power to influence and change the culture. For instance, a senior manager as a visible key user of a BI project actively communicating with the staff is the best possible BI promoter of information culture in an organization.

#### 4.3.2 User Adoption

Despite the fact that BI is gaining increasing popularity in general, BI user adoption has remained almost unchanged. A survey (Howson 2010 cited in Boyer et al. 2010, 35) reveals that BI user adoption, concerning all employees, has stayed around 25 percent since 2005. However, it is important to emphasize that not all of the employees are potential BI users. The survey respondents estimate that just over half of employees could potentially use or consume BI in an average organization (Howson 2010 cited in Boyer et al. 2010, 35).

There are many reasons for the low user adoption of BI. Organizations need to motivate individual departments and decision areas and transform them from ‘passive information resources’ into ‘enthusiastic stakeholders’ in the BI process itself. This can be achieved by creating internal business and IT team communities and structures to reassess the information process within the key decision areas. These communities compare the information processes to the information goals of the larger BI strategy. (Boyer et al. 2010, 39.)

The collaborative approach discussed above engages business users with BI initiatives as it educates, supports structures, reveals obstacles, inspires collaboration and creates vital buy-in. The approach facilitates the change of the business culture in an effective way as it helps building the culture. Through alignment of the business strategy with identifiable metrics and increasing performance by re-engineering the information process, decision areas will start to witness an increase in capabilities and a profound streamlining of business efficiencies. (Boyer et al. 2010, 40-41.)

Boyer et al. (2010, 41) have discovered that business leaders sometimes need to be sold on the idea of standardization. The business leaders need to understand the value of a collaborative performance management initiative or the value of wide user adoption. In order to prevent a silo-driven approach to an implementation, it is useful to educate the key stakeholders about the goals of the performance management which may help open lines of communication between regions and departments.

However, also user engagement requires senior management’s support, as it is vital for success to get the top-down push to use BI and analytics for in-depth understanding of the business. The executives can support the engagement through encouraging, engaging, evangelizing and enlisting.

Boyer et al. (2010, 58-62) define five success factors leading to higher user adoption. The first success factor is to create technology standards to reduce project costs and technical infrastructure costs. Technology standards also increase end-user acceptance, IT satisfaction and the usability of BI. In addition, other important success factors are

convergence of IT and business users as well as ensured timely trusted information. Moreover, sufficient access to BI and BI product management are also mentioned.

Yuk (2013) emphasizes the importance of business user engagement in BI initiatives. Setting expectations in an efficient manner and deploying a prototype rapidly as well as embracing user feedback, are keys to a successful business user engagement which leads to better user adoption. Further, promoting success stories supported by other business departments or groups can become helpful in increasing user engagement (Boyer et al. 2010, 35). In general, the importance of user adoption for BI strategy execution cannot be overemphasized. In the end, the key measure of BI's success is the increase in user adoption (Boyer et al. 2010, 58).

#### 4.4 Critical Processes from BI Perspective

According to Mayer (2009, 11), the main goal of a BI strategy is to enable a consistent and accessible source of detail and summary information to the business through standardized tools and thus make BI a competitive business advantage. From a BICC perspective, the objective in order to meet the goal of the BI strategy is to provide a framework to implement and evolve a consistent BI technical and non-technical environment that can grow to support the global business reporting requirements. The first question to ask is how well an organization knows its data. The trusted data sources as well as critical data sources need to be defined. In addition, the business processes that create the data and the owners of the business processes need to be known as well.

Another question to ask is related to the level of documentation and auditability for validating the processes and information currently exist. The benefits of optimized BI are consistent information from trusted data sources and defined point of truth which enhances cross functional cooperation and brings individuals together, who look at the same big picture and thus gain a profound understanding of dependencies (Mayer 2009, 11). Such optimization leads to an improved business process efficiency by eliminating redundancy and duplication and brings transparency of processes and data. As the expectations on business management increase rapidly, success in business can only be

enabled by having the optimized processes in place and the right BI landscape supporting business management.

#### 4.4.1 Common Definitions

Another vital step is definition of standard metrics and KPIs and the creation of a framework for performance management. The business unit managers define what they want to measure and the IT and BI team supports them in connecting the defined metrics in the reality of the data (Boyer et al. 2010, 24). The importance of the creation of common definitions for BI is also supported by Evelson (2007 cited in CIO by Diann 2007) who also recommends to start small and choose only a limited number of KPIs and to create common standards and governance. Furthermore, Gartner (2011) argues that defining solid architecture and common standards are the cornerstones of a successful BI strategy. Furthermore, also BI development standards, data naming standards and development methodologies as well as data management standards need to be clearly defined and agreed.

Data forms the basis for any BI initiative and for that reason common master data definitions are one of the main keys to success. Due to the fact that data should be considered as a corporate asset, it is crucial that data remains consistent across the organization and it is properly managed. Common data definitions are the first prerequisite on a journey towards the single version of truth across an organization. (Pant 2009, 16.)

#### 4.4.2 Data Governance

Data reveals a company's business performance and offers insights for planning strategic direction. Utilizing data in a proper way can play an integral role in running the company. If data is considered as a strategic asset, it has to be treated accordingly. Therefore, it has to be sufficiently managed.

Data governance increases level of confidence in decision making, improves data transparency, and data visibility throughout the organization. Data governance also increases user confidence in data validity. Moreover, Pant (2009, 13) highlights that

“data governance promotes data quality, data integrity, data consistency, data timeliness, data security, information privacy, and thus increases the information usability and reliability.”

Any time data crosses an organizational boundary, it should be governed regardless of with whom the data is shared. Data governance should also include identification of relevant data stakeholders, including data owners, data stewards and their roles in handling organization’s data assets (Pant 2009, 13). Implementing a data governance program with MDM initiative provides an organization a focal point for identifying and controlling the collection, storage, and disposition of information resources. (Pant 2009, 14)

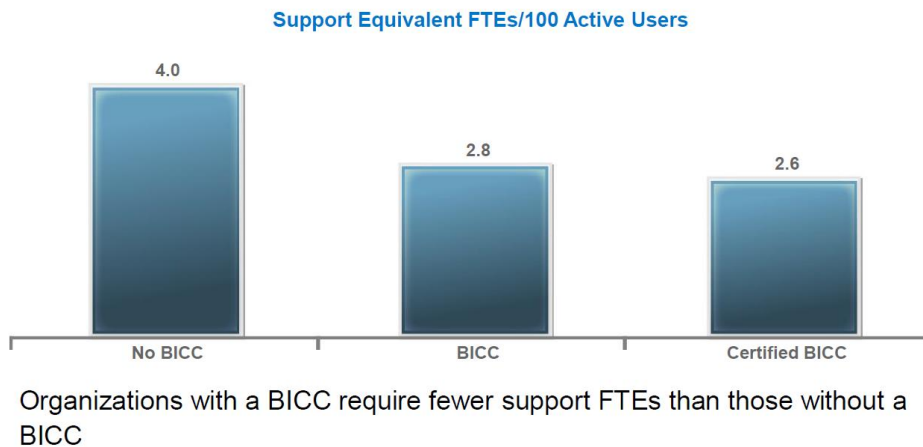
The importance of data governance cannot be highlighted enough as the impact of low data quality can cause both tangible and intangible losses. It can lead to lowered user adoption and rework in deploying BI solution. Therefore, it is relevant to consider data quality as one of the most powerful factors impacting on the success of BI initiatives. A holistic approach to data quality which considers the whole organization is required to avoid data inconsistencies. Data quality efforts should also be carried out by business and IT together to guarantee the success of the initiative. Also in this respect business engagement is extremely important. IT is able to provide the technology for managing the data but the responsibility for defining data quality and data ownership measurements lies within business.

#### 4.5 Organizational Considerations of BI

BI organization is one of the most relevant cornerstones of a successful BI strategy. This is supported by Applebaum (2010, 9) who argues that the most important people-related success factor of BI is to establish an in-house BICC. The existence of BICC is critical in achieving success and managing the TCO of BI and it also ensures top-down focus in BI initiatives (Applebaum 2010, 9). Boyer et al. (2010, 47) support the fact that institutionalization of BI structure can help organizations to lower TCO of BI. BICC enables lowered implementation costs and eased deployment risk through consolidation of information, skills and knowledge. BICCs enable the creation and institutionalization



of proven practices and standards (Boyer et al. 2010, 47) which are crucial for the success of a BI initiative. Moreover, organizations with a BICC require less supporting Full Time Employees (FTE) than the ones without BICC as illustrated in Figure 4.



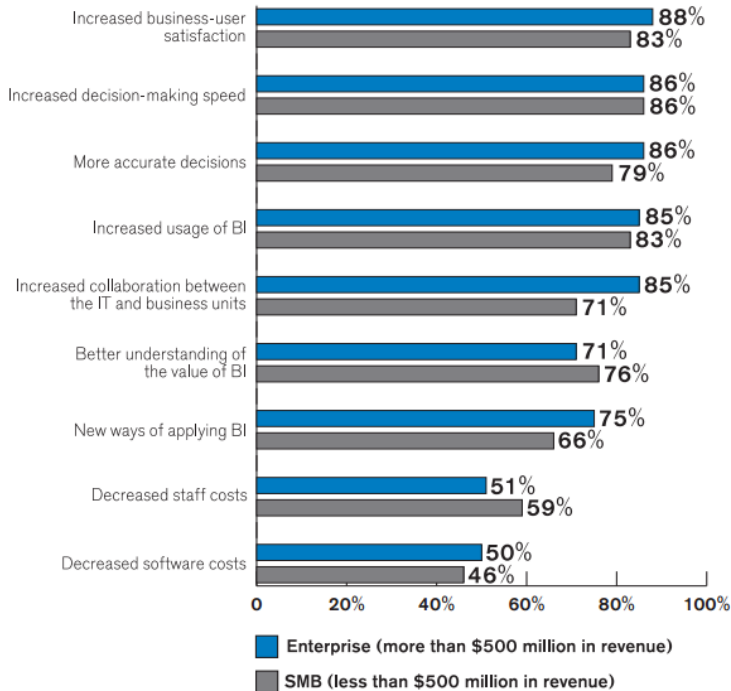
**Figure 4.** BICC Effectiveness (Gartner 2013, cited in Sankar 2013, 22)

If there is no in-house BICC in place but the BI organization has been outsourced for cost saving reasons, this can lead to inflexible and insufficiently architected BI systems. Outsourcing often results in losing the BI core competencies, which are critical intellectual property for any organization. (Gartner, 2008.)

In addition, based on a study by the Business Applications Research Center (cited in Boyer et al. 2010, 46), companies with BICCs outperform those without BICC. The study revealed that user satisfaction improved, user adoption increased and notable improvements in alignment with strategy, process and data improvements were achieved.

Figure 5 illustrates that increased user satisfaction and increased decision-making speed are the most common benefits that are expected to be gained with a BICC.

On a scale of 1 to 5 (with 1 being not at all important and 5 being extremely important)  
 Percentage of respondents ranking the following benefits their company  
 gained or hopes to gain from establishing a BICC at a 4 or 5 for each:



Base: 61 enterprise BI influencers who have or plan to have a BICC,  
 29 SMB BI influencers who have or plan to have a BICC

**Figure 5.** Benefits of BICC by Organization Size (Computer World 2006)

The benefits from having a BICC in an organization include increased business-user satisfaction, increased decision-making speed, more accurate decisions and increased usage of BI. (Computer World 2006, 15.)

The benefits of an in-house BICC were disclosed above. Once the decision of establishing a BICC has been made, it is relevant to consider the roles and responsibilities of the BICC.

#### 4.5.1 Roles of the BICC

Performing well in the BI domain requires individuals with both knowledge of the business and technical skills. It is important to develop these skills in-house and thus keep control of intellectual property. Training of internal BI and business resources and establishment of various working groups, including data governance, BI-strategic, and BI-tactical, is necessary. Development of standards, engaged in the prioritization and

alignment of operational BI activities to the Enterprise Strategy requires an appointed Reporting Manager to control the BI activities. (Mayer 2009, 18.)

According to Mayer (2009, 14), BI needs to be a strategic partner between all of the business and BICC, as neither can do it effectively alone or in business data silos. Therefore, BI needs to be integrated as part of business processes and focus on BI as a fundamental business practice. BI has to be prioritized with senior management's top down buy-in to the strategy, which is important in making the BI strategy successful. Alignment of all development efforts is relevant to adopt and adhere to an enterprise standard and view of the underlying supporting data. Further, creating various BI related standards is equally important, as BI strategy influences also program and project methodologies of an organization.

Mayer (2009, 20) also argues for the need for continuous organization of processes for sharing BI competencies and investments across the organization. Additionally, Business Analysts have to be transformed from data assimilators to information analyzers (Mayer 2009, 13). Transformation of Business Analysts to information analyzers requires in-depth business understanding and requirements analysis skills from the business perspective.

#### 4.5.2 Responsibilities of the BICC

It is relevant to clearly differentiate the responsibilities between BICC and the business: BICC is best suited to handle core design of data warehouses, data marts and their development. BICC oversees design consistency and identify cross-functional points of integration. BICC also leverages external partnerships where necessary and monitors vendors for performance by establishing relationships with third party partners. (Mayer 2009, 17.)

Business is best suited for developing ad-hoc reports, queries and analytical reporting. Initiation of an overall corporate direction is equally important, as each business unit must identify and train BI information owners and power users as part of project

rollouts (Mayer 2009, 17). Further, development of comprehensive BICC training plan is required for increased reliance on internal resources to facilitate project deliverables.

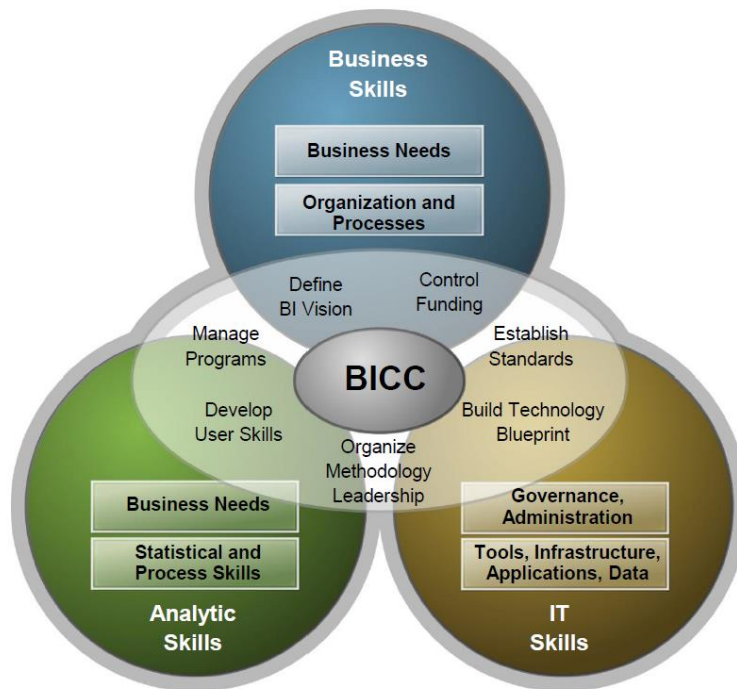
Moreover, continued identification of key Business Information Owners and Data Subject Experts is an on-going process (Mayer 2009, 19). According to Gartner (2013 cited in Sankar 2013, 24), the core responsibilities of a BICC are to define BI vision, control funding, establish standards, build technology blueprints, organize methodological leadership, manage programs and develop user skills.

According to Boyer et al. (2010, 19), BICC representatives' responsibility is to innovate and define how business metrics can be applied with data, systems and processes. BI team representative(s) also make sure that the execution within a BI environment is successful. Finally, the IT team representative(s) ensure that all technologies relevant for the strategy execution are integrated. The IT team representatives apply technology in order to enable the business strategy from information integration, database administration and security as well as infrastructure perspectives.

Furthermore, it is also relevant to build subject matter expertise throughout the lines of business in order to improve the analysis and utilization of the information. Once the BI implementation has reached this point, the IT responsibility of the initiative should be limited to running the Project Management Office (hereinafter PMO). The responsibility of PMO is to take ownership of compliance and business standards and policies. (Evelson 2007 cited in CIO by Diann 2007.)

#### 4.5.3 Skills of the BICC

BICC becomes most effective when the recognized need for BI crosses functional boundaries (Boyer et al. 2010, 53). In addition to IT skills, supporting diverse functional departments requires a versatile set of business and analytic skills. Figure 6 demonstrates the core skill requirements of a BICC as suggested by Gartner (2013).



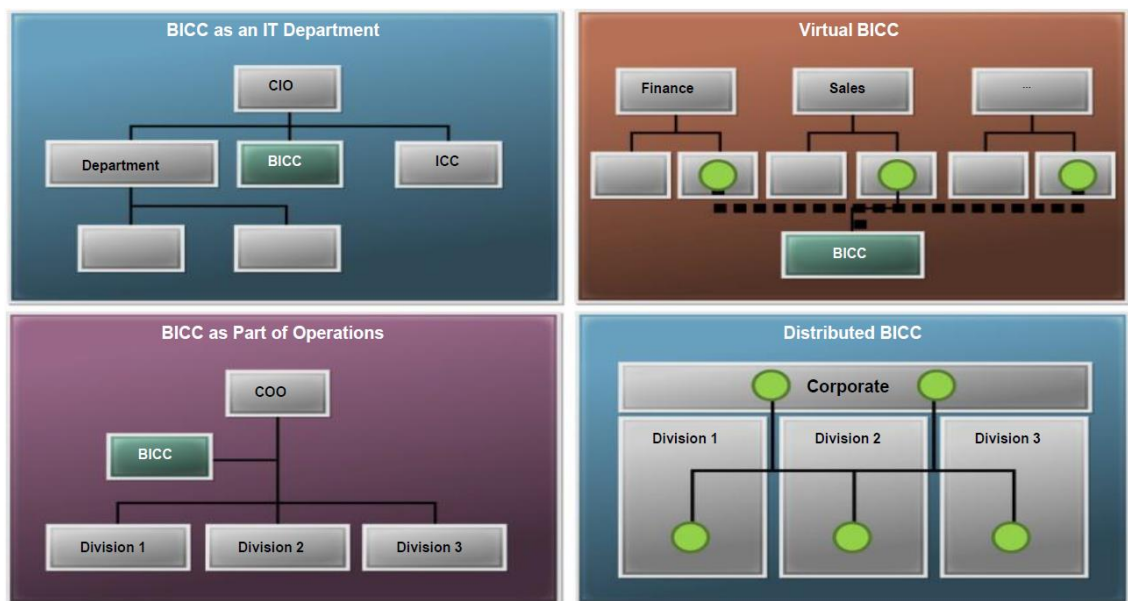
**Figure 6.** BICC Skill Requirements (Gartner 2013, cited in Sankar 2013, 24)

As shown above, understanding the business needs have an impact on both business skill and analytic skill requirements. It is also relevant to understand the organization and processes as well as have sufficient statistical and process skills from the analytic perspective. Core IT skills consisting of governance and administration skills as well as tool, infrastructure, application and data skills complete the skill requirements of a BICC.

#### 4.5.4 The structure of BICC

There are several possible structures to support establishment of a BICC. According to Boyer et al. (2010, 50), most successful BICCs are “formed through a pragmatic development effort that matures over time.” Starting small, thinking strategically and systematically accelerating are the tactics recommended by Boyer et al. (2010, 50). Boyer et al. (2010, 50) suggest that there is no ‘one size fits all’ approach in terms of BICC, as BICC has to fit within an organization’s unique cultural and organizational approach. Therefore, BICC models vary depending on the needs of an organization.

The importance of right planning could not be emphasized enough in the successful establishment of a BICC. “Organizations that take a measured, well-managed approach that stresses synergy between people, processes, and technologies are more likely to succeed” (Boyer et al. 2010, 50). The benefit in such an approach is that it will “gain wider support and contribute to significant cost savings while it takes business intelligence to the next strategic level” (Boyer et al. 2010, 50). Figure 7 depicts the four different operational models of a BICC.



**Figure 7.** BICC Operational Models (Gartner 2013, cited in Sankar 2013, 23)

The functions and roles of a BICC can consist of any combination of the following (Boyer et al. 2010, 52):

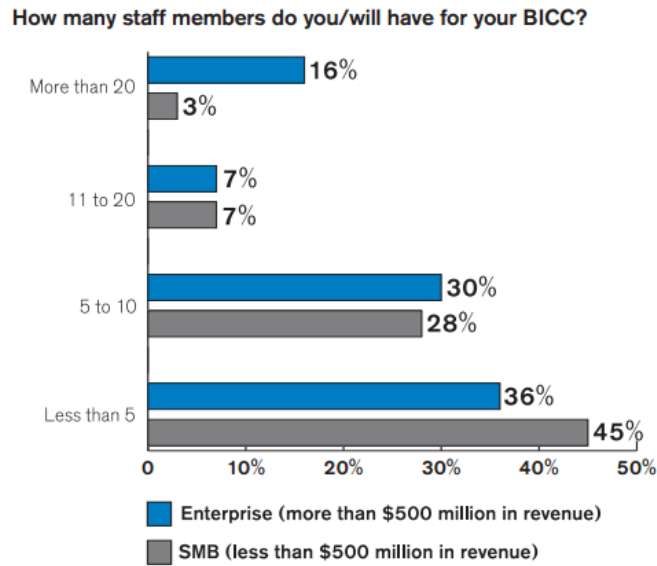
- Best practices and standards management
- Advisory and consultancy
- Communication and evangelism
- Enterprise architecture
- Education and support
- IT governance alignment
- Data governance alignment

- Business strategy alignment
- IT relationship management
- Vendor relationship and product management
- Analyst interaction and market research.

The optimal size of a BICC is naturally dependent on the roles and responsibilities of a BICC in a given organization. As the BICC matures and the scope of its function diversifies, additions and changes to the roles and skills may be required to meet the service and capacity needs of the organization (Boyer et al. 2010, 54). Based on the findings by Boyer et al. (2010, 54), BICC should consist of the following basic roles as an absolute minimum:

- BICC director/manager
- Business analyst
- Technical consultants
- Educators/BI evangelists
- Technology analysts focusing on R&D on emerging technologies, aware on technology roadmaps
- Formal relationship managers with sourcing, IT infrastructure and architecture teams.

Regardless of the company size, most BICCs are often relatively small teams with fewer than 10 staff members. In small organizations, 72 percent of BICCs have fewer than 10 members, while in large organizations 66 percent have fewer than 10 members but only one third of large organizations have BICC less than five staff members in (Computer World 2006, 14). Figure 8 illustrates the number of BICC members by organization size:



*Base: 61 enterprise BI influencers who have or plan to have a BICC,  
29 SMB BI influencers who have or plan to have a BICC*

**Figure 8.** Number of Staff Members in a BICC by Organization Size (Computer World 2006)

As demonstrated above, in enterprise-size organizations, i.e. revenue over \$500M, the most common size of BICC is less than five staff members. However, BICC's with between five and ten employees are almost as common whereas only 16 percent of enterprises have a staff of more than 20 BICC employees. In small and midsize businesses, i.e. revenue less than \$500M, almost half of the companies have less than five BICC staff members but the percentage of between five and ten BICC staff members is almost as high as with the enterprise-sized organizations.

The size and the structure of the business organization naturally have an impact on the size of the BICC too. The more complex the business landscape, the more BICC staff members are required to support the business in BI initiatives.

#### 4.6 BI Technology

Technical components of BI that impact on the success of BI implementations are metadata, data integration, data quality, data modeling, analytics, centralized metrics management, presentations, i.e. reports and dashboards, portals, collaboration, knowledge management and MDM. All these components are vital in the BI



architecture and it is important to define the architecture for all layers of the BI platform. The individual components are not necessarily part of BI strategy as such but the components will play a major role influencing the success of the implementation (Evelson 2007 cited in CIO by Diann 2007). Due to the recent developments in BI world, also real-time data platform has to be considered as one of the key components of a successful BI implementation.

According to Evelson (2007 cited in CIO by Diann 2007), an organization has to decide whether to buy or design the analytical data model. Smaller companies with homogenous IM environment can benefit from a standard out-of-the-box industry specific data model. As soon as the environment gets increasingly complex, companies may benefit from customized data models. However, starting with an industry-standard model as a template is recommended if the business processes can be adjusted accordingly (Evelson 2007 cited in CIO by Diann 2007).

Evelson (2007 cited in CIO by Diann 2007) does not recommend outsourcing the technical fine-tuning of BI, as the process requires a high degree of collaboration among end users, analysts and developers. Therefore, it is important to use an external partner with comprehensive experience to support the internal resources if necessary. However, a BI initiative can be difficult to manage and enforcing standards against physical database changes and implementations is challenging. This is due to limited understanding of dependencies, as they often relate to BI initiatives across multiple data sources (Mayer 2009, 29).

#### 4.6.1 Standardization and Consolidation

In many organizations, the variety of legacy BI technologies has entered the IM environment as the business has grown through mergers and acquisitions creating fragmented toolsets and technologies. The fragmented BI technologies often become an expensive support nightmare from IT perspective, as they increase the TCO and the complexity of information. (Boyer et al. 2010, 78.)

A fragmented approach discussed above decreases the organization's ability to gain visibility into its information sources and reinforces the existing information silos throughout departments and divisions. Therefore, creating a common set of standards to manage BI from technological perspective has to be the target. Choosing standards and consolidating BI projects allows organizations to leverage investments in technology and decrease TCO while increasing ROI (Boyer et al. 2010, 77) in an efficient manner. Unifying technology also leads to lower project costs as the individual teams are working together rather than isolated re-using each other's components. When company runs hundreds of heterogeneous hardware and software systems, the costs are out of control (Feld & Stoddard 2011, 33).

Also Mayer (2009, 21) highlights the importance of standardizing on tools, which enables better overall support for building competency both in BICC and business units. Standardization has to be extended also on the right BI software vendor and tools. Mayer (2009, 21) also suggests creation of a flexible, scalable, and robust technical architecture that can quickly adapt to business needs while controlling costs.

The value of standardized, simplified and unified corporate technology platform is also emphasized by Feld et al. (2011, 28). A unified platform replaces a variety of vertically oriented data silos that serve individual needs with a clean horizontally oriented architecture, which is designed to serve the whole organization.

Regardless of the backend technology or the application involved, all BI reports have to be delivered to users via one central portal. The benefit of such an approach is the complexity reduction. It is also important to separate the back-end data source technology from the technology driving the presentation layer to the end users, as the presentation needs to be consistent to the end user, regardless of backend system. (Mayer 2009, 24.)

#### 4.6.2 Big Data and BI Technology

The challenges that the emerging Big Data produces, need also be considered in the technology perspective of a holistic BI strategy. As argued by Devlin (2012, 2), Big

Data does not stand alone in the infrastructure but deploying and using it effectively, requires embedding it in existing business processes.

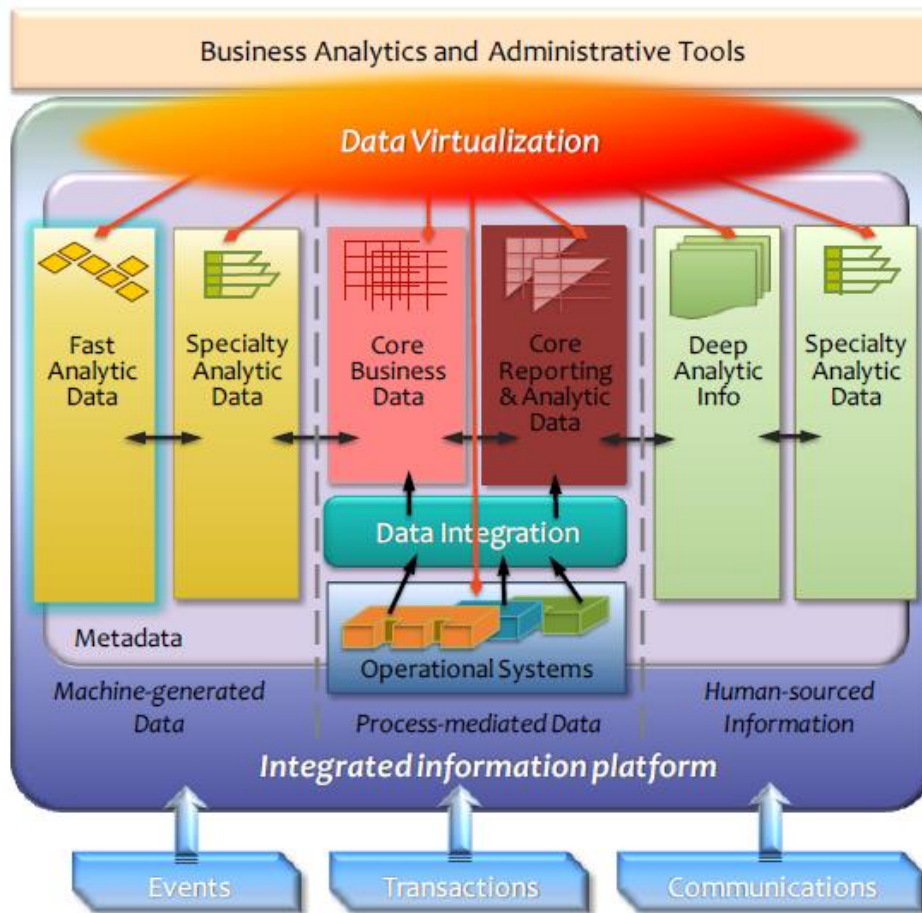
Devlin (2012, 2) further points out that Big Data “must and will sit with all the information-centric tools currently in use in a comprehensive, enterprise-scale platform. Big Data is best introduced incrementally and, in many cases, sooner rather than later for maximum benefit.”

Currently, some leading-edge business processes require flexibility, loose boundaries and innovative approaches whereas other business processes need certainty, limited scope and adherence to rules. The business processes are crossing a threshold of complexity that is beyond the capabilities of the highly regulated data processing of traditional systems, but are equally unsupported by the simplistic view of a Big Data world characterized by volume, variety and velocity. Therefore, an enterprise-grade platform and toolset that supports both characteristics is a necessity as future-proof business processes require both big and traditional small data approaches and tools. (Devlin 2012, 4.)

The value of implementation of a real-time data platform is also supported by Abhyankar (2013), as it optimizes the supply chain of information and makes operational data available for analytics in real-time. Real-time data platform saves IT recourses as the multiple intermediate steps of data extraction and preparation will not be needed. These improvements allow IT to provide real-time analytics to a large user population at a lowered TCO. Real-time data platform also allows analysts to enrich the data with their own views and calculations without adding materialization costs to the system.

Due to fact that all the information and processes interrelate in the divisions and silos of existing systems and organizations, there is a need for a new mental picture of the existing information landscape on a fundamental level. The information landscape consists of three distinct, but deeply interrelated, domains. Human-sourced information consists of loosely structured information from books to tweets to movies. Process-mediated data consists of highly structured and regulated, transactional data. Machine-

generated data consists of well-structured output of machines, from simple sensor records to complex computer logs (Devlin 2012, 5). Figure 9 presents the technical combination of the three domains discussed above, which requires an integrated platform for all information types consisting of a number of database and analytic technologies.



**Figure 9.** Integrated Information Platform Architecture (Devlin 2012, 7)

The integrated information platform contains all the information generated and used by the enterprise (Devlin 2012, 8). Devlin (2012, 10) also highlights the importance of close integration of Big Data with the existing BI organization in the business-technology ecosystem. Successful integration can turn big data “into a powerful tool for innovation and process evolution, rather than weapons of mass value destruction.”

After discussing the theoretical prerequisites for a holistic execution of corporate BI strategy, the following chapters present and discuss the case company specific structures and challenges.

## 5 LANDIS+GYR BI STRATEGY

The BI strategy of Landis+Gyr is presented in this chapter. The case company's BI strategy creates basis for benchmarking the BI strategy to market best practices discussed in the literature review.

In compliance with the case company's instructions, the case company BI strategy is regarded as confidential information. Deriving from this requirement, the chapter 5 is written in Appendix 1 and it is not published through the Library databases of Lapland University of Applied Sciences.

## 6 IM ENVIRONMENT IN THE CASE COMPANY

The current challenges of the IM environment and BI-related problem areas in the case company are described in this chapter. In addition, the findings from previous studies are presented.

In compliance with the case company's instructions, the IM environment in the case company is regarded as confidential information. Deriving from this requirement, the chapter 6 is written in Appendix 2 and it is not published through the Library databases of Lapland University of Applied Sciences.

## 7 PREREQUISITES FOR CORPORATE BI STRATEGY

The main empirical findings of this thesis research are described in this chapter. The chapter is divided in three subchapters to reflect the three perspectives, i.e. business, technology and organizational perspectives, of the three research questions.

The information for this research was gathered from interviews in the case company. The semi-structured interviews were used as a research technique to collect the empirical data. The main focus of the data collection was on studying the strategic role of BI and the current level of utilization of BI in the strategic management of the case company. The semi-structured interviews were used to discover possible BI-related shortages from business management's perspective in the case company. Finance and marketing executives, business line vice presidents and business controllers as well as members of IT management were interviewed. These interviewees were selected because they utilize BI in their decision making processes.

Additionally, semi-structured interviews were used to gain deep understanding of the main prerequisites and conditions for the IM architecture and processes which are necessary for optimized implementation of the corporate BI strategy. The data collected from the interviews was supported with subject-related confidential documents such as the case company's BI strategy, which were reviewed and analyzed. The IT executives and IT managers interviewed for this research were selected due to their understanding of the case company's BI processes and IM architecture.

Finally, the semi-structured interviews of the IT management in the case company were used to find out the necessary modifications to the current BICC for increased support of the corporate BI strategy in the case company. This was supported by benchmarking the size of BICC in similar organizations based on the theoretical information available.

The semi-structured interviews were carried out during autumn 2013 both face-to-face and via conference call depending on the physical location of the interviewee. The interviews were documented either in a written or recorded form.



In compliance with the case company's instructions, the main findings and prerequisites for corporate BI strategy are regarded as confidential information. Deriving from this requirement, the prerequisites for corporate BI strategy are written in Appendix 3 and it is not published through the Library databases of Lapland University of Applied Sciences.

## 8 CONCLUSIONS

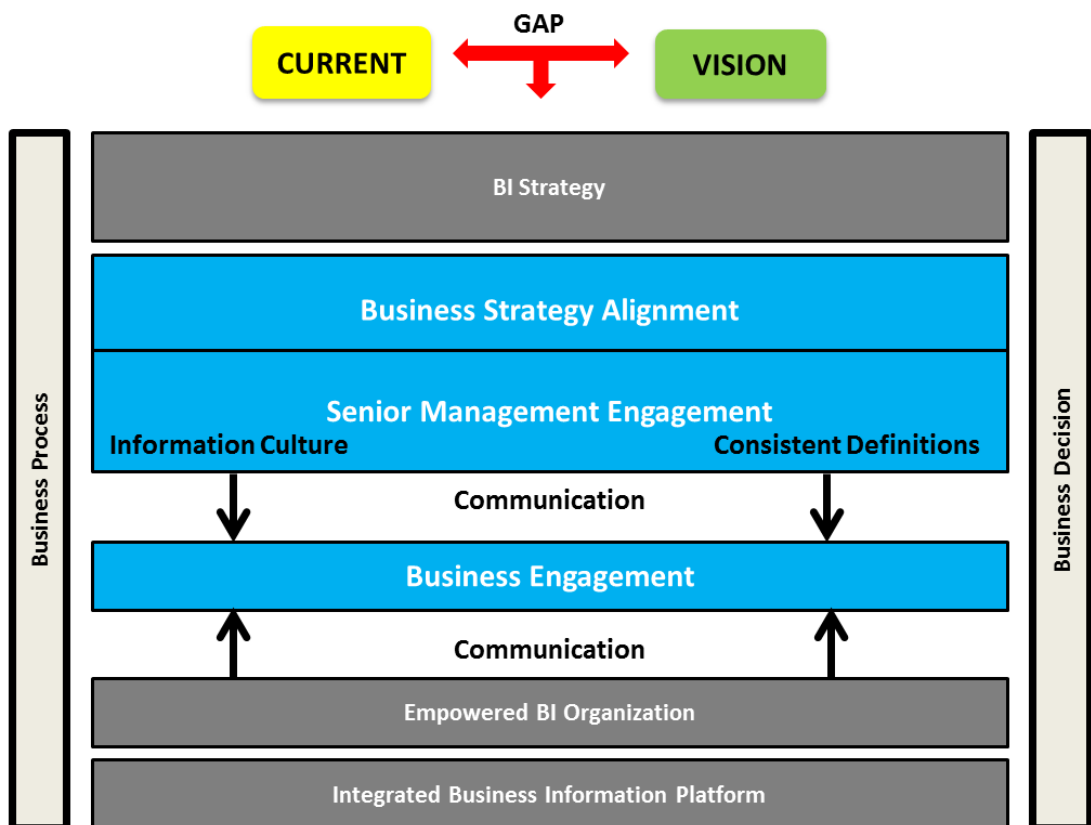
The conclusions on how the case company can improve its management decision-making processes by executing BI strategy are discussed in this chapter. Similarly, the topics for further study are suggested.

It is crystal clear that implementation and execution of BI strategy is helpful for companies which aim at utilizing the benefits of BI in their strategic business management. The thesis suggests that holistic BI strategy execution can be achieved through solid senior management engagement, and consistent business processes and definitions. It is beneficial for the organizations to aim at technology standardization and establish empowered BICC's to facilitate the integration of business information to support management decision-making. Successful driving of strategic priorities requires efficient and effective utilization of BI. Therefore, utilization of automated BI processes is required to replace the manual data collection processes for improved cost efficiency, increased information visibility, and faster access to insights for improved decision-making processes.

Based on the findings of the research, many business users pursue irreplaceability by snaffling the knowledge in spreadsheet-centric reporting culture. The knowledge is the power they have and defines their value in the organization. Heterogeneous and inconsistent IM environment enables this kind of behavior as collecting the data and turning the data to information requires manual processing as the information is not readily available. In such a culture, the business users store the valuable insights in local spreadsheets rather than share the information with others. Therefore, turning the spreadsheet-centric reporting culture to an enterprise information culture requires overcoming stubborn political challenges.

In order to overcome the challenges caused by the spreadsheet-centric reporting culture, a holistic approach in BI strategy implementation and execution is necessary. Firstly, the establishment of information culture is of significant importance to facilitate the cultural and political change in the organization. Ideally, the enterprise information culture is driven by the senior management, which enables the communication to flow

top-down. Sufficient senior management-driven promotion increases business engagement, which improves the user adoption of BI. Secondly, centrally accessible integrated platform to facilitate easy and rapid delivery of information is another key prerequisite. An integrated platform saves the users from manual data collection and unnecessary data processing on spreadsheets. Finally, aligning BI initiatives with business strategy guarantee the BI initiatives with solid senior management engagement outside IT. Figure 20 illustrates the core factors of the successful BI strategy execution.



**Figure 20.** Holistic Execution of BI Strategy

As illustrated above, a holistic BI strategy execution covers a centralized and empowered BI organization structure to ensure full business user support and necessary communication. Moreover, a technology strategy to facilitate and streamline the IT infrastructure through integration and standardization is another key requirement. In heterogeneous business IM environment, such as the case company's business and IM landscape, the change has to start from the top. The necessary harmonization of application landscape, business processes, and definitions as well as seamless MDM to guarantee high data quality and to facilitate one version of truth can only be achieved

through clear responsibilities and robust management control. Involving business process owners from the business side supports the harmonization of the business processes and increases commitment to data ownership. Furthermore, senior management support to establish an empowered BI organization with a clear communication strategy to facilitate the cultural change is of significant importance.

The core technical factor for engaging the business users is to utilize an integrated real-time business information platform to melt down data silos and ensure timely and transparent access to information. The integrated platform enables business users to contribute information and improves the close engagement with BI initiatives through collaborative approach. Therefore, the usability of the integrated platform has to be optimized to enable self-service BI. An easy-to-use platform increases user adoption and delivers the information to the business users in a timely fashion.

To conclude, this study suggests that the case company's underlying heterogeneous and complex business structures have to be harmonized first until BI can be fully utilized in improving the management decision-making processes. Technology cannot solve the problems alone but business and IT have to work together to achieve the integrated approach. The cooperation of business and IT has to be sponsored by the senior management outside IT. Integration of the data silos in the heterogeneous IM environment requires a consistent and holistic approach from all three perspectives, i.e. business, technical, and organizational.

The case company has an extensive BI strategy in place but it has never been implemented. To be successful in the efficient and holistic BI strategy execution, the case company's management should make a clear decision on implementing the BI strategy and stick to that decision. In order to implement the BI strategy throughout the global organization, successful execution requires cross-regional BI initiatives driven by the group's senior management. A key prerequisite for corporate-wide BI initiatives are a set of strategic KPIs at a group level which require a global rather than regional approach.

Should there be no corporate-wide BI initiatives, the main driver for corporate BI strategy is the cost efficiency, which is very attractive in terms of decreased TCO of BI. Leveraging standard technology of an integrated BI platform across regional boundaries reduces the TCO of BI as the skills development for a standard suite of tools is more cost effective than maintaining multiple heterogeneous tools. Building standardization of methodologies, definitions, processes, tools and technologies leads to improved data quality, results, and insights. Further, through standardization the company achieves a higher return on the overall BI investments. Automation of the BI processes can be justified by measuring the price tag of one manual BI process, such as the monthly CEO report. The writer suggests comparing the current TCO of a time consuming manual process to TCO of an automated process, for instance, on a three-year time span.

From the interviews, theory background, own experience and observations a conclusion can be drawn that the interviewees have a clear picture of the BI-related problem areas in the case company. The reasons why corporate BI strategy has never been implemented are the lacking information culture, BI maturity, and business engagement as well as senior management sponsorship. In addition, the lack of common definitions, inconsistent business processes, heterogeneous and isolated source system landscape are another reasons why BI strategy has not yet been implemented. Further, implementation of the BI strategy has not been considered business critical enough and the management has not recognized the potential ROI of implementation of the corporate BI strategy. Regardless of the fact that the BI in the case company has traditionally been finance-driven, the Finance department has not seen the full value of an automated BI platform.

It is suggested that the case company aims at increasing senior management sponsorship and business engagement in BI initiatives to ensure the required resources for implementing and executing the corporate BI strategy. Business engagement is vital as the BI strategy implementation is not just another IT project but business needs to be involved in the process as well. In addition, alignment of BI initiatives with business strategy enhances the strategic importance of BI and boosts the formation of information culture in the case company. Further, senior management engagement is needed for achieving the consistency through common definitions, harmonized core business processes, source system landscape, and MDM.

Moreover, establishment of empowered corporate BICC with sufficient resources is equally necessary. A BI program manager to coordinate all the BI initiatives on a group level is needed to utilize the synergies in terms of BI skills and technologies. Improved BI technology standardization and the implementation of an integrated business information platform to facilitate the growing user expectations are crucial cornerstones of the successful BI strategy execution in the case company.

As discussed earlier, 70-80 percent of corporate BI projects fail (Gartner 2013), confirming that the BI-related challenges in the case company are common in other organizations too. The main reasons for failure in other organizations are either related to lack of sponsorship or engagement outside of IT, lack of vision or strategy, or addressing data quality issues. Further, agreeing on definitions and business vocabulary as well as organizational culture and political issues are considered general challenges in other organizations (Gartner 2013).

The analyses of empirical data have shown that efficient and effective BI strategy has a remarkable potential in terms of cost effectiveness. Thus, further study could include how holistic BI strategy adds value to the business. An evaluation to show if the execution of BI strategy supported by the key prerequisites presented in this research will enable a more optimized approach for consolidating and integrating heterogeneous IM environments. Finally, the future empirical research areas could encompass, for instance, how the implementation of an integrated platform impacts on the TCO of BI in the case company. It is suggested to analyze the current effectiveness of manual BI processes and to study how automated BI processes influence the ROI of BI through minimizing bureaucracy in the case company.

To summarize, the results of this thesis research indicate a number of suggestions and opportunities for improvement. This study has increased the writer's understanding of the corporate BI strategy execution, and also given significant information on the importance of the political and cultural factors behind such initiatives. This study provided the case company and the writer with an irrefutable proof that solid business engagement and consistent and harmonized business structures underlying the integrated BI architecture are the keys to successful corporate BI strategy execution.

Thus, this research can be perceived as a solid starting point for further research to improve the BI strategy execution. Understanding that the BI strategy execution in a heterogeneous IM environment requires a holistic and consistent approach to enable its success is of significant importance.

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## APPENDICES

### APPENDIX 1: (CONFIDENTIAL) LANDIS+GYR BI STRATEGY

5.1 Introduction of the BI Strategy

5.2 Scope of the BI Strategy

5.3 Motivation of the BI Strategy

5.4 Standards of the BI Strategy

5.5 Benefits of the BI Strategy

5.6 The Foundation of the BI Strategy

5.6.1 People

5.6.1.1 The Organizational Strategy of BICC

5.6.1.2 Organization and roles of a BICC

5.6.1.3 Organizational structure of BICC

5.6.2 Processes and data management

5.6.3 Technology

## APPENDIX 2: (CONFIDENTIAL) IM ENVIRONMENT IN THE CASE COMPANY

6.1 Current Environment and challenges

6.2 BI-related problem areas

6.3 Findings from Optimus Project

## APPENDIX 3: (CONFIDENTIAL) PREREQUISITES FOR CORPORATE BI STRATEGY

### 7.1 Business Perspective

#### 7.1.1 Consistency

#### 7.1.2 Business Engagement

#### 7.1.3 Information Culture and BI Maturity

### 7.2 Technical Perspective

#### 7.2.1 Integration

#### 7.2.2 Standardization

### 7.3 Organizational Perspective

#### 7.3.1 Empowered and Communicative BICC

#### 7.3.2 Sufficient Skills and Resources

## APPENDIX 4: (CONFIDENTIAL) INTERVIEW FORM

**I. What are the role and the current level of utilization of BI in the strategic and operational management of the case company?**

- 1.1 What are the core business problems which are weakly addressed by the present BI environment for making time critical business decisions in Landis+Gyr?
- 1.2 How is the existing BI environment in Landis+Gyr insufficient in helping you to resolve those problems?
- 1.3 In a perfect world, how would the ideal BI environment look like from your perspective in Landis+Gyr?
- 1.4 From your perspective, what are the requirements for transforming the current spreadsheet-centric reporting culture towards analytics driven information culture, which brings the data silos together?

**2. What are the main prerequisites and conditions for the IM architecture and processes necessary for the efficient execution of the corporate BI strategy?**

- 2.1 Which are the critical business processes, practices and definitions as well as system architectural shortages impeding efficient execution of BI strategy in Landis+Gyr?
- 2.2 What are the required changes that have an impact to current system architecture in enabling high level of data access and data quality in Landis+Gyr?
- 2.3 What is your vision for improving data accessibility, data usability and user engagement in BI?

**3. Which modifications to the organization are necessary to support the corporate BI strategy in the case company?**

- 3.1 What kind of governance model do we need to support BI initiatives in Landis+Gyr?
- 3.2 What are the responsibilities of BICC in respect of corporate BI Governance in Landis+Gyr?
- 3.3 What skills and capabilities are required to make information available and useful in Landis+Gyr?
- 3.4 Which roles and minimum resources are required for running a corporate BICC in Landis+Gyr?



APPENDIX 5: (CONFIDENTIAL) TRANSCRIPT OF INTERVIEW 1

APPENDIX 6: (CONFIDENTIAL) TRANSCRIPT OF INTERVIEW 2

APPENDIX 7: (CONFIDENTIAL) TRANSCRIPT OF INTERVIEW 3

APPENDIX 9: (CONFIDENTIAL) TRANSCRIPT OF INTERVIEW 4