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Developing Business Intelligence for an expert organisation

Forcit Consulting Business

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The purpose of the present study was to develop a measurement system for the Consulting Business as a first step into the world of knowledge management. With the measurement system and improved reporting practices the organisation can be led with knowledge, which improves its performance. There were also some challenges related to operations, information accuracy and lead time of the invoicing process in the target organisation.

The theoretical framework of the study consisted of key concepts, such as Business Intelligence (BI), Performance Measurement and Knowledge Management. The framework also presented the Balanced Scorecard, how to build a measurement system and how to choose meters that are meaningful to the organisation, decision making and management reporting.

The study was carried out as an action research. The researcher was a member of the organisation. The material was gathered through observations, interviews and from workshops. The interviews were done with the organisation's CEO and managers. Meetings were also held with the shareholder's representatives.

The result of the study was a measurement model for the organisation, which consisted of the BI tool, the measurement system for success factors and the scorecard. The study also increased the performance of the organisational reporting and improved processes related to information creation and sharing.

With the new model for measurement the organisation was able to achieve more information about its state and market environment. The new model offered information about customers and projects that was not achieved before. The reporting practices offered better information sharing and through that they enabled knowledge creation. In the study, proposals for further actions in the organisation were also presented.

Keywords	Business Intelligence, Balanced Scorecard, Knowledge Management, Performance Measurement, Performance Management

Contents

1 Introduction

It is not possible to win a hockey game by only watching the scoreboard. You might be able to win one game, but how about the whole season? The situation is the same when we move from sports to business. Statistics shows that this kind of practice is used in many organisations even in the 2010's. Are companies able to achieve success in the future, if they only look at the scoreboard? The answer is no, they are not able to do that.

Rahkonen (2013) presents that competition between organisations has gotten harder in every industry. To succeed in a challenging competition field every organisation must be able to make decisions faster. The probability of making decisions that hit the target is bigger when the decisions are based on facts, not on gut feeling. For acquiring and sharing those facts, organisations need knowledge management information systems.

I woke up to my employer's situation in the spring of 2013. During my studies many teachers talked about measurements of organisations. They linked the topic to the development projects that the students were about to make. Research included in MBA-studies should include meters with which change is measured. I wondered what meters I could use in my upcoming development project since there were none in the organisation I worked at. Then I realised that I could be the one to develop meters for my organisation. This was the beginning of this development project.

At present state the organisation was only measured using financial meters. That caused some challenges to the organisation and with the right meters the organisation could be managed better short and long term. At present state there was no published strategy for the organisation. Most measurement systems are based on strategy but this time there was no possibility of using one.

During the year 2014, the organisation has implemented the ERP-system (Enterprise Resource Planning) to its daily operations. The ERP-system has made it possible to gather information about the operations of the organisations. This information is new and offers new perspectives for analysing the organisation and its business.

In this study a performance measurement system was built based on the balanced scorecard. During this study the business intelligence system is also developed. There is no

sense in measuring if the information is not shared and used. The study also presents old reporting practices and proposes improvements to reporting.

The key concepts of the study are Business Information, Business Intelligence, Performance Measurement and Knowledge Management. The concepts are described in the second chapter, which is the theoretical framework of the study.

1.1 The organisation

The researched organisation in this study is Oy Finnrock Ab, hereafter Finnrock. The roots of Finnrock reach back to the 1970's. It is a part of Consulting Business, which consists of four different companies. All of them work under the same corporation, Oy Forcit Ab, hereafter Forcit. Consulting Business is one of Oy Forcit Ab's core businesses.

Today, there are consulting businesses in three different countries. Business in Norway (Bergcon AS) was established in 2014. A second company in Finland (Räjäytyskonsultit Oy) was bought by the parent organisation in 2014. The Swedish company was also bought in 2014. Business in the Swedish company (Bergutbildarna AS) differs from business in the other companies, because the focus of the business is on training and educating customers. This study affects all of those companies. These four companies are called Consulting Business in this study. The material used in this study is gathered from Finnrock. It is the biggest organisation in the Consulting Business counting employees and revenue. I work for the Consulting Business but I have worked for Finnrock for six years. Norway's organisation is still quite small. It employs only a couple of people. The second company in Finland employs ten people. The company in Sweden employs about ten people. The structure of the Consulting Business is presented in Figure 1.

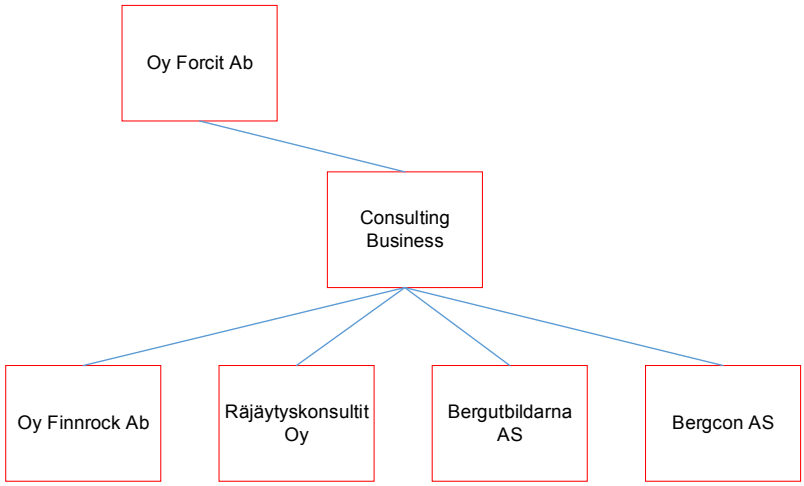

Figure 1. The structure of the Consulting Business.

The company produces consultant services to contractors and builders. The main part of the organisations' revenue consists of building inspections, device isolations and environmental measurements (device rental).

All the organisations in this study are knowledge-intensive organisations. In this context the term expert organisation is used as a synonym for knowledge-intensive organisation. Lönnqvist et al. (2005, 49) presents that these kinds of organisations are organisations whose main part is applying and developing new information. Typically this kind of work is planning or consulting, for example.

According to Statistic of Finland (2012) seven percent of Finland gross national product is construction. A major part of the organisations services are produced for the mining and excavation industry. This is 0,4 percent of the gross national product of Finland. In the 2000's the rate of construction hasn't varied notably. According to Rakennusalan suhdanneryhmä (2015, 3-6) upcoming years look challenging for the field of construction, but there is a possibility that the market starts to grow. The times after the financial crisis have been challenging for construction. According to interviews with the management of the organisation, the specific market where the organisation operates has grown about ten percent per year in the past years. The organisation has acquired all that growth.

In the first quarter of 2015 (Q1/2015) there are two notable competitors on the Finnish market. There are a few small companies (1-2 persons) around Finland that could be

seen as competitors for the organisation. In the Nordic market there are big competitors. Those operate mainly in Norway and Sweden.

There has been significant growth in the organisation's revenue in 2000's as described in picture Figure 2.

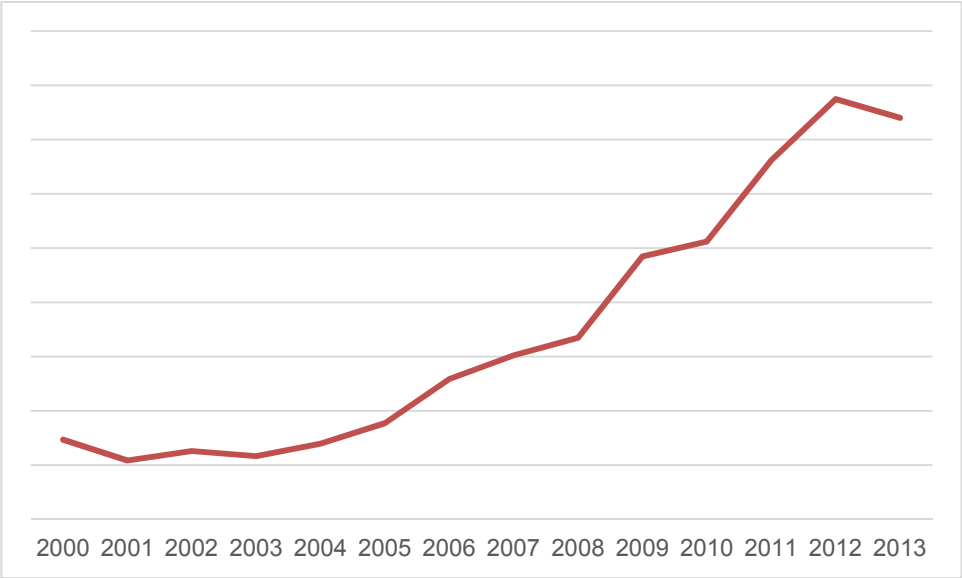

Figure 2. Revenue of the organisation.

Corporate acquisitions are remarkable milestones in Finnrock's history. In 2008 the company bought a smaller company and its number of employees rose to 25 persons. In the beginning of year 2014, Forcit bought Räjäytyskonsultit, which raised the corporation's consulting business headcount to forty employees in Finland. At the same time a new roof organisation was launched, which involved the parent company's consulting business in the Nordic market. During the year 2014 consulting business was established in Sweden and Norway. The corporation's consulting business headcount is about fifty employees in Q4/2014. In this study the consulting business as a whole is called Consulting Business.

There is no documented or published strategy for the organisation. The strategy that the organisation uses is highly related to cost criticality and growth. The consulting business shares the same kind of objectives, which relate to growth and profitability.

1.2 The premise of the development project

From the researcher's point of view the organisation is now at a point, when it is turning from a small to a big company. At this point, the organisation can't be managed as a small company. Some practices and ways of working are still from those days, when the amount of employees was small. There have been efforts to make the company more organised. In the beginning of 2014 the ERP-system (Enterprise Resource Planning) was implemented for everyday use at Finnrock. There is also an ongoing quality system project.

There was no systematic measurement system in the organisation and all of the meters were focused on financial issues. The management of the Consulting Business requested tools for managing the business. There are now so many employees in different locations that the management is not able to control the whole business.

Overall, there is a lot of research in this topic. Performance measurement and business intelligence are subjects that are widely researched. There are hundreds of books which discusses performance measurement and business intelligence.

1.3 Scope and restrictions of this development project

This development project was at first only focused on Finnrock. The acquisitions made during 2014 changed the focus of the project. The management indicated that there was a need to measure all of the companies in the Consulting Business. After that, the decision was made to include all of the companies in this development project.

I had worked for Oy Finnrock Ab for almost seven years. I have seen the growth and different phases of the organisation. That gave me a good view of Oy Finnrock Ab. I completed my previous master's thesis for Oy Forcit Ab (Oy Finnrock Ab's owner). Räjäytyskonsultit Oy and the companies in the other countries are not as familiar to me. For that reason this research focuses on Oy Finnrock Ab. The results of this study will be used in all of the companies and they will be measured with the same meters. Material for the study is mostly collected from Oy Finnrock Ab.

2 Theoretical framework

The theoretical framework used in this study is presented in Figure 3. The theoretical material related to the study is wide and there are hundreds of books and researches. Material chosen for the theoretical framework is the most relevant material for the study. The theoretical chapter begins with defining the key concepts of the study. After that, theory about measurement systems is presented. The last part of the theory discusses decision making and reporting. The last part focuses on information sharing in an organisation.

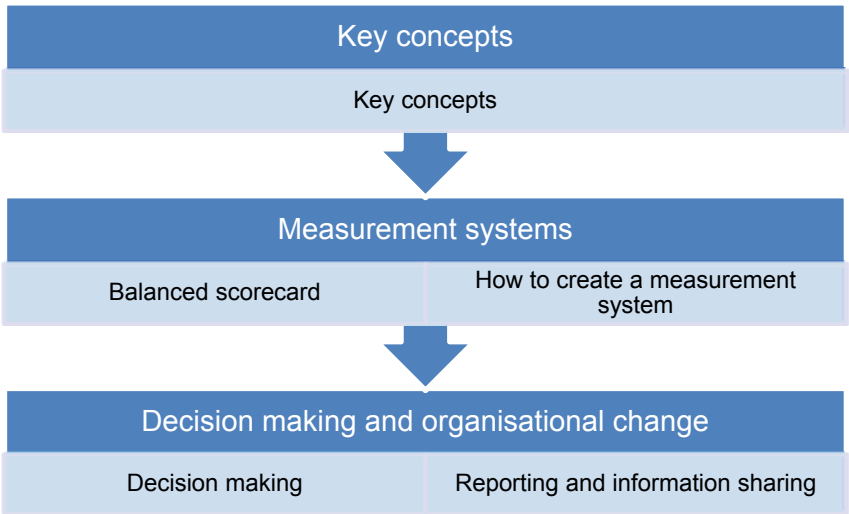

Figure 3. The structure of the theoretical framework.

2.1 Key concepts

In the following paragraphs the essential concepts of this study are presented. In this research field it is hard to draw borders between different concepts. Many of the concepts share similar kinds of elements and are connected to each other, but the point of view can be different (Figure 4). In this study, four concepts are highly related to the topic of the study: Business Information, Business Intelligence (BI), Performance Measurement (PM) and Knowledge Management (KM). Okkonen et al. (2002, 9) state, that the main reason for using business intelligence, performance management or knowledge management is to manage and improve the performance of an organisation. The most efficient way to do this, is to use them simultaneously.

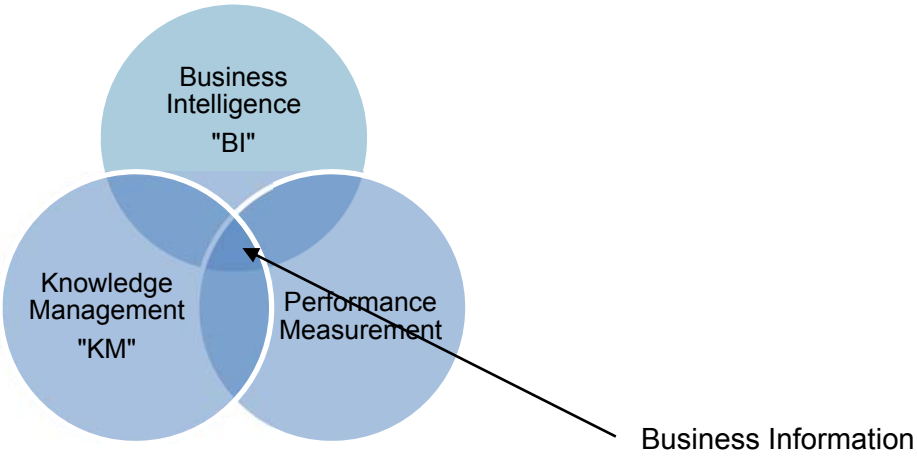

Figure 4. The key concepts of this study.

Relations between Business Intelligence, Performance Measurement and Knowledge Management can be examined with the model that the Tampere University of Technology's Performance Management team (Okkonen et al. 2002) has presented. Business information is a raw-material, an objective of the refinery, and the result of the process. BI, KM and Performance measurement needs information (or data) as raw material for the process. The process handles information and data and the results of the process is information. Okkonen et al. (2002, 2) presents, that performance measurement deals with the implementation of the organisation's strategy. Business Intelligence focuses on gathering and analysis of large amounts of information, in and outside of the organisation. Knowledge Management concerns managing information and competencies in the organisation. Business information is in the centre of the other concepts, like Figure 4 presents.

2.1.1 Business information

It is said that Information will be the oil of 21st century. It means, that information is the most valuable asset an organisation can have. In a modern, uncertain economy, information is the only permanent competitive advantage. These days, organisations are able to get all kinds of information from many different sources. And that is a challenge. (Turban et al. 2010, 86.) Information can be experienced as a simple concept. In a study like this one, information plays a major role, and it should be examined deeper.

Information can be in many shapes in organisations. To understand the philosophy of business information, first we have to define all the shapes that the information has. The

simplest way to define information is to divide it into explicit knowledge and tacit knowledge (Nonaka 2007, 162). Explicit knowledge is information that is stored in databases, notebooks, systems, etc. This kind of information is easy to share and store. Tacit knowledge is more complex. Tacit knowledge is typically bound to a person. It is based on experience and adopted during the years. This kind of knowledge is driving a car or problem solving, for example. Emotions and experiences are highly related to tacit knowledge. It is hard to codify using symbols, such as formulas or written-down rules. The problem with tacit knowledge is that it cannot be shared easily. The best way to do this, is through examples. Tacit knowledge is typically the most valuable information an organisation has. (Choo 1998, 114-117.)

One typical way to classify information is to divide the concept into data, information, knowledge, intelligence and truth (Thierauf 1999, 6). As shown in Figure 5, information can be modelled like stairs, where the highest stair is truth. Each step higher includes more learning, and is more valuable for organisations. In this study, information is discoursed only in the three lowest levels, so wisdom and truth are left out. Wisdom and truth are concepts used and examined in more philosophical studies.

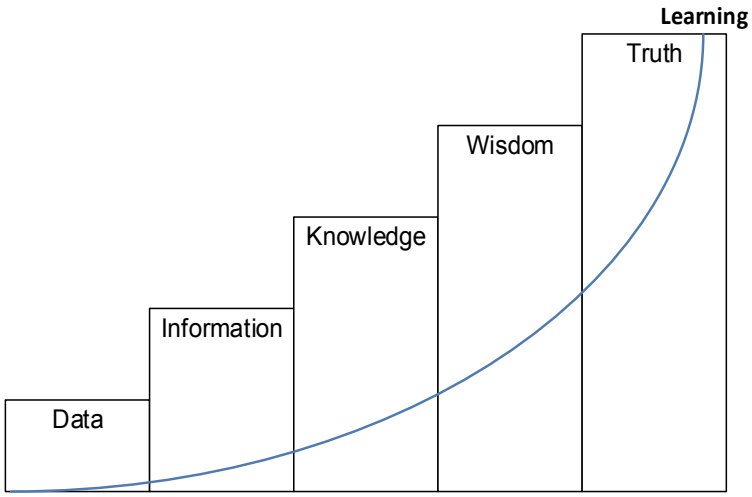

Figure 5. The levels of information (Sydänmaanlakka 2002, 175).

Thierauf (1999, 69) presents, that the lowest level of information is defined as data. According to Sydänmaanlakka (2002, 176), data is the raw material of information, consisting of numbers, text, pictures etc. These don't have any relation or meaning by themselves. Rollins et al. (2005, 2) present, that data itself is useless until it is refined to

information. Information is structured data. The data is connected to its meaning. Information can be used for solving problems, and analysed, so it becomes valuable for organisations (Thierauf 1999, p6).

Knowledge is a more complex concept than data or information. It consists of data and information which humans have processed with experience and knowledge. Knowledge arises from human brains, but it can also be presented as information. (Turban et al. 2010, 41.)

2.1.2 Business Intelligence

Business Intelligence (BI) is a wide concept and it means different things to different people. It is an umbrella term that combines architecture, databases, tools, applications and methodologies. The major objective of BI is to enable interactive access to data, to enable modification of data, and to give analysts or managers the ability to generate appropriate analyses. By analysing data, performances and situations, decision makers get valuable insights that enable them to make better decisions with more refined information. (Turban et al. 2014, 6-7.) Collins (1997, 14) defines BI as a process which supports business decision-making. Information is gathered about markets, customers and competitors. This raw data is converted into focused analyses. Thierauf (2001, xi- xii) presents, that business intelligence converts captured data, information and knowledge into valuable intelligence. Business intelligence systems are an effective tool for decision makers and managers to gain the whole picture of an organisation's capabilities and the external operating environment. Collins (1997, 19) presents, that organisations use BI for several reasons. Firstly, by using BI, an organisation can identify opportunities and threats. The use also aids in preventing surprises. Secondly, BI offers a baseline for performance evaluation. Thirdly, BI offers increased reaction time. It also improves operational and tactical decisions, business planning and strategy formulation through a deeper knowledge of the company and the external environment.

Halliman's (2000, 3-7) presents a definition of BI that differs from previous ones. He states, that business intelligence can mean anything and everything that has to do with using business information. Business intelligence can mean any information that facilitates decision-making, or information that helps manage a business in the future. In this study BI is defined similarly as Halliman's wide definition. One has to add to Hallimans

definition, that the aim of BI is to help decision-making through refining data about internal and external facts of the organisation. So the aim is to gather and evaluate the information or data at higher levels.

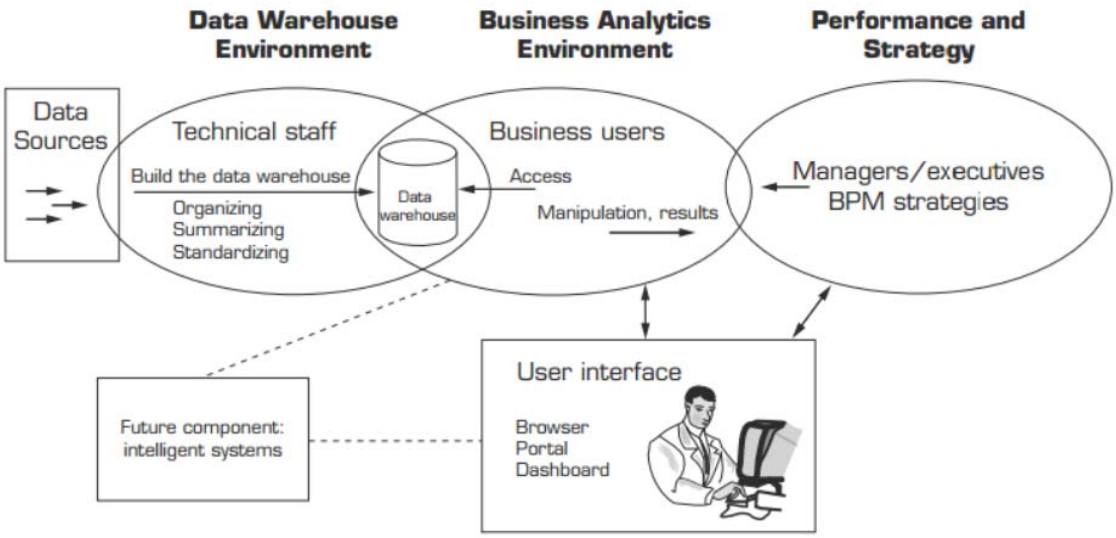

Figure 6. An architecture of BI (Turban et al. 2014, 8).

In Figure 6 the different components of BI and the relationship between these components are presented. The data warehouse is the base of any BI system. The data warehouse includes historical data that is organized and summarized, so end users are able to view and manipulate it. Advanced BI systems include current data as well, so users are able to access current data and get real-time information. (Turban et al. 2014, 8.)

Business analytics is the second component presented in Figure 6. In this component, end users work with the data and information in a data warehouse by using a variety of tools and techniques. These tools and techniques can be divided into two major categories: Reports and Queries, and Data Mining. Reports and queries offer different kinds of queries, information discovery and multidimensional views to the data warehouse. Data mining offers sophisticated mathematical and advanced statistical tools to search unknown relationships or information in the data warehouses. (Turban et al. 2007, 7.)

The third component of the figure is performance and strategy. It can also be referred to as business performance management (BPM). This is the component that decision makers and the management use. It includes different kinds of performance indicators. It is usually combined with a Balanced Scorecard and dashboards. (Turban et al. 2014, 10.)

Turban et al. (2014, 10) present, that there are five different types of BI. These are report delivery and alerting, enterprise reporting (dashboards and scorecards), cube analysis, ad hoc queries, and statistical and data mining.

Business Intelligence is not easy. Gartner (2012) presents that 70 % of BI-projects fail in some point of view. There are many reasons for the failures of BI-projects and these can be found in different sources.

2.1.3 Performance Measurement

Performance measurement is a fundamental part of business management. It allows companies to learn from the past, to check current state of affairs, to plan where the organisation is heading to, and to manage that pathway. To be able to manage their business, organisations must be able to measure it. (Tonchia et al. 2010, xi; 3.)

Performance measurement in organisations is usually performed using a performance measurement system, which consists of different kinds of meters. There are many frameworks for performance measurement. The most commonly used model in organisations is the Balanced Scorecard (BSC). Others are, for example, Performance Prism, Navigator and Meritum. (Okkonen et al. 2002, 3; Lönnqvist et al. 2006, 37-39.)

The model for performance measurement is presented in Figure 7. It is a rather simple model, but it presents the main phases of performance measurement. As the model presents, performance measurement starts with the design phase. During this phase it is decided what to measure and with what kind of measures. The second phase is implementation of the measures. In this phase, the enterprise systems are updated and the personnel is trained. After that, the measures can be used for support management and to develop an organisation. The last phase is maintenance. It is essential, because the businesses needs could change and existing measures could become useless, and new needs of measuring could emerge. (Lönnqvist et al. 2006, 12). As described, performance measurement is not a separate project. It is a continuous process which develops during time.

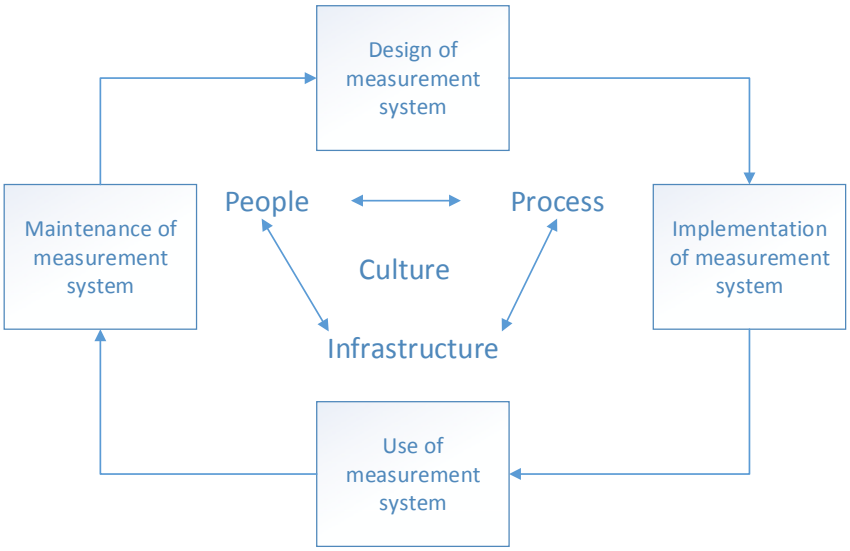

Figure 7. Main phases of performance measuring (Lönnqvist et al. 2006, 12).

During the different phases of measurement, the people, process and infrastructure should be considered. Measurement always has a connection with people. The people usually participate in the process which is measured. Measuring always needs infrastructure that supports it. (Lönnqvist et al. 2006, 13.)

Additional discussion about performance measurement will be held later in this chapter.

2.1.4 Knowledge management

Knowledge management (KM) is a wide concept. Academics and business consultants have created many ways to define and understand knowledge management. In the widest extent, it is the management of the intellectual capital of an organisation. In its narrowest extent it is only a system or a tool for managing information and knowledge inside an organisation. (Okkonen et al. 2002, 4.)

Knowledge management's concept is large and heavy. In this study, the knowledge management can be seen as a philosophy to manage organisations. In this study tools which are related to KM are presented. In the philosophy, members of the organisation are interested in information. It is used to support operations and decision making in the organisation. Knowledge management includes tools which help organisations achieve goals. Performance measurement and Business intelligence are seen as tools related to knowledge management.

2.2 Measurement and measurement systems in organisations

Organisations use measurement systems for transforming their strategy into actions (Malmi et al. 2006, 19). There are two important aspects of measurement, meters and the objective. Meters present some value that is mirrored against targets values. When there are many meters classified in a reasonable way, it is called a measurement system.

In academic and consultant literature there are a lot of different measurement systems and frameworks presented used for performance measurement. These systems emphasize different things. One of the most popular measurement systems for measurement of the organisation is the Balanced Scorecard (BSC). (Okkonen et al. 2002, 3.) In this study we examine only the BSC-framework for measurement. BSC is widely used and it is modifiable for the use of all organisations. It focuses on every meaningful part of the organisation and it gives a good outlook on the organisations situation. In BSC there is a logic on how the perspectives and meters are linked to each other. That logic is described later.

2.2.1 Balanced Scorecard

Originally BSC consists of four different points of views. These are 1.financial, 2.customer, 3.internal process and 4.learning and growth. Many organisations that have applied BSC have modified the perspectives to suit their own operations. Many Nordic appliers have added one more perspective to the framework. This added perspective is personnel. Public sector organisations use four perspectives. These are: 1.resources and financial, 2.impressiveness, 3.processes and structures, and 4.reform and ability to work. During the construction of a measurement system, every organisation should plan their perspectives that are suitable for their operations. Specification of the perspectives can be done before specification of the meters or, the meters can be classified to suitable perspectives. (Malmi et al. 2006, 24; Kankkunen et al. 2005, 104.)

The logic and the idea of balanced scorecard is quite simple. Määttä (2000) has presented a model which describes how the different perspectives of BSC are related to each other and what those relations are. The model is presented in Figure 8.

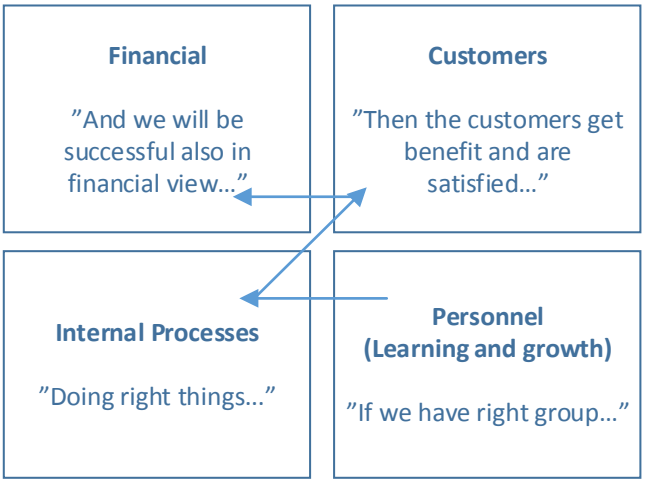

Figure 8. BSC internal logic by means of theory Z (Viitala 2005, 90).

As Figure 8 presents, every perspective of the BSC is linked to the next. The scorecard's function is simple. Good personnel affects the organisation's internal processes and operations. Successful internal processes and operations leads to higher customer satisfaction. Higher customer satisfaction typically leads to better financial performance. This all could be crystallized as follows: “If we have the right group of people, doing the right things, the customer gets benefit from that and will be satisfied. That leads to higher levels of performance from a financial perspective.” (Viitala 2005, 90-91.) As mentioned before, every organisation should find the right perspectives for their operations. Every perspective should be linked together like the Z-theory presents.

In the original BSC there are four different perspectives. The financial perspective shows how the strategy is actualised from a financial point of view. Its objective is to measure what the shareholder is interested about. Most of the meters in this perspective are financial. There could also be non-financial meters, which measure indirect results. (Malmi et al. 2006, 25.) Lönnqvist et al. (2006, 35) present, that financial perspective meters tell the history, customer and process perspective meters tell about present state. Meters for learning and growth perspective tell of the upcoming.

Malmi et al (2006, 26-27) present, that customer perspective meters can be divided into two categories. One of the categories is called basic meters. These are very similar in all organisations, for example market share, customer satisfaction, customer profitability, customer loyalty and so forth. The other category measures the customer promise. These meters answer the question: what should the organisation do for its customer to achieve customer satisfaction, customer loyalty or market share. These kinds of factors

could be preferences of a service or a product, a precision, a customer service or brand of the company. These meters should illustrate the core of the company's competition strategy.

In the internal processes perspective the processes are measured in which an organisation should succeed in perfectly to achieve the objectives mentioned in the financial and the customer perspectives. It is not likely to measure all of the organisation's core or sub processes. The measured processes should rise from the organisation's competition strategy. (Malmi et al. 2006, 27-28.)

The perspective of learning and growth should answer the question: Is the organisation able to develop and create value to its owners in the future? The perspective measures aspects are related to employees, system or infrastructure or ways of work. Practically employee satisfaction, sick leaves, employee turnover or resources used for training are typically measured. Changes in this perspective should affect the financial perspective. (Malmi et al. 2006, 28-29.)

It is clear that different scorecards should be created for different levels of the organisation. Every business unit could build their own BSC to measure how effectively the unit executes the organisation's strategy (Kaplan et al. 1996, 47). There is no common rule that BSC should be used at corporation level. One option is to build an index measurement system that combines different main results from different BSCs. In the organisation separate scorecards should be built for department, team and individual levels. (Malmi et al. 2006, 76-79.)

2.2.2 How to build a measurement system?

How to build a measurement system for an organisation is not the simplest question. Different organisations have different kinds of requirements for measurement systems and different kinds of organisational culture. Kankkunen et al. (2005, 117) present, that the presentation and implementation of a measurement system in support of decision making, takes 12-18 months. It takes longer to make the measurement system part of the management philosophy. Lönnqvist et al. (2006, 99) present, that there are usually an external consultant and a person in charge in the target organisations, who plan and manage the meetings related to building a measurement system. The proper development of the meters is usually done by a working group gathered from personnel.

There are a lot of theories in academic literature which describe the construction of a measurement system. Toivanen's (2001) project model for design and implementation of BSC is described next.

1. A clear decision about the roll-out of a BSC-project
    a. The project's scope, resources, benefits and disadvantages
2. Commitment of the management
3. Clarification of the organisation's vision and strategy
    a. Simple, clear and easily communicated vision
    b. Common view of vision and strategy
4. Specification of the organisation's critical success factors
    a. Clarification of the company's environment, competitors, products and customers (SWOT= Strengths, Weaknesses, Opportunities, Threats)
5. Placement of objectives and meters
    a. Selection of perspectives and meters
    b. Challenging objectives
    c. Cause and effect relations
6. Commitment of the organisation
    a. Participation of the personnel, explicit reporting
    b. Fast implementation of the measurement system, concrete results
7. Reduction and complement of meters
8. Application of measurement system to different parts of the organisation
9. Action plan setting to achieve objectives
10. Development of the measurement system with the principle of continuous improvement
    a. Feedback, rewarding and learning
    b. Support of ICT, data warehousing

This kind of project model is quite heavy for small companies. This model is not used in this study as it is described above, because there is no published strategy in the organisation. Therefore the different phases are not described more precisely. The model provides a good outlook on the kinds of actions organisations should perform during a BSC-project. Lönnqvist et al. (2006, 102) present, that though there are many models for building a measurement system for organisations, there is no model for building a meas-

urement system for an expert organisation. They (Lönnqvist et al. 2006, 104) have created a model that could be used for creating a measurement system for an expert organisation. This model is described in Figure 9.

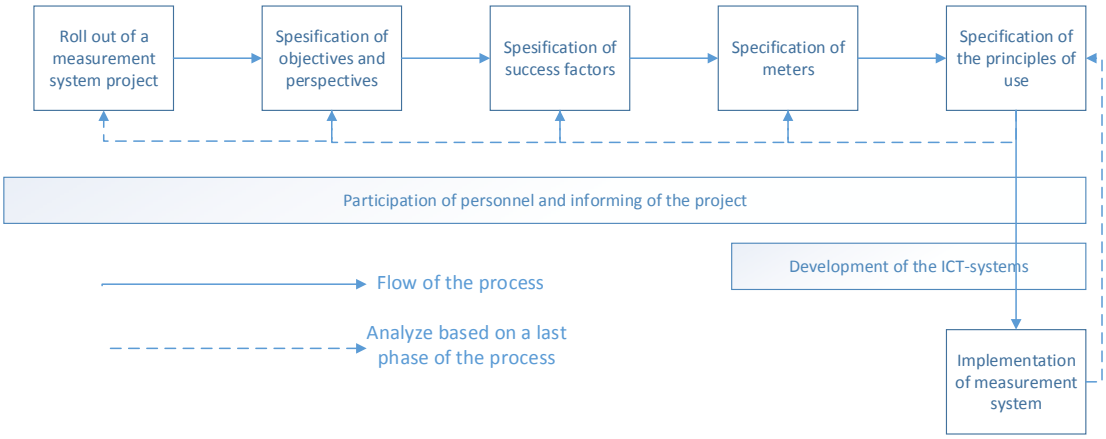

Figure 9. The model for planning a measurement system for an expert organisation (Lönnqvist et al. 2006, 104).

The planning of a measurement system project starts with resourcing. At this point a decision is made on who participates in the project. Lönnqvist et al. (2006, 104) present, that there is no common model for this phase. It depends on the organisation and its culture and practices.

In the phase regarding the perspectives and objectives, the objectives that the organisation has and all of the perspectives that the organisation is measured on are set. This phase begins with the clarification of the organisation's strategy and vision. Another way to begin this phase, is to clarify the stakeholders of the company. After identifying them, their needs and their contribution should be analysed. This analyse can be concretised in the following questions: What do the stakeholders demand from the organisation? What does the organisation expect from the stakeholders? The selection of the perspectives is important. In balanced measurement, the target is that the perspectives create the big picture, which depicts the organisation in many ways. Organisations can use the prepared perspective example from BSC or Navigator. In this case, there is a risk that the characteristic of an organisation is forgotten. Organisations could have different kinds of requirements for the perspectives. (Lönnqvist et al. 2006, 106-109.)

Identifying the success factors of an organisation is an important phase for building a measurement system. Success factors, in this context, are the objectives that are most important to the organisation. These could be financial, non-financial or relate to intangible capital. Often the measurement system includes all of these. Success factors vary between different organisations, depending on what the organisation emphasizes. Expert organisations typically emphasize non-financial and especially intangible success factors. Every perspective has its own success factors. In BSC these success factors can be found with the aid of the following questions: What kind of financial performance are the shareholders expecting? What must be done for our customers to achieve the financial goals? Which business process do we have to succeed in to satisfy the needs of our shareholders and customers? How do we sustain our capability to change and develop, to achieve the vision? Two to five success factors from different perspectives (BSC) can be chosen for a measurement system of the success factors. (Lönnqvist et al. 2006, 109-110.)

2.2.3 How to choose the correct meters?

In this study the employees of the organisation do “knowledge work”. The organisations or the Consulting Business can be called expert organisations or knowledge-intensive organisations.

Lönnqvist et al. (2006, 51) present, that the measuring of knowledge work is challenging. The results of the knowledge work are sometimes hard to find and the results can arise with a delay. Intangible contributions related to work are also hard to measure. That leads to a situation where the productivity of the knowledge is challenging to measure. It means that measuring the traditional work process is not meaningful when it comes to knowledge work. Lönnqvist et al. (2005, 51) state, that the effectiveness of the work process in these kinds of cases is not important. But, in these kinds of cases the focus should be on personnel and aspects related to that. Success factors in knowledge-intensive organisations are the continuous development of the employees’ knowledge, the creation of knowledge, co-operation networks, and an effective flow of information. Referring to many studies, organisations experience that measurement of these are important, but they do not have knowledge to do that, nor are they able to do it in practise. (Lönnqvist et al. 2006, 52.)

Organisations have intangible success factors. This means different sectors of intellectual capital and functions that exist to gain value for the intellectual capital. The sectors of intellectual capital are, for example, knowledge of the employees, the image of a company, and customer relations. Functions related to those are, for example, training of employees, marketing campaigns, and actions to achieve appreciated partners, visits to clients, and shared development projects with customers. In many cases, functions related to intellectual capital are more easily measurable than the amount of the intellectual capital. For example: When measuring the quality of a customer relationship, it is not always clear to the personnel how to affect this relationship. If shared development projects with customers or visits to customers are measured, employees get a better view on how to affect the customer relations. (Lönnqvist et al. 2006, 55-56.)

The intangible success factors are typically measured with subjective meters. Subjective meters are usually based on queries and approximations and the results are counted through this information. In many cases the intangible success factor is hard to measure itself. In those cases the indirect success factor should be found. An example of this kind situation is presented in Figure 10. (Lönnqvist et al. 2006, 58.)

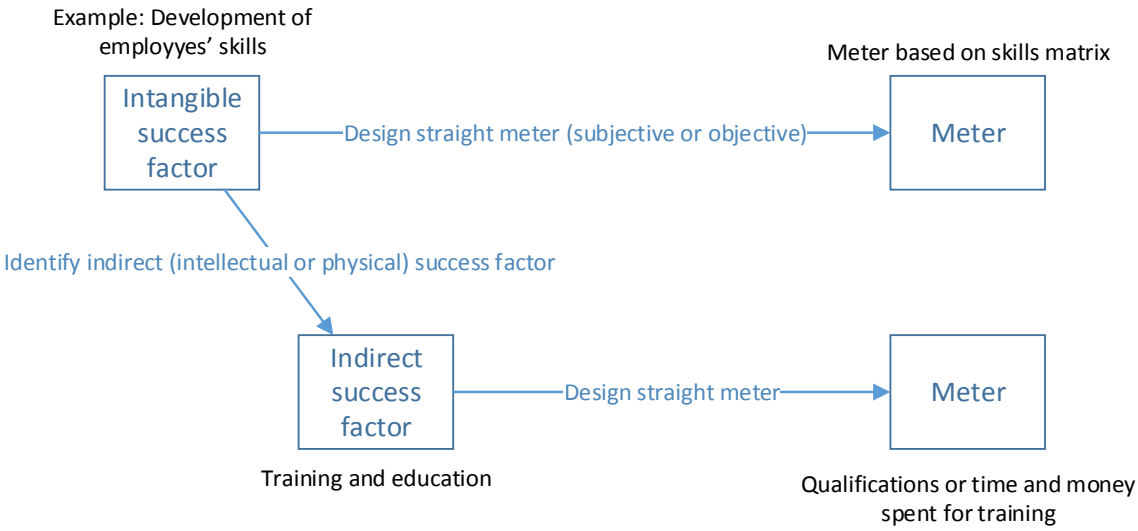

Figure 10. The model for designing a meter for intangible success factor (Lönnqvist et al 2006, 58).

Meters can be analysed using four perspectives. A good meter should have a good validity. It means that the meter should measure what it is intended to measure. For example, does the amount of training days measure learning? As can be seen, the correlation

be-tween the meters target and the issue that the meters are focused on are not always the same. Another criterion that a good meter has is reliability. It means, that the meter provides the same value if there is no change in the target. With good specification of the meters and clear rules for how to measure one is able to achieve better reliability. A good meter measures things which an employee is able to affect. And if the employee affects it, the change is positive. Relevance and practicality of a meter are also criteria which should be considered. Relevance presents how significant the meter is to an organisation. There is no idea in measuring aspects whose outcome only can be seen many years ahead. Practicality presents the meter's cost and benefit ratio. (Malmi et al. 2006, 83-84; Hannula 2002, 63.)

There is common phrase which goes: "You get what you measure". If we, for example, start to measure the invoicing rate of consultants, the rate will typically rise. The steering effect of the meters should be considered during the development of the meters. In these days, there is a challenge related to measurement. With new information systems it is possible to measure almost limitlessly, and from the large amount of meters it is hard to find the significant ones. Oksanen (2010, 292.)

2.3 Implementation of business information

It is clear that there is no sense in building meters or systems for an organisation if they are not implemented to an organisation's daily operations. One of the most critical operations in the organisation where information is needed, is the decision making processes.

2.3.1 Decision making

Decision making is the process of making a choice from different alternatives. In organisations decision are made every day and by each employee. Some decisions do not have a remarkable effect on organisations and some decide on how the organisation will to prosper in the future. Within an organisation decisions are made at all levels, managers as well as non-managers make them. (Buchanan et al. 2013, 691.) Mintzberg states, that decisions making is the most important activity that managers and leaders fulfil. (Mintzberg 1989) In Figure 11 rational decision making is explained.

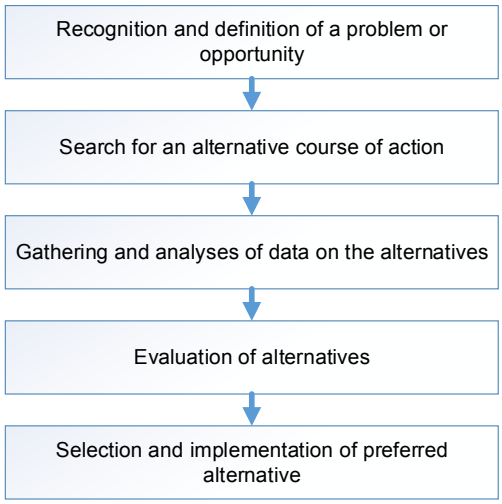

Figure 11. Rational model of decision making (Buchanan et al. 2013, 692).

As Figure 11 presents, decision making starts with the recognition and definition of a problem or an opportunity. In next phase all the alternative actions against the problem or the opportunity are searched. When the alternatives have been identified, data will be gathered and analyzed. Based on the analyses an evaluation of the alternatives begins which leads to the last phase where the preferred alternative(s) is implemented. (Buchanan et al. 2013, 692-693.) The role of business information can be seen in the different phases in different ways. In the first phase, when the problem or the opportunity is recognized, business information can be the trigger or the alarm (Turban et al. 2014, 10). By using meters or BI-systems, changes in the organization or its environment could be identified. In the phase when different actions are examined business information could be used to analyze the alternatives, or data about experiences from different alternatives could exist. Data gathering and analysis can be done with the Business Intelligence systems. In many cases analyzing and evaluation is done with the support of Business Intelligence. The data or information that is analyzed is mostly business information. This model points out why decision making and business information has such a close relation to each other.

2.3.2 Management reporting

A typical tool for supporting decision making is management reporting. Reporting that is used to support decision making and to help plan an organisation's operations. It is not only the organisation's financial issues like revenue or profit that is reported. The main

idea of it is to provide a general view of the organisations financial issues, and state of the operations. Management reports should answer aspects presented in Figure 12.

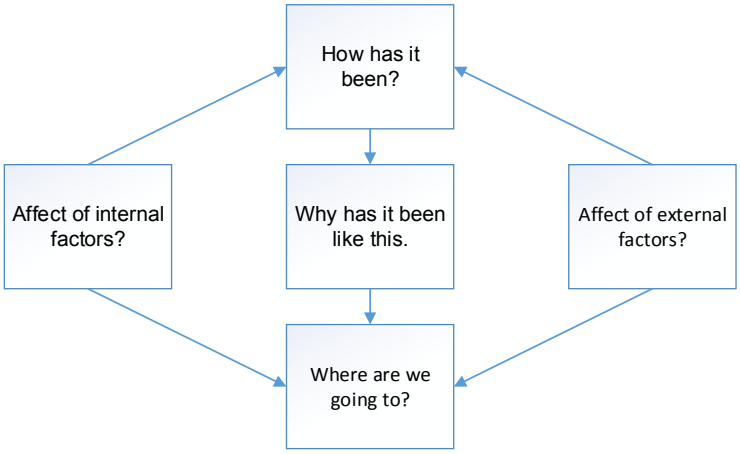

Figure 12. Contents of Management Reporting (Alhola et al. 2005, 173).

As Figure 12 presents, Management reporting should first answer the question “How has it been?” The answer tells us how the business or operations of the organisation has been in past times. It is like looking in the rear-view mirror. The next question tries to find the reasons for the current situation. The last question aims at prediction. It tries to find the course of the organisation. To be able to predict future, managers of the organisation should find reasons behind success and failure in the past of the organisation. Comprehensive management report discuss the effect of external and internal factors in the organisation. (Alhola et al. 2005, 173-175.)

Levels of reporting and the content of reports differ in organisations. Roughly, reports of organisations can be divided into external and internal reports. The same reports that are used internally cannot be shared with external quarters. Internal reports can be divided into different levels. Top management or shareholders are typically interested in different aspects then middle management. An employee could be interested in detailed information that is highly related to his or her work. That’s why reports often are produced to the strategy level (top management), the tactical level (business unit management) and to the operational level (employees). The reports could be produced daily, weekly, monthly or yearly depending of the user of the reports and its meters. (Alhola et al. 2005, 175.)

3 Research

This chapter describes the structure of this study. It gives a view of the aim and the objectives of the study. The research questions used in this study are presented in this chapter. Meters are an important aspect of action research, with the object of monitoring if change has happened. The meters used in this study are also presented in this chapter.

3.1 The objectives and research questions

The aim of this action research is to build a measurement system and meters with which the organisation is measured. The information from the meters is used to support the organisations' decision making. That leads to a situation where the organisation is managed using business information. This kind of change is modelled in Figure 13. The left part of the arrow presents the current state of the organisations decision making, which is based mainly on experience and feelings. In the next part of the process, decision making and activities are based on business information. In the highest level of the process, decision making and activities are based on higher levels of processed business information. The aim of this study is to begin the journey from the left side of the arrow to the right side.

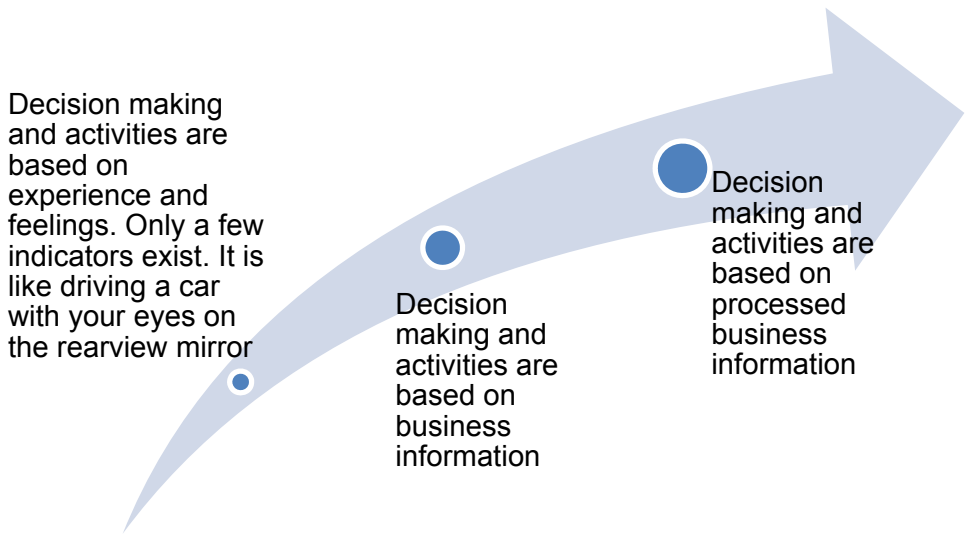

Figure 13. Aim of the development project from present state to the goal.

One objective of this study relates to information, it should be up to date. There is no sense in reporting or measuring if the data is not right. Oy Finnrock Ab has shared their monthly income statement to shareholders. The process of producing and distributing

the monthly income statement has a long lead time, and the shareholders have set an objective to half that time. The shareholders have also pointed out that the way of reporting should be harmonized within the Consulting Business during 2015. This objective is highly related to this topic and for that reason it is also one objective of the study.

The main objectives of this study are summarized as follows:

1. To build a measurement system with purposeful meters.
2. To share the information to the organisations' decision making and activities. To design a model for implementing the information in the organisations' decision making and activities.
3. The generated information should be up to date and harmonized in the organisations.

The research questions play a substantial role in action research. The purpose of the questions is to clarify the objectives and aims of the study. The research questions also describe the nature of the study. An action research is typically a qualitative research. The research questions are commonly in the form of: "Why, How or What". When the research questions are put forward as "How", the answers focus on what has happened and thus, change is visualized. (Kananen 2009, 25-26.)

The topic of this research is approached through the following research question:

- How to build a measurement system and develop Business Intelligence in support of the organisations decision making?

The research question can be defined with the following additional questions:

1. What kind of measurement system does the organisation need?
2. Which meters are meaningful to the organisation and how to choose them?
3. What is the process of building a measurement system for the organisation?
4. How can the "new" information be implemented in the organisations' daily operations?

The hypothesis of this study is described as follows: by producing meters and measurement systems (Business Intelligence and Performance Measurement), the organisation can be more aware of its own situation and market environment. That enables knowledge management.

In this study, technical solutions will not be discussed. The technical issues related to BI and the measurement systems is too wide a subject to discuss without making this study too broad. This study is made for a business competence degree and that is another reason why the technical issues do not belong here, even though they play big role in the field of performance measurement and Business Intelligence.

The results and the measurement system built during this study will be used in all the organisations (Consulting Business). The material used in this study is gathered mainly from Finnrock.

3.2 Meters that are used in the study

Quantitative meters used in this study:

- Number of meters with which the organisation is measured
- Number of non-financial meters
- Ratio of financial and non-financial meters
- Number of logins that the CEO makes to the BI-system/ERP
- Number of reports
- Delays in inserting data to the ERP
- Lead time of the invoicing process
- Personnel test

Above the quantitative meters used in this study are presented. The first meters focus on the amount of meters that the organisation uses for its measurement. This meter is split into two different categories. The theory of the research field used in this study has presented that organisations should have a balance between non-financial and financial measurements.

Change in decision making is quite challenging to measure. Decision making in itself is a complex process so quantitative measurement of it, is not easy. When the basis of change is considered, one finds out that decision making is based on the use of information. Before the study, the CEO of the organisation hasn't logged in to the ERP on a regular basis. That is the platform, where the BI-system is built. If the number of logins increase, one could assume that the CEO receives more information about the business. This information is implemented in the decision making of the organisation.

Reports are an efficient way to share information. The amount of reports gives some information about how much information is shared.

To get up-to-date information through the meters, the data should be accurate. Most of the data related to the business that the organisations create is generated from the ERP. The transactions in the ERP are mostly done by employees. That is why the delay time between actual events and the insertion of the data into the ERP is measured. This is related to the shareholder's needs. They need the financial information from the organisation for their own decision making. It takes too much time to get the information and this aspect related to decision making should be developed.

Decreasing the lead time of the invoicing process is an objective set by the shareholders. It can measured simply by counting the days spent during the process.

The personnel test presents how accurately the employees are able to estimate some specific measured values that are meaningful to the organisations' business. The organisations has not previously been aware of these values. This information will be produced in the measurement system which is built during the study. This information tells something about the level of the decision making in present state. The deviation between reality and the views of employees reflects on the organisations accuracy in decision making.

Qualitative meters used in this study:

- Do the meters measure the things that are meaningful to the organisation?
- Is the new measurement model better than the old practise?

The answer to the first and second qualitative meters is analysed by comparing the developed measurement system to the theoretical material of the study. The management group gives their opinion on the measurement system when it is ready. That information is used to analyse whether the meters are significant for the organisation, or not.

4 Methodology

This chapter describes the choices made while designing this study. The methodological choices in this study can be presented using the research onion presented in Figure 14.

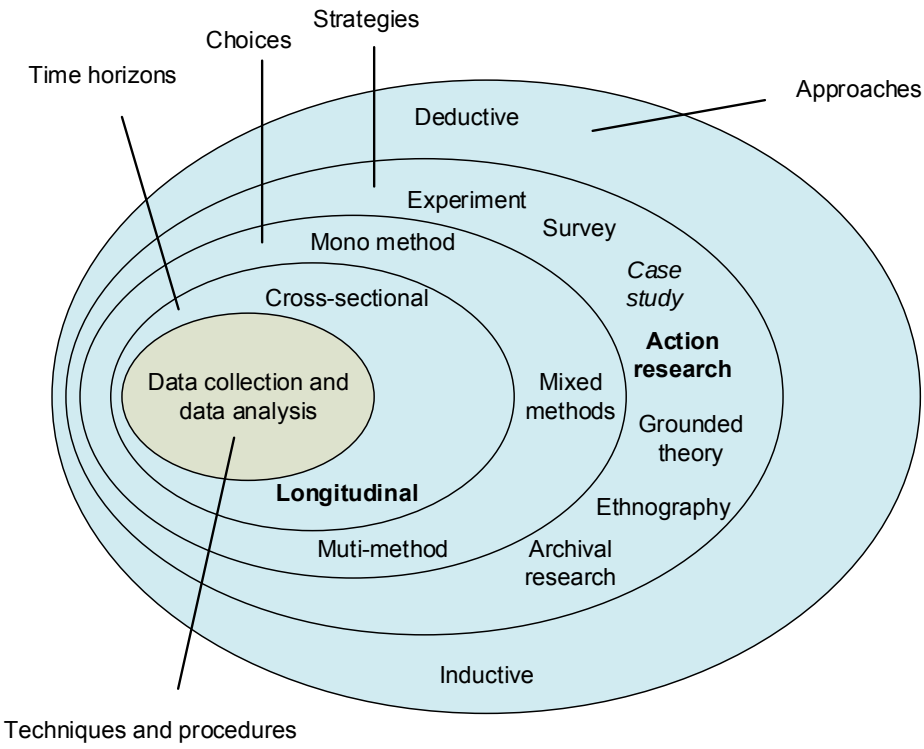

Figure 14. Research onion (Saunders et al. 2007, 102).

Action research is used in this study as a strategy to approach a phenomenon. The method is chosen for this research because one of its purposes is to develop organisations.

Material is gathered through mixed methods. In this kind of study or development project the source material comes in many forms. Part of it is gathered through observation. Interviews provide another point of view, and meters offer quantitative facts. The theoretical framework for this study is created by using different written sources.

The empirical material of this study is mainly qualitative. The material is collected from workshops and interviews. Observation plays a major role in collecting the material. The

material is gathered through observations, since the researcher has worked for the organisations for many years and is knowledgeable in the field. Almost every workshop and interview was recorded digitally with a dictation machine.

Action research is a longitudinal study. It is based on iteration, where actions and evaluations follow each other.

4.1 Action research

There is no exact definition of action research because it is not only one method. It is a group of research methods. Action research can also be called a research strategy with which it is possible to approach the phenomenon, and gather information about it. (Kananen 2009, 11.) Heikkinen et al. (2006, 17) present that an action research is a temporary research and development project, where new practices are developed and tested. The scope of it can be small, for example developing your own working methods, or in a wider scale, it can be a social or political operation.

Action research is a research method often used for organisational development (Kananen 2009, 9). For that reason, the method is used in this study. According to Heikkinen et al. (2006, 15) the function of an action research is to change reality by researching it, and to research reality in order to change it. The researcher works as a change agent in the action research. He or she is not only researching or observing the organisation or its processes, he or she is also actively changing these. The researcher is in tight co-operation with the organisation and participates in its work. (Luoma et al. 2010, 33-34.) In action research the focus of the research is always on human actions. The approach is not suitable for exploring machines or natural phenomena (Heikkinen et al. 2006, 16.)

Kuula (2000) presents that in the process of an action research the design, action and evaluation varies. The process is cyclic. Heikkinen at al. (2006, 19) suggest that after a plan based on experiment, follows a plan that is developed from the experiment. The action is refined after sequential plans and experiment cycles. This creates a spiral that is based on interaction between the experiments and the research (Figure 15). Material can be gathered through qualitative and quantitative methods (Heikkinen et al. 2006, 36-37).

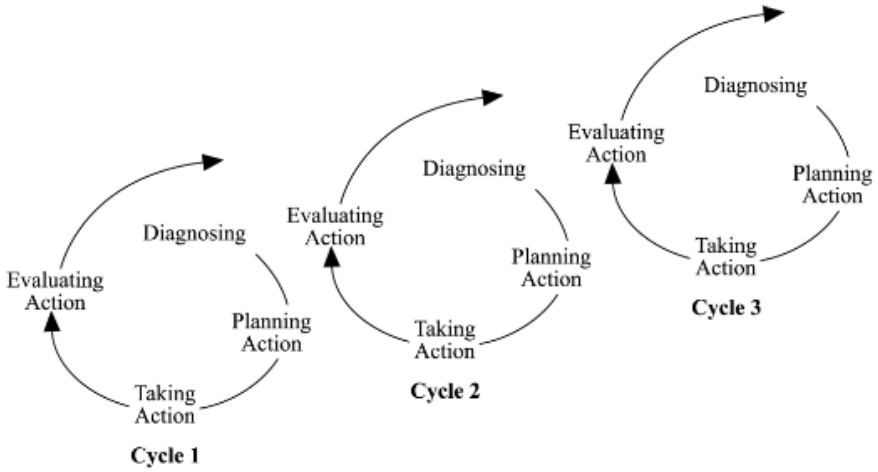

Figure 15. The process of an action research (Coghlan et al. 2001, 19).

4.2 Role of the researcher

In action research the role of the researcher is significant. In this study I research the organisations and make changes to the researched phenomenon. These changes are called interventions. There are some risks in having the researcher also participate in the organisation's functions.

While making changes the researcher also researches phenomenon related to the subject. When the researcher takes on all of these different roles there is a possibility of the research being distorted. Typically, phenomena and results are seen in a too positive way. To avoid this, the researcher must be critical, and also be able to analyse his or her own actions. This can be reported by presenting also negative things. (Kaisla 2014)

One disadvantage of action research is that the researcher typically has worked for the organisation for years. When the researcher is so close of the organisation he might not be able to see things in a new way. That is the reason why organisations use consultants, which come outside the organisation. They are able to see issues more objectively. (Kananen 2014, 138.) This kind of situation could be seen as a threat for this development project.

There are a few things that influence this study and should therefore be mentioned. First of all, BI or management with knowledge are things that might be unfamiliar to most of the organisations members. While researching, the researcher gains knowledge of the subject in the organisation.

5 Present state and interventions

This chapter describes the present state of the organisation, points out what kind of observations were made during the study and evaluates the interventions. The chapter is based on the theoretical framework which is presented above.

5.1 The basis and design of the development project

This development project started at the beginning of 2014. Discussion about the topic began in 2013 and it was clear that the organisation needed meters. It was at a time when there was only one company in the Consulting Business. The end of year 2013 and the beginning of 2014 was a significant time in the history of the organisation because the ERP-system was implemented. I worked as project manager on that project and it was discussed that after the implementation it was time to develop the measurement system.

5.2 The present state

We can approach the organisation's present state with Kähkipuro's (2014) model. With the model, one is able to analyse the present state of the organisations' level of knowledge management. The model (Figure 16) has five levels which show the state of knowledge management in an organisation and it is trajectory to the culture of management by knowledge.

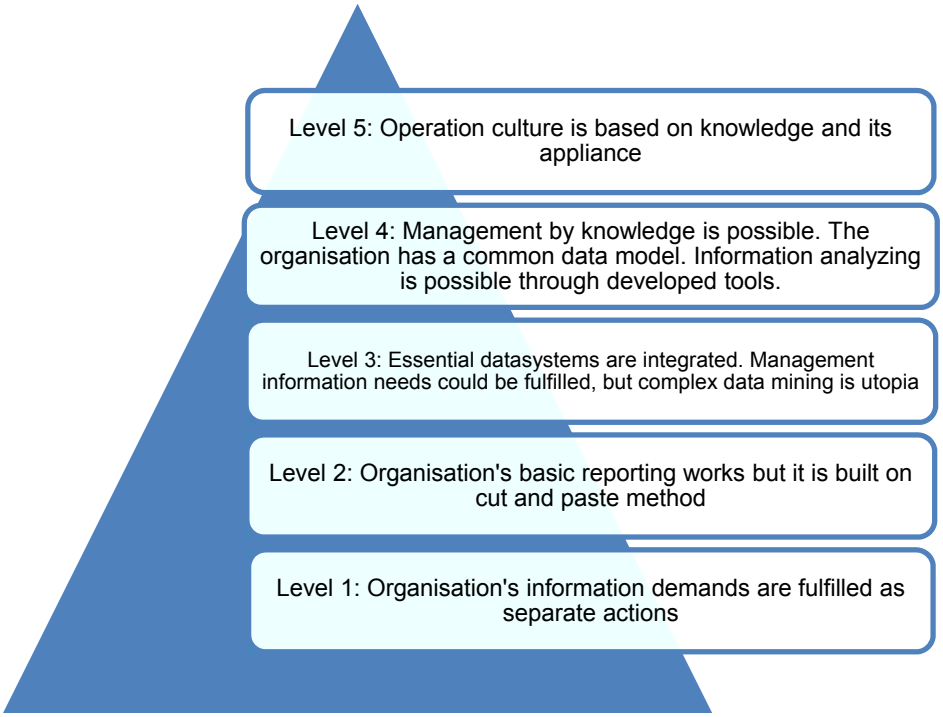

Figure 16. Maturity model to analyse level of knowledge management in an organisation (Kähkipuro 2014).

Kähkipuro (2014) presents that in the lowest level an organisation's information demands are fulfilled as heroic actions. This kind of situation is typical in corporate fusions when information is located in many places. In the second level the organisation's basic reporting works, but it is composed from different sources using cut and paste methods. Abnormal information needs are fulfilled through manually produced reports. In the third level essential data-systems are integrated and there are practices for master data management. Most of the management's information needs can be fulfilled, but complex data mining is impossible. In the fourth level the organisation is managed with knowledge. The organisation has spent money and time to develop a data model and to harmonize data. There is also knowledge of, and tools for information evaluation. In the highest level of the model, the organisations corporate culture is found on knowledge management. Every decision is knowledge based. Knowledge is part of every process and it is created, shared and refined during operations.

In the present state, the organisations' knowledge management is in the lowest level of the model. There is some basic financial reporting, but more specific information needs are fulfilled through manual work if the data exist. There is no developed practice for reporting. Employees or managers are not able to get any ad-hoc reports and almost all of

the measured information is shared in quarter year meetings. The information shared in the reports is financial. Kähkipuro (2014) states that progress from lowest level to higher level needs a lot of time and work, because there is also a need for change in the organisation culture, not only in technique. The jump from the lowest level to the second level is the most demanding, because there has to be a change in work culture and way of thinking.

If one examines present state at the consulting business-level, one finds some differences among the organisations. Every organisation in the consulting business uses different systems and practices for project management, quotes, invoicing and so on. The systems for those functions are also different in all the organisations. The only company that uses ERP in daily operations is the the Finnrock.

Company takeovers, growth and new business opportunities abroad has set the case-organisation in a new situation. In the present state, the case organisation or consulting business cannot be managed through the same means as in past times. Management has pointed out that they need more information to manage the business. This study provides an answers those challenges.

5.2.1 The organisation's meters and reporting in present state

The organisation had some meters in present state. These meters focused oin financial issues. The meters that were in use at the present state are presented in appendix 1. There is more financial meters than non-financial, so according to the theory, the present measurement system is unbalanced. Malmi et al. (2006, 18) presents that many organisations measure their operations only with financial measures. That is almost the same as thinking that you can drive a car only by watching the rear view mirror. That's why modern organisations need measurement systems, like pilots in modern aeroplanes. These systems tell exactly where you are and where you are heading to. The financial meters were updated monthly, but for example customer satisfaction and employee satisfaction have only been measured once. There is no frequency for measuring those. That raises a question, can the organisation even say that customer or employee satisfaction is measured?

There was no systematic reporting in the organisation except for monthly profit reporting. These reports were shared with the management group. Financial issues were reported to personnel in meetings that were held quarterly.

Information about the market and the companies' financial affairs are shared in meetings, which are held quarterly. Financial numbers are reported on monthly basis.

5.2.2 The challenges of present state

I have worked for six years at Oy Finnrock Ab, so I have a good outlook on the organisations and the business that it is in. During the years, I have seen how the company has grown from small to bigger. There has been significant growth, but the organisation has not developed at the same speed as it has grown. At the moment, the lack of meters causes some difficulties to the management. These difficulties and challenges are discussed in this chapter. Problems which do not relate to the topic of the study are left outside of this examination. Most of the challenges presented below are gathered through observations during the years and during the course of this development project. Some of the challenges had been raised during discussions with personnel.

The biggest challenge was that there were not many meters or indicators used in the organisations. That becomes problem when it is time to make decisions. Most of the decisions were made without an information base, found only on personal experiences of employees and managers. It was clear, that the organisation is not led with knowledge. That caused many symptoms such as a high risk for making bad decisions. It was also a barrier for example for development projects. The challenges in processes or operations were hard to point out because quantitative and qualitative information was missing. The employees' objectives were also missing because there was no indicators to show their state. That caused challenges for employee recompensation and decision making.

The lack of meters slows down the reaction to changes. Because there is no meters, it is hard to see alerting signals early enough. Without these warning signals reacting to different things happen while the situation is on. The lack of meters makes it harder to see where the organisation stands. Without meters it is hard to say if the personnel are satisfied or if there are problems in processes. Management could think that everything is fine in the organisation, but there could be problems that are not visible. Analyse of present state is not possible in development projects.

Almost every company runs their operations against objectives. Objectives tell the target level for the performance. In the organisation the objectives are very basic and these are related to revenue and profit. Without meters it is not possible to set targets for processes or personnel. That could reduce the performance of the organisation. With targets bound to meters it is easier to control and steer the organisation's actions and personnel work.

The shareholders of the organisation have been disappointed that it took so long for the organisation to give information about sales of the month. It has taken over twenty days for the shareholders to acquire financial information for the past month. The shareholders had set an objective to cut the time to less than ten days. It means that information should be generated faster. That causes some changes to the invoicing process.

The organisation has always focused on financial issues. Of course the most important meter in business is profit, but when the focus is only on profit it can lead to decisions that aren't good on the long term. Costs are examined very carefully in the organisation. This kind of examination increases profit but in many cases leads to situation where investments are not made, even if they increase the performance of the organisation.

It is clear that this development project is not able to solve all of these challenges, but it is an efficient way of making things better. Although this study focuses on the organisation, results from this development project are used in whole Consulting Business. The biggest problem that can be seen at the level of Consulting Business is: every company in the corporation has different ways and systems to handle their projects, do their quotes and invoices. That is very challenging for managing the Consulting Business.

This chapter has presented challenges in the organisation. There is plenty of good, but these are the challenges that should be raised. There are good things related to the topic at present state. At present state, the organisation does not use resources for measurement, so there is no cost related to measurement

5.3 Plan for a new model of operations

The plan was to develop a Business Intelligence system in the same platform as the organisation's ERP was, if possible. The meters that could not be included in the ERP will be built in other systems, such as in Excel.

The measurement system and meters were planned to be specified during workshops and meetings. It was clear that I was to be the main facilitator in this project. The development process is iterative and the measurement system was developed during the interventions.

The reporting at present state was quite a simple and it did not offer much information. That is why the new model should include improvements in reporting. With the new model the employees should also get up-to-date information about the organisation's affairs. When the information only is financial and shared quarterly it is distributed too seldom and narrowly. There should also be other kinds of reports in addition to financial reports. The practises related to reporting should be created.

The challenges with the invoicing process's lead time were to be examined and solved. First the process was compartmented and I examined where the problem was situated. The needed improvements were to be done to the process.

The plan consisted of three interventions. The purpose of the first intervention was to start the project and all the tasks related to it, it was a roll-out of the development project. The purpose of the second intervention was to create meters and to build the system. The purpose of the third intervention was to implement the measurement system and get some feedback about its use.

There was also a need to change the culture of the organisations towards a culture of knowledge management. There was no specific plan for that. I believed that this change would happen when the management's focus was turned to this kind of thing. I thought that the pilot meters would raise the hunger for more information and through that, the culture would change.

5.4 The first intervention

This chapter describes the first intervention of the study. It is divided into three parts: the plan, actions and evaluations. It concurs with the process of action research (Figure 15). The diagnosing of this phase was done during the present state analysis.

The first intervention started in May of 2014.

5.4.1 Plan

The first intervention contained the phases of the project that are important for creating a good base for measurement. The purpose of the first intervention was also to assure the management about the need of the measurement system. I knew that this would be the largest intervention of the study. The first intervention was planned to contain the following actions:

- The establishment of the project. The members involved in the project were informed
- Clarify the present state of the measurement in the organisations
- Clarify the objectives for measurement and clarify the information needs
- Build a structure for measurement system
- Build ”demo” meters on the ERP-system which can show the capabilities of ERP’s BI-module and wake up the managements’ desire for information
- Begin the implementation of the ERP-system in Bergcon and Räjäytyskonsultit for harmonizing the reporting base
- Start to gather information about working hours of employees to the organisation’s ERP

The first workshop was held with two project managers. They agreed that the organisation only had financial measures: “It is only looking for financial numbers” like one of them said. There was also discussion about the development of the organisation. It was mentioned, that the organisation has not developed during the past years, even though there has been significant growth in the business. In the workshop the project managers had a lot of ideas that could be measured and what kind of information was needed. These ideas were mainly related to the organisations financial issues. But it was clear, that the organisation needed financial information about the project’s profitability and the employee’s efficiency. In the beginning of this project there were only economical meters and no non-economical meters. These meters are presented in appendix 1. I listed the meters that were presented in the workshop and I told the project managers to think about the measurement needs from their perspectives.

As a conclusion from the first workshop, one can say that the organisation must have something called basic measures and indicators to fulfil basic information demands that organisations typically has. When these so called basic information demands are fulfilled,

it is possible to produce more specific and refined measures. The organisation's project managers showed a lot of interest in the employees working hours. Before this study there was no exact information about the employees' use of working time. I developed the system with the vendor of the ERP to the organisations' ERP-system, which gathers information about the employees work time. The employees working hour monitoring system was transferred to the ERP from the old practise of using Excel-sheets.

The first interview with the CEO was held in the beginning of the study. As a conclusion from this interview one could say, that the organisation needs more basic meters to fulfil basic information needs. It also pointed out by the management that measurement is seen strongly in economic terms. Like the theoretical material presents, organisations also need non-economical meters. The interview strengthened the notion that the organisation's knowledge management maturity level is in the lowest level of Kähkipuro's (2014) model. In the interview the CEO told me he felt that he is able to lead the business in Finland because he is located in the same place as the main part of the personnel. . The challenge lies with the branch offices and operations in Norway and Sweden.

During the next interviews and workshops we had a discussion about measurement and the system. The interviews and workshops confirmed the previous impression that the organisations needed to take the first "jump" into the world of measuring. After that, it is possible to discuss more complex meters.

From the observations and workshops it was also found that there was no balance between economical and non-economical meters. All of meters in present state were focused on results, not actions. According to the theory, both of these things are against the principles of a good measurement system.
At that point there were many ways to continue. It was possible to develop the ERP-system's BI-module, build an own BI-system for the Consulting Business and use only Excel. The restriction to this development was cost. Developing an own BI-module for the Consulting Business could have been a great choice. It would have offered a static and harmonized base for reporting in the organisations. This idea collapsed due to costs, because it would have needed lot of resources to establish it. . The ERP-system of the company had a BI-module. It was not implemented. It offers a base for ad-hoc information needs and every employee can have entrance to that system. The costs related to the development of it was not as significant as building an own system, so it was decided to create part of the meters there.

The BI-system can handle meters which are related to the information in the system, but it was clear that there was a need to measure things outside of the systems information. That was the reason to develop another system that complements the ERP-system. The BI-system could offer information, which is used mostly in tactical and operational decision making and that was not enough.

The additional measurement system was to be based on BSC and it measures the organisation from many perspectives. This is the system which focuses on performance measurement.

The third measurement system is for “strategic” measurement. It is also based on BSC, but it measures things that are linked to the organisation’s long term objectives

Like Kaplan and Norton (1996) present, typically meters should be created from the strategy, but there is no joint strategy in the organisation. Signals and observation of the organisation show that the present state strategy is connected to cost criticality and growth. According to the theory, growth is highly linked to the personnel. Expert organisations should focus on their personnel, because they are the true value of the organisation. That is the reason why one should emphasize personnel measurement in the measurement system.

5.4.2 Actions

This is the phase when the measurement systems were built. In this phase the organisation’s infrastructures was modified to support measurement. In the case of the Consulting Business it meant that, the ERP-system was to be implemented into daily operations of all the organisations. It also meant that, the ways of work and practices were to be harmonized. So a decision was made that the ERP-system was to be implemented at Räjäytyskonsultit during Q1/2015. The same deadline for implementation of the ERP to the organisation in Norway was set. That provides a solid platform for reporting and measurement. I started the development of those tools in autumn of 2014 with the ERP’s vendor. The operations model was different in Bergcon and Räjäytyskonsultit, so I had to change the practices in the companies.

Referring to the first interviews and observations, the management was very interested in the use of working hours. At the present state the consultants reported the working

hours with an Excel sheet. It was not useful for the purposes of information management, so I created a specification for the ERP-vendor about monitoring working hours. It was implemented to daily operations in October 2014. I trained the employees to use the new way of monitoring working hours. The old way, based on Excel sheets was terminated. With this feature the organisation was able to monitor exactly how the working hours were used. There was no reporting but the system gathered information about it. The data was not used yet, but it is useful information for the future.

There were options to build the meters in the ERP (BI-module) or to make some kind of Excel for the measurement. Excel is almost free to use, but the resources for classifying, editing and harmonizing information are costly for the organisation. In the long-term the automatized BI-system is less expensive, it does not take as much work time as traditional ways of reporting. I sensed that there was no possibility of getting all the meters in the BI-system (cost issue), so I decided that part of the meters would be in the BI-system and part of them will be in Excel form. At that point I had to figure out what meters the organisation needs for ad hoc reporting and which are needed more seldom. The meters which needed to be reported actively were decided to be built on the BI-platform. The costs created restrictions to the project and it meant that the BI-system is not going to be very developed.

As a kick-off, a few meters were developed to the company's ERP-system. These meters are presented in Appendix (2). The purpose of these "first phase meters" was to familiarize the heads of the organisations to the project and make them think about what else could and should be measured. First meters and indicators were developed to the organisations ERP-system's BI-module. The "first phase measurement system" was produced during September 2014. I developed it with the ERP-system's vendor. It included basic measures and it was developed to show what the organisation's ERP was able to do. It was also "opening" new ways of working and thinking, with the organisation's decision making based on knowledge. It was the beginning of the knowledge management culture in the organisation.
During the study, I tested another solution for Business Intelligence than the organisation's ERP's BI-module. The implementation of another solution would have been so work heavy that the decision to use the organisation's ERP as a platform for BI seemed right.

The first phase measurement system was launched at a workshop with the whole management group on site. It was introduced in a conference room and discussion was allowed during the introduction. The atmosphere in the workshop was positive and excited. Every participant showed interested in the meters that were showed during the event. The values of the meters sparked discussion and there was also discussion about the source of the meters.

During the construction of the first meters, it was found that the data in the systems was not clean enough. The ERP-system was designed very carefully, although there were some problems with the data. The data needed cleaning operations. The harmonizing of the data needed resources and time. At the same time we re-engineered some classifications of information, like product groups.

At the beginning of this project the lead time of the invoicing was too long. The shareholders wanted the lead time shortened. The process of monthly invoicing can be modelled as in Figure 17. In the figure the different phases of the process, and on which day of the month the phase usually has been usually completed are presented. At the present state it took about twenty days to get the invoicing done and to obtain information about profit and costs.

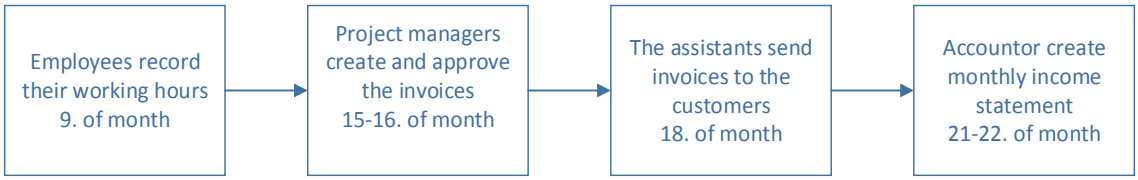

Figure 17. Phases of invoicing and lead time of each phase.

During the first intervention, the personnel was briefed to record their working hours to the ERP-systems daily. I briefed the assistants to do it and I advised employees to do it in many situations and meetings. Normally it took about nine days to get the phase completed. During this intervention the personnel were guided to fill all the necessary information related to working hours and invoicing before the third day of the month. Project managers were guided to create invoices after the second day of the month but at the latest on the sixth day of the month. Assistants started to send invoices to the customers immediately after the invoice was accepted by the project manager. Information about the revenue was sent immediately to the shareholders after the invoicing was done. The

main tool for this intervention was communication and simplification of the process. The results of this improvement are presented in the chapter 0.

5.4.3 Evaluation of the first intervention

This evaluation was done in January of 2015. I made a small mistake when it comes to the size of the intervention. The first intervention should have been divided into two separate interventions. From my point of view this caused challenges in writing this study report. The amount of work from the first intervention was greater than I had planned. But I think it was normal because there were so many aspects that this study affected and that needed to be launched.

At this point it was clear what kind of system were to be used for measurement. There were a lot of ideas about what to measure, but most of the ideas were related to financial issues. This tells that there was a need for basic meters about the financial view. That the organisation only was interested in financial issues was still a challenge. As researcher and project manager my role was to change that way of thinking and to point out why the personnel, process and other non-financial issues are important to the organisation.

During this intervention the ERP was developed for Räjäytyskonsultit, data were harmonized and purified and so forth. It took a lot of time to get the data in order and harmonized in different sources. During the intervention, the ERP was developed and it was able to gather information about the personnel's working hours. That information will be useful in the future. These actions provided a good base for the next interventions.

One significant idea that was raised in the first workshop was a project profit calculator. At the present state there was no tool for or way of counting project profitability. This kind of tool should be developed during the study and I decided to take it under development in the second intervention.

The present state was analysed before the first intervention but it was clarified during the first intervention. The observations and interviews strengthened the impressions that I had about the present state.

The use of the first phase measurement was not a success. Related to the ERP logins, the CEO didn't use the BI-module of the ERP (January 2015). That was a small disappointment. Project managers had tested the system. As a conclusion: the meters that are in the measurement system should be more interesting and the new business information should be shared proactively. Information could be shared, for example, using different kinds of reports or in monthly briefings. The most important aspect was that the project had been launched.

Lepola et al (2014) suggest, that one of the biggest success factors in BI-projects is to create a culture of knowledge management. It means, that there should be a will to manage the organisation with knowledge rather than beliefs. The creation of the culture of KM started before this study and it continued in the first intervention. It seemed that working to change the culture will take time, just as Kähkipuro (2014) has presented.

Lessons learned from the first iteration:

- Information needs related to "basic" information should be fulfilled first
- Management was not proactive in the use of BI. That gave rise to a need for reporting
- Three kinds of measurement system should be built.
    - Business Intelligence (AdHoc)
    - Short term measurement system (Operational and Tactical)
    - Long term measurement system (Strategical)
- It will take time before the organisations is led with Knowledge
- It will take a lot of time to get data in order in this kind of cases

The interview with the CEO and the workshops with project managers pointed out that there is long journey to a time when the organisation is managed with knowledge. Besides building a mighty BI-tool, there was a need to start a journey to an unknown destination, but hopefully the organisation will be there, managed with knowledge. To be realistic, this development project is only a beginning to the journey and it can raise the KM-level only one or two steps (Figure **16**).

5.5 The second intervention

This chapter describes the second intervention of the study. It is divided into three parts: the plan, actions and evaluations. It concurs with the action research process (Figure 15). At this intervention the first intervention's evaluation is seen as the diagnosing phase.

The second intervention started in January of 2015.

5.5.1 Plan

In the second intervention the focus was on producing something concrete that could be evaluated. There had been talks of meters and reports but not much to show. The planned actions of this intervention are listed as follows:

- Define the success factors for Consulting Business
- Create meters for success factors
- Define the measurement views
- Create tools to measure personnel and customer related aspects
- Create and implement meters
- Make pilot reporting
- Implement the ERP-system to the company in Norway
- Create a tool for project profitability measurement

In this phase the focus was on meters. The focus was on complex meters, meters that are critical for the Consulting Business. Definition of the success factors in the Consulting Business was a notable phase in this intervention. The previous phase showed that information is not applied from the BI-system, so it should be shared actively through reports and briefings.

5.5.2 Actions

The definition of success factors was made by me. I evaluated a phrase which included the success factors. This phrase was presented to the management group in a meeting. The phrase was:

> "Our company succeeds, if we win calls for tenders (Quotes Hit rates). The winning of those leads to a rise in amount of projects (Number of new projects). The higher the amount of projects is, the consultants' invoiceable hours increase (Consultants' invoicing). The high utilization rate of consultants leads to a high utilization rate of monitors (Utilization rate of devices that the companies rent). As a whole, this leads to a high revenue (Revenue). The operation of consulting business must be profitable, which is consequence of high usage rate of equipment, high average price for consulting hour and high average of rental price of the equipment. In the long term the personnel of the organisation will be the source of growth"

This definition was agreed on by the management group. The CEO of the Consulting Business started to think about the root causes for the different success factors. The winning offer is based on good quality, good brand, and customer relationship. The right pricing level is also a big part of the win. In the meeting, we decided to use the success factors that were presented in the phrase above. The meters that I suggested were included in the phrase above. I also presented the idea that after every completed project the customer would get a survey which includes a few questions and an open field for comments. There would also be a field for answering the question how the customer ended up ordering from our company. The questions related to quality of service and customer experience create good meters for the Consulting Business. The management group supported the idea and we made a decision to implement the practise.

Personnel is a significant factor in expert organisations. One part of the measurement system consists of meters related to personnel. I had a meeting with the Human Resources (HR) manager of Oy Forcit Ab. In the meeting, aspects related to the measurement of personnel were discussed. I presented the measurements where personnel meters were built on a survey, which included about ten questions. The technical tool that was tested for the purpose of the survey was Questback. I had built a pilot-survey on that platform for the personnel survey. The meters would be led from the results of the survey. During the meeting we made some improvements to the survey. The survey is presented in appendix. 3. The HR manager approved the meters. He also contemplated if it is possible to apply the same survey and meters in the parent organisation.

In the beginning of February, the development of the ERP-system in Räjäytyskonsultit was done. It was implemented into their daily practices on the first day of February. I was leading that implementation. I briefed the new way of work to Räjäytyskonsultit. Now the processes in Finnrock and Räjäytyskonsultit were almost the same, and that made it possible to measure both organisations with the same measurement system. It is possible to do a study on the implementation of the ERP. That is why the implementation is not examined more precisely in this study.

In the beginning of February, the design of the project's profit calculator started. It was decided that it will be built upon the companies' ERP-systems. The challenging part of this was to model the costs of personnel that participated in the projects and to model other expenses that are appointed to the projects. The workshops in the first phase showed a need to develop this tool.

At the beginning of March, a workshop with the sales manager of the organisation was held. I presented a template for the customer satisfaction survey, which was supposed to be sent to a customer every time a project ended. It included eight questions and the meters were led from the questions. The meters were: NPS (Net-Promotor-Score), overall grade of the project, information sharing during the project and scheduling of the project. The customer satisfaction survey was finalized in the meeting.

Significant stakeholders of the organisations are householders and tenants. There hasn't previously been any efforts to obtain feedback from them. A substantial part of the work is done with those stakeholders. It is important to have some meters which present how the householders experience the service of the organisations. I proposed that this kind of survey also should be made. There is no clear connection between the stakeholder group and revenue, but if the organisation is able to succeed with the group the quality becomes better.

The developed measurement model was presented to the management group in March. In this meeting I described how the model will work, how meters work and how those meters get their values. They agreed on the model and the meters but the CEO was wondering how often these meters (surveys) should be updated. Related to the personnel meters I proposed that during the first year surveys related to the measurement system should be sent out four times a year. If this is done rarely the organisation is not able to react to changes. The meters could also reveal something that the management should react to immediately. A discussion about the organisations' strategy also rose in this meeting. The topic rose because of the discussion about measurement. The management group discussed that the strategy should be created for the whole Consulting Business. I saw one Power Point slide related to a draft of the strategy and the organisations' competitive advantages. If I compare these to the meters which were chosen for the measurement system, my strong opinion is that the meters fully support those strategic views. There was no discussion about when the strategy would be ready or if the

management group wants some changes to the meters after that. There was no need to modify the original perspectives of the BSC.

The measurement system was presented to the parent company's personnel manager, financial manager and business controller. They commented that it would be beneficial to include more predictive meters in it. That was a good comment.

5.5.3 Evaluation of the second intervention

During the second intervention we were able to define the success factors of the organisation. The meters chosen reflect the environment and the situation of the organisation.

The second intervention included a lot of pilot work. In this phase the meters were examined and it was tested where and how the meters get their values. During this intervention every source of the meters was modelled. Which meters were possible to meter with a sensible amount of work and which were not was verified. Customer loyalty was a meter that was not easily accessible. There were no system that could produce information for that purpose.

5.6 The third intervention

This chapter describes the third intervention of the study. It is divided into three parts: the plan, actions and evaluations. It concurs with the process of action research (Figure 15). In this intervention the second intervention's evaluation is seen as the diagnosing phase.

The third intervention started in March of 2015.

5.6.1 Plan

The third intervention was the shortest one in the study. The purpose of it was to finalize the issues that were possible within the timeframe. The planned actions of this intervention are listed as follows:

- Meaningful meters in the Business Intelligence system or in the measurement system.
- The model for measurement is ready and published.
- The meters for measurement are chosen and it is clear how the meters will be measured.
- The model for reporting is ready.
- Forecasting meters.

5.6.2 Actions

During the third intervention the implementation of the ERP to Bergcon was done. It was first time when the organisation's ERP system were used outside the Finland. I managed that project to guarantee that the processes are same in Finland and Norway.

The measurement model is complete and presented in Appendix 4. I finished the development of the model. I presented the model to the management of the organisation. At this point is was clear how to measure and the systems of the organisation supported the measurement. During the workshop with the management, the CEO opened the discussion about the strategy of the organisation. They made the decision that Finnrock was going to have a strategy before the summer.

The pilot calculator for project profit was under development. I made a cost modelling for the services of the organisation. The ERP-vendor developed the platform for piloting purposes. The management did not make an order for the calculator. The development of the tool was terminated. That is why I was not able to get feedback from the profit meters.

I presented the final versions of the customer and personnel surveys to the management. The model was approved. I was not allowed to order the license for the survey tool and that is why I do not have any feedback from those meters. In that meeting discussion about the strategy construction rose.

I finalized the proposal for reporting and information sharing. It was presented to the management.

In the last meeting with the management group there was a discussion about forecasting tools, but they did not raise significant discussion. I asked if there is a need for the tools, but I did not get a clear answer. The conclusion from that is that the meters might possibly be developed after this study.

5.6.3 Evaluation of the third intervention

The third intervention was shorter than planned before. At the third phase there was a plan to finish the surveys for personnel and customers when the project ends. That could have been valuable feedback. I did not get the investment decision for the survey tools so they were not implemented during the study.

After all, at the end of the third intervention there was a model for measurement and a proposal for reporting. Almost all of the meters were piloted and obtained their values. The management seemed satisfied with the meters.

The journey into the world of knowledge management was started. It was the aim of this study and after the third intervention it had begun.

6 Results and notions

This chapter presents the results of the study and answers the research questions.

The concrete result of this study is a model for measurement, selection of meters which are meaningful for the organisation and model for reporting. These are presented in the appendixes. During the study I also developed a model for the profitability tool of projects and it is under development.

Referring to Kähkipuros (2014) model (Figure 16) the organisation has climbed at least one step higher in the level of Knowledge Management. At the lowest level (present state) the organisation's information demands were fulfilled as separate actions. Referring to the model, in the second level "an organisation's basic reporting works but it is built on cut and paste methods". With the new model the organisation is able to achieve the second level. The organisation now has capabilities to reach the third level, but the

second level must first be completed. In the third level “essential data-systems are integrated. Management information needs can be fulfilled, but complex data mining is utopia.” With feedback from the second level and continuous improvements the organisation is able to achieve the third level.

6.1 The new operation model

A new model for measurement is the result of this study. The new model should replace the old practices of measurement. There were not many practices related to measurement or reporting, so to unlearn old practices should not be problem.

In the new operations model, the decision must be based on the measured information. The created model for the measurement system should be implemented to the organisation.

Measuring

The new model of measurement is based on Business Intelligence, Success factors meters and a scorecard based on BSC.

Business Intelligence contains measures that are typically needed in ad-hoc reporting. The meters in the BI-system are presented in Appendix 5. In an ideal situation there are more meters than now, but the development of meters to BI is quite expensive. I recommend that meters should be added to the system from success meters and the scorecard when the benefits of different meters are perceived.

The measurement system which consists of success meters is presented in Appendix 6. The meters chosen to this framework are important to the organisation’s business. These meters should be monitored monthly and the values should be updated every month.

The meters in the scorecard are important to the organisation in the long term business. These meters are mostly tactical and strategic. The scorecard is presented in Appendix 7. Personnel, customers and processes are measured in this framework. This framework should be updated monthly. Personnel meters are based on a survey. I recommend that this survey will be sent to employees four times a year. The section for personnel meters should be updated after every survey.

My advice to the organisation's management is that the values of the meters are not as important as the variance in them. It does not mean much if work satisfaction is a three or three and a half. It is more important to see the changes in the values. Why has the value decreased or increased?

Reporting

The new model for reporting includes two new management reports. One report consists of the organisation's success factors. In that report all things that are very important to the business of the organisation are gathered. It is updated monthly. The second report is a kind of a scorecard. It is separated from financial, customer, internal processes and personnel sections. It is updated quarterly.

Employee's get their own report monthly. Information sharing in the organisation has been a challenge. The management group should decide what information will be shared to the employees of the organisation. A good practice is to send a summary about the meters to the personnel after the management group have examined them. The values of the meters could also be presented in result meetings which are held quarterly. Like Eloholma (2013) presents, management by knowledge is not the management's exclusive right anymore. From my point of view there are not many meters that could not be shown to every employee. The organisation must actively share the generated information. Through this it will be implemented to every operation in the organisation and its decision making processes.

The measured values should be discussed among the management group in monthly meetings. This refines the information to knowledge. A summary of the meters can be presented to the personnel in quarterly held meetings.

Unfinished

During the study most of the meters were piloted and the source of the values is clear. There are some tools related to the meters which should be implemented. There was no time to implement the survey-tool for customer and personnel satisfaction measurement.

The tool for that was tested during the study and it will work with the new way of operation. Personnel meters should be updated three or four times during a year and the customer satisfaction survey should be sent to the customer after every project.

The tool for project profitability counting is specified. There is a pilot version of it but it should be implemented to the ERP-system.

Development

There should also be some kind of practice to develop the measurement framework. As the theory presents, business is changing and the meters should also change. It means that the meters and the framework should be updated regularly. During the first year after implementation it could be a good practise to have a meeting every second month and to discuss the measurement needs.

6.2 Cost and benefit analysis

In this kind of case the cost and benefit analysis is not easy. It is all about the information's value to organisations. The value of the information is hard to analyse, so it is typical that in this kind of case counting the return of investments (ROI) is almost impossible. Another aspect is how the organisation is able to implement this new information to its decision making and operations.

One can approach cost and benefit analysis with Table 1. I am not able to tell the exact cost of the project because that information is business secret. In Table 1. five different alternatives for this project are presented. The numbers describe the amount of the cost or benefit. The values are approximates.

Table 1. Cost and benefit analysis of the development project.

Cost	Without the project	All the meters in Excel	BSC and Excel	BSC, Excel and ERP's BI-module	BSC, Excel, Developed BI-module
Developers time	0	0,5	1	1	1,5
Management groups time	0	0,2	0,4	0,4	0,4
ERP-vendors costs	0	0	0	1	3
Survey tool	0	0	0,2	0,2	0,2
Total	0	0,7	1,6	2,6	5,1
Benefits					
KM's culture development	0	0	0,75	1	1
Meters (Financial, Customer, Internal Process, Personnel)	0	0,5	0,5	1	2
Improvements in ERP	0	0	0	1	1
Scorecard	0	0	0,5	1	1
Support to decision making	0	0,25	0,5	0,75	1
Total	0	0,75	2,25	4,75	6

First in the table the alternative that this project was not established is presented. That would not have caused any costs to the organisation, but there are no benefits for it either. The second alternative is that the meters were built as a list in an Excel-sheet. That solution is cheap but the benefits are limited. In this solution the ERP-system was not developed which means that all the meters were not able to be created, for example information related to working hours. In the third alternative only the BSC-framework and Excel-based meters were developed. It gives some benefits, but it is not possible to measure all things that are presented in this study. The fourth option describes the solution which was developed during this study. The last alternative is same as in this study, but the BI-system is highly developed. It gives the organisation access to information (ad-hoc) and the reporting takes fewer resources than in solution made for this study.

The costs of that solution would have been significantly higher, because it would have needed a lot more work by the ERP vendor.

The table does not include alternatives where an external consultant is used or the system is built as a separate BI-system, which has its own databases and ETL-process. For that kind of solution the costs would have been manifold.

All the benefits of this project cannot be seen when the project ends. During time the organisation learns to analyse the meters and to utilize it in daily operations. It is also possible that the benefits of this kind of project can be seen somewhere else. The organisation is perhaps able to hold the experts in its service longer. This can be seen in the revenue and profit of the organisation. In this kind of case one does not even know that the measurement system effected the issue. Therefore, it is not possible to calculate the return of investment in this kind of project. In the best case scenario this project produces benefits twenty years from now. The project starts a journey, not just a project which ends after this study.

6.3 Answers to the research questions

Below the research questions of this study are presented and the result is discussed after each question.

"How to build a measurement system and develop Business Intelligence in support of the organisations decision making?"

Typically the building of the measurement system starts with an examination of the strategy. The meters should be led from the strategy. In this case the problem was that there was no communicated strategy in the organisation. Therefore, the observations were focused on getting information about critical aspects to measure for the organisation. That is also the reason why there is no in depth discussion about strategy in this study.

During the first interviews and workshops it was clarified that the organisation needed "basic meters". Those basic information needs had to be fulfilled before it was possible to produce and implement any complex meters. In the second intervention the measurement system and meters were built. The meters were led from the success factors of the organisation with support of BSC. BSC offered the framework for measurement. The

views of the BSC was left like they typically are. The Z-model presents how the BSC works and the logic of it is clear. In the organisation it was like the model presents: the right and satisfied personnel (Personnel view), doing the right things (Internal process) leads to a high customer satisfaction and loyalty (Customer view). The result of that is high financial performance (Financial view). There should be a balance between financial and non-financial meters.

"What kind of measurement system does the organisation need?"

The organisation needs three kinds of measurement systems: For ad hoc-reporting, operational and tactical measuring and for strategic measuring.

Business Intelligence is used to give ad-hoc information and give alerts. It is used in operational decision making, when there is not time to report information. BI-systems can also give alerts when there is something wrong. Meters in this measurement system are updated in real-time. The problem with BI is that it is very expensive and that reduces its possibilities in the organisation.

One of the measurement systems should give information that is used in tactical decision making. In this case this measurement system was formed on the Balanced Scorecard-framework. The values of those meters will be updated monthly or quarterly. There was five to ten meters in each perspective and the perspectives were those which the BSC normally uses.

Strategy should have its own measurement system. In this case there was no communicated strategy. For this strategic measurement system I added the meters that are relevant to organisations' long term business. These meters focused on things that are examined once or twice in year. Someday, when there is a strategy in the organisation, the meters should be added in this first.

"What are the meaningful meters to the organisations and how to choose them?"

The organisation works in a field of consulting. In this case the main source of revenue and profit are personnel. That is the reason why meters related to personnel are highly important.

One big part of the organisation's business is device rental. It creates a significant part of the organisation's revenue. For this business segment, utilization rates and average rental prices are important meters. These play a significant role in the success factors measurement tool. In the Consulting Business the utilization rate of the personnel is also an important aspect. Invoicing rate of working hours is significant for profit. That is the reason to measure it and meters should also focus on things that could lead to a higher invoicing rate.

Before this study the organisation hasn't measured customer satisfaction systemically. Despite that it is important for business, without customers there is no revenue or profit. The work for customers is project-based in the organisation. Related to the meters there will be a survey for the customer after every project. There is a question related to the project and customer satisfaction. These questions are turned into meters and the values are updated after every project. This kind of practice also offers a good way for getting feedback from customers.

Meters in each measurement system are presented in appendixes.

"What is the process of building a measurement system to the organisation?"

An answer to the question can be presented as follows:

- Create a culture that is able to receive the message from the knowledge management
- Find out the need of measurement in the organisation (workshops)
- Make some pilot meters to familiarize the organisation members with measurement
- Gather feedback about those pilot meters
- Create a model for different measurement systems
- Find out the success factors of the organisation together with personnel
- Create a draft about measurement system and its meters for the management group
- Find out how these meters could be measured
- Make a pilot measurement system with meters and values
- Have a workshop about these with the management group
- Create tools that can gather the values for the meters
- Automate them if it is possible

- Modify the Business Intelligence system
- Launch the measurement system
- Gather feedback about the meters
- After that follows the phase of continuous improvement

"How the "new" information could be implemented in the organisations' daily operations?"

Implementation of the information was an issue that the original development project's plan focused more on than this study was able to. There were some challenges related to time and this section was shortened a bit. The implementation of the information is as important as the measurement. There is no point to measure if the information is not shared to the organisation's decision processes and operations. In this case there was no time to implement all the information in the organisation, but I created a model for that.

The main tool to share measured information in this case is through reporting. The meters that are created during this study are mainly for the management. In the developed operations model the management get their monthly report about success meters.

During this study there was not much discussion about what to report to the personnel. In my reporting model I propose that personnel get their report monthly and it consist of meaningful aspects to the operational level.

6.4 Changes in the researched meters

Meters are used to show changes in the researched. In chapter two meters which are used in this study are presented

The first meter focuses on the amount of information. The amount of meters at the beginning of this study and after this study are compared. It tells how much information the organisation is able to obtain in the new course of action. The result is presented in Table 2.

Table 2. Number of meters in different perspectives used in the study.

View	**At the start point**	**At the end of the study**
Financial	5	8
Customer	2	6
Operations and process	0	11
Personnel (Learning and growth)	0	12
Total	**7**	**37**

As the table above shows, the number of meters increased with the new measurement model. That affects the amount of information that the organisation has. There were no meters for operations and process, and personnel. With the new model there are many meters in the sections. The number of financial meters is higher than shown in the table, but the measures are not presented here in detail. The customer view is measured systematically in the new model and it gives significantly more information about the customer. The customer meters are related to the projects which also give information about how the customers sees the quality of the organisation.

The theory of the study presents, that there should be a balance between financial and non-financial meters. The decision making of the organisation works in the most efficient way if the decisions are based on financial and non-financial facts. The ratio is presented in Table 3.

Table 3. The ratio between financial and non-financial meters.

	At the start point		At the end of the study	
	Financial	non-financial	Financial	non-financial
Financial	5	0	7	1
Customer	2	0	0	6
Operations and process	0	0	2	9
Personnel (Learning and growth)	0	0	0	12
Ratio	100 /0		30/70	

As the table above shows, there is now more balanced ratio between non-financial and financial meters in new model. At the present state there were none non-financial meters and now main part of the meters are non-financial. The present meters offered a view about the results that the organisation is able to make. The new model gives a view also about the actions that the organisation make.

Before the study, there was one report which was sent to the management group and it included financial meters. In the new model, there is one report for success factors which is updated monthly. There is also a report for the scorecard, which is updated quarterly. The employees get their own report monthly. So the number of reports rose with the new model, which raises the amount of shared information. During that process the new information is implemented to the organisation's decision making.

One of the meters focused on the logins that the CEO made to the BI-system. With this meter it is possible to analyse how the produced information is implemented in the organisation's decision making. The vendor of the ERP/BI-system presented that CEO's typically actively use the tools in the systems. The result of this meter is presented in Table 4.

Table 4. The CEO's logins to the BI-system.

	Before the study	During the study
Logins that the CEO made to the BI-system	0	0

As the table shows there has not been any development in the use of BI-system by management. The use of information is important. If it is not used, it will not be implemented in the organisation's decision making process. The CEO was encouraged to use the BI-system during the study, but there has not been any change. Luckily, the other members of the management group used the system and through that the information was implemented in the organisation. The issue with the lack of use of the BI-system should be solved in the near future.

One objective of the study was obtain up-to date information by the meters. The information that the measurement system creates is as accurate as its source of information. The main source is information that the users add to the system. When the users add their information to the ERP as soon as the action is done, the more accurate the information is in the system. The results of this meter are presented in Figure 18.

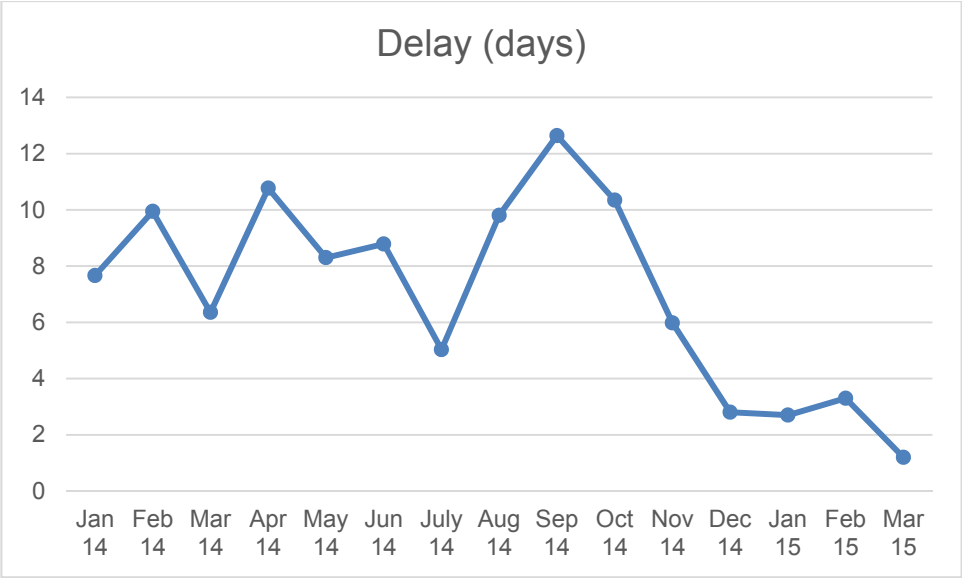

Figure 18. The average delay between action and the user inserting the data into the system.

The delay between the action and the time when the transaction is inserted to the ERP-system decreased during the study. After the summer, I noticed an issue that could be a problem in the future. There was significant delay between the employees' actions and the moment when the information was added to the ERP-system. During the first intervention, the focus was on that problem and the personnel was guided to add the information on a daily basis to the ERP-system. I also found that there were problems with the technical system or in the way of working. Some small technical changes were made to the system, but the main reason for the change was that the employees started adding information to the system daily. After the study the delay was below two days, which is acceptable.

One meter of this study was a personnel test. In the test there were nine questions related to rental prices of the equipment and utilization rates. Before this study, the organisation was not able to obtain this kind of information. The test was completed by employees, the sales manager, the CEO and project manager. The test group answered questions according to their perceived levels of rental price and utilization rates. The members of the test group were allowed to answer the questions and their answers were compared to information in the measurement system. The result of this test presents the gap between "the facts" of the employees that the decisions were based on before this study and the actual results in the measurement system used after this study. The difference is calculated by counting the median of a person's answers. This shows that

some decisions were made on faulty grounds. After this study, the organisation is able to get exact information about these things. The difference is presented in Table 5.

Table 5. Results of the personnel test.

	Person 1	Person 2	Person 3	Person 4	Person 5	Person 6	Ave-rage
Median of diffe-rentials	30 %	32 %	19 %	37 %	18 %	13 %	25 %
Max differential	300 %	20300 %	1340 %	2639 %	2900 %	2400 %	
Min diffrential	1 %	8 %	5 %	5 %	0 %	1 %	

As can be seen from the table, the average difference between reality and the answers was 25 percent. The difference between the answer and reality was in the best cases from zero to a couple percent. As a result from this table, one could assume that the organisation can get 25 percent accurate information to base a decision when they use the measurement system.

The shareholders of the company set one objective for this study. They presented, that the financial reporting of the organisation should be quicker, they needed information about monthly sales in a shorter timetable. During the study, the process for invoicing and accounting was examined and the bottle necks of it was eliminated. The invoicing process was the slowest part of the process and the lead time of this process was chosen as one meter of this study. The development of the lead time is presented in Figure 19.

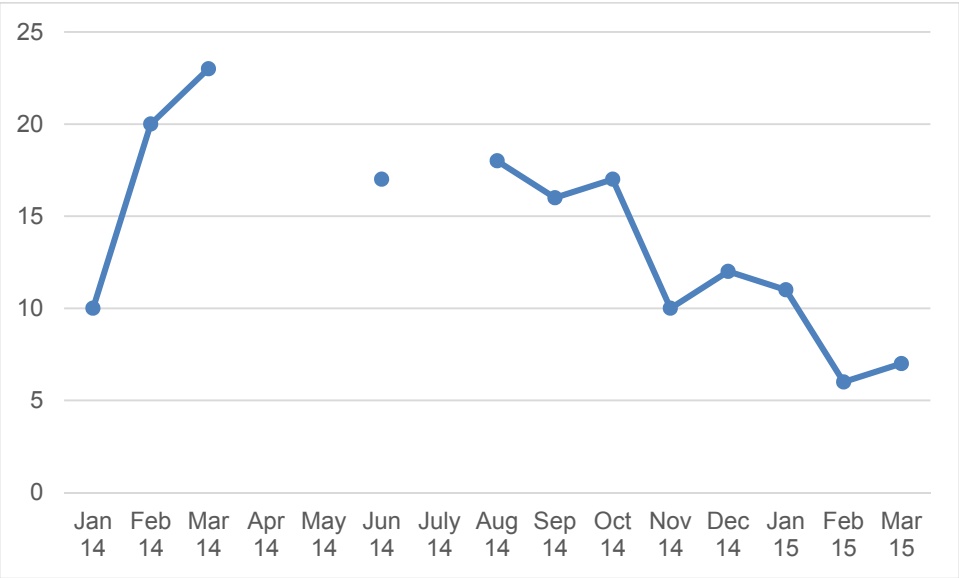

Figure 19. Lead time of invoicing process (days).

As Figure 19 shows, the lead time of the invoicing process has decreased during the study. There is no data from some moths, but the trend can be seen in the figure. There were no significant changes in the technical parts. Some major changes were made to the process. A major change was that the employees were guided to add their information to the system daily or before the second day of the next month. The change in practise was not big, but it can be seen in the results. The lead time at the end of the study was at the level that the shareholders had set.

The qualitative meters of the study are discussed in the next paragraphs.

“Do the meters measure the things that are meaningful to the organisation?”

Referring to the meetings with the management group they did not say that the meters were not meaningful. The measurement was quite new for the members and I think that more detailed feedback is available after the measurement model is fully implemented. The shareholder’s CIO, personnel manager and financial manager saw the model in the meeting. They wondered if it is possible to apply some meters to their organisation.

The theoretical framework is compared to the measurement model in chapter 7.3 Research reliability, validity and verification. It shows that in relation to the theory the model is built in the right way and the meters are chosen like the theory proposes.

“Is the new measurement model better than the old practise?”

I think it is clear that the new model offers much more information than the previous one. It also supports more efficient information sharing and through that, offers better ways to steer the organisation. The cost and benefits of the new and the old model are discussed in chapter 6.2.

7 Conclusions

This chapter provides the conclusions for the study. It discusses the project, the methodology, the reliability and validity of the study, and offers some proposals for further actions.

7.1 Evaluation of the development project

When I wrote the conclusions about the study I did not have an idea about whether the project is able to solve the challenges presented in this study. It will take time to see what kind of changes the implementation of the measurement brings to the organisation. Like Kankkunen et al. (2005, 117) present, the presentation and implementation of a measurement system in support of decision making, takes 12-18 months. It takes longer to make the measurement system part of the management philosophy. Referring to that fact, the objective to have the measurement system ready when the study ended was ambitious. The study took about ten months and there was some work done before that, so all in all, it took about a year.

The purpose of the study was to begin the journey into the world of knowledge management. Performance measurement and business intelligence systems are a good start for the journey. From that perspective this development project has accomplished its objective. The objective of the study was also to implement the meters in the organisation, but related to the challenges with time that was not possible. Most of the meters were implemented, but there was some that were not implemented. That is also the reason for the lack of feedback about the change. It was not possible to extend the time span of the study because it was a barrier to my graduation.

Related to the meters, the development was able to improve the measured issues. There was clear development in every meter except for the one that focused on the use of the information.

The development project could have accomplished more. I did most of the work and I should have made others participate more on the project. This study was not the only project or task that I performed during the months. This was one project next to others. It was hard to find time for the development project. My calendar was full, but so were

the others. It was hard to find a time when the whole management could use half of a day for thinking about measurement of the organisation. Meetings and workshops including the whole management lasted at best an hour. The development of the meters takes much more time and I was not able to make all the others participate. Hopefully the management starts to feel enthusiasm for the measurement when they find the benefits of it.

Referring to observations, this kind of development project is not only about developing tools. The big part in this kind of development project is the development of an organisational culture. In the beginning of this study the focus of the management was mainly on the costs. Through this study the management is now able to think about measuring not only as a financial issue.

The hypothesis of the study is: “By producing meters and measurement systems (Business Intelligence and Performance Measurement), the organisation can be more aware of its own situation and market environment. That enables knowledge management.” Referring to the challenges with the scheduling of the project, the measurement system was not fully implemented. For that reason, it is not possible to analyse fully if the organisation is more aware of its own situation and the market. The information that was developed through measurement systems gives an improved outlook for the organisation and its market. With the information it is possible to manage by knowledge. The hypothesis of the study can be partly proved.

According to my employer the development project is praiseworthy and my employer was satisfied with the results.

7.2 Action research as a development model

Action research was a great way to accomplish this development project. Action research offered a model to get from presents state towards the objectives. The environment of the study changed a lot during the development project. This kind of development project often carried out as a huge project. This kind of project is expensive and clumsy. I have seen some IT-projects that are carried out from large and detailed specifications to a completed system. The problem with those is that the needs change during the project and the real needs are sharpened during the project. When the project is ready and

completed according to the original specification description it does not reflect the real needs of the subscriber anymore.

Action research offers a good model to accomplish these kinds of evolving projects. The project is chopped into small phases and after every phase follows evaluation of the change and construction of a new action plan. It allows time for stopping and thinking about what really should be done. If this development project had been carried out in a traditional way, I dare say that the results would have looked different. In action research the results of the study can be seen during the study and it is great because the developer is able to show concrete results to the management before the project ends.

In the beginning of the study, I made a rough model of interventions included in this study. During the study, I modified the interventions because I had to. For example, when the first intervention was completed, I was able to specify more precisely that there was a need to develop a tool for counting project's profitability

I found some similarities between agile methods and action research during the study. Agile methods are nowadays used a lot for software projects. Action research and Lean-methods also have some similarities.

7.3 Research reliability, validity and verification

Typically research is examined through validity and reliability. Hirsjärvi et al. (2010, 232) present, that analyse of these preferences is mostly used in quantitative research and the use of these is challenging in the context of qualitative research. One approach for evaluation of qualitative research is presented by Lincoln et al. (1985, 43) in writing "Naturalistic Inquiry". The four evaluation criteria for qualitative research are:

1. Transferability
2. Credibility
3. Dependability
4. Confirmability

Transferability tells how the results of the study can be transferred to other cases or organisations. Are the results true also for other companies? (Lincoln et al. 1985, 123.) Kananen (2014, 133) presents that the transferability of the research is better when the documentation of the study is detailed. This study is made for the organisation. There

are some specialities in the organisation's business and in the organisation's culture. One example of itis that there was no strategy in the organisation. The process for building a measurement system does not actively discuss with the strategy. That weakens the transferability of this study to the organisations that have a strategy. If the company does not have a strategy or a measurement system this study and the results of it can be exploited in the beginning of a journey into knowledge management. There is more documentation related to the study, but there are two reasons for some of them being left outside of this report. Firstly, part of the documentation is business critical and under secrecy. Secondly, if all the material was included to this study it would have been over a hundred pages long. All meaningful and public information is presented in this study.

Credibility refers to how credible the results of the research is (Lincoln et al. 1985, 11). The credibility of the research can be evaluated by those who have been the target of the research. They can confirm the results of the study. (Kananen 2014, 133.)

Dependability refers to how easily the research can be repeated by another researcher. Is it possible to follow the research process, selections and decisions which were made during the process? (Lincoln et al. 1985). Kananen (2014, 133) presents, that repeated research cannot produce same the kind of results because the research situation effects the researched persons. The process in this study could be repeated in other organisations. Related to the present state and its challenges the results of the study could vary. Every organisation has different needs for measurement and those should be specified during the research process. The process of development of the measurement system can be the same. The content of the measurement system(s) should vary between different organisations

Confirmability describes if it is possible to end up at the same kind of conclusions if the researcher or methodology is different. (Lincoln et al. 1985). The field of performance measurements, Business intelligence and balanced scorecard is comprehensively researched. It is common in the field that projects have high failure rates, but when they are finalized the systems produce information. This information gives advantages compared to competitors and helps organisations to achieve higher performance. In this case, there were challenges in the implementation of the meters and this caused problems for the schedule. According to other studies these incidences are common in these projects. At this point one is not able to analyse if the organisation is able to increase its performance through the measurement system, but now it has the tools for it.

The results of this study can be tested against the theory. The measurement system is based on the Balanced Scorecard. BSC has perspectives and we used those default perspectives in the organisation. Each of the perspectives answers to a specific question. The verification of the new model of measurement can be done by comparing the questions to the answers that the new model is able to give

Referring to Malmi et al. (2006, 25) the financial perspective of the measurement framework should answer to those questions that the shareholders are interested about. During the study the shareholders were interested only things related to financial issues. The new model of measurement gives financial information more precisely and in different perspective than before.

According to Malmi et al. (2006, 25) the perspective of the customer should answer two questions: How does the organisation succeed in the market? What should the organisation offer its customers to satisfy them? The meters which answers the second question should also describe the organisation's competition strategy. The new model for measurement answers how the organisation is succeeding in the market. Quality is one of the organisation's competitive advantages. In the new model of measurement, quality is measured after every project. Scheduling is one thing that the customer appreciates in the field of the organisation. Scheduling is measured after every project by a survey. The survey is transformed into meters. . When it comes to the second question (about what to offer clients), the development in the measurement framework is still taking place.

The internal processes measured those processes in which an organisation should succeed perfectly to achieve the objectives that are mentioned in the financial and customer perspectives (Malmi et al. 2006, 27-28). The meters in the process perspective of the measurement system answers the things presented above.

The perspective for learning and growth should answer the question: Is the organisation able to develop and create value to its owners in the future? (Malmi et al. 2006, 28-29.) In the new measurement model, the perspective for learning and growth focuses on personnel. Lönnqvist (2006) presents, that in expert organisations personnel is the most critical factor related to the organisation's future. The case-organisation works in the field of consulting. It is natural that the new model for measurement has meters that are related to personnel (and at the same time to the organisations future). In a nutshell: If the

employees are not satisfied with working for the organisation there will not be any employees in the future. This leads to a situation where the growth is impossible.

7.4 Proposals for further actions

The main issue after the study is to complete the implementation of the measurement system. The measurement model and reporting practices related to it, should be implemented in the decision making processes and to the organisation's daily operations. With this study the organisation is able to finish the process. After the study I continue with the project. The investments for the project and the survey tool are so small that I hope the organisations will invest in them quickly. It is possible to implement them before the summer.

After the implementation it is time to analyse the values of the meters. From the present values the objectives for the future meters should be created. There is no sense in measuring if there are no objectives for different measures reflecting the change. According to the theory the objectives should be led from the strategy of the organisation. I think that I was able to adapt the (possible) coming strategy also to the present meters. So, it is possible that the implementation of the strategy does not cause significant changes to the measures. I propose that in the future, the management spends one or two hours together just for analysing the meters.

One big feature of the BI-systems are the forecasting tools. Development of these tools takes a lot of resources. During the study, there was only some pilot meters that had the ability to forecast. In the last meeting with the management a discussion about forecasting meters was held. Referring to those discussions, I am not sure if the organisation still needs those. The need can be specified more precisely in the future. If I think about the business of the organisation, the company could not optimize much even if they got forecasts. I have also seen that sometimes changes takes place rapidly in the field of the organisation. Bigger changes in business or strategy can led to situation where this kind of forecasting is more beneficial.

The measurements systems weight is recommended to move towards the ERP's BI-module in the future. The automation of the meters costs but in this case, the manual work is more expensive in the long-term. It is also possible to construct alerting preferences, which, for example, send notifications when a value is under or over the limit,

upon the BI-system. This kind of alerting could be linked to the utilization rates of the devices. To the ERP-module it is also possible to integrate automatic reporting. Again it is costly, but in the long term it will be less expensive than manual work.

In this study the measurement model was implemented at Finnrock. That process was unfinished when the study ended. The meters are designed in a way, so that it is possible to use the same meters and measurement model in the whole Consulting Business. The implementation of those follows the same process as in Finnrock.

To get the greatest benefit from the meters, there should be a strategy. I propose that the organisation creates a strategy. From that strategy the objectives can be led. The meters should reflect the objectives and this is the process that the organisation should perform. It does not mean that the meters created during this study are unnecessary, but that the measurement framework can be updated after the strategy and objective are created.

7.5 Final words

Like I presented in the introduction, it is possible to win a hockey game by watching only the scoreboard but it is not possible to win the whole season with that method. The same applies to the business world. Many organisations are led by only looking at the revenue and profit. Of course, these are the most important values for organisations. But these numbers give a very limited view of the organisation and its state. In the long term, a business needs all of its components measured and developed continuously. If customers or personnel are not satisfied, it is not possible to have a profitable business on the long term. If the revenue starts to fall, it is hard to find the reason for the decline, if the organisation is not measured in different kinds of ways. Management through financial numbers only is old fashioned and in the toughened competition environment it is almost a barrier to success. The measurement itself does not provide many advantages, but it enables things that improves the performance of the organisation. If measuring performance management is pointless, I am sure that big companies would not have done so for years in vain.

The subject of the study is wide and during the study there was a lot of work. Like the theory presents, the journey into the world of knowledge management is long and the first steps are the most difficult to take. After concluding this study, I agree with that

statement. I am sure that in a year from now the benefits of the study can be seen more clearly with the measurement system implemented completely. When the organisation is able to apply the new information into decision making, the project starts to return its investment.

The new model for measurement and reporting creates much more information than the one before this study. The number of meters rose significantly. The model for reporting provides much more information sharing and through that, more information and knowledge creation than the past one. And that is the common thread throughout the study. The study was also able to solve some challenges with the practices of the company. The information in the ERP-system is more up-to-date after the study. The shareholders are able to achieve information about sales faster from now on.

For me, this study was very instructive. I learned the process of measurement system construction and analysing meters that are meaningful to an organisation. I also learned how important it is to get managers involved in this kind of project. During the study, I familiarized myself with different kinds of BI-tools. But tools are only tools, the main point is the information those tools create, and how it is shared in an organisation. The prices of BI-projects are easily hundreds of thousands of euros. These kinds of developed BI-systems are able to give information about almost everything. But is all that necessary? It is always nice to have detailed information, but it does not always add any value to the management of an organisation. The study has improved my English, a great by-product of this development project.

I made my last master's thesis for Oy Forcit Ab. The subject of it was development of practices related to CRM-tool implementation. In the study I presented that the CRM is more of a journey than a project. At the end of the study, I wished them a pleasant journey during my final words. Again I am at that point. This time the study was a journey towards knowledge management. In the world of KM there are a lot of projects, many related to implementation. The idea behind KM is continuous improvement or continuous development. It means that nothing will be ready, nor is it supposed to be. To reach the greatest benefit for the organisation the systems should be updated regularly. The innovation related to the information never stops. I hope that the organisation is able to assimilate this. With these words I wish the organisation a pleasant journey into the world of KM.

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