Eva-Stina Jokiniemi

Report Offering

2018

Helsinki Metropolia University of Applied Sciences

Master of Business Administration

Business Informatics

Thesis

19 January 2018

Helsinki Metropolia University of Applied Sciences

Author(s) Title Number of Pages Date	Eva-Stina Jokiniemi Report Offering 33 pages 19 January 2018
Degree	Master of Business Administration
Degree Programme	Business Informatics
Instructor(s)	Antti Hovi, Senior Lecturer

The objective of this Master's thesis was to build up a suggestion on how to improve report offering. The suggestion was made for a company, which operates in telecommunication industry. The suggestion introduces several steps that needs to be taken into consideration when planning to improve the current report offering.

Both qualitative and quantitative research methods were used in this study. The qualitative research method included informal interviews done by phone and email. It also included data from a previous customer survey that was originally sent out to serve another purpose. The quantitative research method included two separate datasets that were used to analyse the current state of report offering.

The results of both qualitative and quantitative research methods indicated that some actions could be used to improve the current selection of reports and the report offering. There currently exists a wide selection of reports available in production and it would be a good idea to reduce the amount of reports as well as to combine some similar reports into wider concepts. The current state analyses also indicated that some internal training, process definitions and training sessions for stakeholders could be improved.

The conceptual framework of this study was based on information, information delivery, information quality and report visualization. It also included a case example of reporting improvement case that was processed in Radiology.

The study resulted in a suggestion for improving report offering. The suggestion included several issues that need to be taken into consideration when setting up a project to improve report offering. The suggestion included the following topics: to plan and implement a strategy as a part of reporting, management commitment and resources, knowing your audience, cleaning up old reports, create an internal process for report creation, combining existing reports, documentation, internal and external training and auditing. It is also important to keep improving report offering as an on-going action learning process.

Keywords	Report offering, information delivery, data visualization

Contents

1 Introduction

1.1 Overview

The topic of this study was chosen based on the author's interest on reporting and on a real business need that the author and her colleagues and managers face on their everyday work. This thesis covers a suggestion how to improve the case company's current report offering to a stage that it will better serve customers and users, and also will reduce the amount of maintaining and developing several similar types of reports. This thesis will not cover legal challenges and regulations in telecommunication industry that usually needs to be taken into consideration when creating, managing and transferring information.

1.2 Business challenge, objective and scope

The business challenge is that the case company's reporting department has quite a wide variety of reports and dashboards to full fill organization's several types of reporting needs. Currently the variety is broad and it also includes numerous amount of ad-hoc reports. The current report selection should be improved to be able to serve customers better in a more effective way, and also make maintenance side of the reporting easier, more structured and lighter. There is also an internal challenge within this business challenge, it is not always clear what type of reports other report managers do have or are currently working on, especially when looking into stand-alone and ad-hoc reports and ad-hoc reporting. That said, there might be some reports in production that are overlapping with other existing production reports.

The objective of this study is to create a written suggestion how to improve the current report offering. Currently there are numerous reports that are used in several operations within the organization and some of the reports might be very like each other and some of them might overlap with other reports. It is also occasionally a bit challenging for customers to find the correct report or the right information needed, especially for new hires. From maintenance perspective, it is also time consuming to maintain, update and create several similar reports and dashboards. Also, it is not profitable to have separate reports

for different customers and users if one report could serve several customers at the same time. The output of this study will be a written suggestion how to improve the current report offering.

1.3 Case Company

The case company is one of the leading telecommunication businesses in Finland. It has operations all over the country and years of experience of being a stable and a productive telecommunication business.

The company has several operations and departments. One of the company's departments is specialized in reporting, report development and analyses (information delivery). This reporting department is responsible for the company's diverse and rapidly growing reporting needs. That also includes providing reports for business customers outside of the company, (to help them to monitor their mobile phone and telecommunication usage and costs). On this theses business customer reporting for the customers outside of the company is out of scope. That part of the reporting has been already organized in the recent years.

1.4 Outline

This thesis will study the problem by gathering currently available information about the current selection of reports and the current process and as well how to create and publish new reports into production. This will be done by informal email interview, gathering data about current report offering and by using result of an existing customer survey that has taken place in 2016. Based on the results, some additional interviews might be done, but only if the results are not clear enough. To be able to understand the problem fully and to be able to perform a solution, some literature research needs to be done. This study will find information about similar challenges from books, journals and internet and use TedTalk recordings to find business examples.

First step will be gathering data what is needed for current state analysis. On the current state analysis, some additional informal interviews might be done if necessary to clarify some of the datasets.

Second step of this thesis will cover some literature review to get a good understanding about similar challenges, how an efficient reporting should be done, what needs to be taken into consideration when creating new reports, how to transfer information and how to keep report offering as efficient as possible.

The third step is to find a solution to the current challenge and then write a suggestion how to improve the current report offering.

The last part of this thesis will be a summary of the thesis and an evaluation of the thesis.

2 Method and material

On this chapter, the details of this study will be covered. This will include detailed steps that will be taken while this project will be delivered. Research methods and materials have been chosen based on the writer's personal experience in reporting field and based on information received from the case company's management.

2.1 Research Approach

Research approach for this thesis is mostly based on writer's experiment. The writer has been working within reporting for almost 10 years both in Finland and abroad and in several large organizations.

To be able to have a good understanding of the specified business challenge, it is important first to search literature for information delivery, information management and information quality and report visualization. Reporting can be seen as information delivery to its stakeholders. Information is being delivered by the forms of several reports to those who needs that information. More about different types of information and information delivery will be found in chapter 4 in this thesis. Therefore, the first thing is to get a good understanding of information delivery and how other organization have been building up their reporting hierarchy.

The second set is to get valid information about the current state of the current report offering and what processes there are in place. Current state analysis will include some data that already has been produced earlier. This includes searching for information from current production reporting site and also include some results from a survey that has been sent to end users in 2016 (for those end-users who are using reporting department's information delivery). Also, a manager view of current state status is included.

The output of current state analysis will be a summary of following:

- Summary of reports and processes
- List of strengths and weaknesses

The next step will be building up a written plan for improving the current report offering. This will include tips and advice how to move from current status into more improved and efficient way of reporting.

The last part of this thesis will be feedback and evaluation. Feedback for the suggestion from the management will be asked for. This will be done via email and phone, depending on what is the best approach to get a feedback. Once the feedback has been received, the written plan will be modified if necessary or thoughts for future will be collected. The final state of this thesis will be a summary of the final plan.

2.2 Research Design

The first phase of this project was to set up objectives. On this case, the objective is to develop a suggestion how to improve the current report offering.

The second phase of this project was to fully understand the current selection of reports and to understand the current processes of updating and or creating and deleting existing production reports from the report selection. The main purpose of the current state analysis was to find the strengths and the weaknesses of the current situation.

The third phase of this project was finding information about existing knowledge. What is needed for efficient information delivery, what is information and how to manage information delivery and what also to understand how visualization effects on information delivery and why visualization is important. The purpose of this phase was to create conceptual framework that will be useful for this type of research.

The forth phase of this project was building up a plan how to improve the current report offering. This was done based on the data that has been gathered during this research process.

The fifth phase of this project was to get feedback. The feedback is written as one of the last parts of this study and give some thoughts for the future.

The research design process itself will follow a research process shown in Figure1. The research process includes three different datasets that are used in this study. Datasets are shown on the left-hand side of the figure and outputs of each sections are shown on

the right-hand side of the figure. The data gathering methods and analysis of this this process will be presented in more details in the next chapter: Data Collection and Analysis.

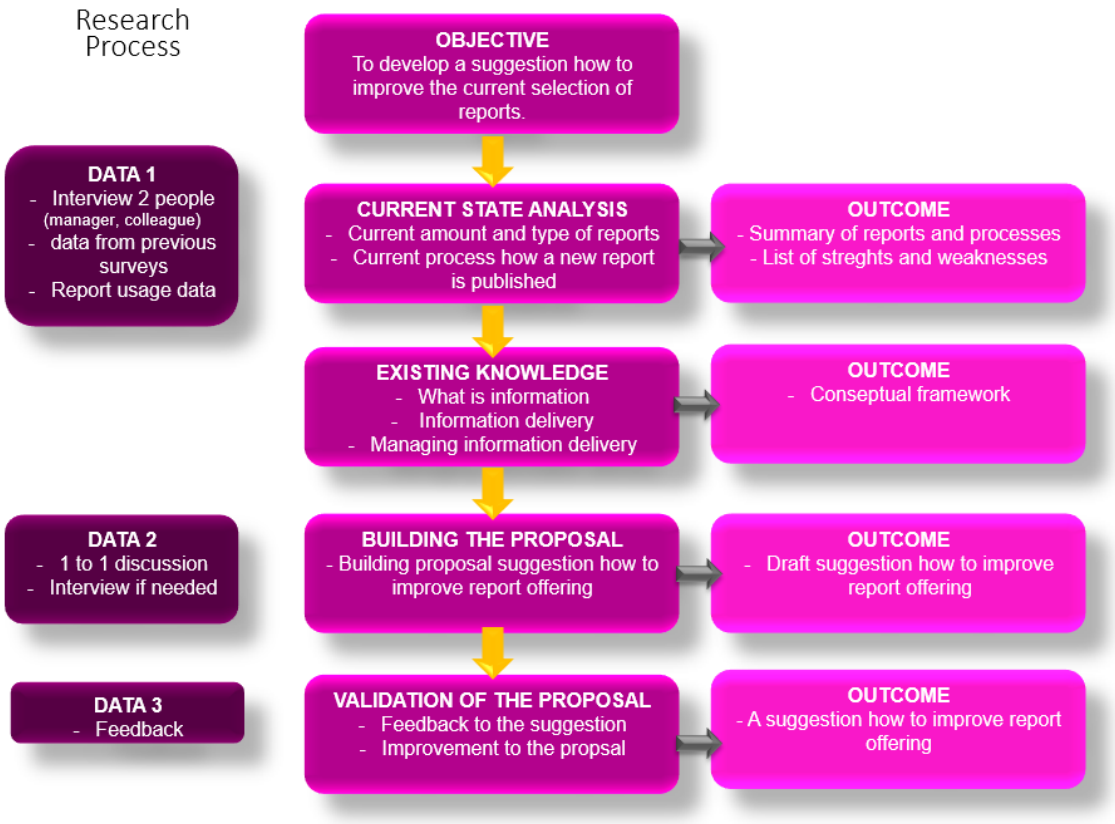

Figure 1. Research process flow chart.

2.3 Data Collection and Analysis

The first dataset was collected before the start of this research. An informal interview with one of the managers, that was initially done to understand the problem, described the challenge quite well. The interview described what the possible weak points of the current process are and what do they want to be in the future. Another informal interview was done via email with one of colleagues who already started working on with this challenge. Also, the first dataset included data from previous survey. That survey was sent to the customers of reporting department. The survey was not intended or planned for this research, but interesting and valuable information was gathered from that survey. Last but not least, the first dataset also included a report of reports (usage reports.) This report was set up for this research and it indicated how often a report has been viewed,

opened, updated, modified etc. (utilization report.) Based on the first dataset, a current state analysis was processed.

The second dataset was gathered via informal interviews and one to one discussions with managers and colleagues. This was done during the research process via email and telephone. The second dataset gave an idea of the draft version for the suggestion how to improve report offering. There was also a change in the management team during this process, but it did not have any impact on this research.

The third dataset was a feedback for the suggestion how to improve report offering. The feedback gave some future thoughts and ideas to consider.

3 Current state analysis

A current state analysis is a present set of circumstances. Where are we now and how are we processing our tasks. This chapter will introduce the current state of report offering in the case company. It is important to understand the current processes and methods inside the reporting department. Also understanding the content of current report offering is important, otherwise there is no efficient way to improve the current report offering.

Currently there are several different types of reports and dashboards. Reporting offering currently is quite wide. Reports have been mainly categorized by the needs of different departments or units of the organization. For example, business to business organization have their own set of reports, finance have their own set of reports, business to consumers have their own set or reports etc. In other words, reporting sets have been built up by depending on the end user's organizational location. Therefore, there have been some reports that might overlap with some other reports.

3.1 Management interview

As a start of this study, there was an informal interview with the head of reporting to understand the scope of this project. In the last years, there have been some organizational changes in the company and reporting department needs to improve their report offering to be able to promptly answer to customers' needs in a fast pace environment. Currently there are many reports available and new reports are created quite often, especially ad-hoc reports. In the future, the plan is to have a well-organized report catalogue that will cover most of the company's reporting needs. This will require time and effort of all stakeholders.

From management perspective the current process ensures quick delivery and it is very easy for the customers. However, there are some development areas which are: some similarity in reports, new reports are created on light bases, maintenance takes time due to the amount of several separate reports, information could be shared more inside and outside of the department and report offering could be improved by combining some of the reports, perhaps into wider units and dashboards when it is doable.

3.2 Data from previous survey

A customer satisfaction survey was done in 2016 to understand how reporting organization is serving their customers. This survey was sent to most of the customers inside the company. Answers to this survey were received from variety of departments. The key finding from this survey was that there are many reports and no clear process how reporting organization works. However, ad-hoc reporting was mentioned to be good and even very customized reporting needs have been fulfilled successfully.

In the beginning of this study, there was a plan to send out a detailed questionnaire to all reporting department stakeholders but at that point there was no need for additional information. Satisfactory information was found on this previous survey.

3.3 Report usage data

To understand the amount and the variety of all reports, a report that shows utilization was created. Actually, there has been one report in use previously that has been extremely good but for this purpose a new utilization report was created. The reason for this report was to get more detailed information in case some new information might come up for that specific report that was not visible on the report that was created earlier.

The difference between these two reports are not that big. The first previously existing report included all reports from all reporting platforms and the one created later concentrated only on one main reporting platform. Both of these reports indicated how often a report has been modified. On this study the utilization report was used as a main source of information. This utilization report includes detailed information of reports including: modified date, owner, last viewed, last refreshed. By reading this report it was easy to see if there were reports that were not in use in the near past.

From both of reports it was easy to see that there is in fact a very good selection / variety of reports. However, maintaining such many reports is time consuming and some similarities on the reports were found.

3.4 Current process for a report delivery

At the beginning of this study there were no clear process flow charts how a report is created. Below a light version of the current process for a report delivery. This process chart was created by the experience I have had while working in the reporting department.

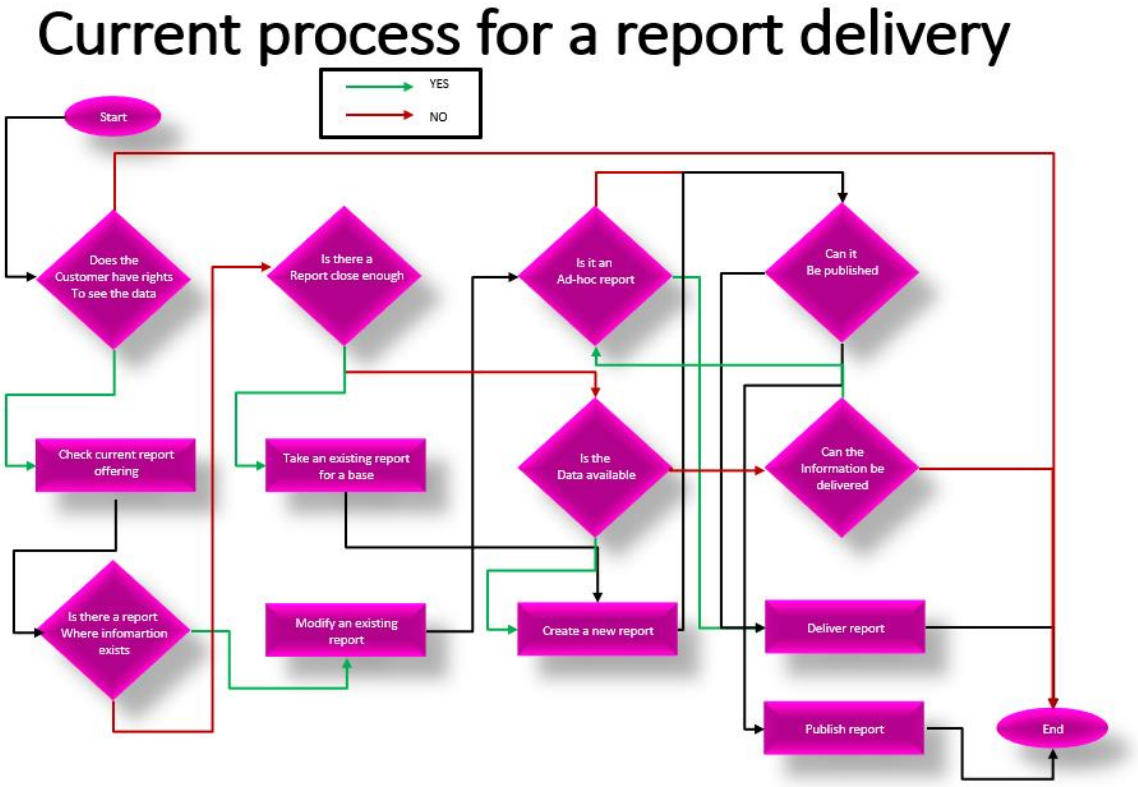

Figure 2. Current process for a report delivery.

When a customer orders a new report or asks for information, the first thing that needs to be validated is that does the customer have the right to see the data is she/he allowed to get the information she/he requires. Due to regulations and laws there are strict rules what information can be delivered and who is allowed to see that information. Once that has been resolved, the reporting manager needs to find out if a report already exists where this required information could be found. If there is not a report where information already exists, there might be a report that is close enough. That means a report which can have the required information with a minimal modifications. If there is not an existing report or a report close enough, a new report must be created. The first step is to understand if it is an ad-hoc report or perhaps a report that could be used later on. When a new report is being created, the first step is to find out if the data is available? If the data is not available, the next step is to find out if the information can be delivered at all. If the

data is available, the last part of the process is to find out if the report can be published on the report offering tree, meaning production or should it be delivered with other methods for the user.

3.5 Strengths and weaknesses

The data sources pointed out some strengths and weaknesses of the current method of managing report offering. From customer satisfaction survey it came up that the current way of delivering reports provides good ad-hoc reporting, very customized reports for specific needs and well working reports. The weaknesses that came up are: not clear where to order new reports, it takes time to get data for some areas, lack of resources, too many reports, not clear what reporting department has to offer and no specific delivery times.

Current production report catalogue and utilization report indicates that there is a good variety of reports that are in active use. The weaknesses are that maintaining this wide variety of reports might take too much time and resources and some similarities on the reports can be found. For example same information could be presented in several reports that are published for different end users.

Management interview in dictated that the current process has very quick report delivery and there are plenty of reports available. However, it looks that there are some similar reports and new reports are perhaps created on light bases. Maintenance of such a large variety takes some time and in some cases information is not properly shared within the reporting department. Also, the variety of reports could be improved in the current report offering.

The current method has some limitations that cannot be resolved. The data on this business field is quite complicated and also closely regulated and protected by laws and regulations. This already causes some challenges in the report delivery and it is important to keep in mind that these regulations occasionally could cause the reason why same information has to be published on several reports.

As a summary of the current state analysis is that reporting offering could be improved. The biggest strengths of the current process is that report delivery is very quick, a reporting manager is able to work quite independently and use flexible way of processing

daily tasks. Customers receives the exact information they need and from customer perspective it is very easy and flexible. However, there are some main development areas such as: a new report is created on light bases, documentations of the reports are not necessarily up to date, information is not always shared with other reporting managers and wide variety of reports could be also seen as a development are. Based on the data, it is possible to minimize the variety and therefore improve the current report offering.

4 Conceptual framework

First to be able to understand the importance of information, we need to look at what information really is. There are several definitions of information but this thesis will only cover information from reporting perspective. Meaning what types of information is relevant regarding to information delivery. Information can also be classified into several different types. Chapter 4.1 will include definitions of information, mainly from reporting and information delivery perspective.

When we look at information delivery and reporting, we also need to understand what report and data visualization means. Visualization might have a big impact on how information delivery is successfully organized.

Of course, one very important factor while looking at reporting is information delivery. What is information delivery and why it is so important in many organizations now days. On this thesis information delivery will be covered later.

Once we have gone through information and definitions of information and we have a good understanding of information delivery, it is time to think about audits. There are several ways and levels to perform audits. More about audits, will be covered in its own chapter.

Best practice will not cover legal matters and regulations from telecommunication company perspective. This is a wide matter and therefore it should probably be considered as a separate project within report hierarchy.

4.1 What is information

Quite often we see words data, knowledge and information. In some cases, these terms are used as synonyms. However, there is a difference between all these terms. Data is facts of something, information is captured data and knowledge is what we know. (The Differences Between Data, Information and Knowledge :: Infogineering - Master Your Information, 2017). On this study the main focus will be information.

One important part of reporting is to understand what information is. Therefore, reporting could be seen as information delivery in a company. Reports are not just data, it is information that has been created for people to understand the company's operations and behaviour. By information a company seeks to improve their efficiency and make business decisions.

To be more specific, information is organized data for a purpose which is presented with a context that gives it a meaning. Information could decrease uncertainty and lead to more understanding of data. Information is valuable since it affects decision making or outcome. (Good one to know!, 2017). A good example of information is sales numbers that have increased in the last quarter by 25%. Based on the information, production manager could increase production to be able to fulfil demand.

Today's world we talk about information society. Information society is: "A society with widespread access to and transfer of digital information within business and the community." (Chaffey and Wood, 2005, 7). It is important to understand how vital information is for todays' world. Without information this society would quickly run into difficulties and all affairs would be vulnerable to disruption. (Chaffey and Wood, 2005, 7).

Today we have plenty of information around us. Also, the flow of information between a company and their stakeholders increases all the time. Information overload is defined as: "The capacity of individuals and systems within an organization to derive value from information is exceeded by the volume and complexity of information." (Chaffey and Wood, 2005, 11). However, to avoid information overload, some technology-enabled methods could be used. These are aggregating, summarizing, filtering and alerting. By aggregating you can show the big picture instead of the individual datasets. By summarizing you can give an abstract of the information. By filtering you can remove less relevant information and by alerting, you can send piece of information with on-screen messages. (Chaffey and Wood, 2005, 11).

Information is extremely important to all organizations and businesses. Company's performance can be easily monitored with information. Therefore, information is used to support processes within a company. Information enables a company to sense what is going on in the external environment and react accordingly. It helps a company to research demand for products, it also helps to monitor and control operating processes,

exchange information within stakeholders and communicate both internally and externally.

4.1.1 Types of Information

There are different types of information. There is structured information, which is presented in reports, tables and graphs, unstructured information, which could be delivered on an ad-hoc bases or verbally, formal information which could be part of established reporting and communication or informal information, which is ad-hoc communication e.g. email or conversations. All these forms of information are available from both internal and external data sources. Also, these often needs to be managed separately. (Chaffey and Wood, 2005, 28 - 29).

Management of information to achieve better results involves management of information lifecycle. The information lifecycle is a dynamic process that has five elements: capture, organize, process, maintain and destroy. A good example of information lifecycle is customer records. First you collect information of you customer e.g. customer details, then you organize it in your database, you process the information; meaning you process analysis about this customer, you maintain the customer records and after 5 – 10 years for legal purposes, you delete the records. (Chaffey and Wood, 2005, 31 - 32).

People are very keen to process different types of information. An individual processes information quite similar way than a computer that takes in information, processes it according to programmatic rules and then gives an output. (Information Processing | Simply Psychology, 2017)

4.2 Managing Information delivery

Information delivery contains basically everything in an organization. It is very wide concept. On this study, only few points have been risen up just to get an understanding how this part has an impact on reporting.

Teaching could be seen as information delivery. First you learn something new and the next second you share the information you learned with other people. There are multiple ways to deliver information. The first thing you need to know is to crack the code. To

understand how you can simply delivery information to your audience. You can use comparisons, visualization or find totally new ways to do things. If information is not understood, the fault is on the person / method who delivers the information. One important factor is, that you need to know your audience. Know a little bit of their behaviour, how they respond and how they learn new things. (TEDxLaSierraUniversity, 2015).

When talking about delivering information inside an organization it is important to understand the complexity of information management. Information management encompasses people, processes, technology and content. In the last decades the growth of electronical information has increased and therefore information management has become a bit more challenging. There are some very common problems like, large number of systems, little integration between systems, legacy systems that should be replaced, no clear strategic direction, direct competition between systems, limited adoption of existing information systems by employees, poor quality of information, little recognition by senior management, limited resources, lack of enterprise-wide definitions, large number of diverse business needs, lack of clarity, difficulties in changing habits and internal politics that impacts on the ability to coordinate. (10 principles of effective information management, 2017).

On the article 10 principles of effective information management it is presented that there are ten key principles to ensure that information management activities are effective and successful. These key principles are: recognise complexity, focus on adoption, deliver tangible & visible benefits, prioritise according to business needs, take a journey of a thousand steps, provide strong leadership, mitigate risks, communicate extensively, aim to deliver a seamless user experience and choose the first project very carefully. (10 principles of effective information management, 2017).

4.2.1 Information strategy

Information strategy is a detailed plan for sharing and using information inside an organization. It should be closely linked to the organizations overall strategy.

Chaffey and Wood define information strategy in their book Business Information Management as: “Definition of management approaches to the organization, control and application of organizational information resources through coordination of people and

technology resources in order to support organizational strategy and processes." (Chaffey and Wood, 2005, 180).

Information strategy is needed to protect information from malicious or accidental events which destroy or corrupt the data. Also, data quality is another issue. (Chaffey and Wood, 2005, 181).

On this study information strategy will not be presented in more details but in the future, further investigation of this subject might be valid. It is vital to know that information strategy plays a role also in reporting.

4.3 Information quality

Information quality is important. Without good-quality, relevant information and without the right information at the right time might have severe consequences. With poor quality information it is hard for management to process their business decision. (Chaffey and Wood, 2005, 504).

Chaffey and Wood presents an interesting model for information quality in their book called Business Information management. DIKAR model. It nicely describes the transformation of data. The model has five points. Data, information, knowledge, action and results.

1. Data contains data quality (accuracy, completeness, validity, consistency)
2. Information contains information quality (data quality, definition clarity, relevance, presentation, timeliness, availability)
3. Knowledge contains knowledge quality (information quality, ASHEN factors, prior experience, explicit knowledge, tacit knowledge)
4. Action contains action quality (appropriate, timely, clarity)
5. Results contains results quality (consistent with objectives, effectiveness, efficiency)

The typical approach to use this model is from data to results, however results-driven approach is recommended and considered as a better approach. It means that you start with the results and then deduce the knowledge required needed to achieve your results. This model also indicates that to achieve information quality, you need to understand and manage both knowledge and data quality. (Chaffey and Wood, 2005, 506 - 507).

4.4 Report visualization

Data visualization is one of the hot topics today in reporting business and information delivery. How should we present the data we have, who needs the data, what are the key indicators that needs to be monitored, how can we make the data look so easy and understandable that even our great grandmother understands it? Think about a situation where you have two pages of the same topic. The first page has a nice picture, perhaps a colourful chart about last year's expenses and the second page has just a few lines explaining the same information as the colourful chart shows on the first page. Which one feels better? Would you remember the picture better than the few lines?

Traditionally reporting has been more or less several types of Excel spreadsheets, pivot tables or simple graphics on PowerPoint slides. Not so much graphics, mainly just numbers after numbers. However, data visualization has been there already for quite a long time, you know those charts that you have seen in almost every corporation's financial reports: pie charts, line charts etc. Those charts are one format of data visualization. However today, we need more than that. Our data is getting more complicated, very hard to understand and therefore you just must be able show the complex data in an easy way so that it is understandable and usable. We also want to modify our data on our visual reports when needed, we are not happy with static graphics. That adds a nice touch on today's reporting. Traditional spreadsheets and slideshows are not the right tools for interactive data visualization. Luckily today, there are several tools available, that will make data presentation quite easy, simple and agile. E.g. Tableau, SAP Business Objects and SAS Visual analytics. With the help of these tools you can modify the data into visual components and dashboards, even so that complicated data and data from different data sources looks easy and understandable. The big question here is, that how can we present data in a way that it is clear for every user to understand what is going on in the business? Answer to that question is simple: through visualization. Data visualization is vital because through visualization we humans are trying to see patterns in data to understand the meaning of the data.

When we are representing data, we need to understand what is data, what the data is for and how to represent different datasets in an easy memorable way. Visualization is one of the key factors in representing data and datasets. In fact, visualization is one of the key elements in the whole business reporting field. While we are building up our story

board for a new report or a dashboard, we need to bear in mind that we are representing data to an audience not just to ourselves. Our audience needs to understand what is going on and be able to use that information on their business decisions.

We need to remember that data represents a lot more than just numbers. We need to understand what data represents. Yau Nathan defines data representation as a snapshot of a moment of life in his book called Data Points. That said, data is more than just numbers and to be able to visualize data, we need to understand what data represents. (Yau, 2013, 2).

Then why data visualization? Vision is the best sense a human has. We understand our surroundings with our eyesight. It is actually estimated that eyesight delivers information into our brains eight times more than all other senses together. In the best-case scenario, a picture can make us realize something that we have never seen before or something that we did not expect to see. (Koponen, Hildén and Vapaasalo, 2016, 17 - 18).

Then what is data visualization? Data visualization is encoding data with different type of shapes and colours. Mapping data to geometry works well because human brain is wired to see patterns. We have better way to understand the big picture via pictures. You just need to make sure that the essence of the data does not get lost when switching back and forth on visual components. There are several different visual cues that needs to be taken into consideration when visualizing data and datasets:

1. Position

   In the position, you need to think where in the space the data should be presented. Scatterplots are commonly used just to visualize the position, however the challenge here is, that sometimes it might be hard to identify what data each point represents. The advantage to use just position (scatterplots) is that the data takes less space than any other visual cues. Below an example of a scatterplot diagram.

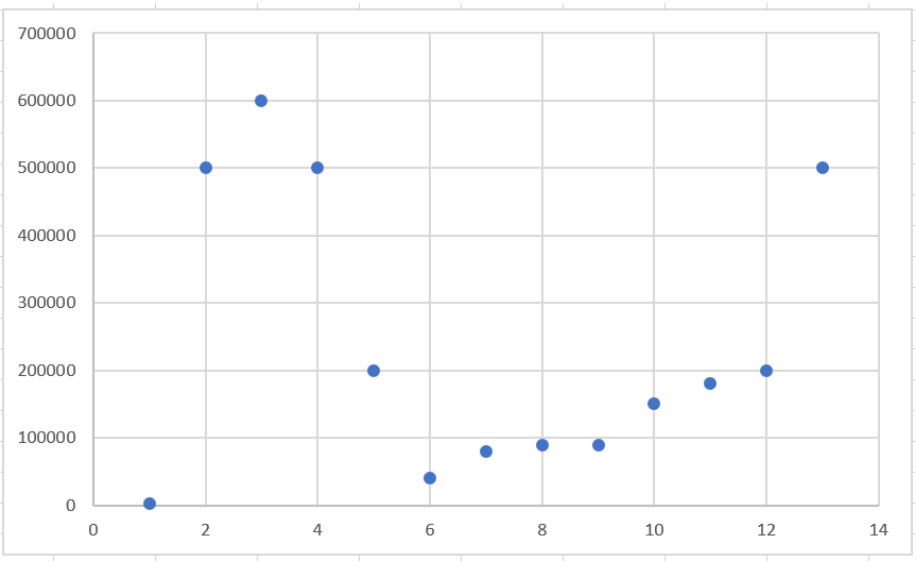

Figure 3. Example of position.

2. Length

Length is usually used in bar charts. The longer the bar is, the greater the value is. Length can be used horizontal and vertical. Length is easily judged visually, you figure out the length from one end to another end. Below an example of a bar chart.

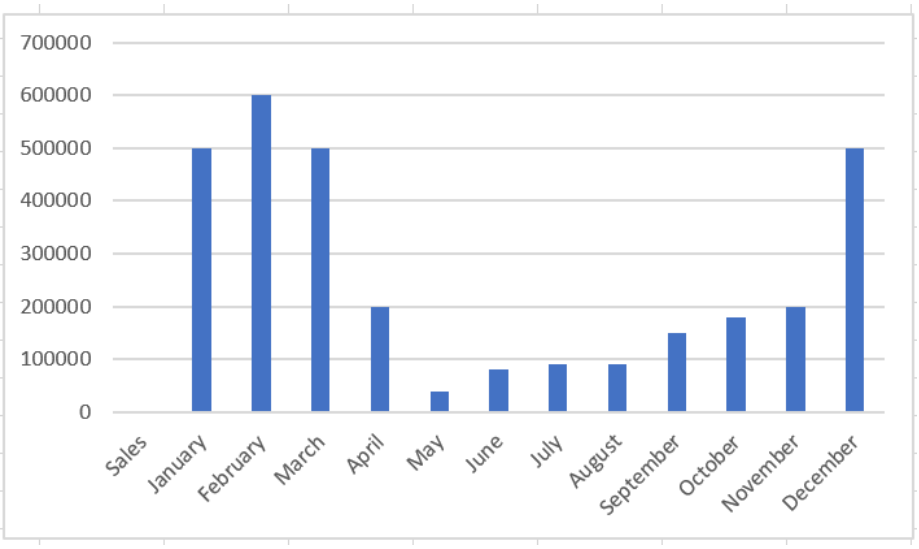

Figure 4. Example of length.

3. Angle

Angle has a range from 360 to zero degrees. Angles are often used as pie charts.

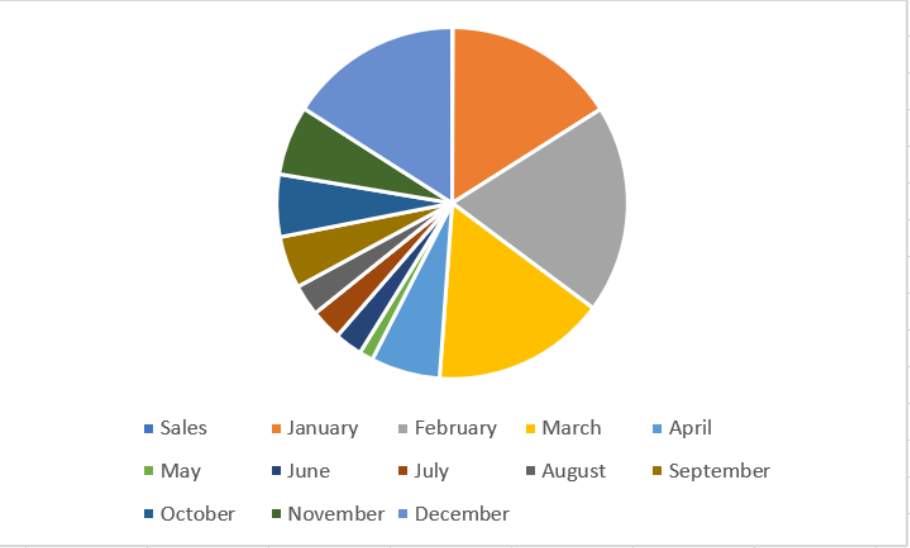

Figure 5. Example of angle.

4. Direction

Direction relies on a single vector's orientation in a coordinate system. It is easy to see what way is up, down, left and right. Using direction, you can easily see increases, decreases and fluctuations.

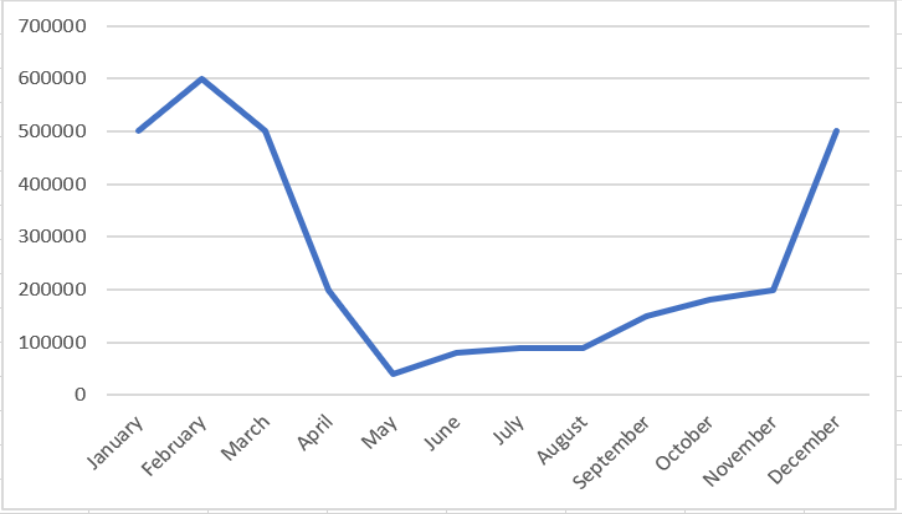

Figure 6. Example of direction.

5. Shapes

Shapes are used with maps to differentiate categories from objects. In a chart context shapes are not so commonly used. One way to use shapes is to use them in scatterplots. (e.g. different symbols describe different items.)

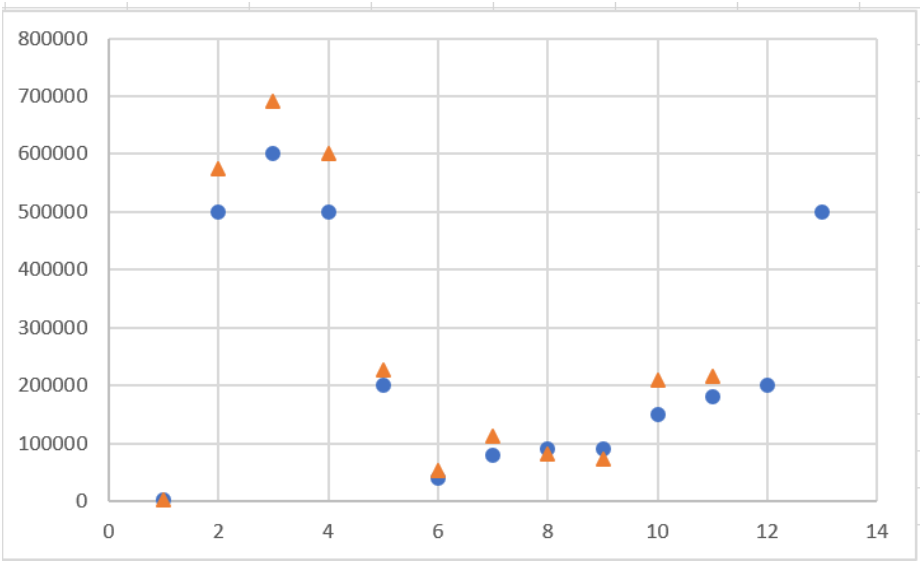

Figure 7. Example of shapes.

6. Area and volume

Bigger objects represent greater values. You can size by area and volume but bear in mind that you should not use too many dimensions and mixing area with volume it might end up with confusing results.

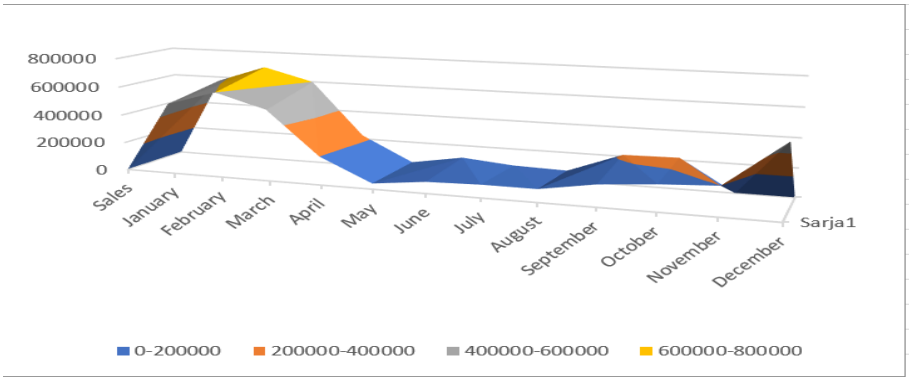

Figure 8. Example of area and volume.

7. Colour saturation and colour hue

   Careful colour selection can give more context to your data. One thing to keep in mind is colour blind people. Do not use too similar colours. Make sure that the difference should also be seen if the chart is printed on black and white paper. A good example of colour saturation and colour hue can be seen on the previous example chart.
   (Yau, 2013, 93 - 103).

4.4.1 Dashboards

Dashboards are commonly used to represent data. You have perhaps driven a car. All the vital information you need to drive a car can be found on a dashboard. You use the car's dashboard to monitor your driving performance. From business perspective, managers today are pretty much turning to business dashboards to quickly to see the state of their business. The dashboard shows the key information they need to run their business smoothly. Dashboards are usually part of business intelligence software, but it can be built in other tools too. A well-designed dashboard allows to combine data from multiple data sources, display metrics that are results from different type of calculations, quickly provide new information on the screen and drill down into details of the data. A well planned and implemented dashboard will show advanced charts, gauges and indicators, tables, scorecards and strategy maps. It will also have five functions: Advanced monitoring, drill down to analyse, monitor key metrics, monitor tactics and monitor strategy. All this is represented in well planned visual format in a one single dashboard. (Chen, Bansal, Rasmussen, 2009, 3 – 6).

Dashboards do have several benefits for its users. It uses visual components and therefore it is easy to understand. It is also transparent to the user and therefore it is easy to use. A Dashboard can also have multiple data sources (not required) and it enables a drill drown possibility to get into the details of the data. (Turban et al., 2007, 421).

4.4.2 Stand-alone and ad-hoc reports

A stand-alone report is defined as a part of routine report. E.g. a simple weekly sales report. (Turban et al., 2007, 266). An ad-hoc reports could be defined as on-demand report. These reports are created for a specific need for a specific user. For example, an ad-hoc report could be a partly dataset of a standard report, for example different timeframes or customer segments etc. (Turban et al., 2007, 267).

4.5 Case study in Radiology

A case study of reporting improvement presents an interesting case how reporting was improved. This article has been published in Radiology journal in April 2013. The name of the reports is: Improving Consistency in Radiology Reporting through the use of Department – wide Standardized Structured Reporting. This research was done in the department of radiology, Cincinnati Children's hospital Medical Canter in Cincinnati.

The purpose of this research was to develop a department – wide standardized structured reporting program and achieve widespread adoption throughout the department.

For this research a structured reporting group was formed. It included representatives from each divisions, leader of the quality improvement and informatics divisions and two administrative people.

During this research a standardized department – wide reporting was established. The main findings of this research were that it is possible to implement a structured department – wide reporting. They also established a fair and consistent process to update and create new reports. In 2012 a survey was done and based on the results the implementation of this plan was successful.

Based on this study it is beneficial to improve consistency in reporting. However, it should be well planned and resourced and also monitored after the initial implementation. Also, it is good to keep in mind that it should not be too strict, a successful plan will also leave room for some flexibility. (Larson et al., 2013).

5 Building a proposal

Proposal is built based on the current state analysis, existing knowledge and the authors knowledge of reporting. The proposal has several actions and the last chapter will introduce some ideas for further investigation. The current report offering has been quite wide and during this study there has already been some changes. This study will not take those changes into consideration.

5.1 Information strategy as a part of reporting

To be able to understand the importance of information, an information strategy should be implemented in reporting department and carefully inspected, what information strategy means from reporting perspective and how to manage information strategy. As said in chapter 4.2.1, information strategy should be in place and linked to company's overall strategy. In case if there is no information strategy available, it should be created based on the overall business stagey.

5.2 Management and resources

It is not an easy task to improve report offering especially in large organizations. The systems behind data and information are complex and so are business needs combining these could be very challenging and fully commitment is required for a successful project. This is a quite wide project and it should be prioritized by senior management. Meaning, there should be enough available resources from both reporting department and business side. To be able to succeed, committed, available resources are essential. On the case example "Case Study in Radiology" it was clear that successful implementation requires commitment from all levels of organization.

5.3 Know your audience

The second step to improve the current report offering is that you need to know your audience. As said on the chapter 4.2, it is vital to know your audience, a little bit of their behaviour, how they respond and learn new things. It is very easy to start with the current

report offering to get an idea of your audience but in an ideal world it would be recommended to start from scratch. In this busy business environment resource allocation is essential as presented in the previous chapter.

To be able to know your audience, several methods can be used. On this plan, I would start by sending out a very detailed and personalized survey to all reporting customers. This survey needs to be carefully planned and also tested. The outcome of that survey should be a summary what is done well at this point and what needs to be addressed and looked into in more details and what parts needs to be restructured. This survey would be a current state analysis from the report customers point of view. What reports they find beneficial, what type of information they are looking for, overall experience and of course, their suggestions how to improve the current process and overall reporting.

Once the survey has been sent out and the results have been carefully analysed, a more detailed analysis of customer needs must be done. One good way to do it, is workshops with the customers. The customers need to be segmented before it can be done, but it should be fairly easy to use organization structure to start with. If workshops are not possible, a good way to understand customers is buddy-up sessions. These buddy-up sessions were used in a company I used to work for and I personally found it to be a very good way to get to know my customers. In this case, it would mean that a reporting manager would spend a day or two with their customers while the customers are processing their daily tasks, just to understand how the customers are using information in their daily tasks.

5.4 Cleaning up old reports

Perhaps the easiest task is to clean up or archive old reports that are not in use. There are tools to monitor report utilization. Perhaps a new utilization report could be created and that should be monitored on regular bases. As the current state analysis stated, there are reports in production that are no longer in active use. All reports that have not been used recently, should be archived and removed from production. Cleaning up old reports should be a part of a process and processed every now and then. I would recommend monitoring utilization once per quarter.

5.5 Internal process for report creation

As said on the chapter 4.1 it is important to understand the complexity of information management (that also includes processes within information management) to be able to operate smoothly. One important factor on keeping report offering under control, is to create a department wide internal process for creating new reports. When an agreed process of report creation has been established, it is easier to control, understand and maintain report offering.

5.5.1 Report types

One part of internal process are report types. It is easy to create stand-alone and ad-hoc reports, but perhaps, sometimes a dashboard would be a better solution to present information. It should be classified within the process, what types of reports are offered and when and for what purpose. For example, management reports could be mainly dashboards, stand-alone reports could be for only very specific reports and ad-hoc reports only when the information needed can not be found on existing reports or if other variables are needed.

5.5.2 Unified report visualization

As said on chapter 4.4, report visualization is a key element on presenting data in an easy understandable way. To be able to have unified offering, it is important to agree a set of rules, what comes to report visualization. Since visualization has risen up lot lately in the reporting field, it might be a good idea to organize internal training about data visualization and also agree on how to use visualization. A unified visualization template could be a good idea to have. The template would include for example available colours, company information, company logo, font and so on. It is also important to agree what types of charts are used.

5.6 Combining existing reports

To be able to improve report offering, some existing reports should perhaps be combined. As seen on the current state analysis, some of the reports could be quite easily combined into bigger reports or dashboards. To be able to combine information from the

current selection of reports, it is important that all team members have a good understanding of the current report offering. By combining current reports, it will narrow down the amount of reports and therefore make report offering more compact.

5.7 Documentation

Documentation is an important part of improving report offering. All processes should be documented as well as all reports. This should be part of implemented information strategy. From end user perspective, a well-established documentation will give deeper understanding of information that is available and also information how to read reports and where to find the correct information. Documentation should be published and kept up to date on regular intervals.

5.8 Internal and external training

Training is also extremely important. It is a way to share information by teaching and learning. As on chapter 4.2, teaching is part of managing information delivery. Therefore internal and external training is vital, to be more exact there should be internal training and external training. Internal training would cover for example information about new reports and processes. This should be done on regular bases. External training is also very important. On the survey that was previously processed, came up that there should be more information about reporting group. Perhaps end users easily ask for ad-hoc reports, since they do not have the knowledge what all is already available. External training could be organized for example once per month and then proceed to once per quarter.

5.9 Auditing

To be able to maintain efficient report offering, auditing is needed. Auditing process should also be implemented. As said on chapter 4.3, ensuring information quality is vital. All reports should be audited on regular bases. There are new products and services coming up every now and then it is vital to make sure that all reports are up to date and showing correct information.

Another big part is data auditing, or perhaps information auditing would be the right term on this concept. By information auditing I mean that both data and how it is presented is correct and it serves the purpose. By different types of audits, a consistent information delivery can be offered and guaranteed.

There are quite a few steps to consider when improving current report offering. It should be considered as an on-going project. One way to look at this project, could be action learning.

6 Feedback

The proposal was sent to head of reporting for feedback and comments. During this study there has already been several changes in report offering and new processes has been taken in use.

When looking at information delivery, deep data analysis should also be taken into consideration. Reporting and analytics should operate hand in hand to guarantee correct and useful information to stakeholders.

One of the biggest part of reporting are source systems. On this study source systems were left out, however source systems do have a big impact on information delivery and it also gives a reason why report offering cannot be as compact as possible. But source systems are not the only reason. There are also several reporting systems that needs to be taken into consideration. When the source systems and reporting system do evolve, it gives new opportunities to improve report offering.

On the proposal there are elements that will be taken into further analysis and through there, perhaps even into implementation. This study gives a good overview on how to improve report offering and perhaps some parts might be implemented in the future.

7 Conclusions

To be able to improve report offering, many steps are needed. It is not an easy project and it should be considered as an action learning process. An efficient information delivery and reporting needs regular maintenance, learning and teaching. It is not an easy task, but it is possible. It will require strong commitment from the management, from the whole reporting department and also from some of the reporting departments' stakeholders. It is not something that can be done in a day or too. It is a long journey, but well worth of all the work that needs to be done. In a fast pace business environment, a well-established and accurate information delivery is vital.

7.1 Evaluation of the thesis

The thesis did meet the requirements. It could have included more detailed information about efficient reporting, tools, source systems etc. but due to the fact that this is an ongoing learning process, new information needs to be searched on regular bases. The purpose of this thesis was to write a suggestion how to improve report offering based on the current state analysis. The current state changes and therefore also the plan needs to change accordingly in the future. From that point of view the thesis did meet the criteria that was initially set up.

7.1.1 Reflection & Afterword

Reporting is a wide concept and there are several items that needs to be taken into consideration. This thesis does not cover the legal matters or regulations, source systems and different types of reporting tools. These all elements needs to be taken into consideration while the project goes forward.

Also, one interesting fact to consider is that the data and the information in telecommunication business is quite difficult to handle due to several types of laws and regulations. There are many limitations what data can be used, who can use the date, who is allowed to see the data etc. In spring 2018 there are already some changes coming up. New EU regulations (EU general data protection regulation) will be coming applicable in May 2018, and it also needs to be taken into consideration while setting up processes and reports.

Reporting tools and visualization tools also have an impact on information delivery. There is a huge selection of different types of tools available. Tools should be studied carefully and taken into consideration when building up an information strategy. Perhaps another project could be to evaluate different types of tools and systems.

References

Chaffey, D. and Wood, S. (2005). *Business information management.* Harlow, Essex: Pearson Education.

Good one to know!. (2017). [Online] BusinessDictionary.com. Available from: http://www.businessdictionary.com/definition/information.html [Accessed 24 Nov. 2017].

The Differences Between Data, Information and Knowledge :: Infogineering - Master Your Information. (2017). [Online] Infogineering.net. Available from: http://www.infogineering.net/data-information-knowledge.htm [Accessed 24 Nov. 2017].

Yau, N., (2013). *Data Points.* Wiley.

Borgman, C., (2015). *Big Data, Little Data, No Data.* MIT Press.

Chen, C. Bansal, M. Rasmussen, N., (2009). *Business Dashboards.* John Wiley & Sons, Incorporated.

Diamond, S.,Yuk, N., (2014). *Data Visualization for Dummies.* Wiley.

Information Processing | Simply Psychology. (2017). [Online] Simplypsychology.org. Available from: https://www.simplypsychology.org/information-processing.html [Accessed 27 Nov. 2017].

TEDxLaSierraUniversity (2015). *The Art of Delivering Information.* [video] Available from: https://www.youtube.com/watch?v=tcVW4nqcWxE [Accessed 27 Nov. 2017].

10 principles of effective information management. (2017). [Online] Step Two. Available from: http://www.steptwo.com.au/papers/kmc_effectiveim/ [Accessed 29 Nov. 2017].

Koponen, J., Hildén, J. and Vapaasalo, T. (2016). *Tieto näkyväksi*. Helsinki: Saarijärvi Offset.Turban, E., Aronson, J., Liang, T. and Sharda, R. (2007). *Decision support systems and intelligent systems.* Upper Saddle River, New Jersey: Prentice Hall.

Larson, D., Towbin, A., Pryor, R. and Donnelly, L. (2013). *Improving Consistency in Radiology Reporting through the Use of Department-wide Standardized Structured Reporting*. Radiology, 267(1), pp.240-250.