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Operational Work Management with Data & Management Reporting

Utilizing Power BI Reporting and Visualization

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Abstract

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This thesis focuses on improving the case company's operational work management and informed decision making by using interactive reports and data visualization. The existing reporting is limited due to accessibility of the data in the source systems and the manual work required for report building and thus restraining the business analysis and efficient management. The objective of the thesis is to develop a plan for up-to-date Power BI data analytics and reporting tool for operational work management and management reporting.

The thesis was conducted as using Applied action research approach and used qualitative methods for the data collection. The data was collected by investigating internal documentation, interviews and cocreation workshops with the key stakeholders. The key stakeholders were interviewed to reveal the strengths and weaknesses of the current reporting practices and technical readiness for purposeful use of data. Based on the findings from the current state analysis, the data-driven performance management and modern reporting practices were chosen as the focus areas for the existing knowledge and best practices review. The inputs from the key stakeholders and the best practices from the literature supported the proposal building and cocreation of the final proposal.

The outcome of the thesis is a proposal for documentation of the three levels reporting focus to be implemented in Power BI. The documentation includes purposes of each reporting focus, the report pages, detailed documentation of each visualization on the report page and supportive information. The documentation acts as a definition documentation for the data team's implementation work and the supportive documentation for the users of the Power BI analytics and reporting tool. The validated implementation was handed to the data team and included to this year's backlog. The implemented outcome of modernized reporting and visualized data provides the case company the opportunity to capture the meaning from data by seeing the trends and patterns, gaining the insights, take actions and make decisions based on timely and accurate data to improve business operations and operational work management.

Keywords	Operational work management, performance management, data-driven organization, data visualization, Power BI

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1 Introduction

Data and data analytics are the cornerstones and competitive advantage for business success nowadays. When data is used wisely, it helps to make better decisions, solve problems, understand business performance and market behavior, and apply that understanding to improve processes. Data has always been around but the exponential growth of it and innovations in technology has made it reachable and easier to interpret via various business intelligence and visualization tools.

Becoming data-driven organization is not anymore that much of a technical issue but more of a people, process or cultural challenge to overcome (Bean, et al. 2021, Foreword). Data literacy is the ability to read, write and communicate data in context. Investing in employees and management capabilities in data literacy is important as it is becoming essential in driving business value in the current business world. (Gartner 2021.)

This thesis studies the case company's current state of data usage in operations management, defines metrics and proposes a tool for transition to more data-driven decision-making via dynamic analytics and reporting tool.

1.1 Business Context

The case company is a Finnish life insurance company that provides loan insurances and saving insurances to individuals and companies. Insurance industry market share in Finland is concentrated to three insurance companies, with 78% share of the market (Finance Finland 2022). The case company is competing for the rest share of the market. The company employs around 30 professionals. It is part of a financial group that includes banks, fund management, real estate companies, central and mortgage bank. Banks act as agents for the case company.

Digitalization and development are part of the company´s and group´s strategy towards being a modern organization that invests in employee competence to gain excellent business performance. Adopting a data-driven mindset and processes is one step towards achieving these goals.

1.2 Business Challenge, Objective and Outcome

Management and decision-making in the case company is currently done based on data and reports using various sources through built-in reports in programs, IT developed reports in Intranet, or manually conducted in Excel. Data is updated daily, weekly, or even less frequently. There is a common internal understanding that the case company is missing modern reporting and analytics tools to gain advantage of the available data and make well-grounded decisions on up-to-date data and analytics.

The current reporting tools were developed in cooperation with different IT-solution suppliers, making updating or modifying the reports a costly project. Reports are mainly formed in tabular forms and visualization is not used efficiently, thus missing on better overview of the situation and easier prediction of the future. Moreover, over time, the needs for reports have changed and acquiring correct data has become time and labor consuming process. In addition, the low frequency of updating the data in reports provide poor data and may lead to misinterpretation.

The objective of the thesis is *to develop a plan for up-to-date Power BI data analytics and reporting tool for operational work management and management reporting.*

The outcome of the thesis is a proposal of the plan for up-to-date Power BI data analytics and reporting tool for operational work management and management reporting. The outcome should improve and support management of operational teams and decision-making through accurate and interpretable data available in any point of time.

1.3 Thesis Outline

Insurance teams make about two thirds of the personnel of the case company. The scope of the thesis is to investigate and plan the data analytics tool for operational work management of insurance teams. Additionally, the data analytics tool should improve reporting on operational work for business management. The research methods involved are mostly qualitative such as interviews and workshops with different stakeholders of the case company.

This thesis consists of seven sections. Section 1 introduces the case company and the background and purpose of the thesis, stating the objective and outcome. The following

part, Section 2 discusses the selected research approach and methods suitable for the thesis topic. Section 3 describes the current state analysis and findings from the interviews and existing knowledge, while Section 4 explores available knowledge and best practices on this topic. Based on the findings from CSA and selected best practices, the proposal of the data analytics plan is presented in Section 5. Validation of the proposal is discussed in Section 6, and the final proposal is presented. Section 7 is dedicated to conclusions and executive summary of the thesis and provides recommendations for the next steps.

2 Method and Material

This section describes the choice of research methodology, research strategy, data collection techniques and analysis methods used in the thesis.

2.1 Research Approach

The aim of the research is developing new knowledge. Creating coherent research needs understanding of methodological choices, research strategies, data collection techniques and analysis. The choice of suitable research approach derives from the nature of the phenomenon researched or the nature of challenge to be solved. (Saunders, et al. 2019, 209.)

Business research can be classified into basic research or applied research. Basic research seeks to gain deeper understanding, new interpretations and build new principles of the subject. Whereas applied research aims to solve pragmatic problem through scientific methods of investigating theories, testing, and developing practical alternatives for future practices. (Sreejesh 2014, 4.)

The methodological choice of the research is dependent of the research problem and can involve quantitative, qualitative, or mixed methods. Quantitative research is usually seen as a research approach that collects, analysis and generates numerical data. Common data collection methods are highly structured interviews, surveys, and observations. Quantitative research then examines relationships between variables and uses statistics and diagrams for analysis. (Saunders, et al. 2019, 269-272.) Qualitative research on the other hand uses non-quantitative data, words and sentences as descriptive elements, and aims at in-depth understanding of the topic. The data is collected via interviews, workshops, and documentations. Qualitative and quantitative are the extremes of the research methodologies. (Kananen 2013, 27-32.) Mixed methods research uses the characteristics of both quantitative and qualitative research (Saunders, et al. 2019, 279).

Typical strategies for business research are case study, action research and applied action research, among other strategies. Case study investigates and explores the case to gain an answer to research question. The research question is mostly driven from the

researcher's interest, but the researcher typically remains only as an observer. (Kananen 2013, 39.) Action research, on the contrary, aims to make a change and solve pragmatic problems that arise from practical situations (Blichfeldt, et al. 2006, 4). Action research requires active participation of the researcher in the iterative cycles of planning, action, evaluation and follow up (Kananen 2013, 41-42). Action research and applied action research are somewhat similar in process. The difference is that in the applied action research, the researcher can be either internal or external and the iteration of the cycle is not required as the outcome may remain on a recommendation level. (Kananen 2013, 45-46.)

In this thesis, applied action research is applied as the study develops a practical solution for the case company, that supports the case company's strategic digital development. The thesis researcher is an active member on the path of the development. A qualitative approach is selected via conducting interviews with different stakeholders and having workshops to gain various insights and knowledge from different angles. The outcome is specifically designed for the case company´s purposes and cannot be applied directly to other business environments.

2.2 Research Design

The research design illustrates the process and steps taken in the thesis. The research design of the thesis is outlined in Figure 1.

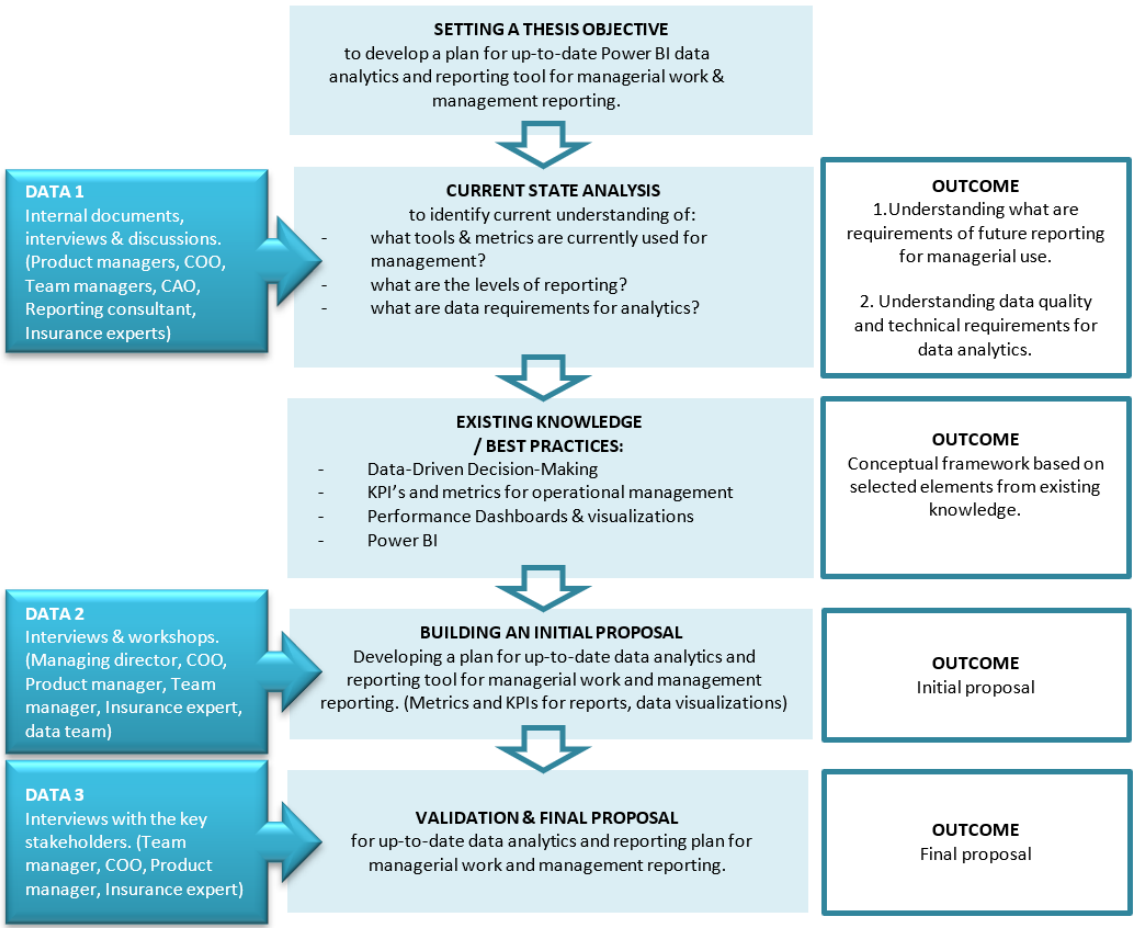

Figure 1. Research design of the thesis.

After setting the objective for the study, the current state analysis is carried out via interviews with insurance teams' managers, chief analytics officer and reporting consultant, and key users of the insurance programs. This is followed by the review of available knowledge and examining best practices on the topic to form a conceptual framework for the study. Information from the current state analysis and the conceptual framework is then used as guidance for building the initial proposal. It is done in cooperation with the key stakeholders through interviews and workshops. The initial proposal is then evaluated by conducting a validation session with the key stakeholders and building the final proposal for the thesis.

2.3 Data Collection and Analysis

This study gathers data from several data sources, and the data was collected in three data collection rounds. Table 1 below presents the details of each data collection round.

Table 1. Details of data collections 1-3 used in this study.

	Data source	Data type	Topic, description	Date	Documented as
	DATA 1, CURRENT STATE ANALYSIS				
1	Product managers	Discussion	Current data use, technical readiness	28.11.2022	Field notes
2	Chief Operating Officer (COO) &Team managers	Interview	Current reporting and needs	2.2.2023	Recording & Field notes
3	Insurance experts (key users)	Interview	Current data use, technical readiness	13.2.2023	Recording & Field notes
4	Chief Analytics Officer & reporting consultant	Interview	Current data use, technical readiness	6.3.2023	Recording & Field notes
	DATA 2, PROPOSAL BUILDING				
5	Managing Director, COO, Product manager	Interview	Strategy, needs for reporting	13.2.2024	Recording & Field notes
6	COO, Team manager, Insurance Expert	Workshop	Needs for reporting, co-creation	19.2.2024	Recording & Field notes
7	Data analytics team representative	Interview	Requirements for data and reporting	5.3.2024	Recording & Field notes
8	COO, Product manager, Team manager, Insurance Expert	Workshop	Metric design, co-creation	18.3.2024	Recording & Field notes
	DATA 3, VALIDATION				
9	Team manager & Insurance expert	Interview	Validation, evaluation, final improvements	9.4.2024	Recording & Field notes
10	COO & Product Manager	Interview	Validation, evaluation, final improvements	16.4.2024	Recording & Field notes

As seen from Table 1, the first data collection round Data 1, was conducted for the current state analysis. The aim of Data 1 was to achieve understanding of the current reporting practices and the technical readiness for Power BI reporting. The data was collected via discussion session and interviews with several stakeholders within the company. The first discussion session was conducted as open discussion on the topic to gain better insight of the current state and to define relative stakeholders to be interviewed for the study. The following interviews in Data 1 round were conducted with open ended questions. The topic and questions were delivered to the interviewees beforehand, and time was planned for leaving room for additional questions and discussion in all data collection rounds. The interviewees presented different levels in

the hierarchy of the case company to acquire data from different perspectives. The last interview in the first data collection round was conducted with data team representatives to provide overview of the new reporting practices and procedures that are to be achieved in the case company.

The second data collection round Data 2 included interviews and workshops of cocreation for the proposal building. The first interview was conducted to understand the strategy and define the critical success factors of the case company. The latter act as guidelines for collecting the data for new reporting practices in cocreation workshops. The data analytics team interview also provided their input in form of requirements for documenting the reporting needs. The workshops were cocreation sessions where new reporting requirements, metrics, possible visualizations were discussed, defined and documented as a proposal draft.

The third data collection round Data 3 included two face-to-face validation sessions. The sessions included questions about the quality of the initial proposal and the improvement suggestions. The first validation was done with the team manager and the insurance expert. They validated the tactical and operational level focus of the initial proposal. The second validation session with the COO and product manager included the validation of the initial proposal as a whole.

The interviews and workshops were carried out via Microsoft Teams, face-to-face or hybrid sessions. The sessions were recorded, field notes were made, and summaries of the interviews and findings were documented as Word documents.

The study also included analyzing internal documentation of the case company as presented in Table 2. The textual data was analyzed using Thematic / content analysis.

Table 2. Internal documents used in Data 1 and Data 2.

	Name of the document	Number of items	Description
	DATA 1, CURRENT STATE ANALYSIS		
A	Insurance reporting statistics	22 pages	Example of current reporting of insurance teams
	DATA 2, PROPOSAL BUILDING		
B	Business strategy and plan for fiscal year	7 pages	Strategy, vision and objectives
C	DW documentation	31 pages	Documentation of data source B data in data warehouse

As seen from Table 2, internal documentation contributed to the study in different data collection rounds. In Data 1 round, the current monthly insurance reporting statistics were analyzed to gain understanding of the current practices – metrics reported, level of details and visualizations used in reporting. In Data 2 round, firstly the business strategy and plan were analyzed. The documentation formed the foundation for building the interview questions for the proposal building. Secondly the documentation of data source B in the data warehouse was analyzed to support the cocreation work in workshop sessions.

The first data collection round focused on the current state of the reporting practices in the case company. The findings from the current state analysis are discussed in Section 3 below.

3 Current State of Reporting in Insurance Teams

This section analyzes the current state of reporting and its role in supporting the team management and company's management. Discussion focuses on the current reporting tools in use in the case company, data sources available and data flow. It is followed with a SWOT analysis of the current tools and practices and suggestions for selecting the focus areas for improvement. These focus areas then inform the choice of topics in the review of existing knowledge and best practice.

3.1 Overview of the Current State Analysis

The goal of the current state analysis was to understand the current reporting practices and the use of available data, methods, and purposes. It also concentrated on understanding the needs of reporting on different levels of the case company and how it could support and guide the work and decision-making. The primary sources of data collected were the group interviews with different stakeholders. The data collected in the interviews was supported with available internal documentation on the current reporting solutions.

The current state analysis was conducted in five steps. The first step included an open discussion session with insurance product managers and investigating the internal reporting documents. Product managers are responsible for Power BI solutions development in cooperation with insurance teams and data teams. The aim was to identify any possible improvement already done in reporting solutions. Internal documents included the current reporting metrics and KPIs and outlined the current focus areas of reporting.

The second step was a group interview with the chief operating officer (COO) and team managers. An interview was conducted with open-ended questions and discussion on question topics. They provided the management-level insight into strengths and weaknesses of the current reporting practices and the importance of improvements.

The third step was another group interview with the same interview questions with insurance experts who are the insurance systems' key users. They provided the insight into the individual-level work and measures in use. Additionally, they described different data sources and their readiness for Power BI reporting.

The fourth step was an interview with the data team representatives. Open-ended questions were used for the interview. The interview tackled topics around the current state of data warehouse solutions in the group's matrix organization, the data flow, and the case company´s data sources.

The fifth and the final step included grouping and analyzing the data using thematic analysis. The SWOT analysis was conducted to identify the strengths and weaknesses of the current reporting practices, and opportunities and threats of future implementation of the Power BI analytics and reporting tool.

3.2 Description and Analysis of the Current Reporting Practices

Reporting practices used in the case company rely mostly on manual work, are collected from various sources, and focus on reporting the numbers of the past rather than insights. The current solutions have been in use for years with some improvements along the way, but according to the opinion of the interviewed stakeholders, they do not meet the modern requirements of business reporting. Supportive business reporting would provide on-time, simple but detailed overview of the present state, to guide the work and decisions on different levels.

Based on the interviews and discussions with the key stakeholders, three levels of reporting were identified, as presented in Table 3.

Table 3. Current levels of reporting.

Level	Purpose	Reporting and analysis	
		Current solution	Expected solution
Management	Business analysis Decision making	Semi-manual monthly reporting	One-click reports and analysis
Team Managers	Business analysis Team management	Manual Experience-based	Reports and analysis in one place Individual's target setting support
Individual	Self-management	Insurance program A: manual, experience-based Insurance program B: semi-manual, more information-based	Targets vs Actual Benchmarking to average

Table 3 describes three levels of reporting including a) the upper management, b) team managers and c) individual-level purposes of reporting and summarizes the comparison

of the current and expected solutions. Each level of reporting is described and analyzed below.

3.2.1 Management Level

The management level reporting of operational work is done monthly, via various higher level KPIs. They are illustrated with bar charts for a better visual overview and show the trends and comparison with the previous years. Figure 2 shows an example of the type of visuals used for the management level reporting.

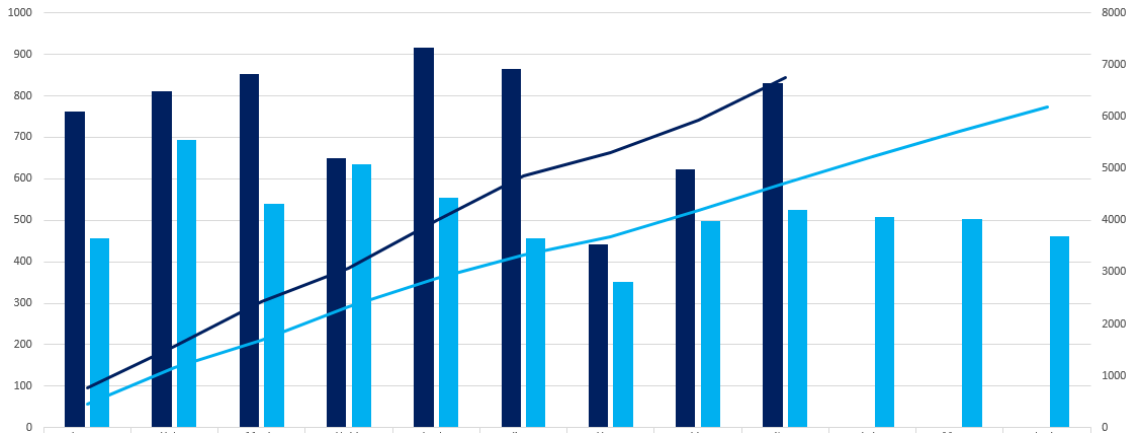

Figure 2. Example of the management level reporting (Internal document, March 2023).

The purpose of the management level reporting is to enable and support business analysis and decision-making. The current metrics and KPIs are in active use by the management and are analyzed in monthly meetings. However, the interviewees emphasized the amount of manual work related to the management reporting. The data is collected as manual work from various sources and processed manually for reports. The data collection process is hence time consuming and subject to human errors. There are some levels of automation established for data processing and creating the visuals for management presentations. Yet, the insufficient automatic reporting components in programs was commented upon by the Informant 1 in the following quote (translation by the thesis researcher):

> Data needs to be collected from various sources, there are no dashboards. The programs are lacking sophisticated reporting components. Too often in software development projects, these components are forgotten. (Informant 1)

The informants agreed that the data needed for creating the reports is available in the systems, but not presented in a systematic and importable way. The expected reporting solution, suggested by the interviewees, would be the so called one-click reports. Such reports should be automatically updated and available in any point of time, thus allowing real time and deeper level analysis.

The current state analysis also exposed that discussion on new KPIs or metrics has not been possible previously due to complicated accessibility of the data. The use of the common data warehouse for various data sources gives many more new opportunities to support analysis and decision-making.

3.2.2 Team Manager Level

Team managers are responsible for gathering the data for management reports and the same data is used for team managers´ purposes. Team managers use the available data and information to support the business analysis, and guide and manage operational teams, e.g. spotting the trends in insurance applications and workforce allocation according to it. Team managers gain the relevant information from several sources, drill into the numbers, calculate the number of items per team member, go through breakdowns per insurance types and sales channel, etc. The same manual procedures are undertaken regularly to reflect and to gain an understanding of the current situation and to be able to communicate it to team members in weekly meetings.

However, the currently available information does not enable an overview of different team member's individual performance. Team managers are lacking the hard facts on individual performance, and it does not support individual target setting. Informant 1 illustrates the current situation as follows (translation by the thesis researcher):

> We have only basic KPIs in use, because we are only able to reach the upper-level data. We are not able to track individual person's performance and therefore also not able to set target metrics for individual performance, what would be more modern approach. (Informant 1)

Thus, team managers, with years of experience, often rely on own experience-based knowledge in managing their team.

Moreover, the interval of the current monthly reporting does not enable real time actions when there are changes in the patterns of daily workload or processing times. Expectations for future reporting solution would be to have dashboard-type reports available in one place and up to date. According to the team managers´ suggestion, the team manager report view should include metrics on both team and individual level. Team managers also pointed to the human resource systems as a source of data that would give valuable support to manage the team performance, but this area is out of the scope for the thesis.

3.2.3 Individual Level

The aim of the individual level reporting is to facilitate self-management in day-to-day tasks. The current solutions in individual-level reporting vary considerably between the two insurance teams. The difference originates from different insurance systems in use and their support for reporting. Insurance system A lacks the reporting features and makes guidance of tasks experience-based and relies on daily communication between team members. The insurance system B has built-in reporting features of the daily numbers and individual task queues. An example of daily numbers dashboard is presented in Figure 3 below.

Figure 3. Example of daily numbers dashboard (Internal document, March 2023).

The dashboard in Figure 3 gives a general overview of daily tasks and workload. The dashboards and reports are supplemented with Excel reports that are manually updated

to receive a more comprehensive overlook of the statistics of the applications and processes.

In addition, both teams use mutual case management system that provides some level of reports. The interviews revealed that utilization of the reports varies between teams due to the adopted culture of insurance system in use. The other team makes more use of information available as they are used to more detailed reports and information for self-management purposes.

The interviewees indicated the following needs for improvement. The current solution does not provide real-time data and may twist the truth. The interviewees illustrated the case of reporting 10 calls per day. But without the real-time data, conclusions cannot be made as the timeframe for 10 calls can be from 30 minutes to up to eight hours. The suggested solution includes dashboards with up-to-date data and provides support to self-management by showing the individual performance versus the targeted performance. Additionally, it could include information on benchmarking to the average performance. Team managers also discussed whether an individual should see other individual's performance. Seeing each other performance is seen as a positive aspect as indicated by the Informant 3 (translation by the thesis researcher):

> The team view would bring openness and transparency. It would directly support streamlining the tasks when individual can evaluate own performance and compare it to the other team members´ performance. (Informant 3)

That type of team members´ awareness can be positive and bring out more interest to best practices.

3.2.4 Data Sources

Three main sources of data were identified during the interviews. The main sources contain the data that is essential for business performance and is used for the current reporting purposes on different reporting levels. Features of the main data sources are listed in Table 4 and analyzed below.

Table 4. Features of the main data sources.

Features of main data sources			
	A	B	C
Connected to DW	+	+	-
Knowledge of available data	some	+	some
Reporting features	-	some	-
Team dashboards	-	-	+
Individual level dashboards	-	+	-
KPIs or metrics in use	-	+	some
Documentation of the system	not known	+	not known

Table 4 illustrates features of each main data source that could be used for future Power BI reporting purposes. The main strength of data sources A and B is that they are already connected to the data warehouse. Data warehouse is used as a source for all Power BI analytics and reporting in the case company. Data source C is not yet connected to the data warehouse, but it is recognized as needed source in data team's backlog.

Data source A does not currently have any built-in reporting features or dashboards. Thus, the data source users are missing the experience of using such features and might not be able to easily identify the measures and KPI's that are most suited for them. Yet, the users do have knowledge of data available in the data source A.

Data source B already uses some general and individual dashboards, which makes it easier for users to define measures and KPI's to be followed in the future reporting. Users are also able to reflect through experience what is currently working and what should be changed and improved. Users also have good knowledge of available data in the data source. A weakness of the data source B is that it is missing team dashboards that could be used for benchmarking for Power BI solutions.

Data source C is complementing data sources A and B with extra data. The team managers raised the data source C as the most used source for gaining the overview of the status of the workload and handling times of customer requests. Currently there are some KPI's in use, but they are not shown in dashboard manner overview. Data is

presented in lists rather than reports. Users have good knowledge of the data available in the data source C and what could be used for future reporting purposes.

Findings from the interviews emphasized that the documentation of the data source is essential when planning and building the connection to data warehouse and solutions for Power BI analytics and reporting. Data source B has good level of documentation available, but knowledge of data sources A and C documentation availability is not known. Missing or incomplete documentation requires extra effort for clarifications when connected to the data warehouse.

3.2.5 Data Flow

The current data flow from data sources to reports is short but it requires manual work. The current data flow is illustrated in Figure 4. The case company has three identified main data sources for the upper management, team managing and self-managing purposes. Insurance experts and team managers collect the data manually from various tables and folders of the sources. Some automation has been created for the current report creation process, but it does not have any significant effect on decreasing the overall manual work in the process.

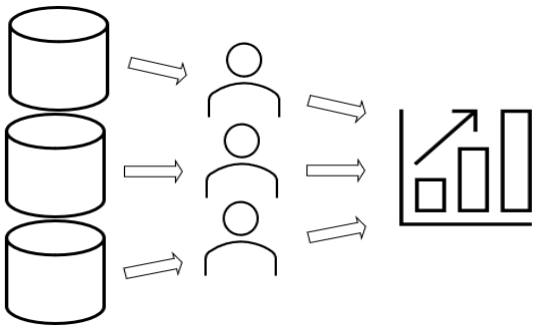

Figure 4. Current data flow.

The group's matrix organization has centralized data warehouse and Power BI reporting tools in use. Unfortunately, the case company´s data for operational work management is not processed for Power BI requirements yet. The team managers emphasized the importance of one source of truth, that can be achieved with mutual data warehouse. Quated from Informant 1 (translation by the thesis researcher):

> If the reports are taken from the data warehouse in the future, then all the data would come from one source, and data is from the same data table, and there won't be source system problem that there comes little bit different data between different source systems. (Informant 1)

The interviewees' description of the process of building the automated data flow to reports and visualizations is illustrated in Figure 5.

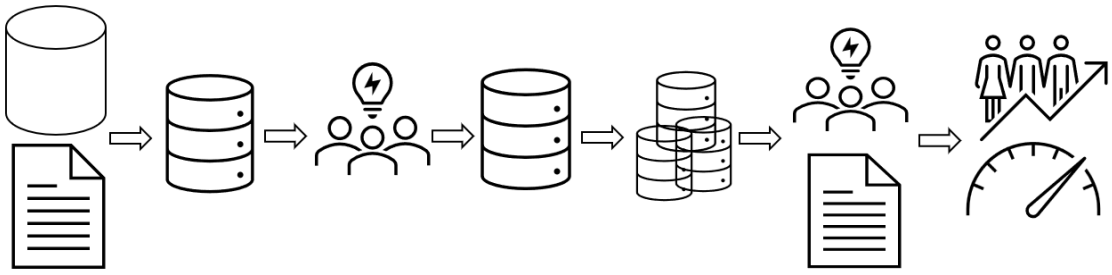

Figure 5. Data flow automation process.

The illustrated data flow automation process is a current process of the matrix organization and partly applied in the case company. As illustrated in Figure 5, the process starts by familiarization with data source documentation. Unfortunately, documentation is often poor or inadequate and information needs to be gathered from the source itself and from the users. The connection is built between the data source and the staging environment, and all possible information form the source is transferred to the staging environment. After the transfer, the data team´s and business unit´s cooperation is meaningful for the expected results. The culture of working with data is still new in the case company, as quoted from Informant 7 (translation by the thesis researcher):

> Utilizing the data is still in relatively beginning phases and our people are not yet used to define what is needed and what is wanted and what is the way to calculate it. There is no long culture yet. (Informant 7)

In cooperation they model, describe, and document what data is essential, what data is needed, for what the data is used for and how it can be connected to other aspects of the business. When documentation is completed, relevant data is transferred to the data warehouse. Inside the data warehouse data marts are built for different business units use. The purpose of the reports and visualizations has been communicated along the process but only now the real work on the reports and visualizations starts. Reports and visualizations are codeveloped and cocreated with the business units. All the metrics

that are used in reports and visualizations are recorded and documented to the glossary. Glossary can be used for interpreting created reports as well as act as bases for future development. Informant 7 described the automation process as a mutual journey between stakeholders in the following quote (author translation):

> It is a lot of cooperation. You need the client, you need the data modeler, you need the data warehouse developer, you need the reporting developer. So, it is kind of teamwork to make it great. And everybody needs to be actively involved. (Informant 7)

The data flow automation process of the case company is established up to data availability in business unit data marts for data sources A and B. Defining and documenting the needs, metrics and visualization for the future reporting is the focus of this thesis.

Once the automation process is completed and documented, the new data flow from the data source to reports and visualization is automatic. The automated data flow is illustrated in Figure 6.

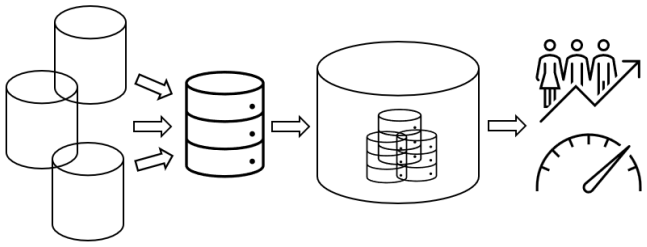

Figure 6. The automated data flow.

As shown in Figure 6, data is transferred from data sources to the staging area on agreed time intervals. The staging area acts as a temporary storage to collect and process the data from various sources. The processed data is transferred to data warehouse and directed to relative data marts inside the data warehouse. The flow does not need manual involvement in creating the reports and visuals and it is updated automatically according to data transfer intervals. The current decision-making often relies on experience and gut feeling, as stated by the interviewees. The new process reduces the amount of manual work and provides the access for more in-depth data to analyze, interpret and support the business with information instead of assumptions.

3.3 Summary of the Current State Analysis Results

The current state analysis described and analyzed different levels of reporting in the case company. It also identified the main data sources and presented the current data flow. The outcome of the analysis is a summary in a form of SWOT-analysis that outlines the strengths and weaknesses of the current manual reporting. It also presents the opportunities that support the shift from the current practices to modern Power BI solutions and the threats that can affect the outcome. In the end of the summary, the selected focus areas for the next steps of the thesis are discussed.

3.3.1 SWOT-analysis of the Current Reporting Practices

The SWOT-analysis results of the current reporting practices are summarized in Table 5.

Table 5. SWOT analysis of the current reporting practices.

Strengths	Weaknesses
○ data available and identifiable ○ existing modern data management process in the matrix organization ○ some established connections between DW and data sources ○ employees familiar with available data in data source B	○ manual reporting on monthly interval ○ individual level reporting missing ○ **lack of data-driven management** ○ data source A users may not be able to identify necessary data easily ○ data source C not connected to DW
○ data from one place -> one source of truth ○ react and reflect on time ○ efficient management made possible ○ streamlining operational work ○ even workload between individuals ○ data use for knowledge and possible development ○ decrease in cost due in-house reporting solutions	○ data team resources are limited ○ long backlog of data team ○ delay in data transfers ○ no self-service reporting and visualization possibilities
Opportunities	**Threats**

As seen in Table 5, analysis identified several strengths of the current reporting solutions. First, the important strength is that the data is available in the data sources, and it is identifiable. Data sources use the system logs that record the events of the system users, and it can be used for analysis purposes. Second, the strength is that the case company has the matrix organization´s level modern data management process already

established. This is important since the change to new reporting tools does not require building new technical infrastructures or new procedures on the case company´s level. Third, the strength is that two out of three main data sources are already connected to the data warehouse. The connections have been established for different purposes, but the raw data can already be found. Fourth, the strength is that data source B´s users have good knowledge of available data and what metrics are important for their daily work management. That knowledge has significant value also for reflecting to data source A´s metrics to some extent.

Analysis also pointed to the weaknesses of the current reporting solutions. First, the current reporting relies on manual collection of reporting data from various sources on monthly interval. Manual work consumes the valuable time of several employees to collect the data and build the reports. Second, the current reporting does not provide individual level reporting and thus measuring the performance and reflecting to target setting of the individual is not easily available. The third and the important weakness to address is the lack of data-driven management experience. All levels of management have insufficient amount of data available for applying data-driven decision-making. Fourth, the weakness is that data source A users do not have practical experience of using the reports for their day-to-day work management and may not be able to identify the necessary data easily. And fifth, data source C is not yet connected to the data warehouse. This is important since, when implementing the new solution, it requires extra work and consumes valuable working time of the data team.

Importantly, based on the interview results, the informants see many opportunities, if a shift to Power BI analytics and reporting is done. The most important opportunity discussed by the interviewees is that data could be pulled from one single place and thus mitigating the possibility of reporting variation of results of the same metric. Additional opportunities include the fact that new up-to-date reporting solutions would enable a faster reacting and reflecting to changes in KPIs and metrics and thus making more efficient management possible. The hope is that the new reporting would also provide solutions for streamlining operational work and evening workload between individuals. Hard facts on individual workload and work outcome could be made available. Therefore, it could provide an opportunity to benchmark and find the reasons for gaps between individuals. Furthermore, an increase in knowledge through data may provide foundation for new ideas, potential development and business improvement. Lastly, the solution could decrease costs through producing in-house reporting solutions. Supplier reporting

solutions are costly and therefore some sources are missing sufficient reporting. Establishing in-house reporting solutions in Power BI would generate higher costs in the beginning of the process but would even the costs later in use.

Analysis also revealed some threats. The main threat is the fact that the data team has limited resources. Moreover, the development backlog is long and backlog items are prioritized. It could mean delaying the implementation of the new solution if the improvement proposal receives low prioritization in the backlog. The third threat in the implementation of new reporting is a delay in data transfer. Data transfer between data sources and data warehouse is done once per day by default. For the operational work management, individual level data would require updating more frequently for the optimum outcome. And fourth, no self-service reporting and visualization is available for ad-hoc purposes in Power BI. The data range is wide and the threat of misusing the data is high. The data team representative indicated that to avoid misusage and misinterpretations, according to the current matrix organization policies, Power BI dashboards do not allow changes or self-made reports. Self-service might be available at some point in the future when data-driven culture evolves within the case company.

As seen from Table 5, the SWOT-analysis identified the strengths and weaknesses of the current practices and stressed the opportunities and threats for the implementation of the change. Some of these aspects act as the bases for selecting the focus areas in the next section.

3.3.2 Selected Focus Areas

The findings from the current state analysis highlighted the absence of data-driven performance management and the opportunities that the data-driven decision-making could bring to the case company if modern reporting practices are utilized. Therefore, data-driven organization and modern reporting practices is investigated deeper to find the best solutions for the case company´s purposes. As agreed in the discussions with the interviewees, the means to introduce modern reporting practices is to utilize Power BI reports and dashboards that are already partly available in the case company but underutilized currently. Therefore, Power BI tools, different data visualization methods, metrics and KPI’s for tracking the business performance are explored next for the proposal building.

The following Section 4 aims at exploring available knowledge and best practices on the chosen focus areas of modern reporting practices and data visualization tools for data-driven performance management. The insights are used for building the conceptual framework that later guides the proposal building for the case company.

4 Existing Knowledge & Best Practice on Reporting with Performance Dashboards

This section discusses the existing knowledge on how an organization can become data-driven to support its operations and work management through meaningful use of performance dashboards. It discusses the underlying components of data-driven organization – data, types of analytics and measures. And how these components are used to visualize business performance in form of performance dashboards. It also provides insights to business intelligence tool Power BI, that is chosen for case company purposes.

4.1 Data-driven Organization

Being a data-driven organization goes beyond collecting data, having modern data warehouses and dashboards. Being data-driven is having the right tools, abilities, processes, and culture where findings and insights from data are acted upon (Anderson 2015, Ch 1). In all simplicity, “data-driven organization is one that utilizes data to improve its business” (Morrow 2022, 58).

Morrow lists the five key pillars of data-driven organization: 1) Strategy, 2) Leadership, 3) Data literacy skills, 4) Data and technology, and 5) Culture (Morrow 2022, 57). The first pillar is organization strategy that sets the objectives of its present and future goals as well as the general directions of the organization. To succeed as data-driven, data strategy needs to be considered and implemented within organization strategy – how the data is utilized to achieve the strategical goals. (Morrow 2022, 61-62.)

The second pillar is leadership and its responsibility on executing the data strategy. Leadership advocacy on utilizing data in decision-making is essential. Leadership should provide the means, tools, and skills, and lead the path to becoming data driven. Having the right skills in the organization may require reskilling, upskilling or acquiring new personnel. (Morrow 2022, 63-64.)

This leads us to the third pillar of the data-driven organization. Data literacy refers to individual’s ability to read, work with, analyze and communicate with data. The skills of

understanding the presented data, ask the questions, find the insights and act upon it is seen as the key pillar of the organization data strategy. (Morrow 2022, 64-65.)

Technology, the fourth pillar, is the enabler of data-driven organization and decision-making. Technology enables the democratization of data – making it available to wider audience and gaining more insights from different perspectives. Technology itself does not do the magic, but the company needs to gather quality data to present to audience. Data quality is discussed more in the following section. (Morrow 2022, 66-67.)

The final pillar is culture, and it brings together the first four pillars. The culture of the organization, its traditions, skills set, beliefs and way of doing things, either supports the goal of becoming truly data-driven or the attempt is to be failed. Stakeholders of the organization, top to down, need to be ready and embrace the change of becoming data-driven and have a trust in data instead of gut feel. (Morrow 2022, 68-70.) Interestingly, 79,8% of respondents of NewVantage Partners survey to Fortune 1000 data leaders think that cultural issues are the greatest roadblocks of gaining value from data investments (Wavestone 2023, 9). As Bean and Davenport state “Becoming data-driven doesn't just happen. It requires leadership, and vision” (Bean et al. 2021, Intro).

The process of making data-driven decisions is described in Table 6 below. The table combines practices from Morrow (2022) and Tableau (2023) by describing the actions to perform upon each step.

Table 6. Data-driven decision-making (based on: Morrow (2022) and Tableau (2023)).

Step	**Action**
Understand	Understand business objectives and goals.
Involve	Involve stakeholders in the organization to understand the current situation, needs, data availability and key data sources.
Plan analysis	Create analysis plan, set the outcome and define metrics.
Data	Collect, prepare and model the high-quality data.
Visualize and explore data	Create visualizations and dashboards. Visualizations help to see the patterns, trends, and outliers in the data.
Insights and action	Discover insights, share insights, collaborate, make decisions, and take actions.

As seen from this summary in Table 6, the data-driven decision-making starts from the very beginning of understanding business strategy, its objectives, and its goals. The second step is involving stakeholders across the organization to understand the current situation of decision-making, the data usage, its availability, and the sources. The third step includes creating the plan for analysis, setting the outcomes, and defining the metrics that align with the strategy. The fourth step is more of a technical step of collecting, preparing, and modeling high quality data for visualizations. The fifth step is creating meaningful dashboards with a story to tell, to see the patterns, trend and outliers in the data. The sixth step is to gain the insights, collaborate on those insights to make well-grounded decisions for actions. (Morrow 2022, 158; Tableau 2023.)

The journey of becoming a data-driven organization involves business aspects like strategy, leadership and culture as well as the data aspects, its presence, availability and quality. Data aspects are discussed in the following sections.

4.1.1 Data

Collecting, preparing and modelling high quality data is one step in the journey of becoming a data-driven organization. Anderson defines data as “the raw, unprocessed facts about the world” (Anderson 2015, Ch 5). Single specific data, such as word, number, symbol, or record of transaction, does not carry business value. But when the data is processed and aggregated, data can be turned into knowledge and support decision-making. (Laursen et al. 2016, Ch 4.)

Data is the raw material for the information. When data is processed in a meaningful and timely way, it can be set in forms of e.g., tables, reports, or visuals to reveal informational aspects of data. Through understanding and analyzing the information it can be formed into knowledge. It is to see the patterns and the trends and answer the questions for future decisions and actions. (Laursen et al. 2016, Ch 4.) The continuum of the process is also called data mining and it is illustrated in below Figure 7 by Delen (2015).

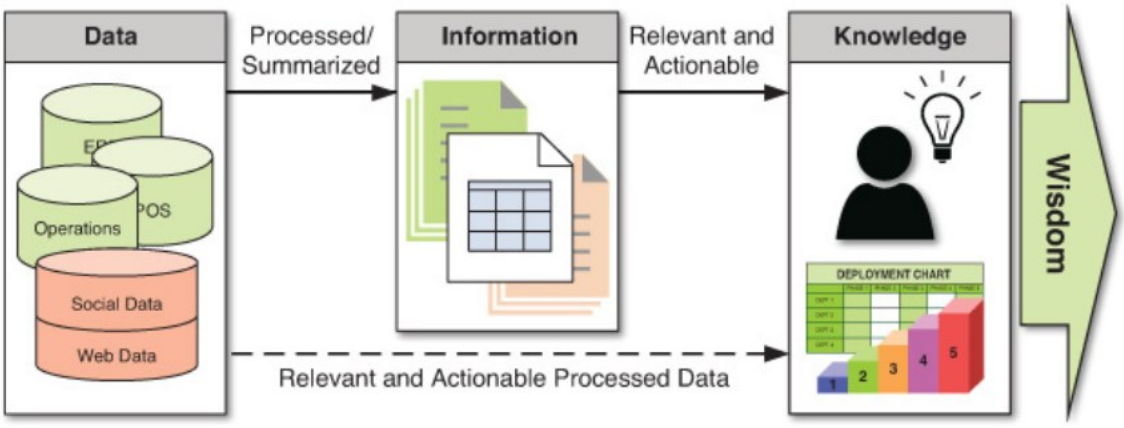

Figure 7. The continuum of data to information to knowledge (Delen 2015, Ch 2).

With intelligent visualization tools information can be visualized so that knowledge can be derived by data literate business users all over the organization (Laursen et al. 2016, Ch 4).

Data is used to tell a story and create insights. To be able to create trustworthy insights from data, data quality requirements are presented in Table 7.

Table 7. Data quality requirements (based on: Anderson, 2015, Ch 1).

Data quality requirements include:	
1	Data is accessible, including permissions and technical tools.
2	Data is accurate and presents one true value.
3	Data is coherent, meaning that it is joinable with other data by key or IDs.
4	Data is complete and reliable, it is not missing any records or presented in incorrect format.
5	Data is consistent, representing the same values across different data sources.
6	Data is defined, so each individual data field has unambiguous meaning. Field names are recorded in the data dictionary.
7	Data is relevant for the purposes of analysis.
8	Data is timely in respect to analysis purposes (up-to-date, daily, weekly, etc.).

Without quality data that stakeholders trust, data may lead to misleading insights, decision makers may postpone their decisions, or rely on their gut feeling and experience instead of data.

To establish one single version of truth the data warehouses are used. Data warehouses are common information platforms that provide cleaned and standardized data that are collected from various sources across the organization (Haines 2019, Ch 3). Benefits of having data warehouse are cited from Laursen et al. (2016) in Table 8.

Table 8. Benefits of having data warehouse (based on: Laursen et al. 2016, Ch 5).

Benefits of having data warehouse:	
1	To avoid information islands and manual processes in connection with the organization's primary systems.
2	To avoid overloading of source systems with daily reporting and analysis.
3	To integrate data from many different source systems.
4	To create a historical data foundation that can be changed/ removed in source systems (e.g., saving the orders historically, even if the enterprise resource planning [ERP] system "deletes" open orders on invoicing).
5	To aggregate performance and data for business needs.
6	To add new business terms, rules, and logic to data (e.g., rules that do not exist in source systems).
7	To establish central reporting and analysis environments.
8	To hold documentation of metadata centrally upon collection of data.
9	To secure scalability to ensure future handling of increased data volumes.
10	To ensure consistency and valid data definitions across business areas and countries (this principle is called one version of the truth).

Within the data warehouse there are data marts. Data marts include specific data that is collected and processed for specific user group. Data marts allow easy access on the data that is used for reports for business unit, department or a team. For example, financial information for finance department or sales information for marketing team. (Laursen, et al. 2016, Ch 5.)

Well-planned data warehouse provides an organization a mean to benefit from single source of truth across the organizations. To use that data, tell a story and conduct analysis. Data analytics can be divided into several categories and are discussed in the next section.

4.1.2 Analytics

Data analytics are used to extract the meaning from the high-quality data and to benefit from it in data-driven decision-making. To avoid confusion between terms of analysis and analytics, the terms are explained. Data analysis is processing the data to extract meaning of it – cleaning, modeling, visualizing. To analyze data, data analytics is used (Microsoft 2023). Data analytics are methods, technologies, and tools used to create knowledge and insights from data. Data analytics can be divided to descriptive, predictive, and prescriptive analytics (Delen 2015, Ch 1). The terms analysis and analytics are many times used interchangeably, and the difference is always not clear. In this thesis the terms are used as defined above. Figure 8 below illustrates three levels of analytics and their degree of sophistication.

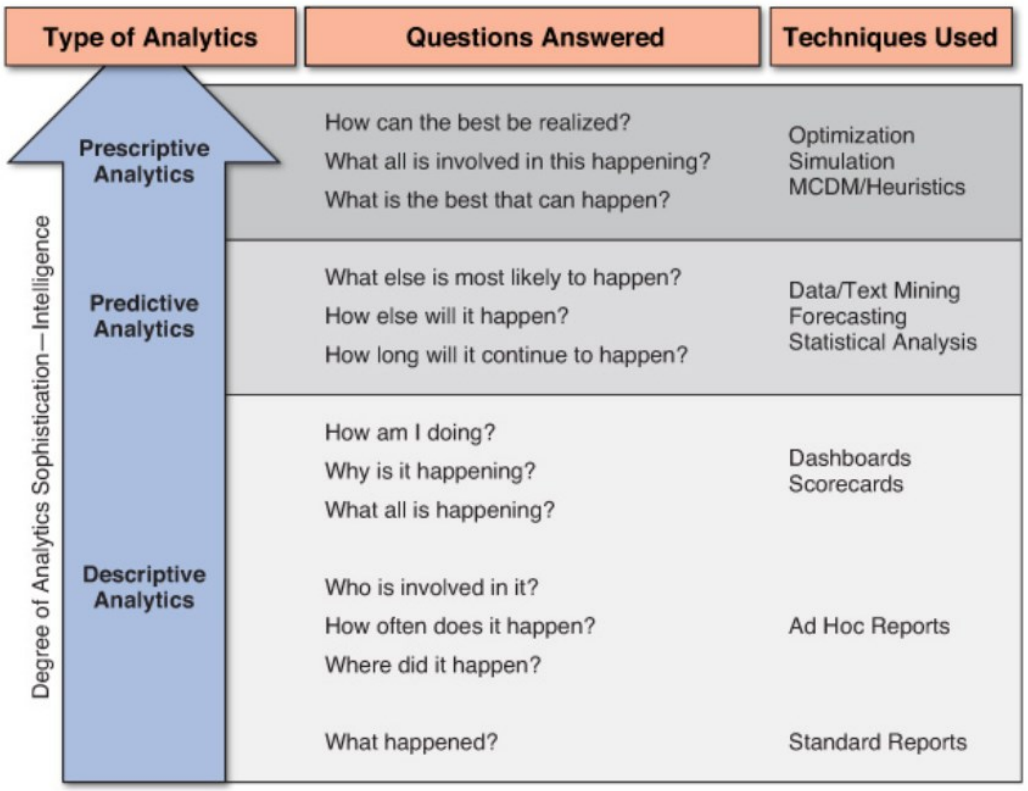

Figure 8. Three levels of analytics and their enabling techniques (Delen 2015, Ch 1).

The first level of analytics in Figure 8 is *descriptive analytics*. Descriptive analytics is sometimes referred as business reporting or business intelligence due to its nature to be presented in form of reports. It explores the data and aims to answer questions “What happened?” and “What is happening?”. (Delen 2015, Ch 1.) Descriptive analytics is based on historical data, and it describes and summarizes large datasets. It provides organization a mean to monitor its performance, progress, and success, through key performance indicators (KPIs) and metrics that are rooted from organization strategy. Microsoft (2023) supplements the descriptive analytics with the term of diagnostic analytics to answer question of “Why it happened? Diagnostic analytics investigates the changes in KPIs and metrics to find anomalies or outliers that can be further explored. It requires collecting additional information on them and running further analysis. (Microsoft 2023.)

The second level is *predictive analytics,* and it aims to answer question “What will happen?”. Predictive analytics is making estimates and forecasting future based on trends that are found in historical data. (Delen 2015, Ch 1.) Different statistical models and machine learning can be used to predict likely future data points to base the decisions of future actions and planning (Anderson 2015, Ch 5). For reliable predictive analysis, the predictions should be inspected within a feedback loop. Feedback loop includes building the predictions, measuring, learning, and repeating. (Anderson 2015, Ch 9.)

The third level is *prescriptive analytics* and it is on top level of analytics maturity. Prescriptive analytics use sophisticated mathematical models that are created on descriptive and predictive analytics. It aims to answer question “What should I do?”. (Delen 2015, Ch 1.) Prescriptive analytics analyses events and decisions made in past and estimates the best alternative for future actions (Microsoft 2023).

The upper two levels of predictive and prescriptive analytics are also called advanced analytics due to its high level of sophistication compared to descriptive analytics (Delen 2015, Ch 1). The sophistication evolves from down to up on Figure 8. Nevertheless, organization can be using analytics methods on each level simultaneously, not underestimating the importance of simple metrics on reporting. With the proper data literacy, the reports and dashboards that are accompanied with right metrics and visuals to explore are powerful tools in data-driven organization. KPIs and metrics are the topic of the next section.

4.1.3 Metrics & KPIs

Organization strategy gives the organization direction where it is heading and focuses on its business objectives. A data-driven organization determines metrics and key performance indicators (KPIs) to monitor them as a compass, whether the organization is on the wanted course and achieving the set objectives. (Anderson 2015, Ch 6.) Being metric-driven means that metrics are determined, used and outcomes are analyzed to gain insights for further actions (Morrow 2022, 59). Reporting with metrics provides the baseline from the past to reflect on the present, to track the change over time, spot the trends and gain the insight when metrics are explored and analyzed (Anderson 2015, Ch 1). The next paragraphs discuss the requirements for good metrics, different types of metrics, and their use in different levels of business hierarchy.

Metrics are quantifiable measures that are used to track business activity. “A metric that measures business activity against a goal is called a performance indicator”, as cited from Eckerson (2010). Performance indicator takes the metric a step further of just measuring the activity. Instead, it gives it a greater meaning that relates to organization strategy and keeping it on track. (Eckerson 2010, Ch 11.)

The requirements of the well-designed performance metric are listed below in Table 9. Requirements are adopted and combined from Anderson (2015) and Eckerson (2010).

Table 9. Performance metrics requirements (based on: Anderson 2015, Ch 6 and Eckerson 2010, Ch 11).

Performance metrics requirements:		
1	Strategic	It links to organization strategy and goals and helps the organization to monitor its success related to the strategy goals.
2	Simple	It is understandable to all levels of organization. It is clear what it measures, how is calculated and the effects of it in the business, along with actions to be taken to improve. Complexity should be avoided.
3	Owned	It is assigned to an owner who is accountable of its performance.
4	Actionable	The negative change in it can be turned around by corrective actions that are known to employees that are responsible for the performance metric.

5	Timely	The data behind it is timely and updated by agreed frequency. Corrective actions can then be taken on timely manner.
6	Referenceable	The performance metrics metadata is available for business users. They can observe the owner, calculation details, data source, last update etc. Users must trust the metrics.
7	Accurate	The value should be close to underlying mean value of the data and take into consideration possible bias. Inaccurate metrics will guide to inaccurate actions.
8	Correlated	The correlation between performance metric and the outcome should be calculated, monitored over time, and refreshed continuously based on correlation result.
9	Game-proof	The result of the performance metric should be tested against possibility to manipulate the result by the employees.
10	Aligned	They are aligned with organizations goals and do not undermine other performance metrics. That is, they need to be looked at together to spot possible challenges.
11	Standardized	It is unambiguous across the user group, preferably definable by a standard definition that is understood by the team, organization, or across the industry.
12	Relevant	When the performance metric does not full its purpose, it should be revised or discarded. Performance metrics have the best impact in the beginning of its life-cycle.
13	Precise	It should give similar result when tested with the same conditions.
14	Relative vs absolute	Both versions are applicable, but the results can be interpreted from different angles. Important is to know which and why is used.
15	Robust	It is relatively insensitive to outliers and extreme values.
16	Direct	Sometimes direct measures are not available, but proxies should be avoided whenever possible.

Eckerson (2010) divides performance indicators to outcome metrics and driver metrics, activity metrics, risk indicators and KPIs.

Outcome metrics measure the past business activity, and are mostly financial, e.g., revenue or profit. *Driver metrics* on the other hand measure the business activities that affect the outcome metrics e.g., weekly sales. Driver metrics track changes over shorter period of times to be able to react and correct the performance to achieve targets set to

outcome metrics. In other words, driver metrics affect the outcome of the outcome metrics. It is relatively easy to define outcome metrics as they are driven by the strategy. Defining driver metrics can be done by example brainstorming. When the outcome is defined, team can brainstorm the ways to count or measure whether the outcome is achieved. These counts can then be used as driver metrics. (Eckerson 2010, Ch 11).

Activity metrics are performance metrics that are not measured against the goals. They complement other performance metrics to provide better insight of the business performance, example top 10 customers. While performance metrics measure success, *risk indicators* are designed to indicate risks by drawing attention to early warning signs. (Eckerson 2010, Ch 11.)

In addition to above metrics, Parmenter (2019) defined *critical success factors (CSFs),* that are business elements necessary for achieve strategic goals. CSFs are linked to performance metrics. Similarly to the driver and outcome metrics, CSFs link daily performance to organization strategy. CSFs are operational issues. Daily activities should be aligned to achieve critical success factors and performance metrics should guide the activities to guide towards achievement and enable corrective actions. Therefore, other performance metrics should be linked to CSFs. (Parmenter 2019, Ch 3.)

Lastly, *key performance indicators (KPIs)* are the few highest level metrics that have strong impact on business. KPIs of the organization depend on its strategy, its maturity, and business model. KPIs should be SMARTER – specific, measurable, achievable, result-oriented, time-bound, evaluated and reviewed or rewarded. It means that verbs such as “improve” and “enhance” or nouns like “the best” and “quality”, should be avoided. And apart from other metrics, KPIs should be visible across the organization. (Anderson 2015, Ch 6.) KPIs and other performance metrics are used to turn the direction of every employee, team, and business unit, through understanding, to the same direction to achieve the common strategic goals. Failing on KPIs can indicate missing focus on strategic goals or missing correct activities, that may be led from incompetencies or lack of resources. (Laursen et al. 2010, Ch 3.)

Six attributes of performance indicator are described in Table 10.

Table 10. Attributes of performance metrics (based on: Eckerson 2010, Ch 11).

Attributes of performance metrics:		
1	Value	It has actual numerical value.
2	Time frame	Is has the period that is measured and the end date for meeting the target.
3	Benchmark	The value is compared to benchmark or baseline.
4	Targets	It has the defined target that is achievable when compared to baseline.
5	Ranges	The targets are divided into ranges (above target, on target, below target).
6	Visual encoding	It is presented visually to easily spot whether the targets are met, exceeded or more work is still do be done.

The above presented features combined with visual encoding enables to spot the performance of the operations and guide towards corrective actions if needed.

The well-defined targets enable easier interpretation of the performance. The targets of performance indicators can be divided into five types as listed in Table 11.

Table 11. Target types of performance indicators (based on: Eckerson 2010, Ch 11).

	Target types of performance indicators:	
1	Achievement	The target should be reached or exceeded.
2	Reduction	The target should be reached or exceeded in a downward direction.
3	Zero	The reduction target, where any positive outcome is not desirable.
4	Absolute	Achieving the target as close as possible without exceeding in either direction.
5	Min/Max	The absolute target with margin of what is acceptable exceeding in either direction.

The number of performance metrics used varies between organizations and industries. Parmenter (2019) suggests that there should be measures focusing on past, current

state and future in a ratio of 60/20/20. Past-focused measures tell the story of how well organization has met the set goals. Importance of measures of the past is to learn and make better decision in the future. The current-focused measures are mainly used on operational level, they are tracked 24/7, daily or weekly and enable corrective actions. Future-oriented goals are commitments of the future actions and when they are meant to take place. (Parmenter 2019, Ch 1.)

The number of organization wide KPIs is suggested to have less than ten well understood KPIs related to strategy goals and are visible to everybody, not only the board. KPIs should cover financial matters, customer, internal business processes, and learning and growth. Focus on those KPIs can be allocated to management responsible of related business unit. Each of these areas should have 2-5 objectives that are related to strategic goals and each of the objectives is associated with 1-3 KPIs that may be additionally associated to other performance metrics. On operational levels less than 20 performance metrics to guide the daily activities is found sufficient. (Anderson 2015, Ch 6). The essence is in the quality of the metrics and having too much metrics leads to distribution of focus.

To establish KPIs that are understood, clear and acted on, it is suggested to keep nine step KPI design workshop that is documented for actions and later revision. The process is illustrated in Figure 9 below.

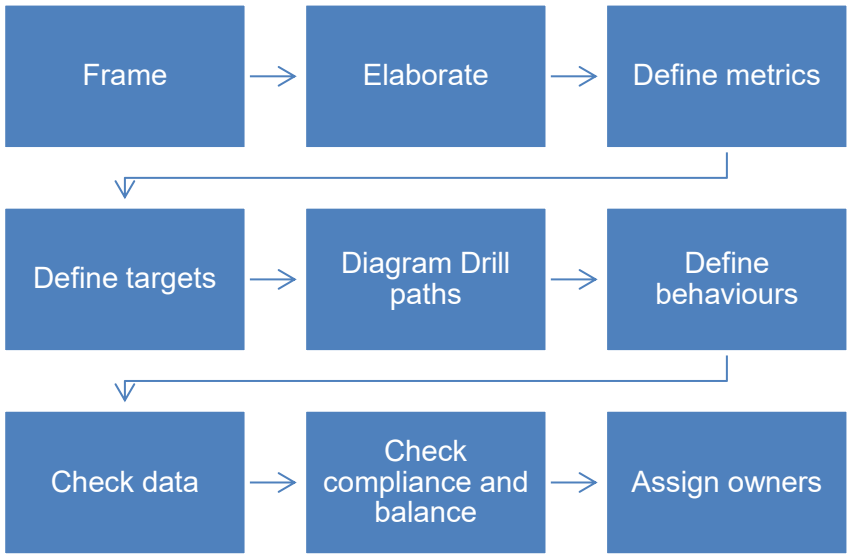

Figure 9. Nine steps of KPI dashboard design workshop (Eckerson, 2010, Ch 11).

As is illustrated in Figure 9, the design process starts with framing statement of strategic objective or objectives that the dashboard should support. Elaborating means generating questions that the dashboard and its KPIs should answer. Next is defining the metrics that supports on answering those questions and settings the targets and benchmarks to each metric. Diagram drill paths should be cocreated with business users as it explains the business user navigation on the dashboard, so that the necessary information is in optimized order. Defining behavior refers to defining each metric its driver and outcome metrics, the targets, and desirable actions to be taken to achieve the target. The next two steps require cooperation with data teams of checking the data availability and the quality requirements discussed earlier. If quality data is not available, the options of additional collection can be considered, or the metric should be discarded. Finally assign owners to metrics and document the outcome. (Eckerson 2010, Ch 11.)

Once the organization has defined the relative and measurable metrics and KPIs, it would need easy access and clear overview to track them. Performance dashboards, as a tool, is presented in the next section.

4.2 Performance Dashboards

To support the organization in being data-driven, employees should be provided with tools to data-driven decision-making. Well-designed performance dashboards provide a tool and support for data-literate employees.

Dashboard is a tool that displays metrics and KPIs in a visual context to reveal insights and support decision-making (Gartner 2023). Like dashboards in cars provide the driver information about the car performance and other data points, like fuel level, dashboards in business provide the information about business performance and other data points to support decision-making (David 2020). In business these dashboards are often called performance dashboards. Very insightful comparison by Eckerson (2010) is that performance dashboards are organizational magnifying glass. Like magnifying glass, performance dashboards allow its users to focus on key aspects on specific levels and areas of business. He defines the objective of the performance dashboard that it “translates the organization’s strategy into objectives, metrics, initiatives, and tasks customized to each group and individual in the organization”. (Eckerson 2010, Ch 1.)

Performance dashboards communicate the strategy objectives, provides timely information and insights on the status of organizational performance. Ability to spot trends, measure efficiency, improve analysis for better informed decision-making are some of the benefits of performance dashboards. Additionally, dashboards should decrease the need for other reporting, saving time to spend it on analysis and managing things that matter. (Rasmussen et al. 2009, 12.) Performance dashboards allow its users to measure, monitor and manage the key activities. They are designed to enable its user to monitor visualized KPIs and metrics, defined by the strategy, to catch the triggers and alerts in timely manner. It then allows user to analyze the causes by drilling down in detail and seeing the data from different angles and act upon it. Performance dashboards can also be called performance management systems. Through monitoring and analyzing, the decisions about managing people and processes are based on data and actions can be taken to achieve the strategy goals. (Eckerson 2010, Ch 1.)

Performance dashboards are used to tell a story of an organizational performance, on certain focus area with a simple glance, and directs to corrections in actions if necessary. With codesigned metrics and KPIs on data that represents single source of truth, data-literate staff may gain great insights and support for the daily work. As well as the management level, to support the organization path on its being data-driven.

4.2.1 Types of Performance Dashboards

The use of performance measures on different levels of business dashboards help to see the progress, understand what actions need to be taken and decreases the need for micromanagement (Parmenter 2019, Intro). Performance dashboards can be divided to three types – operational, tactical, and strategic as illustrated in Figure 10.

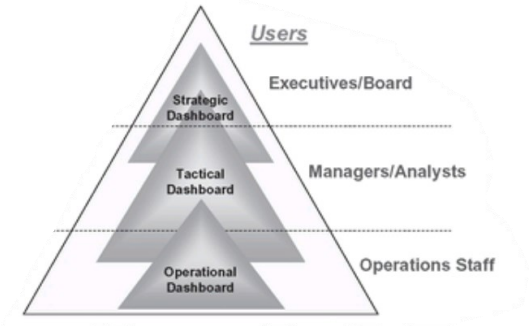

Figure 10. Types of performance dashboards (Eckerson 2010, Ch 6).

Each layer of the pyramid on Figure 10 represents different type of dashboards which have special functionalities and user groups. Each of the dashboard type, users and functionality are somewhat overlapping the levels, meaning that they are not restricted to one and can be used as supportive mean to other levels. (Eckerson 2010, Ch 6.)

Operational Dashboards. Operational dashboard's functionality is to provide very detailed information on specific operational activities in real time or on data that is updated frequently. Performance metrics for operational dashboards are often designed to be monitored for alerts that should be responded with corrective actions. (Anderson 2015, Ch 7.) Therefore, the role of operational dashboards is more about monitoring the performance of key processes, like daily sales or manufacturing process, rather than analyzing. With the special focus on operational staff, it is easy for the staff to read the data, see the exceptions in the processes and act timely. Despite the focus users, operational dashboards are also monitored by mid-level managers to gain more detailed information of the performance, as well as for building the dialogue towards subordinates of the performance in informed manner. (Eckerson 2010, Ch 6.) Operational dashboards are used to paint a picture of the current moment (Qlik 2023, 9).

Tactical Dashboards. Tactical dashboards are used for monitoring and analyzing, with the emphasis more on analysis. The target focus is on monitoring and optimizing business processes in different business units, like finance or marketing. For the analysis purposes, tactical dashboard visuals are mostly based on time series and categorical comparison that are updated frequently. Tactical dashboards emphasize on ability to drill down in data to analyze outliers and unexpected trends (Anderson 2015, Ch 7). Therefore, the interactive exploration within the dashboard is very important (Qlik 2023, 12). Metrics include driver and outcome metrics, where the first ones are driven from operational activities and latter ones relating to mid-level or departmental goals. Tactical dashboards are mainly used by mid-level managers but also by operational staff to see departmental data as well as by executives to gain better insights of the business performance and performance benchmarking between departments. (Eckerson 2010, Ch 1.)

Operational and tactical dashboards concentrate on measuring performance, while simultaneously it collects new data of actions that were taken based on dashboard alerts and spotted trends. This new data can be used for future purposes, measuring the

relationship between actions taken and the effect on strategic goals. (Laursen et al. 2016, Ch 3.)

Strategic Dashboards. Strategic Dashboards present a high-level overview, with KPIs and associated targets of whether the organization is meeting its strategic objectives and goals (Anderson 2015, Ch 7). Strategic dashboard focus is on monitoring progress towards achieving the set goals and managing, that is understanding the current direction and guide the actions towards desired direction. Strategic dashboards often require more manual input for explaining the changes in KPIs and understand whether the issue is the wrong direction or should the strategy be refined. Strategic dashboards are usually analyzed in monthly to quarterly manner. Despite that they are mainly used for executive work, they can be used to communicate the strategy performance to the whole organization. (Eckerson 2010, Ch 1.)

The audience of the dashboard defines the type and content of the dashboard. In addition, it defines how the dashboard is designed and visualized to best suit the audience needs. Human brain can process visuals in more ease than set of numbers in a tabular format. Therefore, the next paragraphs dive little bit deeper and discuss how a good dashboard is designed to support storytelling and data-driven decision-making.

4.2.2 Data Visualization

The amount of data is growing rapidly and is estimated to reach from humble 2 zettabytes in 2010 to 181 zettabytes in 2025 (Statista 2023). The yearly growth is illustrated in Figure 11.

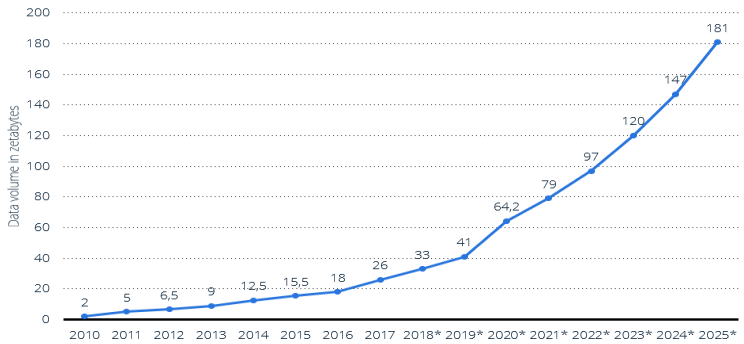

Figure 11. Amount of data created, consumed, and stored 2010-2020, with forecasts to 2025 (Statista 2023).

Stephen Few (2009) describes the massive amount of data as “wealth of potential” to take advantage of. Visual data analysis enables audience to see the data, to explore the data and understand the data. It also brings analyzing data closer to broader audience. (Few 2009, 1, 6.) Data visualization is the graphical representation of data via interactive visual exploration. It means enabling direct interaction with visuals and manipulating charts with color, brightness, size, shape etc. to highlight patterns and trends and to attain insights. (Gartner 2023). Few (2009) simplifies the definition of data visualization being any “visual representation that supports the exploration, examination, and communication of data” (Few 2009, 12). The activities, technologies and goals of data visualization are presented in Table 12.

Table 12. Data visualization (Few 2009, 12).

Data Visualization		
Activities	Exploration Sence-making	→ Communication
Technologies	Information Visualization Scientific Visualization	→ Graphical Presentation
Immediate Goal	Understanding	
End Goal	Good decisions	

Table 12 illustrates that activities of data visualization are exploration, sense-making and communication of data. Data visualization covers both information visualization and scientific visualization that are presented in graphical presentation. The immediate goal of data visualization is understanding, and ultimate goal is to make good decisions based on that. “The purpose of information visualization is not to make pictures, but to help us think.” (Few 2009, 12-13.)

Within the data there lies a story. Combining data, visuals and a narrative around them is impactful way to create change. The impact of each of the elements is illustrated in Figure 12.

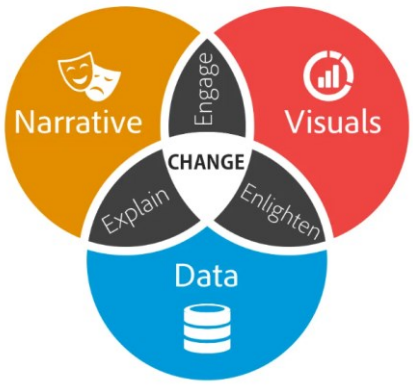

Figure 12. Data storytelling elements (Dykes, 2016).

Figure 12 presents the effect of combining three elements, data, visual and narrative, to each other. When visuals are created from data, it enlightens the audience to better see the insights, patterns and trends within the data. Engaging the audience to a narrative with visuals and explaining the data through that narrative it helps to drive change. (Dykes 2016.) Figure 13 below provides an example of a visualized dashboard.

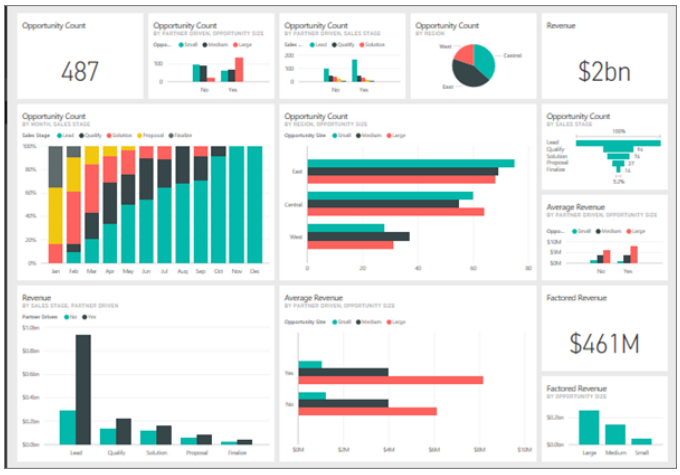

Figure 13. Visualized dashboard (Microsoft 2023).

Anderson (2015) says ““story” is meant to capture the key findings, features, or patterns in data, to convey what caused them where possible, and, looking forward, to spell out the implications and recommendations to the organization” (Anderson 2015, Ch 7). Dashboards do not tell the story as human does. But many components of the dashboard such as colors, fonts, sizing, visual selection, interactivity and familiarity with the context helps to let your data to “speak”. (Yau et al. 2013, Ch 2.)

4.2.3 Dashboard Design

A good dashboard is “a powerful launch point for data-driven conversations” as described by Tableau (2023). The characteristics of a good dashboard are that it delivers the message, is clear and is driven from single source of truth. (Tableau 2023, 2.) In addition, Calzon (2023) emphasizes the layout, order of the visuals, interactivity and user-friendliness, to keep the audience engaged.

Below Table 13 provides the topics to consider when creating a good dashboard. The requirements are combined from three sources of Calzon (2023), Eckerson (2010) and Tableau (2023) for a comprehensive understanding.

Table 13. Requirements for dashboard design (summarized from: Calzon 2023; Eckerson 2010; and Tableau 2023).

Requirements for dashboard design:	
1	*Understand the audience needs.* It is vital to start with considering who are the users of the dashboard and their information needs. These questions can help: What is the time used for reading the dashboard? What is their data-literacy skills? Will they need more guidance within the dashboard? Do they use the dashboard for monitoring, analysis or managing? By defining the audience correctly, the correct metrics and KPIs are easier to choose for completing the purpose of the dashboard. (Calzon 2023; Eckerson 2010, Ch 12; Tableau 2023, 3.)
2	*Provide the context.* For making meaningful insights, it is necessary to provide information on the context, for example, a comparison such as value from the last year, a yearly goal or forecast value, etc. The context is also given via adding chart titles, naming the axes and displaying units to avoid confusion. However, it is important to add additional information about visuals only to extent that is necessary, to avoid excess distraction. (Calzon 2023; Tableau 2023, 14.)
3	*Build a single screen overview.* A dashboard should fit into a single screen to enable quick overview of the data and comparison between visuals. It does not mean having all information on one dashboard, but dashboard characteristics of being interactive (filtering, highlighting, drill-down) enable to explore data more in depth. Dashboards are also not limited to one, there may be several separate dashboards with different focus points in use. (Calzon 2023; Eckerson 2010, Ch 12.)
4	*Select the right chart.* Charts on a dashboard have mainly four focus areas: relationship, distribution, composition, and comparison. A correct chart is chosen based of the metric that it represents and its focus. The charts used should be tested to give a rightful picture of the data and should not bend the truth. (Calzon 2023.) A list of charts is included in Appendix 2 and Appendix 3 presents the guidance on selecting the suitable chart.

5	*Choose the layout.* A dashboard needs to be visually well-organized. Most cultures read from left-to-right and top-to-down. Therefore, the top left quadrant of the dashboard should include the key information as it receives the most attention. The second important quadrant is the top right quadrant, thirdly, the bottom left quadrant and lastly the bottom right quadrant. The importance of the information should follow the same path. Additionally, similar themes should be grouped together to enable easier comparison. It is also important to consider where the filters and slicers are to be placed – on top, on left pane or placed near to visuals that they have effect on. It may be recommended to use a template for the dashboard layout. (Calzon 2023; Eckerson 2010, Ch 12.)
6	*Separate or group the parts together.* To better understand the information, it is necessary to connect or separate areas or visuals from one another. It can be done by shading areas, lines, white spaces between areas, colors with cautious, and muted lines. Muted lines can be e.g. dashed line between separate KPIs on the same visual. (Eckerson 2010, Ch 12: Tableau 2023, 6.)
7	*Ensure clarity.* Practitioners insist keeping a focus on simplicity and aiming to avoid unnecessary decorations (pictures, frames, backgrounds, effects, gridlines). It can be achieved, for example, by using round numbers or abbreviations like 500K or 0,5M instead of 500 000, as well as having a consistent labelling and formatting across the dashboard. The number of suggested visuals on a dashboard is not stated, but one should avoid saturating the dashboard and causing extra distraction. For example, practitioners warn to be cautious with use of colors, choosing a few colors and making use of different levels of gradient if necessary. White labelling, that is using company logo, color themes and visual identity, is recommended when available, as it is already familiar to the audience. (Calzon 2023; Eckerson 2010, Ch 12.)
8	*Ensure interactivity.* Practitioners suggest making use of interactive elements such as drill-down, filtering, time interval widgets, highlighting, tool-tips, pop-up screens for more accurate exploration of data. (Calzon 2023; Tableau 2023, 9.)
9	*Ensure optimization for multiple devices.* As dashboards are viewed on desktops, tablets or mobile devices, therefore, the display size, the number and sizes of elements need to be considered separately for all screens for optimal use. (Calzon 2023; Tableau 2023, 4.)
10	*Test the dashboard.* Practitioners recommend to create a prototype, if possible, and run a test with the audience; or test the usability of the dashboard or run A/B testing, if possible. The test round should answer the question if the users are able to find the needed information with ease and without distraction. Since the dashboard design is an iterative process, it keeps changing as the business around it is changing. (Calzon 2023; Eckerson 2010, Ch 12; Tableau 2023, 15.)
11	*Optimize the load times.* Practitioners recommend avoiding delays in dashboard visual load times with planning the data refreshes when needed and using datasets that need the least calculations by the visuals. (Calzon 2023; Tableau 2023, 5.)

12	*Monitor its usage.* Finally, it is important to keep monitoring the usage of the dashboard by training, tracking, and surveying the users of the dashboards. Dashboard that is not used carries no value. (Eckerson, 2010 Ch 15.)

In summary, Eckerson (2010) states that a "good dashboard design uses the least amount of ink to highlight key trends or relationships within the data" (Eckerson, 2010, Ch 12). Every visual and element on such a dashboard should deserve a purpose and answer the needs of the audience. The next section focuses on the tool to create dashboards for building performance dashboards. Microsoft Power BI visualization tools are discussed, as it is a software that is in use in the thesis case company.

4.3 Power BI

Microsoft Power BI is a business intelligence platform that enables data visualization and improves decision-making. Power BI does not require its users to be technically advanced to be able to create visuals and insights out of data. (Microsoft 2023.) Gartner's yearly research of analytics and business intelligence platforms has positioned Microsoft as a leader in the market many years in a row. The research emphasizes the easiness of creating visuals as self-service and AI automated insights. (Gartner 2023.) Result of the survey is illustrated in Figure 14.

Figure 14. Magic quadrant for analytics and business intelligence platforms (Gartner 2023).

Before going in more detail about tools that Power BI has to offer, it is important to notice that Microsoft definition for a dashboard varies from what has been previously discussed in this thesis. In Power BI, report is a collection of visuals, that are prepared from the same dataset. That dataset can be combined from many data sources. Reports can have either single or multiple pages. Reports can be used the same way as what literature has previously defined as a dashboard. In Power BI, dashboard is a single page canvas that presents collection of visuals from different reports. Visuals from different reports and different underlying datasets can be pinned to one dashboard to enable quick overview of data in interest. (Microsoft 2023.) Figure 15 below presents the difference in a visual manner for clearer understanding. From now on the meaning of a report and dashboard in Power BI context are used as defined by Microsoft.

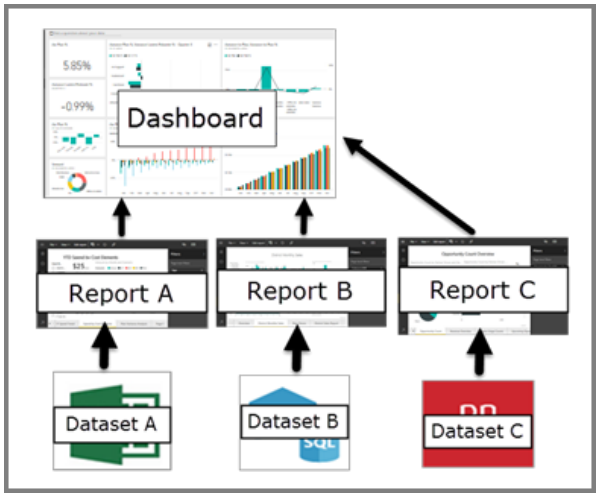

Figure 15. Report vs. dashboard defined by Microsoft (Microsoft 2023).

Power BI can be divided into three components: Power BI Desktop, Power BI service and Mobile apps. The linkage between components is presented in Figure 16.

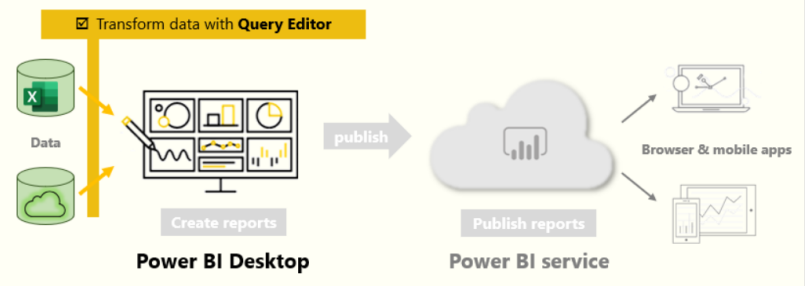

Figure 16. Data flow between Power BI components (Microsoft 2023).

The first component, Power BI Desktop allows user to connect to variety of data sources, upload and the transform the data with Power Query Editor tool to prepare data for modeling and visualization. Desktop is used by report designers, who publish them to Power BI service. Second, Power BI service is a cloud-based tool that enables users to explore the published reports, create own reports and dashboards. Creating own reports in Power BI service is more limited than in Power BI Desktop. Differences and similarities in Power BI Desktop and service functions are presented in Figure 17 as an example. Lastly, Mobile apps enable interaction with the data through shared reports and dashboards. (Microsoft 2023.)

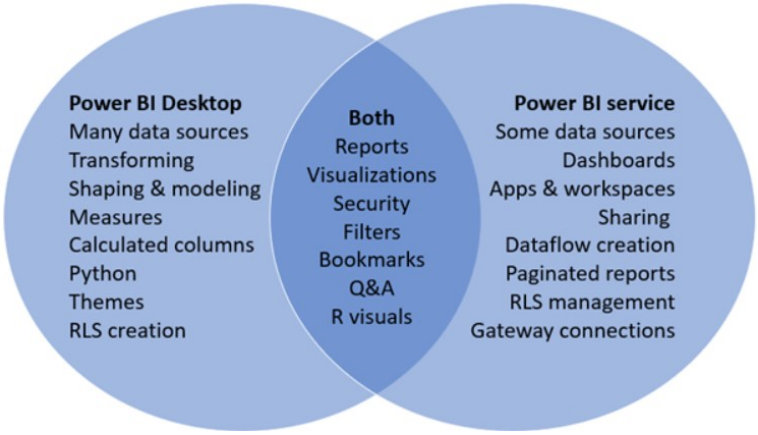

Figure 17. Different and similar functions of Power BI components (Microsoft 2023).

Power BI service provides a safe environment for users to explore and interact with the data. Power BI visuals are interactive, meaning that they can be used to emphasize and highlight other visuals in the report. Users can use the filters, cross-highlight, drill up and down, check the underlying data of the visual, export the visuals and underlying data, etc. Users can save their changes made and reset it to original stage when wanted. Saving the changes affects only on that user's view. Users are not able to break the report or dashboard via exploration. (Microsoft 2023.) Power BI service also enables collaboration with your colleagues to share insights, draw attention and communicate. Comment feature on the dashboard enables direct interaction about the content, no need to extract the conversation out of the context for example via e-mails. Comments can be done on the dashboard level or to specified visual. (Microsoft 2023.) Users can subscribe to reports and get alerts. Users can subscribe snapshots of content in interest to their e-mail on scheduled times. When KPIs that are presented on visuals reach certain predefined threshold, Power BI can send data alerts to enable rapid actions. (Microsoft 2023.)

Additionally, Power BI provides Q&A visual on reports. Designers and users can use the visual to ask questions about the dataset or to create visuals. Questions can be asked in natural language, or choose from suggested options, and Power BI provides the answer in a visual form. Users can then explore the answer visual which interacts with other visual on the report. Answer visuals can be saved and formatted the same way as other visuals. Q&A can be trained by teaching it understanding questions that arise from the dataset and teaching it for example synonyms. Q&A is also available in dashboards but is not in form of visual but it can be found in menu bar under More options. (Microsoft 2023.) The list of Power BI visuals and the use cases are presented in the Appendix 2.

Summing up, Power BI reports and dashboards are user-friendly tools that bring analyzing data closer to employees across organizations. Thus, enabling greater understanding, higher level of collaboration and support decision-making.

4.4 Conceptual Framework of This Thesis

The conceptual framework of this thesis follows the existing knowledge discussion and is presented in Figure 18. The conceptual framework consists of three main areas of data-driven organization that are relevant for building the proposal for the case company.

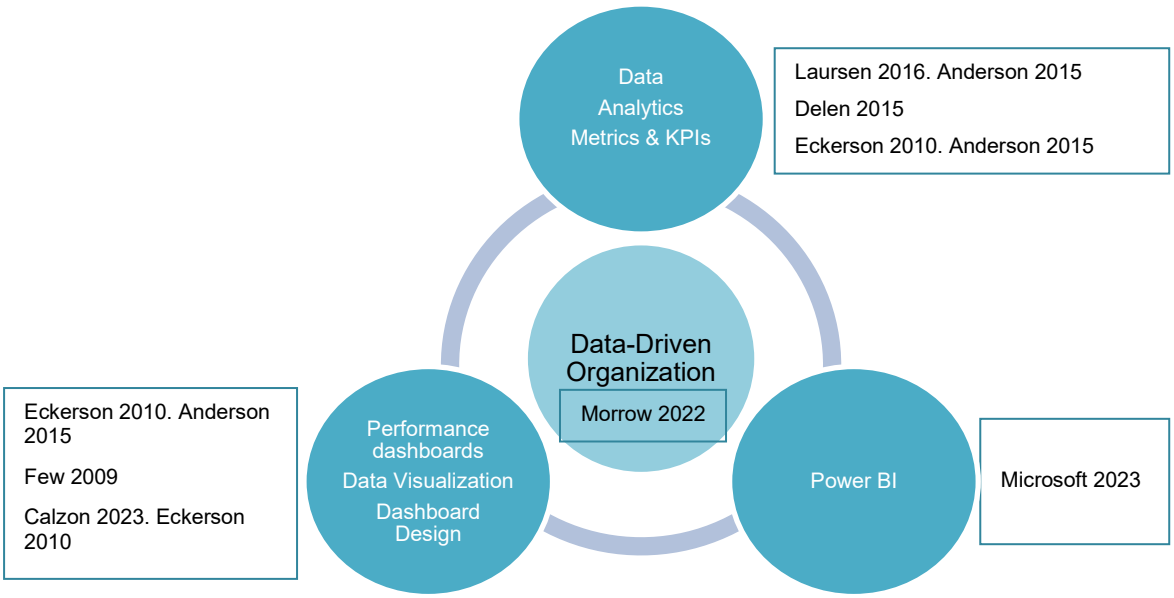

Figure 18. Conceptual framework of the thesis.

The first area covers what are the pillars of a data-driven organization and the steps to be taken to become data-driven. It defines what is data and its requirements for analysis purposes. Three types of analytics are described to understand the sophistication level

of analytics – descriptive, predictive, and prescriptive. Lastly, it covers essential topic of metrics and KPIs to measure the performance. Defining the critical factors that need to be measured in a meaningful and correct way, and by the correct audience. It requires great effort from the organization but is essential to be able to steer the organization towards correct direction in achieving strategy objectives.

The second area covers the performance dashboard as a tool for reporting and managing performance. It presents three levels of performance dashboards – operational, tactical, and strategic. All levels have specific audience and function in data-driven decision-making. The area explains the benefits of visualizing the data and how it helps to gain insights through visually designed dashboards.

The third area shares insights of Power BI as a chosen tool for visual performance management. It describes the working flow of Power BI components and introduces some key features that are important in performance management aspect.

The findings from the existing knowledge and results from the current state analysis support the proposal building in the next sections of the thesis.

5 Building the Proposal for an of Up-to-date Power BI Analytics Plan for the Company

This section focuses on building the proposal for an up-to-date Power BI analytics and reporting plan for operational work management of the insurance team and management reporting. The proposal building is based on the findings of the current state analysis of the current reporting practices and supported by the best practices and existing knowledge discussed in the previous section. The proposal building process is based on internal cocreation and stakeholder suggestions in Data 2 collection.

5.1 Overview of the Proposal Building Stage

This section presents the steps in the proposal building for this thesis. The proposal for an up-to-date Power BI analytics and reporting plan, aims to address the lack of data-driven performance management of insurance team's operational work, which was the main weakness identified in the CSA.

Based on the findings from the CSA the focus areas of data-driven organization and modern reporting practices were chosen for the literature review. The existing knowledge and best practices provided the knowledge of requirements for becoming a data-driven organization in the form of five pillars as well as the practical tools for planning and building the correct metrics and reports for data-driven performance management.

The process of the proposal building followed the rationale described in Table 6 of the practices of making data-driven decisions in the best practices section 4.1. The steps are 1) Understand, 2) Involve, 3) Plan analysis, 4) Data, 5) Visualize and explore data, 6) Insights and actions. The proposal building focuses on the first three steps of the process – understand, involve, and the analysis plan, which is the proposal.

Step Understand. Firstly, the findings from Data 1 collection were reviewed and secondly, the case company strategy and objectives were identified in the interview and from the company documentation. The business strategy forms the basis for data-driven organization and sets the frames for reporting needs and focus.

Step Involve. Involvement of the relative stakeholders started already in the current state analysis phase. In the proposal building phase managers and experts were involved in

workshops of cocreation and interviews. The stakeholders were asked the same questions about the objectives of the case company and how they can affect the objectives, to see whether the business objectives are well understood within the case company.

Step Plan analysis. The stakeholders were provided with the short summary of the best practices of data-driven performance management, metric design, Power BI visuals and a layout tool for the metric creation. Metrics were created in workshop sessions and documented to the proposal of Power BI analytics and reporting plan. The suggestions and insights from the stakeholders are discussed in the next section of Findings from Data 2.

5.2 Findings from Data 2

In the proposal building phase one insurance team out of two participated. The decision was made by the case company due to internal reasons. The second team's reporting needs will be documented later apart from the thesis. For management reporting purposes the reports include both insurance teams' data. Therefore, the main data source to be used in the proposal is data source B and complemented with data from data source A for management reports. The insurance teams' mutual data source C is discarded from the proposal, as per stakeholders' decision. It was identified as only a supportive data source without essential added value to the outcome.

This section discusses the main ideas and suggestions from the stakeholders of this cocreation phase. The main inputs from the stakeholders are presented in Table 14. The table presents the relation between the input of the stakeholders, selected focus area of data-driven performance management from the CSA, as well as the linkage to the theory from the literature review.

Table 14. Key stakeholder suggestions for Proposal building in relation to findings from the CSA and the Conceptual framework.

Key focus area from CSA (Data 1)	Topics from literature (CF)	Main inputs from stakeholders for the Proposal, (Data 2)	Descriptions of the inputs
Lack of data-driven	Data-driven organization (Morrow 2022)	a) Business focus from the strategy	The Managing Director of the case company emphasized three key areas of the strategy for reporting:

performance management			1) Functioning service production, 2) Insurance premiums, 3) Fulfilling yearly business plan.
	Data Visualization (Few 2009) Power BI visuals (Microsoft 2023) Dashboard Design (Calzon 2023, Eckerson 2010)	b) Continuity of the current Management/Board reporting visual outlook	The management suggested that the idea of the current management and board report visualizations remain the same or similar in Power BI reporting to maintain the continuity and traceability of the reporting. Though, it is preferrable to present them in more compact manner or aspects could be combined and highlighted with visual details, like color.
		c) Prioritization of building the reports	The management also suggested that as the current monthly management/board reporting is very labor intensive and manual, it should be prioritized to be built first.
	Performance dashboards (Eckerson 2010, Anderson 2015) Dashboard design (Eckerson 2010, Calzon 2023)	d) Up-to-date reporting made available to everybody in single channel	All interviewees discussed in harmony that new reports should be available across the case company without limits to different hierarchal reporting levels.
	Dashboard design (Calzon 2023, Eckerson 2010) Power BI visuals (Microsoft 2023)	e) Availability of drilling into the data	The Managing director suggested that the data drilling features should be made available to support analysis. Yet, another stakeholder also noted that complication of the reports and the amount of the information should be considered to avoid distraction.
	Data driven organization (Morrow 2022) Metrics & KPIs (Eckerson 2010, Anderson 2015)	f) Documented business definitions of reporting needs	Data team representatives suggested that in addition to detailed documentation of reporting needs and business jargon definitions, the pre decided report permissions and validation numbers available, would support data team's future work on reports.

The stakeholders were actively involved in the proposal building and had suggestions that improve the practical benefits of the proposal. Table 14 above presents the main inputs and are discussed more in the next paragraphs.

Business focus from the strategy. Clear and understood business strategy is one of the key pillars of data-driven organization. Three main objectives of the case company were emphasized by the Managing director and they were chosen as the focus points for reporting. The first and most important focus is functioning service production. Quoted from the Managing director (translation by the thesis researcher):

> Our main objective is to offer our insurance services and related services to the sales channels. In practice it means, that we are the process keepers from that perspective, and we need to ensure that our processes are working, and they work well. (Managing director)

This focus area is the core of the future reporting in all levels of reporting. The levels or reporting make the three elements of the initial proposal. Additionally, insurance premiums and fulfilling the yearly business plan are included in the management level reporting focus.

Continuity of the current Management/Board reporting visual outlook and prioritization. The current reporting consists mainly of the monthly reporting for management and board meetings. The same visuals, reporting the trends with comparison over the years, has been the requirement from the board. The Informant 1 emphasized that the overall idea of the current visuals is preferred to remain as is to maintain the continuity and the traceability of reporting. Improvements though are welcomed as the current reporting contains too may pages. The report design and the choice of the Power BI visuals should be considered to achieve it. As per findings from the CSA, the data of the reports is gathered manually over various data sources and therefore it is wished by the stakeholders, that these reports are prioritized in report building to reduce the manual work.

Availability of the reports. The issue of the report audience permissions was discussed over many interviews. It was agreed that the new reports should be available to all employees in single channel of the case company. As stated in the cocreation session (translation by the thesis researcher):

> Inside the company we don’t have such critical things that someone (own employees) should not be able to see. Our operations are very transparent inside the company. (Informant 2)

The suggestion is supported by the literature of overlapping use of the reports by different reporting levels. The reports should be available and readable to all employees. Hence

it was suggested in workshops that the reports should not contain too much information to cause the distraction. In addition, it was suggested that the drilling down in data is made possible, but it should be kept simple while the data literacy and technical skills of the employees evolve.

Documentation. The logic and the layout of the metric design was created prior to the interview with the data team representatives and was based on the existing knowledge from literature. To support the effective work of the data team, the data team suggested to consider if there are any data that has restrictions to be viewed by all the employees. And secondly, it was suggested to add validation values for metrics. The validation numbers reduce the need for checking the results together between the data team and insurance team. The layout of the metric design tool used in workshops can be seen in below Figure 19 as an example. The validation number was added according to the suggestion.

Heading	Description
Report page	Describes the focus of the set of report pages.
Metric	What is measured?
Metric content	Description of metric content in more detail. If applicable, formulas of calculations and clarifications of the data.
Targets/Alerts	Target or alert if applicable.
Visual	What type of visualization could be used and description if applicable.
Source	Where the data can be found in DW data tables or Excel tables
Validation value	Example of the metric result from the past to check against when metric is being built.
Related metrics	To what metrics it is related and what metrics it affects.

Figure 19. The layout of the metric design tool.

The main inputs from the stakeholders supported the building of the proposal draft that is discussed in more detail in the next sections.

5.3 Proposal Draft

The proposal draft for and up-to-date Power BI analytics and reporting plan for operational work management of insurance team and management reporting contains four elements – three levels of focus in report pages and the documentation of needs and suggestions for the reports and metrics.

The existing knowledge and best practices from literature supported in creating the plan for three levels of reporting. Firstly, it provided the steps of becoming data-driven organization and practical requirements to create a good metric design tool. Secondly, it explained the importance of data visualization and the opportunities of Power BI to support data-driven performance management. Thirdly, it provided practical report design requirements that supported building the rational sets of report views for different audiences, grouping relevant metrics together as well as choosing the focus of each metric. Each level of reporting and the report focus is discussed as separate elements of the proposal.

5.3.1 Element 1 – Management Focus

According to CSA, the current management and board reporting includes only basic upper-level metrics and KPIs, which are based on data from several sources and are collected manually. The new management reporting view, the strategic reports, in Power BI has two focus categories – 1) to answer three main business objectives and 2) to provide up-to-date reports for board meetings. Table 15 shows a summary page of the management report view.

Table 15. Management report view.

MANAGEMENT FOCUS			
Report pages	**Purpose**	**Metrics**	**Visuals**
1. Business Overview	Overview of business KPIs and financial figures.	Income Premium Paid Claims Remunerations	1.1.1 - 1.1.7 (7) 1.2.1 - 1.2.4 (4) 1.3.1 - 1.3.3 (3)
2. Insurance Service 1	Ready made Board reports. Time-series analysis. Stability to reporting.	Received Applications Granted Applications Rejected Applications Change Requests Claims Processing time	2.1.1 - 2.1.2 (2) 2.2.1 - 2.2.2 (2) 2.3.1 - 2.3.2 (2) 2.4.1 - 2.4.2 (2) 2.5.1 - 2.5.3 (3) 2.6.1 - 2.6.2 (2)
3. Insurance Service 2	Ready made Board reports. Time-series analysis. Stability to reporting.	Received Applications Change Requests Claims	3.1.1 - 3.1.2 (2) 3.2.1 - 3.2.2 (2) 3.3.1 - 3.3.4 (4)
4. Budget vs. Actual	*Overview of the spend vs. budget, with ananlysis of IT and suppliers.*	*Data not yet accessible* *Budget vs. Actuals* *IT-spend* *Suppliers*	*Suggestion only*

As seen from Table 15, the summary page specifies the audience of the report, report pages, purpose of the report page, metrics in the report page and number of the visuals on the report page. The latter column of visualization refers to a serial number of the metrics in the documentation of metrics.

The first report page focus is on business overview and financial KPIs, the outcome metrics. In the interviews, the insurance premiums and fulfilling yearly business plan were raised as two out of three main objectives of the case company. The insurance premiums, claim payments and remuneration to sales channels are shown as KPIs in the report page and provide statistical overview of trends over time and possibility to drill into the data. Citation from the Managing director emphasizes the importance of analyzing the data (translation by the thesis researcher):

> You should be able to drill down to the level of euro to see where it comes from. Reporting itself is mute, you need to analyze it and build narrative through that, why things happen and only then data starts to have a meaning and you can take actions. (Managing director)

The second and the third management pages' focus is on board reporting and reporting on functioning service production as the third main objective of the case company. The report has separate report pages for both insurance teams. The visualizations of the pages follow the idea of the current reporting as was suggested by the interviewees. The relevant visuals of each team are collected in one page view and supported by the card-visuals of Power BI to attract the attention with color formatting to whether there has been changes in the metric. If changes had occurred, the trend visuals can then be examined more in focus mode of the report. The Power BI page can be embedded to the board meeting presentation directly and hence reduces the effort of manual report building.

The fourth page of budget overview provides information of the budget and actuals, with special focus on IT services. Its focus is on fulfilling the yearly business plan. The report page includes supplier report and drilling possibilities into spend by business unit. Accounting data is not yet available in the DW, but it is to be considered whether to build Excel-based support for Power BI reporting as a temporary solution to provide the actuals of spending.

The choice of visuals of the management report view has a focus on seeing the KPIs, trends over time and drilling more into details, as recommended by the literature review.

The Power BI new card visual is used to promote KPIs supported with reference labels that present comparison values from e.g. the previous year or shows the change in value numerically or visually. The reference labels support the storytelling of the report. The new card visual is widely used in all report levels. In addition, combo charts of line and columns, as well as the normal and stacked column/bar charts are used to spot the trends and comparison in data groups.

5.3.2 Element 2 – Team Management Focus

The CSA exposed that team managers are lacking the tools for evaluating individual expert's workload and performance, and to use it in target setting and evaluation. The literature review suggested that these tactical reports' focus is on analysis and optimizing business processes. The new team manager report focus is on the business objective of functioning service production. Table 16 presents a summary page of the team manager report view.

Table 16. Team manager report view.

TEAM MANAGER FOCUS			
Report pages	**Purpose**	**Metrics**	**Visuals**
5. Team Performance	Monitoring the performance and the workload of the experts, supports the target setting and inidicates training needs.	Gross Processing Time Net Processing Time Granted Applications Rejected Applications Disclosures Counter-offers Change Requests	5.1.1 - 5.1.2 (2) 5.2.1 - 5.2.2 (2) 5.3.1 - 5.3.2 (2) 5.4 (1) 5.5 (1) 5.6 (1) 5.7 (1)
6. Applications	Application volumes, effects on resources and business.	Applications in the Bank Applications Under Process Granted Applications Rejected Applications Counter-offers Change Requests Disclosures	6.1 (1) 6.2 (1) 6.3.1 - 6.3.4 (4) 6.4.1 - 6.4.4 (4) 6.5.1 - 6.5.2 (2) 6.6.1 - 6.6.2 (2) 6.7.1 - 6.7.2 (2)
7. Sales Channels / Services	Allocation of operational resources to sales channels and service types. Monitoring sales channel performance.	Processed Applications - Sales Channels Processed Applications - Service Types Net Processing Time - Sales Channels Net Processing Time - Service Types	7.1 (1) 7.2 (1) 7.3 (1) 7.4 (1)
8. Insurance Portfolio	Enable analysis of the insurance portfolio and support training offering.	Active Agreements Terminated Agreements Service Types Service Sizes Exclusions	8.1.1 - 8.1.2 (2) 8.2 (1) 8.3 (1) 8.4 (1) 8.5 (1)
9. Claims	*Monitoring claims and effects on resources and business.*	*Data not yet accessible* *Claims* *Compensations*	*Suggestion only*

As seen from Table 16, team manager focus has notable share of the report pages. The phenomenon is supported by the literature as it is the reporting level that helps to monitor and optimize processes through monitoring and analysis. The team manager view includes some of the same metrics as management view, but the implementation of the visualization is adapted to serve the purposes of the team management and enabling drilling feature in different level of detail.

Team management focus is divided into five pages – 1) Team performance page to enable monitoring workload between experts, support target setting and provide targeted training, 2) Insurance applications to monitor business and support human resource decisions, 3) Sales channel and service page to measure sales channel activity and see which sales channels and services consume experts' time and whether there is a need for targeted support, 4) Insurance portfolio page of the statistics to support analysis of the current state of the insurance portfolio and to support training, and 5) Insurance claims page to analyze claims and time consumed by experts. The insurance claim page is presented in the proposal, but the actual data is not yet available in the DW and hence the implementation is postponed. The choice of visuals varies between the management focus pages, but comparison visuals that enable drilling down in data are widely used.

The interviewees suggested that up-to-date team management views enable managers to react to changes in volumes in a timely manner with resource planning and reallocations. In addition, interviewees suggested that seeing different aspects of the business data might advance development ideas that are supported with facts rather than assumptions and gut feelings. Furthermore, the reports reduce the need to request data and reports via 3rd party as per the status quo.

5.3.3 Element 3 – Insurance Expert Focus

The CSA revealed that the current individual level reporting consists of an overview of the static figures of daily workload and individual task queues. The interviewees expressed that available information does not provide sufficient support for self-management. The operational reports', also called operational dashboards in the existing knowledge, purpose is on monitoring the key processes and acting upon the data.

The new expert level reporting aims to support self-management by providing data of an expert's own performance and benchmarking it to the team's performance. Additionally, it includes daily updated comparison of own performance to targets. The team manager suggested that such information increases the responsibility of the experts' own performance. Table 17 gives an overview of the expert report view.

Table 17. Expert report view.

INSURANCE EXPERT FOCUS			
Report pages	**Purpose**	**Metrics**	**Visuals**
10. Expert View	Enables measuring insurance expert own work and reflection to team performance, target tracking, supports self-management.	Applications in the Bank Applications Under Process Net Processing Time Task Queue Events Service Types	10.1 (1) 10.2 (1) 10.3.1 - 10.3.2 (2) 10.4 (1) 10.5.1 - 10.5.4 (4) 10.6 (1)

As seen from Table 17, expert report view has one page overview of the expert's own performance and tasks via activity metrics. In addition, it provides an overview of overall application amount to provide information of coming workload. Monitoring own performance includes current task queue, net processing time of an application, events and decisions made regarding applications and types of products handled. All metrics are presented in a visual way to showcase the expert's own portion of workload compared to the total team workload. The Power BI visualizations suggested to expert report view are mainly stacked bars and donut charts to provide easy visual comparison of part-to-whole. The features of drilling down into lower level of details is kept to a minimal on expert report view. The purpose is to support monitoring own performance rather than analyzing, as also suggested in the existing knowledge.

The participants of the workshops suggested that it would motivate the insurance experts, if evaluating own work performance is made possible to proposed level of detail. The defined metrics of the report view would guide the tasks of the expert and decrease the need for team manager involvement. It was also discussed that seeing own performance against the rest of the team would raise the awareness of the need for extra training or vice versa could draw attention to good practices of some experts to share with others.

5.3.4 Element 4 – Documentation

The fourth element of the initial proposal is the documentation for the up-to-date Power BI analytics and reporting plan for the case company. The documentation consists of two parts – Excel documentation of recorded specifications of each metric and supportive Word documentation.

The Excel documentation is the result of the cocreation in the workshops. Each level of the report view was focused upon separately. The first workshop considered mainly the discussion on required metrics that would benefit the report purposes. For the second workshop the metric design tool, presented previously in Figure 19, was created based on best practices in literature. The metrics were grouped and allocated to different views of the reporting level and to different report pages. In the workshop the purpose and features of each report page was filed. The example is seen below in Figure 20.

BACK TO SUMMARY PAGE

Strategy focus:	**Functioning service production**
Report focus:	Managerial focus
Report page 6:	Applications
Purpose:	Application volumes and the effect on resources and business.
Update interval:	Daily
Owner:	Team Manager
Slicer:	Time (year, month, week, day)
	Sales channel

Figure 20. Documented purpose and features of each report page.

The example in Figure 20 records 1) what is the strategy focus of the page, 2) to which level of reporting the page belongs to, 3) the number and the name of the page, 4) what is the purpose of the page or which questions it answers, 5) the interval of data update, 6) the owner of the page, 7) the slicers in use to filter the data. Altogether 10 pages were defined in the initial proposal phase.

In each report page, every visualization of the metric was recorded in the metric design tool. As an example, the metric of granted applications is presented in four visualizations with different focus on the metric. Visualizations in the example case are 1) card visual showing number of applications granted, supported with granting percentage of all applications and comparison to the previous time period, 2) stacked bar chart of granted

applications with and without disclosure, 3) stacked bar chart of granted applications divided by granting level, and 4) combination of donut and card chart to visualize the amount and the percentage of the applications granted by the automated process. The metric design tools of each visualization are the foundation for report building of the data team. The layout requirements of the report, found from the best practices section, were reflected in the proposal building. Thus, the amount and type of the visuals, grouping the visuals etc., were considered when the metrics were assigned to each report page.

The metric design workshops with the stakeholders raised the discussion on importance of defining the business jargon in use. Some definitions were not that obvious even to the stakeholders. An example is “What is a new application?”. Is the new application the one that is made by sales channels? Or is the new application only recognized when it fulfils the requirements for insurance team processing? What sets them apart is that not all applications by sales channel ever make it to insurance team processing. These definitions were added into the documentation and metric design tool to ensure correct calculation of the metric.

The Excel file is supplemented with the Word documentation. The purpose of the supportive documentation is to provide the support to different audiences. The documentation includes terminology and agreed practices of the insurance team data, the data availability, prioritization of report page building, summary of the levels of reporting focus and supportive summary of the theory used for the report design.

Firstly, the documentation is the validation document for the case company, where the content of the workshops is recorded. Secondly, the documentation is part of the definition documentation for the data team implementation. It provides data team the understanding of the purpose of the work, how the Excel documentation is built up, and additional information on data availability, sources and prioritization of the work. Thirdly, the documentation supports the future users of the reports, with detailed records of visualizations and the supportive theory to improve users’ data literacy. To meet the third purpose, the documentation needs to be updated when changes have been applied.

5.4 Summary of the Initial Proposal

The initial proposal for the up-to-date Power BI analytics ad reporting plan is a cocreated and documented plan of the case company's future tool for reporting and analysis. The business intelligence platform for the implementation is Power BI Service. The initial proposal is visualized in Figure 21.

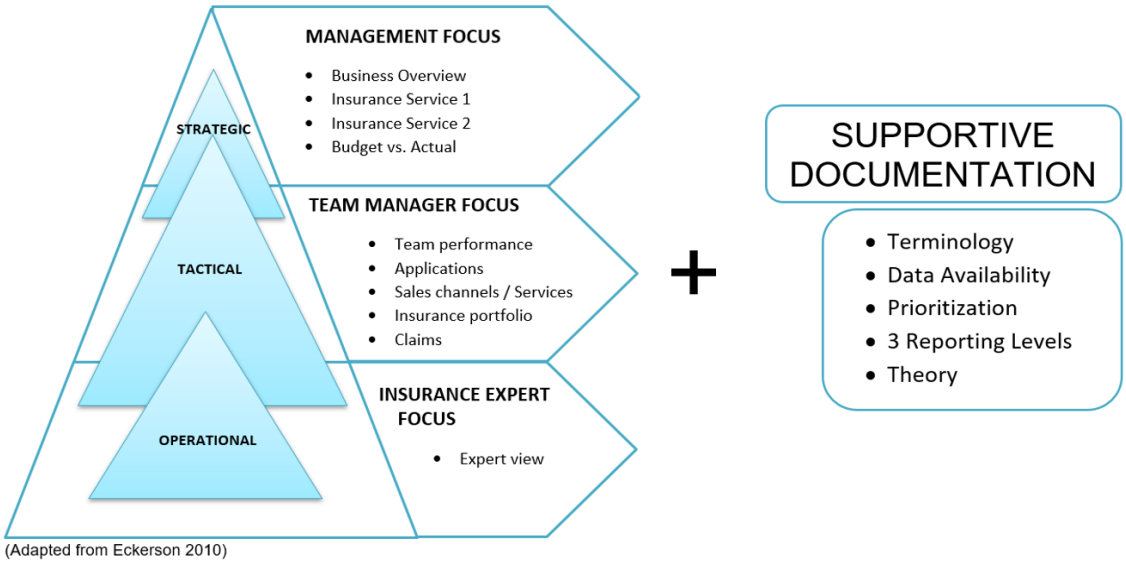

Figure 21. Visual presentation of the initial proposal.

As presented in the above Figure 21, the first part of the proposal is structured according to Eckerson (2010) types of performance dashboards – operational, tactical and strategic. Each layer of the pyramid has its own focus audience and functionalities. Yet, the reporting layers are overlapping and hence are not restricted to one audience only. The need for the three levels of reporting was identified in the CSA. The first part of the proposal addresses that need with cocreated three levels of focus areas with defined reporting pages, metrics and visualizations to be implemented to Power BI Service. In a summary 10 report pages, 41 metrics and 81 visualizations were designed. Each report page, metric and visualization are documented in the organized Excel format.

The second part of the proposal is a supportive documentation for the data team in completion phase of the reports, and for the future users of the Power BI tool. The documentation was presented to the case company as an initial proposal. The validation of the initial proposal and improvement suggestions from the stakeholders are presented in the following section.

6 Validation of the Proposal

This section reports on the validation of the initial proposal and presents the improvement suggestions applied to the final proposal for the up-to-date Power BI analytics and reporting tool. Finally, the final proposal is presented.

6.1 Overview of the Validation Stage

This section describes the steps of validation of the initial proposal. The initial proposal was built in cocreation with the key stakeholders and is based on findings from Data 1, Data 2 and supported by the existing knowledge and best practices. The initial proposal addresses the weakness of the lack of data-driven management by providing the plan for the Power BI analytics and reporting tool for the case company purposes.

The validation of the initial proposal was conducted in two phases. The validation sessions are recorded as Data 3 collection of the thesis. In both sessions the initial proposal was presented, and the feedback and the improvements collected.

The first phase of the validation had a focus of validating the element 2 – Team management report view, element 3 – Expert report view and element 4 – The supportive documentation. The validation session was carried out with the team manager and insurance expert. Each suggested report view in the initial proposal has an assigned owner. The team manager and insurance expert were chosen for the validation as they carry the ownership of these views. The improvement suggestions were applied to the initial proposal before the second validation session.

The second validation session was conducted with the COO and the product manager. The product manager carries the responsibility of the development of the insurance service and hence is using the reports for analysis purposes. The COO carries the responsibility of the operational unit and preparing the monthly reports of the board. The second validation session included validation of the whole initial proposal.

Based on the validation sessions the initial proposal was improved according to the feedback of the key stakeholders. The improvements to the initial proposal are reported in the next section.

6.2 Developments to the Proposal

The improvement suggestions and the development to the initial proposal are presented in this section. The inputs from the first validation session are presented in Table 18.

Table 18. Key stakeholders' suggestions for the initial proposal – Validation session I.

Elements of the Initial proposal	*Parts commented in Validation*	*Description of the comment*	*Development to the Initial proposal*
Validation Session I			
Element 2 - Team Manager Focus	Change the name of the Team Manager Focus	The name "Team Manager Focus" caused confusion and "Managerial Focus" as a name was suggested to better indicate the purpose and audience of the focus area.	Team Manager Focus name was changed to Managerial Focus.
	Restrictions to team performance view audience	The stakeholder suggested that the Team Performance view should be restricted to only team manager, for legal protection of the individual.	The Team Performance view was modified, and some metrics were modified and grouped under Applications view. The notice of the restriction was added to the documentation.
Element 4 - Documentation	Audience restriction information to each view	It was advised in Data 2 to add restriction information to the documentation. The suggestion was raised again in Data 3 as audience restrictions are now applied.	In the initial proposal no restrictions were applied and hence Data 2 suggestion of the data team was overlooked. Restriction information was added to purpose and features section of each view of the final proposal.

Table 18 presents the first suggestion of changing the name of the Team Manager Focus. The key stakeholders considered that it stresses the team manager purposes while the targeted focus is on operational work management and analysis. The suggested name for the report focus is Managerial Focus. The new name better indicates the purpose and the audience of the report focus.

Apart from the related discussions in Data 1 and Data 2, the second suggestion for the Element 2 was to restrict the audience of the Team Performance page to team manager

only. The key stakeholder indicated that it may violate privacy rights of the individual insurance expert. Quate from the Informant 2 (translation by the thesis researcher):

> Probably showing the doings of an individual insurance expert, their processing times, are not the things to be shown to everybody. There also comes expert's legal rights in question. (Informant 2)

Some of the Team Performance visualizations were modified to provide the team manager even more detailed overview of the individual insurance expert performance. Simultaneously, some of the visualizations were re-grouped under the Applications page and Application page was divided into two separate report pages. The possibility of filtering the data of the visualizations to the individual level performance was removed from other Element 2 report pages. Additionally, the audience restriction information of the report page was added to the documentation under purpose and features section of each report page and documented to supportive documentation. The information of the restricted audience of the report pages was also suggested in Data 2 phase. But the suggestion was overlooked then as the restrictions were not applicable on any report page while building the initial proposal.

The inputs from the first validation sessions were applied and the initial proposal was validated in the second session. The inputs from the second validation sessions are presented in Table 19.

Table 19. Key stakeholders' suggestions for the initial proposal – Validation session II.

Elements of the Initial proposal	*Parts commented in Validation*	*Description of the comment*	*Development to the Initial proposal*
Validation Session II			
Element 1 - Management Focus	Counteroffers missing from the report	The stakeholders noted that counteroffers are missing. Counteroffers are one mean of improving the sales of the insurance and monitored by the Board.	Counteroffer metrics were documented under Insurance Service 1 view.
Element 2 - Team Manager Focus	Add metric suggestions	The stakeholder suggested to add metrics regarding average premiums per services provided and claims paid vs. all claims.	The metric suggestions were added to the documentation as optional metrics.

Element 4 - Documentation	Prioritization of the work	In initial proposal only one level of prioritization was done – Insurance Services 1 & 2. The stakeholders suggested that the second priority should be Team Performance view to enable data-driven management of the team.	The second level of prioritization was added to the documentation.

As seen from Table 19, the first input from the key stakeholders was that counteroffers are missing from the Management focus. The counteroffers metric was added to the Service 1 page and metric design tool elements were defined for new visualizations. The stakeholders also suggested to add additional metrics to Managerial Focus of average premiums per services and claims vs. claims paid. The suggested metrics were added to the proposal as optional metrics. The financial metrics analysis on the managerial level is out of scope of the thesis.

The final input from the key stakeholders was to add the second level of prioritization of the implementation of Power BI reports. The first level prioritization of the report pages Services 1 and 2 was done in the building phase of the initial proposal. The first prioritization was done to decrease the requirement of manual input and achieve the availability of board reports in any point of time. The second level of prioritization was added to build Team Performance page to enable data-driven operational work management of the insurance team. The prioritization levels are added to the documentation to avoid the deviation of the focus in the report building phase.

The suggestions from the key stakeholders were applied to the initial proposal and the final proposal was pulled together. The final proposal is presented in the next section.

6.3 Final Proposal

The final proposal of the plan for up-to-date Power BI analytics and reporting tool for operational work management and management reporting is illustrated in Figure 22.

Management Focus

Report pages	Purpose	Metrics	Visuals
1. Business Overview	Overview of business KPIs and financial figures.	Income Premium Paid Claims Remunerations	1.1.1 - 1.1.7 (7) 1.2.1 - 1.2.4 (4) 1.3.1 - 1.3.3 (3)
2. Insurance Service 1	Ready made Board reports. Time-series analysis. Stability to reporting.	Received Applications Granted Applications Rejected Applications Counter-offers Change Requests Claims Processing time	2.1.1 - 2.1.2 (2) 2.2.1 - 2.2.2 (2) 2.3.1 - 2.3.2 (2) 2.4.1 - 2.4.2 (2) 2.5.1 - 2.5.2 (2) 2.6.1 - 2.6.3 (3) 2.7.1 - 2.7.2 (2)
3. Insurance Service 2	Ready made Board reports. Time-series analysis. Stability to reporting.	Received Applications Change Requests Claims	3.1.1 - 3.1.2 (2) 3.2.1 - 3.2.2 (2) 3.3.1 - 3.3.4 (4)
4. Budget vs. Actual	*Overview of the spend vs. budget, with ananlysis of IT*	*Budget vs. Actuals* *IT-spend* *Suppliers*	*Suggestion only*

Insurance Expert Focus

Report pages	Purpose	Metrics	Visuals
11. Expert View* **restricted to experts*	Enables measuring insurance expert own work and reflection to team performance, target tracking, supports self-management.	Applications in the Bank Applications under process Net Processing Time Task Queue Events Service Types	11.1 (1) 11.2 (1) 11.3.1 - 11.3.2 (2) 11.4 (1) 11.5.1 - 11.5.4 (4) 11.6 (1)

Managerial Focus

Report pages	Purpose	Metrics	Visuals
5. Team Performance* **restricted to team manager*	Monitoring the performance and the workload of the experts, supports the target setting and inidicates training needs.	Gross Processing Time Net Processing Time Granted Applications Rejected Applications Disclosures Counter-offers Change Requests	5.1.1 - 5.1.2 (2) 5.2.1 - 5.2.2 (2) 5.3.1 - 5.3.2 (2) 5.4 (1) 5.5 (1) 5.6 (1) 5.7 (1)
6. Applications I	Application volumes, effects on resources and business.	New Applications in the Bank New Applications under process Granted Applications Rejected Applications Counter-offers Change Requests	6.1 (1) 6.2 (1) 6.3.1 - 6.3.4 (4) 6.4.1 - 6.4.4 (4) 6.5.1 - 6.5.2 (2) 6.6.1 - 6.6.2 (2)
7. Applications II	Monitoring processing time, relations to disclosures, effects on resources and	Gross Processing Time Net Processing Time Disclosures	7.1.1 - 7.1.2 (2) 7.2.1 - 7.2.2 (2) 7.3.1 - 7.3.2 (2)
8. Sales Channels / Services	Allocation of operational resources to sales channels and service types. Monitoring sales channel performance.	Processed Applications - Sales Channels Processed Applications - Service Types Net Processing Time - Sales Channels Net Processing Time - Service Types	8.1 (1) 8.2 (1) 8.3 (1) 8.4 (1)
9. Insurance Portfolio	Enable analysis of the insurance portfolio and support training offering.	Active Agreements Terminated Agreements Service Types Service Sizes Exclusions	9.1.1 - 9.1.2 (2) 9.2 (1) 9.3 (1) 9.4 (1) 9.5 (1)
10. Claims	*Monitoring claims and effects on resources and business.*	*Claims* *Compensations* *Data not yet available in insurance system*	*Suggestion only*

+

SUPPORTIVE DOCUMENTATION

- Terminology
- Data Availability
- Prioritization
- 3 Reporting Levels
- Theory

Figure 22. The final proposal.

Figure 22 exhibits the summary of the Power BI analytics and reporting tool that consist of documented three level reporting focus 1) Management Focus, 2) Managerial Focus, and 3) Insurance Expert Focus. The three levels of reporting focuses are supported by the supportive documentation that provides the additional information, and the agreed details for the next step of building the Power BI reports. The Power BI reports support the management of the operational work of the insurance team and enable analysis and data-driven decision-making on data that is accessible in any point of time. The presented two documentations together act as a definition documentation for the data team for building the Power BI analytics and reporting tool for the case company. The documentation of the final proposal was handed to the data team for the implementation.

7 Conclusion

This section contains the executive summary of the thesis, provides the recommendations for the next steps and further development and the evaluation of the thesis work.

7.1 Executive Summary

The growth of data recorded has brought opportunities for businesses to utilize the data to gain insights of the business operations and support informed decision making. With numerous business intelligence platforms on the market, presenting the data via visual reports has brought the possibility of analyzing the data closer to employees all over the organization. The reporting of the case company relies mainly on manual data collection and report building. The improvements of the reports over the years have been minor due to obstacles of the data accessibility. Simultaneously, the operational work management of the teams is based on experience and tacit knowledge of the team managers. The objective of the thesis was to develop a plan for up-to-date Power BI data analytics and reporting tool for operational work management and management reporting. The implemented plan improves and supports the management and self-management of the teams through timely and available data for decision-making.

The research strategy of the thesis is applied action research. The thesis provides practical solution designed for the case company's purposes. After defining the objective of the thesis, the data collection was carried out by using qualitative methods in three data collection rounds. The qualitative methods included analyzing internal documentation of the case company and interviews and cocreation workshops with the key stakeholders.

The current state analysis was conducted to define the strengths and weaknesses of the current reporting practices and the technical readiness for the Power BI reporting solution. The main weakness of the case company was defined as the absence of data-driven performance management and decision-making. Based on the findings from the current state analysis, the focus of the existing knowledge and best practices was on data-driven organization, modern reporting practices, requirements for effective

performance management tool and Power BI as a chosen business intelligence platform of the case company.

Based on the current state analysis and supported by the best practices and the existing knowledge, the initial proposal was cocreated with internal stakeholders. The result of the initial proposal was a documentation of the three levels of reporting focus to be implemented in Power BI. The three focuses are Management focus, Managerial focus, and Insurance expert focus. The first purpose of the management focus is to provide overview and enable analysis of the business KPIs and the financial status. Secondly, the management focus report pages replace the current manually made board reports. Up-to-date Power BI reports can be embedded directly to board presentations, decreasing the effort of report building and the possibility of human error. The managerial focus enables monitoring the operational performance, provides insights of the processes, supports target setting and indicates training needs. The insurance expert focus supports self-management of the individual by providing task queues, a mean to evaluate own work against team performance and target tracking. The general objective of all the focuses is on gaining the insights, identifying patterns and make better informed decisions to optimize the business processes.

The initial proposal included an Excel document and a Word document. The Excel file included information of all reporting focuses as a summary, detailed information of the purpose and features of the report pages and documented metric design tool of each visualization of the report pages. The Word file included supportive documentation of the terminology used, data availability, prioritization of the report pages for implementation and additional information of the reporting focuses and theory behind the plan for the implementation.

The initial proposal was validated in two phases by the key stakeholders of the case company. The first phase included the owners of the managerial and insurance expert focus report pages. The received improvement suggestions from the validators were applied to the proposal before the final validation by the COO and the Product manager. In addition to minor improvement suggestions, the proposal received positive feedback from the depth of the implementation and the gained knowledge of the stakeholders about the data visualization possibilities.

The proposal acts as a definition documentation for the data team in the implementation phase of building the reports. Additionally, the documentation supports the future users of the Power BI reports. The implemented reports modernize the case company's reporting and data usage and provide the tool for analyzing and managing the performance of the business and the operational work. Through visualized data, spotting the trends, patterns, and opportunities, is made possible and actions can be taken based on data.

7.2 Managerial Implications

This section presents some recommendations for the successful implementation of the proposal and achieving the benefits from the Power BI analytics and reporting tool.

The proposal has been handed over to the data team for the implementation. The first step of the implementation is building the reports in cooperation between data team and the insurance team. Despite the well-documented definition, cooperation ensures the optimum outcome of the reports, clarifies the misunderstandings and possible changes, and provides practical knowledge to the future users of the reports.

Secondly, the data literacy skills of the employees and data leadership is suggested to be improved. It can be achieved by providing inhouse training on the Power BI Service main features, introducing organization specific practices and providing user support while the reporting tool is taken into use. The proposal can be used as a supportive documentation on the trainings and provide theoretical background and the explanations of the visualizations on the reports.

Thirdly, when the reports are implemented and in use, the usage of the reports can be monitored via Power BI Usage Metrics report. The report shows which reports are used the most or the least and who are using the reports. Monitoring the usage provides important information on whether the reports are fulfilling the purpose, is the company reporting the correct things and if there is a need for improvements on the reports or the user support. The reports, metrics and visualizations are recommended to be tested, and the metric definition process is suggested to be iterated over time for the best benefit to the case company.

The second insurance team was excluded from the proposal building phase due to internal reasons of the case company. The second insurance team reporting needs and metric design workshops can be implemented based on the same procedure and tools as applied in this thesis, when the time is appropriate.

Finally, the reporting can be complemented with the data from HR for more complete overview of the operational team. Additionally, the financial metrics can be included in managerial focus to provide analysis and deeper understanding of the insurance portfolio. HR data and financial metrics were discussed along the thesis process, but they were out of the scope of the proposal.

7.3 Thesis Evaluation

The objective of the thesis was to develop a plan for up-to-date Power BI analytics and reporting tool for operational work management and management reporting. The proposal of the thesis contains planned three levels of reporting to support the analysis and the operational work management and provide the reports for the management and board meetings. The outcome of the thesis has practical function for the case company and supports it on its path of digitalization and becoming more data driven.

Apart from the initial objective, the proposal does not include managerial and insurance expert focus reports for both insurance teams due to internal decision of the case company. Yet, it was achieved to add other insurance team's metrics to the management focus reports and thus decrease the monthly manual work of creating the reports for board meetings.

The research design created in the early phase of the thesis facilitated the process of the thesis and helped to avoid the deviation in the progress and kept the focus on the objective. From time-to-time interview and workshop sessions lost the focus of the objective and the eagerness of the participants to see and analyze everything was greatly present. The desire to see everything and enthusiasm over the outcome was positive but caused extra effort on narrowing down to the reasonable number and focus of the metrics for the proposal.

The qualitative research methodology suited the thesis process and provided needed substance for the thesis work via interviews, workshops, and internal documentation. The greater involvement and support from the data team could have added value in form of possible benchmarking to similar implementations and through enlightening the data team requirements in more detail. Nevertheless, the chosen existing knowledge and best practices helped on creating the suitable tools for building the proposal. As a summary, the objective of the thesis was reached, and the proposal was validated by the key stakeholders.

7.4 Closing Words

The amount of data is increasing rapidly but it is the purposeful use of it that matters and creates the value for the business. The case company has chosen to improve its data usage and capture the value from data to improve its operational work management. The thesis in hand is one step among others.

The thesis process has given valuable learning experience to the thesis researcher in form of new knowledge acquired and challenges overcome throughout the process. The process supports the personal growth of the researcher as well as the workshop participants by educating on the theory behind the implementation and learning by doing.

Thus, the outcome of the thesis has benefited both parties of the thesis and provides practical tools for the next steps of both parties as well.

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WRITTEN STATEMENT
on the use of AI-based tools in this thesis

by Annika Altdorf, the student of BI Master´s Degree Programme

Thesis title: Operational Work Management with Data & Management Reporting: Utilizing Power BI Reporting and Visualization

According to the "Guidance for addressing the use of AI-based tools in studies at Metropolia Business School (for written submissions)" from August 2023, I make this statement on the use of AI-based tools in my submitted Master´s thesis.

1) Which AI-bases large language models or other AI-based tools I used
   AI-based tools were not used in this thesis.
2) In which parts of the thesis which tools were used, and for which tasks *(please make a list)*
   AI-based tools were not used in this thesis.
3) What portion of the text was helped with these tools, for each use
   AI-based tools were not used in this thesis.
4) Which prompts were asked, exactly *(please indicate the page number in the text where used)*
   AI-based tools were not used in this thesis.
5) Here, I describe what continues an ethical and reliable use of AI-based tools that I used *(use, for example, the recommended documents from "MBS Guidance" referred to above)*
   AI-based tools were not used in this thesis.
6) Here, I describe how ethically and reliably I used the AI-based tools in my thesis submission
   AI-based tools were not used in this thesis.

This written statement makes part of my thesis and is done to help in evaluation and assessment.

5.5.2024 Helsinki

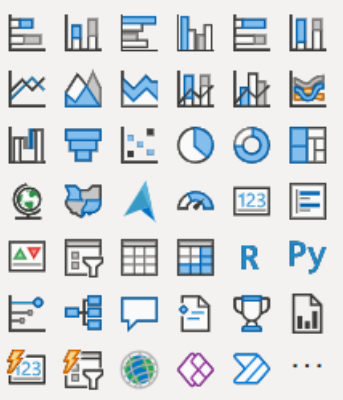
(Data and place)

Annika Altdorf

(Signature)

Types of Report Visuals of Power BI

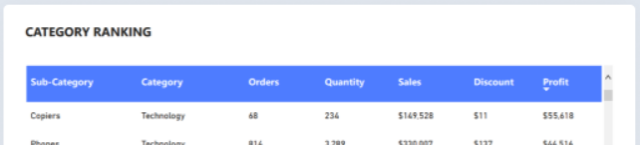
Power BI provides a range of options to visual the data. With appropriate selection of the visual it enables to see the meaning in data and gain insights. Options of Power BI standard visuals are presented in below figure.



The below descriptions and pictures are adopted from Microsoft (2023) and Numerro (2022).

Slicers allow users to filter the datasets behind the visuals and therefore to analyse visual of specific need of the user. Use cases can be to filter data by time, sales channels or operational experts.

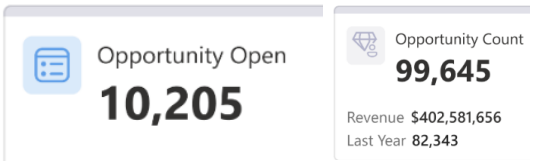
Table displays data in tabular form and enables to see and compare quantitative and detailed values for single category. Use case can be to present amounts of applications in different phases of the process by sales channels.



Matrix is similar to table and reminds the Pivot table. It enables to use more than two dimensions and can be interacted by the user. Use case can be the handling time by expert and by product type.

Region Sales Stage	Central Opportunity Count	Revenue
⊞ **Lead**	**91**	**$441,033,315**
⊟ **Qualify**		
Small	10	$11,550,016
Medium	12	$48,820,525
Large	7	$51,344,920

Card displays a single value of an important metric. New card is a new option that is enhanced with reference lines that enable to compare the single value to the target, benchmark etc. to provide more meaningful insights. Use case is the amount of new agreements over time period that are supported with the share (%) of all applications of that period and comparison to the previous period.

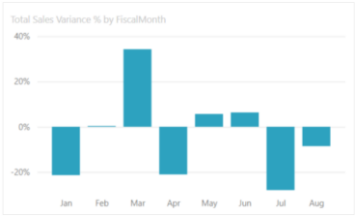


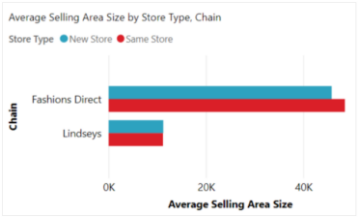
Multi-Row card is similar to card and it enables to display single important values over different categories. Use cases can be amounts of application procedures by experts.

KPI card displays a high level metric and its progress against the goal. Use case can be amount of insurance premium of the year.

Cauge presents the value of the metric against the predefined target. Use case can be tracking average application handling time.

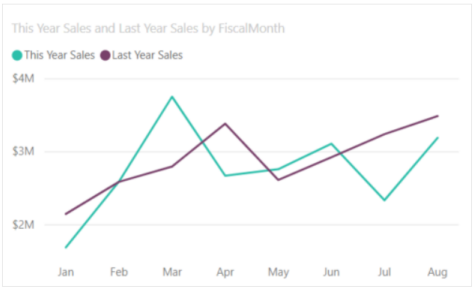
Bar/Column charts enable demonstrating and comparing specific value in categorical manner where bars and columns present different categories. Bar/column charts can be also clustered – there are different categories instead of one and categories are grouped together. Use cases can be comparison of applications over the years or the number of applications handled by different experts.



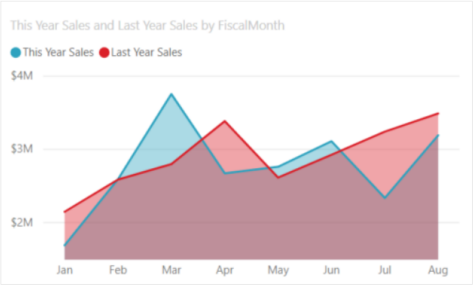


Stacked bar/column chart enables to present the total value of the category and also various subcategory values at the same time. 100% stacked bar/column chart presents the same idea but instead of values it shows the percentages of the whole. Use case can be number of applications by different sales channels.

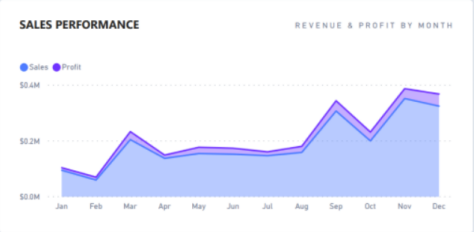
Line chart illustrates the shape of the series and are especially useful for time-based data. Use case can be granted and/or rejected applications over time period.



Area charts are like line charts and illustrate the shape of the change, but they emphasize the volume as well. Use cases can be insurance premium comparison between years.

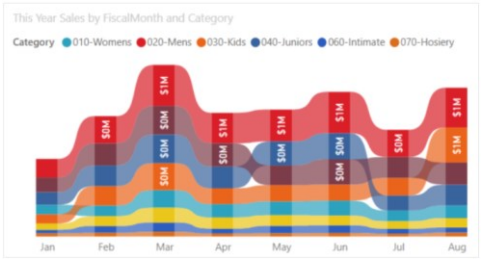


Stacked area chart illustrates the shape of the change and simultaneously presents how different categories contribute to the total. Use cases can be applications by sales channels over time.

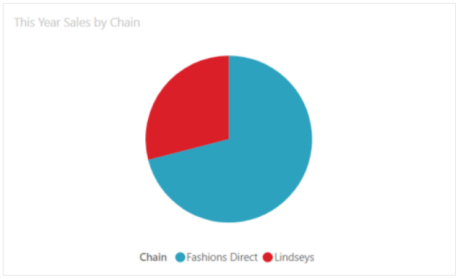


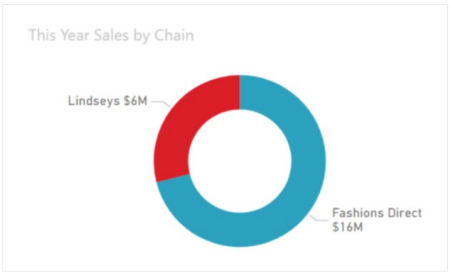
 Line and stacked/clustered column chart (combo) enables to combine line and column together. Use cases can be handling time by sales channels.

 Ribbon chart is like stacked column charts, but it presents the ranking of each category and the change in ranking over time. Use cases can be handling time by experts.



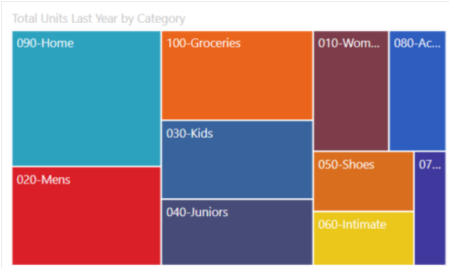
 Pie chart and Donut chart demonstrate the contribution of parts to the whole. Donut chart has the empty space in the middle and allows to include e.g. card with number in the middle.



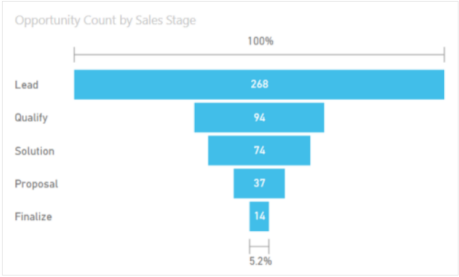


 Treemap includes rectangles that present hierarchical data that are shown in different colours and sizes to illustrate the volume. Categories may be coloured with

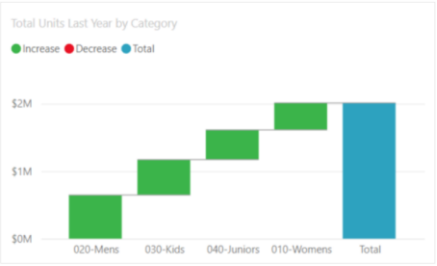
the same color for distinction. Use cases can be amount (size of the rectangle) of insurance agreements presented by sales channels as well as the product type.



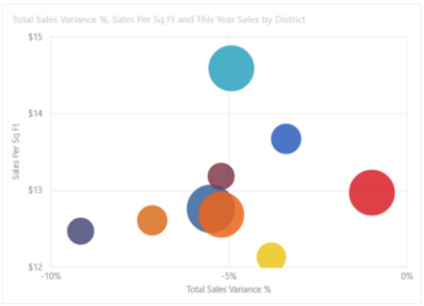
 Funnel chart presents flow or a process and the percentage to the whole of each process stage. Use cases can be application process stages starting from application till granting the insurance.



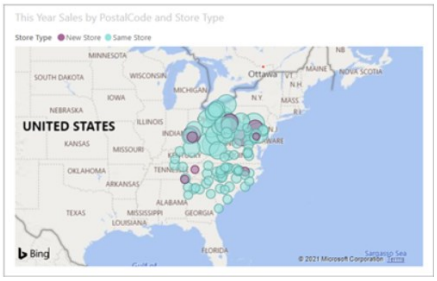
 Waterfall chart enables to illustrate how total is affected by positive and/or negative parts over time or categories. Use case can be how insurance premiums and claim payments from different services contribute to the whole.

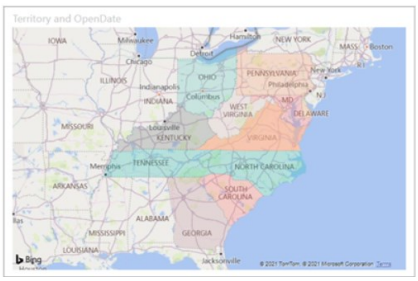


Scatter chart displays how two variables are related to each other, whereas bubble chart displays how three or more variables are related to each other. Use cases can be to see correlations between disclosure type and services.



Map/Filled map present data on geographical map whether with bubble (size shows the magnitude/volume) or by filling the area (colour shows the magnitude/volume). Use cases can be geographical presentation of offices by sales amounts.





Decomposition tree is a AI visual that enables exploring data across multiple dimensions and order by the user. Use case can be drilling down by sales channels to offices and to agreements by services. Drilling down commands like high and low and enables to choose between categories of interest.

Chart Suggestions for Dashboard/Report Purposes

The practical guide for choosing the suitable chart is visualized in figure below (Anderson, 2015, Ch 7).