

CHALMERS



VOLVO

Group Trucks Technology

How to create, capture and reuse time management
knowledge within and between projects

*Master of Science Thesis
in the Management and Economics of Innovation Programme*

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Abstract

In today's society increasing competition forces companies to develop more attractive products through their product development processes. Organisations have realised that creating and capturing knowledge within the company is essential to continue competing since knowledge is an organisations most critical resource. This includes technical as well as organisational knowledge. The aim of this master thesis is to analyse how time management knowledge can be created, captured, and reused within and between projects. To reach the goal of this research the purpose of the study is to investigate this within one unit at Volvo Group Trucks Technology. The unit serves as a case study for investigation and based on many observations as well as brief and in-depth qualitative interviews throughout the whole Volvo GTT the extensive data collection has revealed many findings. An analytical framework constructed from previous research on the notions of project management, time management, and knowledge management respectively, serves as a tool to analyse the findings. A major finding is that currently there is no consistent time management process within the organisation or a knowledge management strategy for organisational knowledge. Several recommendations have concluded this case study where the essential contribution to the company is a knowledge management strategy for the suggested time management process to solve the issue found. The master thesis is finalised with a discussion on the academic contributions of this case study.

Key words: project management, time management, knowledge, knowledge management, knowledge creation

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Göteborg, May 2013

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"Knowledge has to be improved, challenged, and increased constantly, or it vanishes."

PETER DRUCKER, MANAGEMENT CONSULTANT, EDUCATOR AND AUTHOR

Definition of key words

Project management: “facilitation of the planning, scheduling, and controlling of all activities that must be done to meet project objectives” (Lewis, 2001 p.11)

Time management: To set goals and delegate activities, as well as spend the right amount of time for the right activities (Managementstudyguide.com, 2012)

Knowledge: Contextual information with expert insight and previous experience (Frost, 2010)

Knowledge management: Managing and organisations knowledge within the organisation (Koenig, 2012)

Knowledge creation: Interaction between explicit and tacit knowledge (Nonaka, 1994)

List of abbreviations

CPM: Chief Project Manager

CVDE: Chassis and Vehicle Dynamics Engineering

FMEA: Failure Modes and Effects Analysis

GDI: Global Development Instructions

GDP: Global product Development Process

GTO: Group Trucks Operations

GTT: Group Trucks Technology

MTP: Main time plan

KM: Knowledge Management

STP: Standard time plan

PM: Project Manager

PMO: Project Management Office

PMS: Project Management Support

PMR: Product Modification Request

QDCF: Quality, Delivery, Cost, and Feature

QJ: Quality Journals

WBS: Work Breakdown Structure

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1. Introduction

This thesis starts with an introduction. Firstly, the background to the topic is presented followed by a shorter presentation of the case company. Further, the introduction covers the purpose of this thesis, the delimitations and the research questions. This part is concluded with a short presentation of the disposition of the report.

1.1 Background

The society is moving towards a “knowledge society”. This means that knowledge has come to be more and more important in today’s society (Nonaka, 1994). Because of increasing competition companies have to introduce more attractive and better products for every launch (Lindkvist, 2001). Nonaka (1994) argues that the previous mind-set of solving problems and not considering *how* they have been solved is about information processing. Organisations that are in a competitive and dynamic environment should not only process information but also create it as well as create knowledge. According to Lindkvist (2001) many organisations are realising this and moving towards working with knowledge creation and capture. Knowledge is according to Lindkvist (2001) an organisations most critical resource.

Defining what knowledge is can be very difficult since there is different type of knowledge (Frost, 2010). Knowledge, however, needs to be managed within organizations and can be done by creating, capturing, adopting, and transferring knowledge (Collison and Parcell, 2004). Due to higher demands on product innovations, knowledge transfer and use is especially important in product development projects (Lindkvist, 2001).

Lindkvist (2001) argues that the key to continue competing with new innovative products is to constantly improve the product development process and projects. To do so knowledge transfer between projects is a key aspect. By leading and organizing knowledge transfer between projects the organization can benefit from reusing both technical as well as organizational key learning’s and best practices. Organizing and transferring different type of knowledge to other projects within the organization will make the knowledge grow even more (Lindkvist, 2001). Hansen, Nohria and Tierney (1999) argue that the knowledge can be captured and reused if managed in a proper way and therefore a fitting knowledge management strategy needs to be chosen.

As mentioned by Lindkvist (2001), there is different knowledge within and between projects that needs to be managed, technical as well as organizational. This thesis will focus on one specific type of knowledge, namely *time management*. As found throughout this study and from interviews, time management can be defined in different ways. However, one thing that most certainly is included in time management is time planning and scheduling of activities.

Maylor (2010) argues that there is no correct time management process and therefore time management can appear complex. The author does however argue that certain activities should be structured and done when conducting a time plan for a project. Maylor (2010) describes the Stage Gate process as a basic first approach for building a time plan.

Within the case company introduced below project management is the way to work towards creating new products. There are numerous projects in parallel and almost everyone within the organisation is involved in one or several projects. Due to competition it is according to Lindkvist (2001) essential to continue creating innovative products and to do that the organisation has to capture and transfer not only technical knowledge but also organisational and process knowledge, which in this report is delimited to the time management process within projects.

This thesis therefore tries to, with the help from above mentioned previous research, to bring together the notions of project management, knowledge management, and time management to understand if the complex process of time management can create valuable knowledge of how project time management can be handled in a more efficient manner. Furthermore it tries to understand if this knowledge can be captured and lead to reuse so that, as Lindkvist (2001) describes it, the product development process can be continuously improved.

1.1.1 Case company

The information about AB Volvo and Volvo GTT described in this section is to give a brief understanding of where this study has taken place.

Volvo Group Trucks Technology (Volvo GTT in this report) is part of the Volvo Group and is a part of the trucks operations within AB Volvo. The complete trucks operations represent two-thirds of AB Volvo's turnover and besides Volvo GTT the trucks operations include the Group Trucks Sales and marketing for the different geographical areas as well as Group Trucks Operations (GTO), which is manufacturing. Volvo GTT carries out the product development for the complete trucks operations within AB Volvo. Other operations within the Volvo group as seen in figure 1 are Volvo Buses, Volvo Construction Equipment, Volvo Penta (marine and industrial engines), and the Volvo finance and business support unit (Volvo Group, 2013a).



Figure 1. AB Volvo organization (Volvo Group, 2013a)

AB Volvo is a global organization with sites in several countries in Europe, Asia, Australia, Africa, and North as well as South America (Volvo Group, 2013b). The whole group has approximately 98 000 employees and 16 000 consultants around the world (Volvo Group, 2013c).

As mentioned earlier the Volvo trucks operations within AB Volvo stand for approximately two-thirds of the group's turnover. The group has five truck brands that should, as can be seen in figure 2, cover the complete trucks markets on the different continents (Volvo Group, 2013c).



Figure 2. AB Volvo Truck Brands (Volvo Group, 2013c)

The product development for the trucks operations, as mentioned above, is all carried out within Volvo GTT (Volvo Group, 2013a), which employs approximately 10 000 people worldwide (Volvo Group, 2013d). The GTT organisation has, as can be seen in figure 3, seven major areas of responsibility. One area is vehicle engineering, where all product development for the different parts of the truck is carried out (Volvo Group, 2013d).

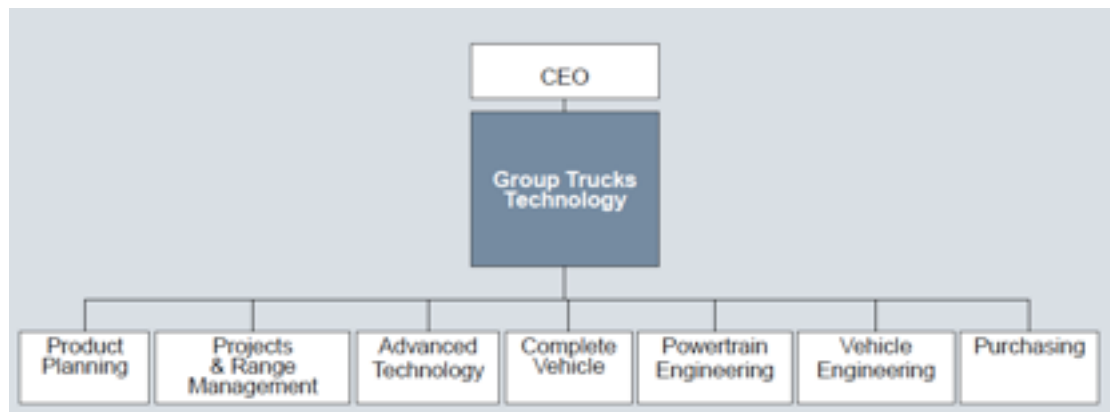


Figure 3. Volvo GTT organisational structure (AB Volvo, 2011a)

The Vehicle Engineering function includes the different commodities and parts of the trucks, of which one unit is Chassis and Vehicle Dynamics Engineering. The Project Management Office (PMO) within CVDE, which has been the case unit within the Volvo GTT organisation, is a European unit with an office in Gothenburg (Sweden) as well as Lyon (France). The CVDE PMO has the responsibility of driving all product development projects related to the chassis and vehicle dynamics. The office in Gothenburg has 24 project managers that lead these different projects.

1.2 Purpose and research questions

The purpose and ambition of this master thesis is two folded. It is (1) To investigate/explore opportunities, with respect to time management knowledge, within the Project Management Office for Chassis & Vehicle Dynamics Engineering (CVDE) in Volvo Group Trucks Technology (GTT) in Gothenburg. To do so the aim of this study is to investigate how time management knowledge can be created, captured and shared or/and reused within and between projects. The end result of this master thesis is supposed to provide recommendations on how time can be managed more effectively within projects within the CVDE Project Management Office (PMO) in Gothenburg.

Further the purpose is (2) To in light of the dissertations applied value analyse and discuss possible contributions to the academic knowledge on project management and knowledge management. In order to reach the goals and purpose of this study four main research questions have been constructed.

The first research question is about understanding what previous research there is on the notions of project management, time management, and knowledge management respectively. Further, the research questions will try to discover how the case unit within the case company currently works with time management and knowledge management within their projects and how the process can be improved. To study the above mentioned, this thesis aims at answering following four main questions;

- *What are state of the art knowledge and the essential contributions from knowledge management and project management literature and how are they coupled with time management?*
- *How do individual project managers and the overall business unit at Volvo GTT currently handle time management and time planning in their projects?*
- *How can knowledge in regards to time management be created, captured and reused within and between projects?*
- *What possible contributions, if any, can the results of this study give to the academic knowledge on project management and knowledge management?*

1.3 Delimitations

The topics of knowledge management, time management, and project management, are all very broad and will therefore not be completely covered in this dissertation. Since knowledge is very extensive and includes many different aspects, this thesis will limit knowledge creation, capturing, and sharing to knowledge about time management. Also the entire project management topic will not be covered. With this said all three areas will be broadly presented before they are brought together and discussed interchangeably.

Furthermore, as mentioned, the investigation of this master thesis will be conducted within a project management office (PMO) at Volvo Group Trucks Technology (GTT) in Gothenburg. With that said, the biggest delimitation of this thesis is that the recommendations will be given to a part of the Volvo GTT organization, and therefore not the entire company. The aim is to mainly support the Chassis and Vehicle Dynamics Engineering (CVDE) PMO in Gothenburg with the results of this thesis. However, generalisation of the study can be made to some extent and is discussed further in this dissertation.

1.4 Disposition

This dissertation consists of eight chapters, as can be seen in figure 4. Below follows a short summary of each chapter's content.

Chapter 1 – Introduction: Introduction to the three theoretical areas of this study, case company description and description of the purpose and the research questions

Chapter 2 – Previous research: Previous research within project management, time management, and knowledge management respectively

Chapter 3 – Theoretical framework: Description of the theoretical framework and how it has been used throughout this study

Chapter 4 – Methodology: This part explains the research design and approach of this study with information on how data has been gathered

Chapter 5 – Findings: Current situation: The empirical data gathered lay ground for the description of the current situation within the organisation and CVDE today

Chapter 6 – Analysis: Within this chapter the current situation is analysed with the help from previous research and the theoretical framework

Chapter 7 – Recommendations: Recommendations to the case company are constructed from the analysis

Chapter 8 – Discussion: The final chapter of this report discusses if and how the results of this study can contribute to the academia with respect to time management and project management knowledge

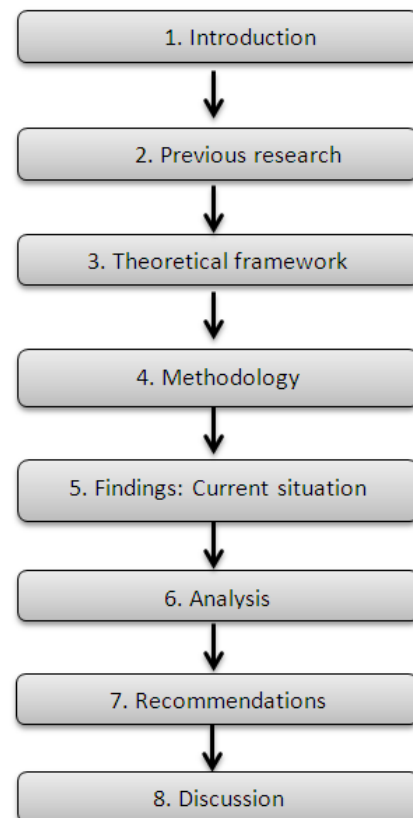


Figure 4. Disposition of report

The purpose with the disposition of the report is to make it easy to follow and read. However, within this report many abbreviations are used, which can make the reading a bit difficult. Due to the many abbreviations that exist within the case company this is difficult to avoid so this report deals with abbreviations and explanations in a certain way. In the beginning of each long section the whole names will be provided and thereafter abbreviations will be used until the next long section where the entire words will be used again. The purpose of this approach is to make the dissertation easy to read and follow.

2. Previous research

The following section of this dissertation presents previous research on the topics of project management, time management, and knowledge management respectively. Each part is concluded with three main highlights as bullet points to provide a basis for the analytical framework.

2.1 Project management

There has been much previous research on projects and project management. But what is then a project? According to Maylor (2010) a project has several major characteristics. One main characteristic, which is representative of a project, is that it is temporary and has an end. Mantel et al. (2005) describe a project as always having a due date. Lewis (2001) mentions how a project has not only a definite starting and ending point but also a temporary team. Further, both Maylor (2010) and Mantel et al. (2005) stress the uniqueness of projects. A new project is never the same as an older project that has already been performed says Maylor (2010). Mantel et al. (2005) together with Maylor (2010) argue that projects are focused with the goal of providing specific deliverables. Maylor (2010) further describes a project as uncertain because the outcome and what is to come cannot be foreseen beforehand. A project is also a social construction since it is a system of human beings and not machines and it is integrating because it interlinks resources, knowledge and activities.

If a project is characterized by the above mentioned, what is then project management? In comparison with general management, project management is cross-functional over several functions, whereas general management is management within a function (Maylor, 2010). According to Mantel et al. (2005) project managers have a high responsibility without necessarily having much authority considering the hierarchy in an organisation. Further Mantel et al. (2005) argues how project management is greatly about budgeting and planning as well as controlling and scheduling a project. Lewis (2001) defines project management as “*facilitation of the planning, scheduling, and controlling of all activities that must be done to meet project objectives*” Lewis (2001, p.11). Project management is about managing the three constraints of performance, time and cost (Mantel et al., 2005). Lewis (2001) agrees that these are forces of a project and how the preferred result is to have a good project that is fast and cheap. However, these three aspects cannot all be fulfilled. Instead two should be picked and focused on whereas the third needs to adapt to the two chosen forces. Not only does Lewis (2001) mention these three constraints but also goes beyond them and argues that in addition to these the fourth constrain is the scope of a project. According to Lewis (2001) value can only be added to three of these and the forth is then dependent of the outcome of these three. It is not possible to have the highest value to all of the four project forces.

For the purpose of this study it is essential to consider the above mentioned description of what characterizes a project and what deliverables within the project that are measured.

Because this study tries to investigate and explore improvement opportunities within project management it is important to consider what project management is and how its results are measured. What is described above will therefore be used to analyse gaps within the case company in regards to project management.

2.1.1 Successful project

Project management is as described before about controlling and facilitating different activities within a project. But what characterizes a good and successful project? According to (Maylor, 2010) a project has four main phases in its lifecycle. As figure 5 shows the first phase is to define a project and determine the purpose and the intentions of it. Phase two is about designing the project process and create models to use for the task and minimise the risk. The third phase is called doing it and it's about the actual project delivery. It is in this phase that the project is actually carried out. The final fourth phase is to develop the process and improve it in regards to experience and knowledge gained throughout the project (Maylor, 2010).

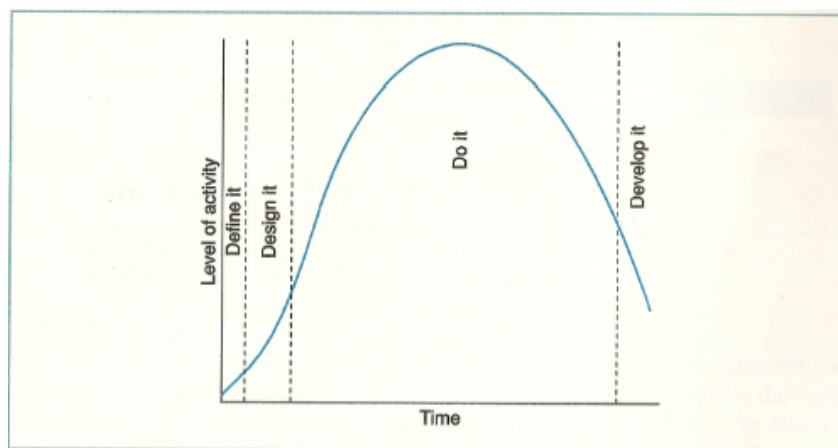


Figure 5. Project lifecycle (Maylor, 2010 p.33)

According to Maylor (2010) the level of activities performed in each phase varies and in the early phases of the project there is little activity. This increases as the project reaches the third phase and the execution. It is in the middle of this phase that the level of activity is the highest in a project. After this the activities decrease in number as the fourth and final phase is reached. In comparison to Maylor (2010), Lewis (2001) has five phases of a projects lifecycle and argues how most of the activities should be done in the early phases of a project in order for it to be successful. The phases mentioned by Lewis (2001) can be seen in figure 6, and are the concept phase, definition phase, planning phase, execution phase, and the closeout of a project.

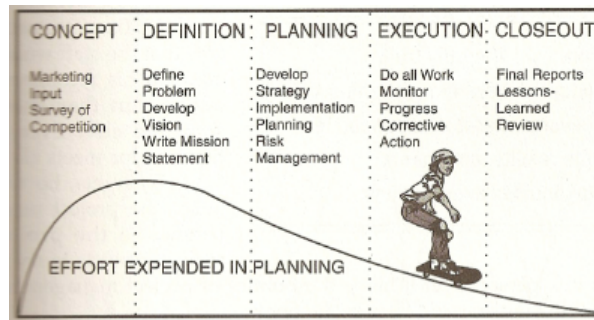


Figure 6. Project lifecycle (Lewis, 2001 p 31)

In content these phases are similar to the ones presented by Maylor (2010). Lewis (2001) however argues that the effort spent on the project should reach its highest level between the concept and the definition phase. It should then decrease throughout the lifecycle of the project. Lewis (2001) argues that in order for a project to be successful it is not necessarily just that the targets of performance, cost, time, and scope are met. The targets can be fulfilled even though a project may be considered a failure. For a project to be successful it is necessary to consider stakeholders and their requirements. Who are the stakeholders and what are their requirements? The principle that Lewis (2001) mentions is that *“The only true successful project is the one that delivers what it is supposed to, gets results, and meets stakeholder expectations”* (Lewis, 2001 p.32). Further, the author argues that projects that fail do so mainly because of not tools and methods used, but because of people. Therefore in order for the project to be successful it is essential to have control of the project process. Control is something that comes from having a plan. If it is known where the project is supposed to be and where it is, it is easier to have control (Lewis, 2001). Therefore planning and scheduling is an important part of a project’s process. This brings us to the notion of time management.

The presented previous research above describes how, for a successful project, it is important to have control of the project process. Time management is part of the project process and it is the focus of this thesis. For the purpose of this study it is critical to consider the importance of a good time management process in order to have a successful project.

2.1.2 Summary

The most essential insights presented so far are:

- A project usually consists of several phases and gates between each stage
- The cornerstones of project management are performance, time, cost, and scope. These four should all be managed but it has to be prioritized which ones are the most important since not all can parameters can reach the highest values within the same project
- Project management is namely about controlling and facilitating activities so right activities are done at the right time. The level of activities should be highest in the early phases and decrease throughout the project life cycle.

2.2 Time Management

Using time effectively and making the best use of it as it is limited, is how Remez (2008) defines time management. According to Managementstudyguide.com (2012) it is about setting goals and delegating activities, as well as spending the right amount of time for the right activities. Within projects time management is the most important resource and without a proper time management handling the project can fail (Tutorialspoint.com, 2013). According to Tutorialspoint.com (2013) project time management is about managing not only the own time but the time of the whole project team. In order to manage time within a project there is a process. According to the Project Management Institute (2008) there are six steps to the project time management process. When working with time management it is important to first identify the activities that have to be carried out and then sequence them so that the relationship between different activities is known. After deciding what has to be done it is important to understand how activities will be conducted and who will carry them out, in other words resources such as people and equipment need to be estimated. Further, the duration of activities has to be estimated in order to estimate the resources. From the above mentioned estimates and information, a schedule should be constructed to understand the constraints within the project. Finally, the schedule needs to be controlled throughout the project process and the changes have to be managed and scheduled (Project Management Institute, 2008).

Maylor (2010) argues that a time management process within projects indeed can be called a planning process for time management but is in no sense a route for planning. A generic model for conducting time plans is not easy to create. The author however, presents an ICOM model where inputs, controls, outputs, and mechanisms are considered for the planning process. Maylor (2010) explains that it is known what needs to happen in a project and by considering these four elements in the planning process it is then determined how it will be conducted.

The above mentioned process that Maylor (2010) presents is important to be managed in a systematic way. The author argues that the planning of activities and decisions taken throughout the process should be traceable. With a traceable project plan it is easier to see what went wrong and what was done correctly and how. Maylor (2010) continues arguing that this is especially important when the complexity of projects increases. It is then very important to provide a logical basis for decision making, a logical sequence of activities, as well as the effects on other activities and systems, etc. In order to create a good time plan several things need to be determined in advance (Maylor, 2010).

Maylor (2010) presents the Stage-gate model by Cooper as a good start for planning. The entire project is divided into stages and in order to go from stage to stage there are gates that need to be passed. The criteria to pass from one stage to the other have to be decided in advance. This will provide a good basis for a time plan and the next step in the planning process, which is to consider the activities that need to be done within each stage and how they will be conducted, i.e. if the activities are sequential, concurrent or partly both. Maylor

(2010) argues that as many activities as possible might be preferred to be carried out in parallel since time can be saved. The author continues arguing that as much as 30 per cent of the total profit of a product is determined by the time-to-market. Not only is it important to consider the activity sequence in time planning but there are several other factors that need to be considered in order to manage the planning activities correctly (Lewis, 2001).

In order to be able to analyse how the case company works with time management and to investigate opportunities it is essential to consider the above-mentioned previous research on time management. It is critical to understand what the notion of time management means to researchers. This research will be compared to the data gathered within the case company in regards to time management to understand the difference and similarities.

2.2.1 Why is time management important?

As mentioned by Lewis (2001) time is one of the cornerstones within projects. The author argues that time firstly has to be managed with involvement of the ones doing the work. It is important to involve the one who is going to carry out an activity in the planning process. Because in order to have a good plan, people conducting different activities within it have to as well be committed to the plan. Further, it is important not to plan in too much detail. Micro planning can be difficult if a plan is so detailed that it makes it hard to control it. Lewis (2001) continues arguing that risks need to be planned for. It is important to understand what risks that can occur and plan for them in case they happen. Everything will not go as planned and there are several obstacles to handle throughout a project. The author agrees with Maylor (2010) saying that it is important to first determine what has to be done in the project and then decide by whom and how it will be carried out.

For the purpose of this study it is critical to consider why project time management is important. Since this research aims at finding improvement opportunities for project time management for the case company it is essential to understand why these findings are important for the organisation. This research will bring light on the time management process within the case company and how it can be improved.

2.2.2 Summary

The most essential insights presented about time management are:

- There is no step-by-step time management process and no one-way solution for all time plans.
- It is important to consider inputs, controls, outputs, and mechanisms in the time management process. No matter how the actual process is conducted these areas should be covered.
- It is important to plan together with the people who carry out the planned activities and be transparent and logical when planning so it is easy to go back and understand what has happened.

2.3 Knowledge management

According to several authors the society is moving towards a “knowledge society” (Nonaka, 1994). But what is then knowledge and how can it be created?

2.3.1 Knowledge

Defining what knowledge is can be very difficult. Depending on the language and the field, the word knowledge can have different meanings (Frost, 2010). According to Frost (2010) it is common that knowledge is confused with information or data. The writer argues that data is something specific consisting of figures and facts and information is built upon data but with more relevance and a clear purpose with the data. Knowledge on the other hand is contextual information with expert insight and previous experience. Nonaka (1994) defines knowledge as initiated and formalized from information. Information on the other hand is a flow of meanings that can add to knowledge. The author continues saying that information and knowledge are used interchangeably and to distinguish these apart Knowledge management (2011) presents a knowledge hierarchy, figure 7, where data is at the bottom, followed by information and then comes knowledge. At the top of the pyramid there is wisdom.

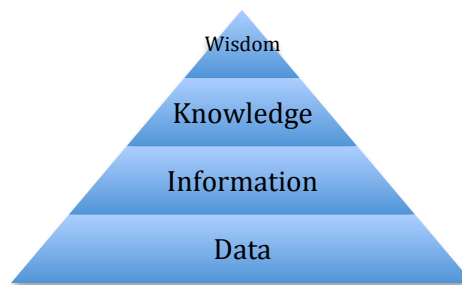


Figure 7. Knowledge hierarchy

According to Knowledge management (2011) data consists of facts and figures whereas information is the interpretation of data. Knowledge on the other hand is information that is put into context and meaning and knowledge with some insight is wisdom. Rowley (2007) argues that knowledge is information put into instructions whereas wisdom is to increase effectiveness and recalls for judgement. To make the distinction between the hierarchical levels more clear Rowley (2007) describes data as knowing *nothing*, information as knowing *what*, knowledge as knowing *how*, and wisdom as knowing *why*.

Nonaka (1994) continues describing how knowledge itself can be divided into two different types. According to the author there is explicit as well as tacit knowledge. The first one refers to knowledge that is codified and can be spread in a formal and systematic way. However, Nonaka (1994) argues that knowledge expressed in numbers and facts is nothing more than a small part of all possible knowledge. Tacit knowledge on the other hand is, in contrast to explicit knowledge, about personal quality and is harder to communicate and formalize. Furthermore, tacit knowledge is more about concrete know-how and individual

skills about something specific. The expression of tacit knowledge is a key factor for creating new knowledge (Nonaka, 1994).

Even though as mentioned, knowledge is very hard to define, the definition used in this thesis is based on previous research presented above. Because this study tries to analyse time management knowledge it is essential, for the purpose of this research, to understand what knowledge actually is and what different types of knowledge that exist. Assumed that knowledge is about knowing how to do something and that there is both tacit and explicit knowledge, what is then knowledge management?

2.3.2 Managing knowledge

Within a learning organization one has to consider processes, people, and the technology in question, figure 8. The three areas represent three overlapping circles within learning organizations. It is where all three overlap that knowledge management exists (Collison and Parcell, 2004).

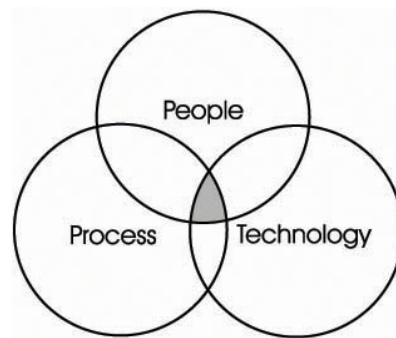


Figure 8. Learning organisations (Collison and Parcell, 2004 ch.2)

In order to manage knowledge Collison and Parcell (2004) argue that it is essential to consider all three areas and not just one or two. Further, knowledge management is about creating, capturing, adopting, and transferring knowledge. Because knowledge is unstructured and intuitive Bhatt (2000) describes the knowledge development process as chaotic. However, to organize the process Bhatt (2000) divides it into the main phases of knowledge creation, adoption, distribution, and review and revision, figure 9.

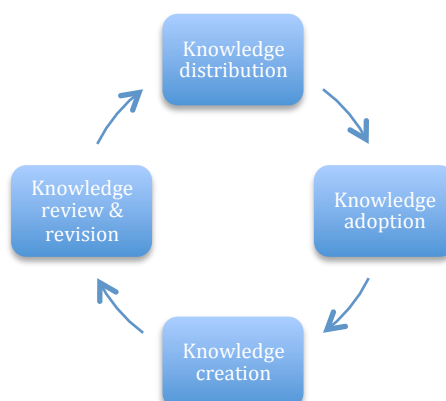


Figure 9. Knowledge development process

Even though it might be hard to distinguish knowledge activities and separate them into different phases, it helps to do so when managing knowledge. Further, even though there is four distinct phases in this development cycle, the phases are interdependent of each other (Bhatt, 2000). The different steps of this cycle will be introduced in more detail in the next section of this chapter.

This master thesis aims at understanding how time management knowledge can be managed in an efficient way. Because of this the previous research on knowledge management, presented above and in following section, is critical to consider for this study. The research on knowledge management will be used to analyse how knowledge is managed within the organisation today and how it can be applied to time management knowledge specifically.

2.3.3 Knowledge creation, distribution, adoption and revision

According to Bhatt (2000) some argue that knowledge is created in the mind of individuals and it is not a systematic process nor can it be planned and controlled. The process of knowledge creation is continuously emerging and is dependent on the motivation as well as the inspiration within individuals.

As well as tacit knowledge is a key factor for creating new knowledge, so is explicit knowledge. It is safe to say that it is the exchanging process between tacit and explicit knowledge that creates new knowledge (Nonaka, 1994). The author presents a conversion framework, figure 10, that shows how new knowledge can be created through four ways of conversion between tacit and explicit knowledge.

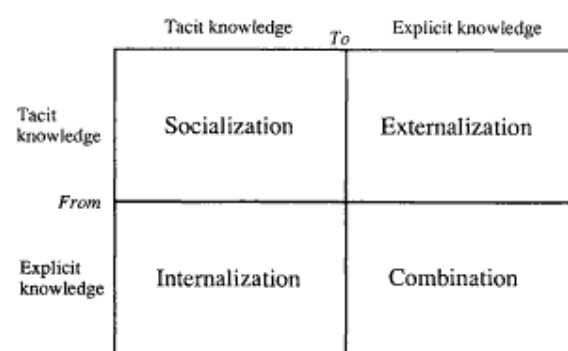


Figure 10. Conversion framework (Nonaka, 1994 p19)

As can be seen in figure 10 above, the creation of tacit knowledge through tacit knowledge can be done with *socialization*. This mode is about creating a shared experience since the key to obtaining tacit knowledge is through experience. Further, knowledge can be created with *combination*, which is to convert explicit knowledge into explicit knowledge. Usually, this is done through computer systems by sorting, adding, or categorizing explicit knowledge. The exchange between tacit and explicit knowledge can be done through two

different modes, *internalization* and *externalization*. The first one is the conversion from explicit to tacit knowledge and is about organizational learning whereas the latter is turning tacit knowledge into explicit. The last mode is critical and very hard to grasp since tacit knowledge is hard to formalize and “put on paper” (Nonaka, 1994). The author argues that it is first when all four mentioned modes are managed by an organization that organizational knowledge is created. It is the dynamic interaction between all four modes of knowledge creation that creates organizational knowledge and drives the knowledge creation process. The author calls this interaction the “spiral of knowledge”.

The second phase in the knowledge development cycle presented by Bhatt (2000) is the adoption of knowledge. Adoption is when firms take existing knowledge and adopt it to the own needs and company. Instead of creating own knowledge they adopt it externally. According to Bhatt (2000) for many firms, this is necessity since not all companies rely on inventing new knowledge.

Before knowledge can be exploited it has to be distributed throughout the organization. The success of the distribution of knowledge depends on organizational culture and explicit knowledge available in the organization Bhatt (2000). The distribution and sharing of knowledge can be done in different ways. Söderquist (2006) mentions three ways of knowledge distribution and sharing processes within the organizations analysed by the author. The writer presents knowledge sharing and transferring from a central knowledge management function, a project-decentralised knowledge management task force, and a functionally located knowledge management cell. Even though there are advantages and disadvantages with each chosen strategy it is according to Hansen, Nohria and Tierney (1999) important that firms choose the right strategy for managing their knowledge.

The final phase of reviewing the knowledge and making a revision is essential since knowledge can easily be forgotten if it is not used. Further, by revisiting knowledge, organizational problems can be solved and it is always good to refine routines and working structures since even though the environment is not dynamic within all industries it is still changing (Bhatt, 2000).

To manage the above-mentioned processes for knowledge creation, sharing, and reuse Hansen, Nohria and Tierney (1999) argue that a proper strategy for managing knowledge has to be chosen by organizations. But what is the right strategy to choose?

2.3.4 Knowledge management strategy

The right strategy to use for managing knowledge depends. However, it should reflect the organizations competitive strategy (Hansen, Nohria and Tierney, 1999). The sharing of knowledge within an organization can be done either by personalisation or by codification. The personalisation strategy refers to as it sounds personal contact between people, whether it is face to face, over telephone, or email. To make such a strategy work it is

important to build networks of people. One good approach of doing so can be to transfer people between offices (Hansen, Nohria and Tierney, 1999). The latter strategy, called codification, is an approach where a person with the knowledge codifies it into a document, then stores it where others within the organization can find it and then reuse it. This codifying, storing, and reuse of knowledge has the great benefit of that the knowledge is made independent of the person that created it. It makes it easy for others to use the knowledge created without having to go back to the very source of that knowledge (Hansen, Nohria and Tierney, 1999).

Even though Hansen, Nohria and Tierney (1999) present two distinct strategies for managing knowledge many firms use both of these. However, in order to be successful it is recommended by the authors not to use both strategies equally. Instead, it is of value to focus on one of these strategies and have the other as a support. Hansen, Nohria and Tierney (1999) describe this as the 80-20 split where 80% of the knowledge sharing follows the main strategy and the rest follows the supporting strategy.

According to the Knowledge management specialist at Volvo GTT the most important thing is to determine who owns the knowledge. If knowledge ownership is not defined the created and captured knowledge may not be shared and reused throughout the organization. Saetang and Theodoulidis (2011) state that there are three main type of knowledge ownership. Either the organization owns the knowledge, or the individual owns the knowledge, or there is collaboration between organizational and individual knowledge ownership.

The previous research on knowledge management strategy presented above explains how it is not only about having a knowledge management strategy within the organisation. It is critical to consider the right type of knowledge management strategy for the organisation. This research is essential for the purpose of this study because the recommendations to the case company should include *how* to manage time management knowledge.

2.3.5 Summary

The most essential insights within knowledge management that have been presented so far are:

- Explicit and Tacit knowledge should be created interchangeably
- Knowledge sharing and transferring can be done through an ownership of knowledge. The owners of knowledge can be placed within a centralised knowledge management function, a project-decentralised team or functionally located cell.
- The right knowledge management strategy has to be chosen between a codification and a personalisation strategy. Whichever is chosen it has to be aligned with the organisation's competitive strategy.

2.4 SWOT Analysis

Managing the strategic process of an organisation requires an analysis of the external environment and constraints as well as the internal strengths and pitfalls (Robbins and Coulter, 2007). The SWOT analysis is about identifying an organisation's **Strengths, Weaknesses, Opportunities, and Threats**. In other words it is about investigating the internal strengths and limitations within the organisation as well as analyse the external threats and opportunities (Managementstudyguide.com, 2013). Robbins and Coulter (2007) describe the external analysis, including the opportunities and threats, as essential to understand the organisations position in comparison to competitors. Opportunities refer to positive trends whereas threats are trends that can have a negative impact on the organisation. The internal analysis on the other hand is about identifying strengths within the organisation as well as weaknesses. The internal analysis is about understanding what resources and capabilities that exist within the organisation which can and should be leveraged even more. Furthermore, it investigates what resources and capabilities that do not exist within the organisation what areas that need to be strengthened within the company (Robbins and Coulter, 2007).

For the purpose of this study it is critical to consider the strengths and weaknesses the case company has in terms of their project management and time management process. Because this study is internal the main focus will be on strengths and weaknesses. However, assumptions will be made to illustrate how internal strengths and weaknesses can lead to external opportunities and threats. The SWOT analysis will serve as tool when analysing the case company.

2.5 Final highlights

As described in this chapter many researchers have the belief that the project management process, time management process as well as knowledge management process is rational and can be controlled in different ways. Lewis (2001) describes how the outcome of a project can be controlled to some extent. It should beforehand be decided which aspects of the four mentioned, *performance, time, cost, and scope*, that are the main priority. The author argues that not all four areas can be fully controlled within a project. Instead it has to be decided which are the most important for the project and then adjust the other aspects to these. Maylor (2010) further argues that the time management process is not a step-by-step process and cannot be a "one-way" solution for all projects. For the purpose of this study it is important to consider that the time management process cannot be fully standardised. However, it is critical to consider what aspects that can be standardised. Standardisation can to some extent bring efficiency. Nevertheless, flexibility and agility is important and standardisation should not be pushed. This research considers the issues with standardising too much and will try to standardise as much as possible to increase the efficiency. However, it will try to keep some flexibility so there is room for continuous improvement and learning. To do so, following chapter tries to summarize the previous research and provide a theoretical framework for analysis.

3. Theoretical Framework

The theoretical framework is an attempt to bring together the notions of project management, time management, and knowledge management. To provide as a basis when analysing the current state at the case company the theoretical framework is constructed from previous research and is presented below.

As described by Maylor (2010) projects are cross-functional. This means that people from different functions within an organization are involved in the same project. Roughly, the project process has several phases from start to end. The workload during a project differs depending on what stage the project is in (Maylor, 2010). After the project process the end goal is to have a result and a project's success is measured by performance, time, and cost (Mantel et al., 2005) but also scope (Lewis, 2001). A balance between these four has to be made to decide what the project will deliver. This is because a project cannot provide a brilliant output considering all aspects equally. It has to be decided which of these that are the most important (Lewis, 2001). According to Lewis (2001) a project can be considered a success from all these aspects but still is a failure if consideration has not been made to the requirements and the stakeholders. This has to be controlled throughout the process and control in a project can be done by having a plan.

Time management is one of the cornerstones in project management and includes planning and scheduling (Lewis, 2001). As Lewis (2001) argues, projects usually fail not due to the tools and methods used throughout a project but due to people within the project. Tutorialspoint.com (2012) argues how time management is about not only managing the own time but also the time of the whole project team. This includes following up on activities and making sure that work and activities are conducted as planned. According to Maylor (2010) the most important thing with time management and planning is to understand that there is no step-by-step process on how it must be done. Instead the important thing is to understand all the inputs to a project as well as what the project should deliver in terms of outputs. Further it is important to consider what mechanisms that are included in the project and what has to be controlled. By considering all four aspects the content for a time plan can be defined. Furthermore, Maylor (2010) argues that when constructing a time plan the basic way to do so is to start with the main phases and gates for a project and then put in the activities that need to be carried out within each project phase. Everything with time management however has to be done in a systematic way and logical way so that it is easy to follow afterwards. It is not always easy to remember the thought process when time has passed. However, a logical and systematic approach to time planning and time management makes it easier to understand the activities and if something goes wrong it is easy to see how and why this happened (Maylor, 2010). Project management goes thereby hand in hand with time management.

Lindkvist (2001) argues that for projects to continue being successful and for organizations to get the best outcome of product development projects they need to keep innovating. Innovation according to Lindkvist (2001) for projects comes by sharing knowledge that is

created. Knowledge transfer between projects is essential for making the projects more effective and efficient and to continue competing with the products created. Lindkvist (2001) argues that it is organizational as well as technical knowledge that needs to be captured and transferred throughout the organization and to other projects.

As Lindkvist (2001) describes it there can be technical as well as organizational knowledge. However, knowledge itself can also be explicit and tacit according to Nonaka (2004). Explicit knowledge refers to codified knowledge that is easy to document whereas tacit knowledge is more an individual skill and know-how. It is not to say that either of these is more important than the other. Instead Nonaka (1994) argues that it is the interchangeable process between tacit and explicit knowledge that creates new knowledge in an organization.

By using both explicit and tacit knowledge the organization can create new knowledge (Nonaka, 1994). To transfer this knowledge it is according to a knowledge management specialist at Volvo GTT essential to find an ownership for that knowledge so that it can be captured and after that reused and shared throughout the organization. As described by Söderquist (2006) there are three main ways of knowledge distribution and sharing processes within organisations. Knowledge sharing and transferring can be managed from a central knowledge management function, a project-decentralised knowledge management task force, or a functionally located knowledge management cell. In order to transfer the knowledge it has to be captured.

Knowledge can be captured in mainly two different ways according to Hansen, Nohria and Tierney (1999), namely by codifying it or by personalising it. A codifying management strategy is about capturing knowledge in documents and writing it down in files or systems that anyone within the organization can reach without having to contact the source of that knowledge. By capturing the knowledge in a system, knowledge can be transferred and reused very easily, assuming the system is used throughout the organization. The personalised knowledge management strategy on the other hand is about personal contact and capturing knowledge within people and transferring that same knowledge by having people interact with each other. It is not to say that one knowledge management strategy is better than the other and therefore many companies tend to use both strategies. However, the authors argue that organizations should not attempt to use both strategies equally. Instead one of the two should be chosen and the other should provide support when needed. With that said the authors argue that whatever strategy is the primary strategy an 80-20% split should be used where the primary strategy is 80% and the supporting strategy is 20%. The primary strategy chosen should however reflect on the competitive strategy of the organization (Hansen, Nohria and Tierney, 1999).

From the presented previous research on the notions of project management, time management, and knowledge management the above described summary of the literature

review will serve as a lens when analysing the case company. Furthermore, an illustration has been created as an attempt to bring the three cornerstones of this dissertation together.

Figure 11 below presents an illustration of the theoretical framework where the project process is consisting of different stages. As the project precedes the knowledge creation, capture, and reuse in regards to time management should work as a spiral where knowledge is continuously created within the project. Further, it is captured and reused within the project. For each stage of the project and the more loops that have been made by creating, capturing, and reusing knowledge, the overall knowledge will increase. At the end of the project the knowledge will be greater than in the beginning of the project. This overall created knowledge needs to in some way be captured in order for it to be transferred and reused in other projects.

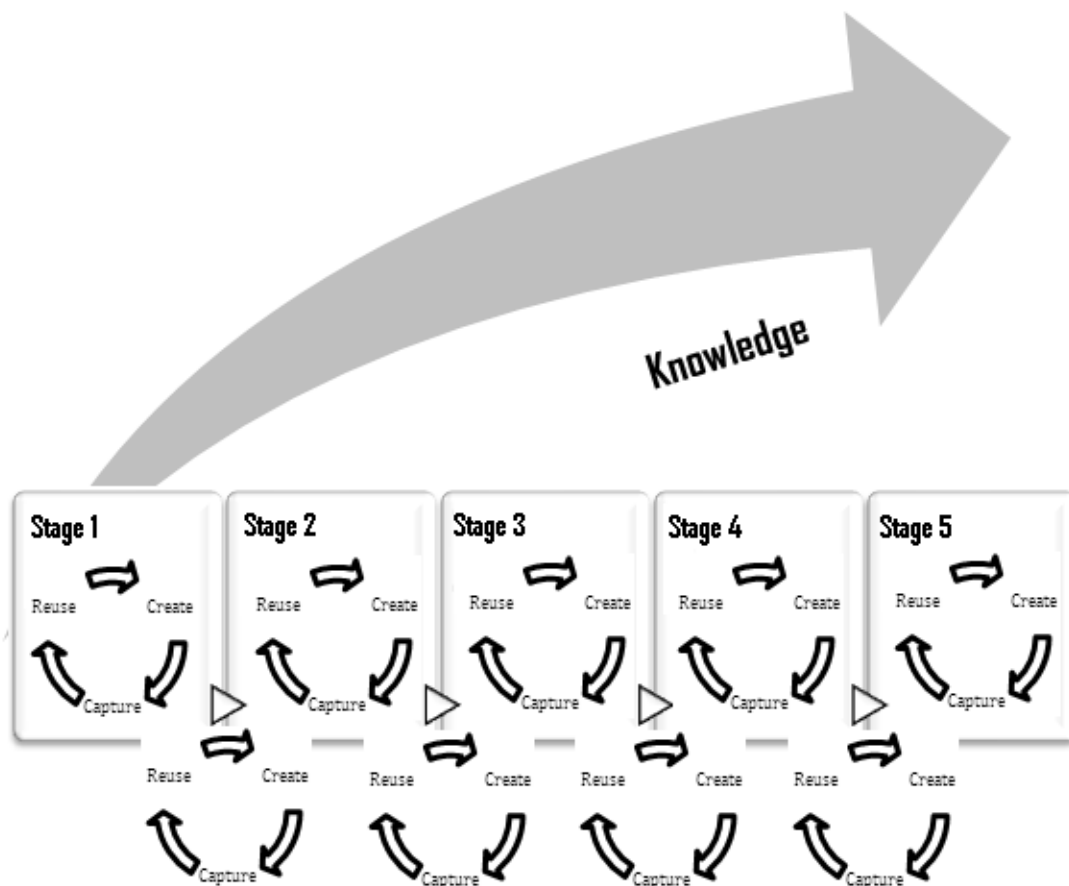


Figure 11. Knowledge Creation, Capture and Reuse within and between projects

The theoretical framework presented above with the illustration made should serve as a lens when analysing the case company. Furthermore, it serves as a base when constructing the interview guides seen in appendix 10.1. The framework has been constructed as a summary of the main highlights from previous research and tries to bring the three cornerstones of this thesis together in order to make the analysis of the case company easier and more understandable.

4. Methodology

The literature and data collection within this master thesis and the research design as well as methods used is presented in this section of the report. Following is a description of methods used for each phase (findings: current state, analysis, and recommendations) of this project as well as a brief validity and reliability discussion of the methods chosen for this study.

The aim of this report is to give recommendations on how knowledge in regards to time management can be created, captured, and reused within the Chassis and Vehicle Dynamics Engineering (CVDE) project management office (PMO) at Volvo Group Trucks Technology (GTT) in Gothenburg. To reach the aim, as mentioned in the beginning of this report, the purpose of this master thesis is two-folded. Firstly, the purpose is to investigate and explore the opportunities for improvement with respect to time management within the CVDE PMO at Volvo GTT in Gothenburg based on knowledge management insights. Further, the purpose is to, in light of the dissertations applied value, analyse and discuss possible contributions to the academic knowledge on project management and knowledge management respectively.

4.1 Research design

A research design where a detailed and intensive analysis of a single case is done is called a case study (Bryman and Bell, 2011). After being asked to investigate improvement opportunities at the case company this research design was chosen from the very beginning. However, in order to be able to do a proper investigation of the case study a few weeks in the beginning of the project were set aside for exploratory purpose. During this time the Volvo GTT organisation was explored as well as the case unit at the company. Figure 12 shows an illustration of the research design conducted throughout this master thesis study.

4.1.1 Exploratory study and literature review

While exploring the company and conducting exploratory interviews with conveniently selected people a literature search was done in parallel to find articles and previous research on the main topics of *project management*, *time management*, and *knowledge management*. Literature was gathered in the form of physical books at Chalmers university library as well as Gothenburg city library. Furthermore, database searches were conducted where many scientific journals were gathered and

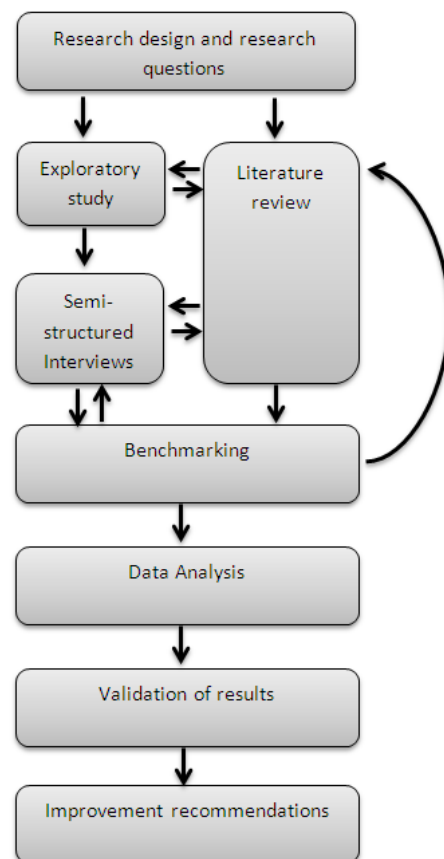


Figure 12. Research design

used in this thesis. Electronic searches were also made on the Internet and information was gathered on different websites related to the main topics.

4.1.2 Semi-structured interviews and literature review

As the exploratory study at the case company as well as the literature review provided more and more information and knowledge an interview guide, as can be seen in appendix 10.1, was constructed to gather specific information about the above-mentioned areas. The questions were constructed with the help from literature to answer the research questions and gather necessary information to be able to analyse the current situation, to make an analysis, and finally to give recommendations to the case company as well as provide a discussion for academia.

The interview guide was used as a basis when carrying out structured interviews at Volvo Group Trucks Technology (GTT) with experts in the different areas of *project management*, *time management*, and *knowledge management*. After gathering more information from interviews a new literature review was conducted to narrow the scope and focus on creation, capture, and reuse of time management knowledge within and between projects.

4.1.3 Benchmarking

Due to AB Volvo and Volvo GTT being a very large organization, time management and the knowledge with respect to it is handled differently at different sites. From the exploratory study and from conducted interviews at the Gothenburg site information was given that the Chassis and Vehicle Dynamics Engineering (CVDE) Project Management Office (PMO) in Lyon, France, are dealing with time management in a different way than the CVDE PMO in Gothenburg. Therefore, to gather further information to see how they are working and if this is a successful approach, a benchmarking was conducted at the Lyon site. A couple of days were set aside to travel to Lyon and interview experts within the area at Volvo GTT in France.

4.1.4 Data analysis, validation and recommendations

After the benchmarking was conducted it became clearer of how the current situation is at the Gothenburg site and what improvements that can be made. The data was analysed from the exploratory study, from the interviews in Gothenburg as well as the data collected during the benchmarking.

The data analysis provided an analysis of the company's current state as well as an evaluation of it with the help from gathered literature and benchmarking data. All the data was validated in order to provide improvement recommendations for the case company and further research within academia.

4.2 Findings: Current state

As mentioned earlier, a couple of weeks in the beginning of this case study were set aside for exploratory purpose. The purpose of understanding the current situation and gathering data about it is to serve as a base when analysing the case company. In order to give improvement recommendations it is essential to understand the current situation so that valuable insights can be provided to the case company as well as to this master thesis. During the first phase of this study, the exploratory phase, the current situation at the company was observed through interaction with employees and through participation on different project meetings. According to Bryman and Bell (2011) there are different types of observations. When observing, the observer can participate or not participate in the social setting occurring. Participative observation is when observing the situation by participating whereas the latter is to only observe without any interference (Bryman and Bell, 2011).

Throughout this study, 50 project meetings were attended for observation purposes. Participative and non-participative observations were used interchangeably. However, most of the observations were unstructured observations. An unstructured observation is according to Bryman and Bell (2011) when an observation schedule is not used. In contrast structured observation is when there are clear rules set for the observation and it is defined what type of behaviour is to be observed. For the exploratory purpose in the beginning of this study the observations were kept unstructured intentionally since there was no knowledge of what type of behaviour needed to be observed. However, both behaviour and jobs were observed in order to get a fuller picture of the current state at the organisation.

Finally, the observations made were done both at scheduled meetings, as well as unscheduled meetings and deskwork observations. Further, in the exploratory phase of this study 48 interviews were conducted as well. The interviews were of an unstructured kind where just one or two questions were asked and the interviewees were allowed to answer and speak freely with no interruption from the interviewer. According to Bryman and Bell (2011) unstructured interviews are a type of qualitative interview where the purpose is to keep it flexible in order to get richer, and more detailed answers. All in all, the exploratory study was kept open and very flexible in order not to miss out on any valuable and important information. The interviews conducted throughout this phase of the study were brief interviews of approximately ten minutes, as well as in-depth interviews of approximately one hour. Even though many brief interviews were made they have been equally important to understand the environment within the case company as the in-depth interviews have been. Since several weeks in the beginning of this study were set aside for exploratory purpose this phase has been very important for this research and has had a great value for this study and the results.

In the exploratory study valuable information was given and tips on whom to talk to in order to get the right information. After getting a lot of names the people were contacted and

asked for permission to be interviewed. The interviews were still qualitative interviews but rather being unstructured they were semi-structured. Semi-structured interviews are according to Bryman and Bell (2011) when a researcher has a list of questions of topics to be covered throughout the interview. The interview is however flexible since the list does not have to be followed the same way in all the interviews and other questions might come up throughout the interview. However, all questions or topics in the list will be covered and similar wording is used during each interview.

Semi-structured interviews were chosen instead of structured in order to keep the openness and the benefit of flexibility with qualitative interviews. However, semi-structured interviews instead of unstructured were used primarily. This because the exploratory study and the literature research contributed to a more clear view on what topics that needed to be covered and information about *what* needed to be gathered. However, in some cases unstructured interviews were also used in this phase of the study. Altogether, as can be seen in appendix 10.2, 41 in-depth interviews were conducted and many unofficial discussions were held with Volvo GTT employees.

4.2.1 Sampling

At the very beginning of this case study there was an agreement that a product development project and a process project would be used as pilot studies and the subject of analysis for this research. Therefore the sampling for the observations were with people and social settings connected to these two projects. The process project was chosen due to its content on time management and the product project was chosen due to it being a large project in order to investigate time management more hands-on through involvement in the time management process. Furthermore, in order to be able to answer the research questions purposive sampling was chosen where interviewees were chosen strategically so that they were relevant for this study.

The interviewees for the unstructured interviews throughout the exploratory phase were sampled in various ways. However, in the very beginning convenience sampling was mostly used. Convenience sampling is according to Bryman and Bell (2011) to simply use what is available and accessible for the researcher. Unstructured interviews on the other hand were done with convenience sampling as well as random sampling. Bryman and Bell (2011) describe random sampling as basic probability sample where the interviewees are selected on a purely mechanical way. Even though random sampling was used, it was done on the sample frame consisting of the Chassis and Vehicle Dynamics Engineering (CVDE) Project Management Office (PMO) and the two projects used for exploration.

Throughout the rest of the study and especially with the semi-structured interviews snowball sampling was the primary sample type used. Bryman and Bell (2011) describe snowball sampling as a type of convenience sample since it is in no sense random. Snowball sampling is basically when initially contacted and approached people help to initiate a

contact with others. This is mainly what happened at the case company since people recommended others to talk to and provided names of experts at the organization on relevant topics.

4.3 Analysis

After studying the current state within the organization and understanding main problems and issues an analysis of the situation was conducted. The analysis started by understanding the collected data both from interviews and observations. To be able to analyse the collected data better a benchmarking was conducted in Lyon, France, where the company has an office. The Chassis and Vehicle Dynamics Engineering (CVDE) Project Management Office (PMO) is for Europe and has therefore an office in Lyon. A visit at the office was made in order to interview project managers and people working with time management. By previous interviews and discussions at the Gothenburg office it became clear that there are people at the Lyon office that work as project management support and where a part of their task is to support the project managers with time management activities. Because of this information a trip to Lyon was booked to conduct interviews and reveal what the situation is within the CVDE PMO office in France.

After conducting the benchmarking it became clear that more information was needed from employees in Gothenburg so additional semi-structured interviews were booked to clarify issues. Additional interviews revealed more information and in parallel with these interviews data gathered during the current state analysis and from the benchmarking were analysed and structured. By collecting the data and comparing the current situation at CVDE PMO in Gothenburg with previous research on the notions of project management, time management, and knowledge management, gaps within the office could be identified and analysed. Furthermore, the current situation was compared to revelations from the benchmarking in Lyon and could further be discussed and analysed to find issues and understand the reasons for them.

The benchmarking was chosen by the Section Manager for Project management and support at CVDE in Europe. This was chosen, as mentioned above, due to rumours that there is a structured way of working with time management and time planning within that office.

4.4 Recommendations

The understanding of the current situation and the analysis concluded in future recommendations for the Chassis and Vehicle Dynamics Engineering (CVDE) Project Management Office (PMO) in Gothenburg as well as the Volvo Group Trucks Technology (GTT) organisation. As mentioned above data for this study was gathered through non-participative observations, participative observations, and unstructured as well as semi-structured interviews. Overall, data was gathered by a qualitative research. However, some secondary data was analysed as well by searching in the internal database of Volvo GTT.

Because the nature of this research is qualitative rather than quantitative the discussion below is not about validity and reliability. Instead it is a discussion about credibility, transferability, dependability, and confirmability, in regards to the recommendations that have been made from this study.

According to Bryman and Bell (2011) credibility is about internal validation and to what extent the data collected and the recommendations made are trustworthy. Throughout this study both observations as well as interviews have been conducted. This was done intentionally so that as much information as possible could be gathered to add for the understanding of the case company and the problems at hand. Bryman and Bell (2011) argue that participant observation has several advantages when compared to qualitative interviews as well as vice versa. The first research approach enables the researcher to better understand the behaviour of people in different context by interacting with them. Further it is more likely to uncover topics and issues that were unexpected in the beginning, which could reveal valuable information. Since the interviews rely on what is said by the interviewee the observations allow for a fuller understanding of the issue. However, not everything can be observed and qualitative interviews allow for questions to be asked and issues to be revealed by asking. Furthermore, interviewing instead of observing is less intrusive in people's lives and it takes less time and effort to be interviewed than being observed. Furthermore, interviews leave less room for interpretation than observations do (Bryman and Bell, 2011). By using both interviews and observations when analysing the organisation the credibility of the findings is higher than if only using one of the two mentioned approaches.

Transferability is another way to measure the trustworthiness of a qualitative research and is to some extent similar to external validity. It is basically to what extent that the research made can be transferred and generalised to other parts of the organisation or outside of the company (Bryman and Bell, 2011). The external validity is very low and generalisation cannot be made further than the Volvo GTT organisation. However, due to the extensive data collection the findings and recommendations can be transferred to other parts within the Volvo GTT organisation and do not have to be constraint to the CVDE PMO. Nevertheless, the data collection is by no means exhaustive but due to its quantity and that interviewees have been from different parts of the organisation, not only from the CVDE PMO this study can, with additional research, be applied within other parts of the Volvo GTT organisation.

Reliability within qualitative research can be measured by dependability. Dependability refers to auditing of the findings where the peer of a researcher acts as an auditor of records gathered by the researcher. The records can be everything from transcripts to selection of research participants and field notes (Bryman and Bell, 2011). Records have been saved from all observations and interviews. However, they have not been shared with a peer for auditing. Even though dependability is a way to measure qualitative research it is according to Bryman and Bell (2011) not used to a large extent because qualitative research provides extensive data collections and auditing is time consuming. Because of this same reason,

auditing has not been used for this study. According to Bryman and Bell (2011) confirmability is also something that can be an objective of an auditor. Since auditing was not used the objectivity of this thesis has as well not been investigated. Nevertheless, personal values and beliefs were separated as much as possible from this study.

The discussion above, about the trustworthiness of the recommendations and this study, implicates that many improvements to this study can be made. Nevertheless, the extensive data collection gathered and analysed throughout this study indicate that the recommendations are based on thick facts. The data is by no means exhaustive but they point towards the recommendations that have been made. To illustrate the amount of data gathered table 1 has been constructed.

Table 1. Summary of data collection

Type of method	Amount
Brief interviews	48
Semi-structured in-depth interviews	41
Observations	50

5. Findings: Current state

Through an exploratory study in combination with interviews and observations the current state and situation in regards to project management, time management, and knowledge management could be analysed at the case company. The description of the 'as is' situation is presented in following section.

5.1 Project management

According to employees several hundreds of projects within Volvo Group Trucks Technology (GTT) are on-going at the same time. Projects are introduced in introduction blocks four times per year and there are several types of projects conducted at the same time.

Within Volvo GTT the Global product development process (GDP) is followed for product development projects. The process is illustrated in figure 13 and according to AB Volvo (2011b) it consists of six phases. Each phase ends with a gate that will be open if certain environmental, quality, and safety goals are met. The project teams for product development cycles consist of people from different functions within the organization and are in other words cross-functional. Below follows a shorter description by AB Volvo (2011b) of each phase within the GDP.

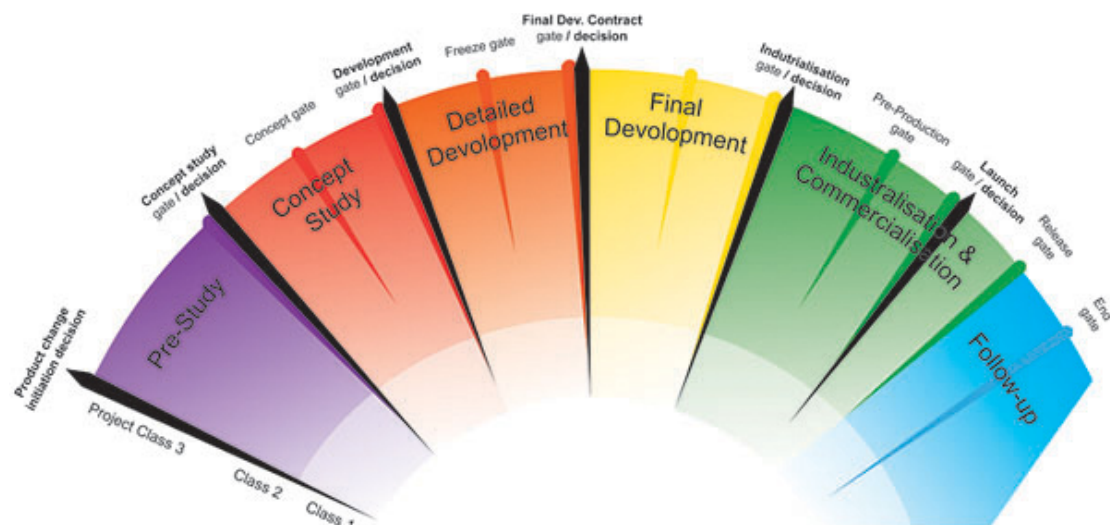


Figure 13. Volvo GDP (AB Volvo, 2011b)

Pre-study phase: In the first phase of the process the scope of the project is defined

Concept study: Several concepts are analysed from different data before one concept is chosen

Detailed development: Technical feasibility study is conducted

Final Development: In this phase the product is built, verified, validated and ratified

Industrialisation and Commercialisation: Production of the new product has to be enabled. At the end of this phase the product is launched

Follow-up: After the launch of the product the project is followed up and experiences are summarized

From interviews and observations conducted within Volvo GTT the GDP seems to be more a guideline than a process that is followed from gate to gate. The gates and stages are well known by the employees and they should be followed. However, gates as well as stages are sometimes pushed forward throughout the process. There are many activities that need to be conducted and finalized within the different gates. These activities are done by different functions and several activities are dependent of each other. One delay in one function can therefore have a great consequence of one or several delays in another function. Delays in activities make it hard to meet goals and other targets for the gates. Therefore, as mentioned above, the gates are sometimes pushed forward. From observations it seems that the gates are moved often and it results in the whole project being delayed. Basically the end of the project, where the production of the product should start, is pushed forward in time several times throughout the process of a project.

Further, interviews revealed that as the scope of the project is defined in the very first phase of the GDP it is not written in stone. The scope of the project changes throughout the process and sometimes adding to the scope makes the project bigger and this as well results in delays in the overall deliveries.

5.1.1 Project management at CVDE in GOT

All the commodities and functions within the organization are supposed to follow the GDP, therefore so is Chassis and Vehicle Dynamics Engineering (CVDE). As mentioned earlier CVDE is part of the vehicle engineering function. Within vehicle engineering there are several commodities of which one is the Chassis and Dynamics Engineering (CVDE) unit. The CVDE unit has employees working with many different tasks related to the product as well as the process. The project management office (PMO) within CVDE is responsible for leading the projects within CVDE and participating and delivering to the projects that concern the whole product.

The responsibilities of the CVDE project manager (PM) are to deliver quality, delivery, cost, and features (QDCF) to the project. The quality refers to the quality of the project and delivery is about delivering the project to the customer. Further, it is important that the cost of the project is fulfilled while still delivering a result (feature) to the customers. All of these four areas need to be measured and controlled throughout the project within a project at Volvo GTT. The quality, delivery, cost, and features are broken down into several other documents and measurements that need to be controlled. When the project managers at

CVDE report the status of the QDCF they either put a green smiley, red smiley or yellow smiley depending on the status of each parameter. Where the line goes from green to yellow and to red is unclear when asking several project managers.

There are three main types of product projects within the company and the CVDE PMO. Namely, start-cost projects, product modification request (PMR), and quality journals (QJ). The first mentioned is usually the biggest type of projects with a change to the product. There can however be smaller start-cost projects as well. A PMR project on the other hand is a maintenance project and a quality journal project is a shorter project with a fixed shorter lead time to solve quality issues. Depending on the size of the project a project manager within the CVDE PMO can sometimes act as the vehicle engineering PM or the chief project manager (CPM).

5.1.2 Main findings

The most essential main critical findings that have been made in regards to project management are:

- The GDP is the project management process that everyone at Volvo GTT should follow
- The project manager at CVDE (and other parts within Volvo GTT) has the responsibility of delivering the QDCF
- Within the CVDE PMO there are three main types of projects

5.2 Time management

What has been discovered during interviews is that time management has a different meaning for everyone. The notion is very broad and involves different things. When answering to the question on how they define time management, interviewees have mentioned time management as planning of own and others activities, planning of the overall project and making sure it is delivered. Further, time management for some means to use the time efficiently and effectively by doing the right things in the right time, instead of redoing activities and previous work. Driving time and making sure activities are performed as planned and not delayed is also something that many mention. However, the notion does have a different meaning for everyone and is therefore tackled in different ways. Nevertheless, what everyone agrees on is that time management includes *time planning*. What is then time planning within Volvo GTT and how is it conducted for projects?

5.2.1 Time planning

Within Volvo GTT time plans are divided into four levels, due to the many activities that need to be performed to deliver the outcome of a project. The first level is the *main time plan* (MTP), which is constructed by the project planner together with the Chief Project Manager (CPM) of that project. The MTP usually includes the main gates and stages of the project. The second level of time plans is the time plans from each function (i.e. product development, purchasing, after market, etc.). The second level time plan that Chassis and

Vehicle Dynamics Engineering (CVDE) needs to follow is the product development since CVDE is a part of this function. Breaking down the activities in the project further on, each second level time plan has a third level time plan. For product development the commodities (i.e. CVDE, CAB, Electrical engineering, etc.) have their own level three time plans. For each level the activities are more detailed so the fourth and last level is a time plan of the engineering activities within each commodity. What the time plans within a project basically are is a work breakdown structure (WBS) of the activities that need to be performed.

When starting off projects the size of the project is determined by several factors. Today there are three main sizes a project can have and each size has a time plan template. The templates are called a standard time plan (STP) and include the major activities conducted throughout the project. The STP is on MTP level, namely the STP is a first level time plan. The STP includes the major activities, stages, and gates, but also the standard lead times for the phases within the project. The idea with the STP is to save time when constructing a time plan. When a project will start the project planner sits down with the Chief Project Manager (CPM) to see what activities from the STP that are valid for this specific project. Some activities may be removed and some can be added. Nevertheless, the STP is to serve as guidance when constructing the time plan. The STP is constructed in Excel and the planning is updated and done in Excel throughout the project. On the lower level time plans Excel, PowerPoint and MS Project are used as tools when constructing and following up time plans in projects. With this said, there is no one way of planning within Volvo GTT and there is no consistency in following up activities within the project.

The project members and project managers are not only to use the STP and MTP as guidance when working with time management but they should also follow the global development instructions (GDI) for project time management. The GDI describes how time planning and other time management activities should be performed throughout the organization. Further, it describes who is responsible for doing what and who owns and has authority over the activities. The responsibility and the authority of activities as well as time plans are not always equal to each other. This is defined in the GDI for project time management. Even though the GDI should provide guidance and is updated according to organizational changes and needs, from interviews and observations project managers are aware that this exists but have not read it. However, there seems to be no awareness of the GDI being updated for a while now. Even though, there is little awareness of this, the GDI has in fact been updated recently.

5.2.2 Time management at CVDE

As mentioned above there are several levels of time plans and if the Project Manager (PM) from Chassis and Vehicle Dynamics Engineering (CVDE) Project Management Office (PMO) acts as a vehicle engineering PM he or she is responsible for the level 3 and the level 4 time plans, the upper level time plans are constructed by a project planner and a Chief Project

Manager (CPM). However, if the PM from CVDE PMO acts as a CPM he or she is responsible for the second level time plan as well. The MTP is already decided from the introduction block where the project was introduced.

When the CVDE PM is to construct the own time plans both the Standard Time Plan (STP) and the Global Development Instructions (GDI) on project time management should be used as guidance. As mentioned earlier, the STP is constructed in Excel and some project managers prefer planning in MS Project since it is possible to link activities together and therefore have a better view of delays and the consequences they may have on other activities. Further, MS Project is actually the tool that the section manager would prefer employees to use due to the efficiency when following up activities and making changes in a time plan. However, from an own constructed e-mail survey, of 21 project managers within the CVDE PMO that answered to the e-mail survey only seven use MS Project and the majority of 10 project managers use Excel. Three of the project managers use other tools such as PowerPoint and one uses several tools together. There are several advantages and disadvantages with both Excel and MS Project that make people use one over the other. Nevertheless, the organization wants to have a consistency in the time planning and will most probably introduce MS Project as the tool to use throughout the organization.

Independently of the tool used for planning, the CVDE PM has responsibilities to construct time plans and work with time management for the projects. Having done close observations on a bigger project within Volvo GTT, it has become clear that time planning takes time and seems to not be prioritized by the project managers. Project managers for smaller projects seem to have their plans straighten out and are continuously updating it with new activities and changes in their projects. Project managers over bigger projects on the other hand seem not to have time to update time plans. It is not only that the documentation is not correct, that is the time plans are not updated in Excel or MS Project. But, the project managers have less of a good overview of activities and what will be done, when it needs to be done, and how long it will take.

As mentioned previously, the CVDE PM is responsible for constructing and following up the third and fourth level time plans within projects. When constructing the time plan there is no clear process to do this within the CVDE PMO, nor is it decided what tool that should be used. The project managers' act differently when making time plans. Nevertheless, all project managers use the gates and stages from the Main Time Plan (MTP) and from that construct their own time plans. Some interviewees construct the time plan during the kick-off meeting with the project team where the main activities from different departments are listed and sequenced. Afterwards the time plan is constructed in Excel or MS Project and shared with the team so that everyone can approve it before the project starts. Other project managers within the CVDE PMO have constructed their own templates from experience and use this for every new project they are handed. They start off with the template and add or remove activities if needed. Basically, there is no clear process of how time planning or time management should be handled at the CVDE PMO.

From observations and own searches on the internal database there are several templates that the CVDE PMO can use for their projects. The templates are both in MS Project and Excel, depending on which tool the PM prefers to use he/she can use the correct template. Looking at the templates, they are different. A few templates have activities but no lead times or links between them. Another template is more extensive and has approximately eighty activities, including activities from the MTP, with both links and lead times connected to them. After these templates were revealed the interviewed project managers at the CVDE PMO were asked if they use any of the templates but most of them were unaware of any templates existing at all. It seems that the people that constructed the templates and shared them on the internal database did not share the information of templates existing or the information was shared but no one bothered or was too busy to see if it was something they could apply and use for their own work.

As described earlier, the Global development instructions (GDI) for project time management within Volvo Group Trucks Technology (GTT) should also be used. This as well includes a list of activities for third and fourth level time plans at CVDE. This list of activities is extensive and includes approximately 400 activities. Even this is something that most PMs at the CVDE PMO are unaware of. However, most interviewed project managers at CVDE PMO agree that the number of activities that the GDI provides are too much and are probably not valid for all projects.

Basically there are several shared templates that can be used for time planning within the CVDE PMO but there are also individual templates that the different project managers themselves use as a base to construct new project time plans from.

5.2.3 Main findings

The main findings related to time management and time planning within Volvo GTT as well as the CVDE PMO is:

- There are four different levels of time plans
- No clear and common process for time management exists within the CVDE PMO
- A direction and guide on project time management does exist within the Volvo GTT but has not been communicated properly to the employees

5.3 Knowledge management

Knowledge management is according to one of the interviewees a fairly new concept within AB Volvo and within Volvo GTT. As it is today white books are used to document knowledge and best practices from earlier projects. According to company policy each projects best practices and problems, or other learning's, should be documented in a white book and shared in the documenting system for Volvo GTT.

By observation and own searches in the database many white books from many different projects could be found. However, no white book could be opened and read. This is because most of the projects are confidential while being conducted, and the white book is created at the beginning of a project. Therefore the white book is confidential as well. Because of this, no one outside of the project team should have access to it. After a project is finished it is usually no longer confidential and the rest of the employees should have access to the white book. However, the owner of the project and the white book usually forgets to share it with the rest of the organization and make the content visual. Instead, the white book is confidential in the documenting program for all times, or until the owner remembers to unlock it. What is then the purpose of the white books within the organization?

As mentioned earlier, due to the organization being large, there are many different functions within the company. It seems that there are some other solutions to the “white book problem” within different functions, but there is nothing throughout the whole organization except for the white books. One function within the organization has a database, visual to everyone, where information is put on. The information is about the product as well as the process conducted for a project. The information is basically similar to the information in a white book and the purpose is to capture the created knowledge and share it through this database.

Another department within a function in the organization has, through a master thesis, created another database for capturing created knowledge and making it more easy to use. The master thesis in question was initiated due to the “white book problem” and due to white books usually being created at the beginning of a project but filled in with valuable information after a project. The department felt that it could be more valuable to have a database with different type of knowledge and information that you can see whenever you want, and what you want. A white book usually consists of many different types of information as well as knowledge and can be many pages long. The master thesis resulted in a recommendation of how a database could look like so that it can be chosen what type of information someone would want to have. It is possible to choose from what database data and information is needed, together with some knowledge insights and the chosen information is then by a click summarized in a word document. This data, information, and knowledge are the most updated so when the database is used the most current information is apprehended and can be analysed. Further, the information, data, and knowledge that can be seen with the help of this database are related to problems within projects, products, as well as time plans and other knowledge. The idea is therefore to put in and document valuable insights as soon as they occur and share them with others. This is also something created to make the documentation easier, because it is easier to put aside five minutes at a time to document instead of having to put aside several hours to this administrative work after a project. This database is currently being implemented within this organization both in Gothenburg and in other sites worldwide.

Databases and documentation of knowledge is done within different departments but knowledge creation and capturing is done through people as well. Within several functions there are knowledge management (KM) roles. These knowledge managers are experts in different areas and work as a support function to provide expert insights and knowledge in their area. It is very different for different departments but one department within Volvo GTT in Gothenburg has a knowledge manager within planning. This person is expert in creating the time plans but does not own time plans nor drives the activities. The KM for planning is today someone that creates the time plans and updates the activities in the time plans when needed. The orders of what should be updated and when comes from the project manager in charge of the project and time plan in question. Further, the role of the KM Planning is to monitor activities and alert the project managers and line managers of the ones responsible for the activities that something has to be done. Basically, the knowledge manager for planning is responsible for making the time plans, updating them, monitoring the activities and alerting the project manager and line managers of delays.

As mentioned, there are different types of knowledge management roles within different departments. Another KM role that exists is a knowledge manager for quality. This as well is a support function where the knowledge managers support the engineers and project managers with using quality tools such as FMEA, Risk analysis, etc. This is a function that exists within the Chassis and Vehicle Dynamics Engineering (CVDE) Project Management Office (PMO) as well.

As can be seen the notion of knowledge management is quite new within the organisation since many departments are going about to creating, capturing, and reusing knowledge in different ways. Some departments are using people, others are using databases and some are using both. According to the knowledge management specialist within the organization there is a new initiative on making a “one-way” solution throughout the whole organization in how to work with knowledge management. It should follow the logic of creating knowledge, capturing it, and reusing it. How this should be done is currently discussed and analysed. According to the interviewee the most essential part for this cycle to work is to put essence on the ownership of knowledge. It is very important to have someone or something to own the knowledge that is created and captured. Because, if no one owns the knowledge and it is just put somewhere, then the knowledge might not be reused. How to do this within the organization is discussed for a holistic view, but how can CVDE PMO do this in a valuable way?

5.3.1 Knowledge management at CVDE

As mentioned earlier, everyone within the Volvo GTT organization has to use white books and document learning's in them. Project managers within the CVDE PMO do this as well. The project managers update white books with information throughout the project. Since most projects are confidential the white books can only be accessed by people within the project team or whomever the project manager gives access to.

Even though the white books exist in order to document learning's and best practices in the organizations documenting database, the CVDE PMO has their own internal website that is shared to the employees at this department. On this shared website there is a headline for tips and tricks so that fellow project managers can share their knowledge. However, by observing and searching this internal website one can ask oneself if there is knowledge, best practices, and learning's shared between the project managers. Searching this it is unclear. There is much information on this website, such as information about what characterizes a good and successful project, templates for time plans, etc. But to what extent do CVDE PMO employees use this? The project managers do use it throughout the project but the information is only visible to the people within the project team. After a project is finished it is rarely that project managers go back to a white book to use valuable information.

As described earlier, the CVDE PMO has knowledge managers for quality. This is a support function with the main responsibilities of supporting the engineers within CVDE and the project managers within the CVDE PMO to use quality tools and to finalize quality analysis. The knowledge managers for quality create and capture the quality knowledge and reuse it when using quality tools for different projects. Further, they have internal meetings, which serve as a network where discussions of quality tools and other quality concerns are brought up and discussed. The network of knowledge managers is within the CVDE PMO, but should there be a network between knowledge managers cross functionally as well?

Overall the knowledge that exists within the engineering departments at CVDE in Gothenburg is mainly product related. From interviews and observations it seems that the engineers within CVDE are experts and specialists on engineering and technical solutions within their area. However, it seems that the process knowledge and the knowledge of how the engineers' activities affect other functions and vice versa is low. Not all engineers are aware of how they affect others within the organization and within the project. It is not visible how each activity and the delay of activities can affect the overall delivery of the project.

5.3.2 Main findings

The most critical findings for knowledge management within Volvo GTT as well as the CVDE PMO are:

- White books are used for capturing project knowledge but this knowledge is locked and cannot be transferred and shared during a projects existence
- The white book problem and other types of knowledge management solutions (such as knowledge management roles) have been initiated within different parts of the organisation but no clear and common strategy for knowledge management exists for Volvo GTT
- Within the CVDE PMO a knowledge manager for quality tools and methods exist as a support for the project managers within the office

5.4. Benchmarking, Lyon office

To find some more answers on how time management knowledge can be created, captured, and reused within the Chassis and Vehicle Dynamics Engineering (CVDE) Project Management Office (PMO) in Gothenburg a benchmarking was conducted in France, Lyon. The interviewees', all within the Volvo Group Trucks Technology (GTT) organisation, consisted of project planners from different functions, as well as project managers within the CVDE PMO in France and project management support.

In general there seems to be more essence and effort put on time management in Lyon than in Gothenburg. There are much more support functions and more people working with time plans and time management in Lyon than in Gothenburg.

When starting off a project, project managers within CVDE PMO in Lyon work with a project management support (PMS) to construct a time plan. The collaboration between a project manager and a PMS depends on the type and size of project. Further, it depends on the personalities as well. A PMS is a person that supports the project with various activities. Even though the idea is to support the project, the support is actually for the engineers within their department. Each engineering unit within the CVDE department has one PMS that supports with various activities. One of these activities is planning and monitoring engineering activities. The project managers use the support of planning from the PMS to construct their own cross-functional time plans for the projects. Within one project a project manager uses the time plan of several PMS to make an own project time plan. Within the Lyon office it seems clearer that the engineering tasks and level four time plans are constructed and followed up by the PMS. It is then the third level project time plan that is constructed and followed up by the project manager. The third level time plan is also aligned with the MTP that the CPM has constructed together with his/her PMS. With that said, the PMS role consists within the Range and project management function as well as within the different commodities.

5.4.1 Main findings

Main insights from the conducted benchmarking at the office in Lyon, France, are:

- Every commodity within the Vehicle Engineering unit has several project management supporters (PMS) that support with time planning
- The PMS does the planning purely administratively, that is the person does not drive any time management activities nor is he/she responsible to do so
- The PMS assists the *engineers* with time planning and provides this information to the project managers. In other words, the PMS does not assist project managers with time planning only the engineers.

6. Analysis

The following part analyses the current state using previous research and the theoretical framework constructed earlier in this dissertation. The current state is analysed not only through the theoretical framework but also with a SWOT (strengths, weaknesses, opportunities, threats) analysis.

6.1 Project management

As can be seen in the description of the current situation at Volvo Group Trucks Technology (GTT) the company follows the structure of the Global Product Development Process (GDP) for their projects. The GDP is namely a stages and gates process for a project. Maylor (2010) as well as Lewis (2001) describe how a successful project should include distinct phases where the deliverables for each phase is well known beforehand. The structure of having different phases with targets that have to be met in order to get to the next stage is a good way to structure the work and it makes it easier to notice delays and alerts in early stages in the project. After observations and interviews, this study revealed inconsistencies with the GDP and the *actual* way of working. Several project managers are frustrated by the scope and targets changing throughout the project lifecycle. Many deliveries are moved from gate to gate and stage to stage without being reached. I would argue that this can be an issue but no project is ever the same and things may change. However, it is not to say that if this is the culture within the organisation that it is okay to not have a clear scope and goal. If this is the culture within the organisation it is a major weakness and threat.

Another main highlight from previous research is that a project has four main cornerstones that have to be measured throughout the project. According to Lewis (2001) these are performance, time, cost, and scope. The project management office (PMO) at Chassis and Vehicle Dynamics Engineering (CVDE) in Gothenburg has to measure its projects in terms of quality, delivery, cost, and features (QDCF). Lewis (2001) argues how not all parameters can reach a high level. These things have to be prioritized depending on the project and what the outcome should be. Within Volvo GTT however, it seems that each of these four parameters (QDCF) should have a green light. It is however unclear what the green light is. After observing the status report that project managers at CVDE PMO provide to the overall project and the Chief Project Manager (CPM) as well as asking several project managers (PM) how the status is defined in terms of numbers it is unclear. What numbers make a green, yellow, and red smiley? Even though Volvo GTT and Lewis (2001) do not have the same names for the cornerstones of project management the parameters seem to be in accordance with one another. After reviewing Lewis (2001) definition of the four parameters and Volvo GTT's definition of QDCF following table 2 was compiled to compare the two.

Table 2. Comparing Volvo GTT to Lewis (2001)

Lewis (2001)	Volvo GTT
Performance	Quality
Time	Delivery
Cost	Cost
Scope	Features

As can be seen in the table above, the naming of parameters is different but after investigating the content it seems to be approximately the same. Even though Volvo GTT seems to be measuring the right thing according to previous research the study made in this dissertation shows inconsistencies in measuring the parameters in the *right way*. How can something be measured if it is not clearly defined what is a green, yellow, or red smiley. It is not to say that this is clear for all projects but there is an inconsistency where this is unclear in some projects and clear in others. Volvo GTT, as most other organisations, does have KPI's to compare to but it still seems unclear if this is what all project managers are comparing to, both within CVDE PMO and within other commodities and functions. Further, giving the status of the entire project in terms of smileys does give a visible status but it does not say much else. If the status is a red smiley it is very clear that this is bad and that there is a delay with this parameter. However, how much delay is there and how much is reached of the target. A number in percentage would make it easier to follow the status and understand how much is left of the work in order to reach the target of each factor. Therefore, even though it is good to know *what* to measure it is as important if not more important to know *how* to measure it.

As described above, Volvo GTT follows the logic of the GDP in their projects. This is in accordance with previous research and is a structured and good way of working. What is a bit unclear in this process is the work load. According to Lewis (2001) most of the activities should be conducted in the early phases of the project lifecycle. The number of activities should then decrease as the project ages. A successful project has the hard work in the beginning of the project and makes a good foundation for the rest of the work and makes the rest easier. Therefore it is not needed to have as many resources later in the project as it is important to have it in the beginning.

6.1.1 Strengths, weaknesses, opportunities, and threats

This study has revealed that the strengths of Volvo GTT in regards to project management are that the organisation is working according to previous research. This means that this way of working is acknowledged by several researchers and is a good way to structure the work around projects. Furthermore, it is good that Volvo GTT has a common way of working with projects throughout the whole organisation. This makes project management within Volvo GTT consistent and strong. A weakness that has not yet been seen within the organisation is the division of work and activities throughout the project lifecycle. How much work and how

many activities are conducted in the early as well as the late stages of the project? According to previous research it is to say that work within projects should be frontloaded to be able to reduce the resources as the project ages as well as still reaching the goals. If Volvo GTT put effort on making their strength, the project process, stronger by considering the number of activities, this can be a huge opportunity for them. This can enable the organisation to reach goals and better results than competitors.

However, to reach the goals they need to be well-defined. As mentioned above several interviewees have explained how the scope and the goals of a project change throughout the project lifecycle. It is understandable that this sometimes happens. Volvo GTT is a very large organisation with many people involved in one project. Each function and part of the organisation has their own targets, goals, and wishes to include in the project. If every project followed the same targets and goals the organisation would have to worry because then something is wrong. It is however not to say that the exception should become the rule. If this way of working is the culture within Volvo GTT then there is a problem. The internal weakness of having this type of culture will lead to less projects being successful. If most of the projects are unclear and it continues being this way, what is it then that the company wants to achieve? What are the goals with these projects? Goals cannot be met and reached if it is unclear what they are. This internal weakness in combination with competitors having more consistent projects leading to better results this will bring a major external threat towards Volvo GTT.

To reach the goals, as described above, it is essential to know and understand the status of the project. Volvo GTT uses the QDCF for this and according to Lewis (2001) it is a well-structured way of understanding the delivery of the project. Even though Volvo GTT have the strength of working according to research and an acknowledged way of working, it is essential to do it in a proper way. The weakness that Volvo GTT has in regards to QDCF is not *what* to measure but *how* to do it. It seems that there are inconsistencies throughout the organisation and inconsistencies within the CVDE PMO when working with these parameters.

6.2 Time management

Large organisations usually have a process for everything, and so has Volvo GTT. The process for time management and how to handle this issue is within the Global Development Instructions (GDI) for project time management. This document is distributed within the database of the entire organisation and is for everyone to see and for the project managers to follow within projects. Maylor (2010) argues that it is hard to have a process for time management and a one-way solution for all time plans, however certain aspects need to be considered when constructing a time plan and managing time within projects. These factors are inputs, controls, outputs, and mechanisms. The time plan should then be constructed by considering these four and time should be managed in the same way. Volvo GTT does in fact have a process for time management but interviews show that the GDI is not read by all

project managers. Further, if project managers have read the GDI they have done so when they started working as project managers at Volvo GTT. They do not read the updated GDI nor do they know if it is updated. What is then the point in having a process for doing something if no one follows the process, or knows that it exists? The organisation is putting a lot of effort and time on investigating something and creating it so that work is more efficient. But the result of efficiency cannot be reached if the work is not presented and rolled out to the employees in a proper way. Communication is a weakness within this organisation and a lot of time and money can be saved if the right things are done in the right way.

Due to the size of the projects and the many hierarchical levels that exist within Volvo GTT the organisation has four levels of time plans. Interviews and observations have shown that the distinction between the level of time plans is unclear for most employees. Even though the GDI includes a description of the content of each level time plan it is hard to understand the content in these time plans in practice. The process and the work that has been made to make project time management more efficient and easier is for nothing if it is hard to understand and use. The creation of the GDI and the Standard Time Plan (STP) has been done top-down and it seems to not have been communicated properly to lower levels in the organisation. Lewis (2001) mentions how, when creating a time plan, it is important to plan together with the ones who are to carry out certain activities. This is something suitable for this project as well. In order for the process to work and generate efficiency it has to be done in cooperation with all levels in the organisation. In theory this does not sound hard but in practice it seems not to have been easy to do this within Volvo GTT.

Within the Chassis and Vehicle Dynamics Engineering (CVDE) Project Management Office (PMO), time plan levels are unclear as well. It is not fully understood what a third and fourth level time plan is. The distinction between these is unclear within the department. Because of this there is no consistency in creating the time plans and it is different depending on the project and the project manager. Interviews show that even though there is a common process for time management within Volvo GTT the project managers (PM) within the CVDE PMO work differently. As Maylor (2010) argues, there is no one-way approach to handle time management. However, I believe that a standardized process can be defined with room for flexibility. Flexibility is important to have so that there is room for creativity and improved solutions. However, too much flexibility and no standardization creates inefficiency. When it comes to defining the time management process within the CVDE PMO as well as within the entire Volvo GTT the organisation has work to do. It has to be clearly defined what is included in the box of project time management and what is the project managers responsibility in this. The large organisation Volvo GTT has problems with the communication. Work that is affecting everyone is being done without taking in the requirements from all parts of the organisation and considering everyone. Such works ends up not being communicated and even if it is communicated some refuse to listen if they themselves have not been heard when putting in requirements. This leaves inconsistency

and inefficiency in the way of working and frustration with the ones that are trying to solve a problem.

Even though the creation of time plans is different for different project managers within the CVDE PMO, both in terms of tools but also process, what they have in common is that most project managers work closely to the engineers. As mentioned above Lewis (2001) argues how time plans should be conducted with the people who are to carry out the activities. This is something that most project managers within the CVDE PMO have embraced. The interviewees mention how it is the engineers that know the actual activities that have to be carried out and from experience know the time it will take. In order to construct a reliable time plan in the very beginning it is important to do it with the engineers. Many project managers mention how they create the rough time plan during the very first kick-off project meeting and then make it more structured afterwards to send it out to the project team and share it. In that way the entire project team has done the first planning together and agreed on the activities and the time they will take to carry out as well as all the deadlines. If any changes occur all are aware how it may affect others. Working closely to the engineers is a great strength within the CVDE PMO.

6.2.1 Strengths, weaknesses, opportunities, threats

A great overall weakness that seems to consist within Volvo GTT is lack in communication. By not communicating information throughout the organisation inconsistencies occur in the way of working and there are attempts to solve the same problem within different areas of the organisation. That time management is not handled properly within the organisation is something that several functions and commodities have seen and are trying to solve in different ways at their level. By doing the same thing but over and over again and in different ways creates not only inconsistency but it creates costs. Costs that can be avoided if all concerned within the organisation are working together. The lack of communication is mainly between functions and levels within the organisation. A great strength that exists within the CVDE PMO is that most project managers understand the importance in working closely to the engineers and having a good relationship with them. By planning with the engineers, the ones carrying out the activities, the project managers receive more trust from the engineers and the engineers feel more involved in the actual process. Even though most project managers work closely to the engineers it is not a common way of working. Planning with the engineers is something that the project managers have learnt from experience is good to do. Otherwise, the project managers within the CVDE PMO also have different ways of working with project time management.

Not having the same underlining base for constructing the time plan as well as driving the time plan activities everyone does things in their own way and some do it more efficient but others quite the opposite. Further, it makes it hard for a new project manager to work efficiently if he/she has to make mistakes in order to understand what is good and what is bad. It is not to say that everyone should do everything in the same way. This does not work

at all, but it would be good to have a base to work from where certain aspects are standardized.

6.3 Knowledge management

As earlier described Volvo GTT and the Chassis and Vehicle Dynamics Engineering (CVDE) Project Management Office (PMO) document knowledge in white books and share it with others through an internal database. What is written in white books was hard to see in this study since no white books could be opened. However, the knowledge management specialist within the organisation mentioned how it is not clear what is knowledge and how the information in the white books is not always knowledge. Instead it is sometimes data or information. Furthermore, both explicit and tacit knowledge should be created and captured. Interviews show that tacit technical knowledge is created and captured within the database. However, if it is not shared in a proper way it cannot be transferred and the capturing is for nothing. This is one main weakness that Volvo GTT has. Interviewees have said that people outside of projects are not allowed to access information about the project since most projects are confidential. It is first when the project ends that others within the company should be able to access the white book. However, finished projects are still closed in the database as well as on-going projects. Further, explicit knowledge should as well be created and captured. Interviews and observations show that this is done but not shared in a proper way. Explicit knowledge is created and captured within individuals and only shared through personal interaction with this individual. Overall within the company there are many experts within different areas and the only way to find out some good information or knowledge is to contact these people. Not much is documented when it comes to explicit knowledge.

Furthermore, the organisation and the employees are very concerned with capturing technical knowledge but process and organisational knowledge seems not to be as important. From interviews and observations it became clear that many engineers have poor process knowledge. Even if they are technical experts within their area and they work in projects they lack the knowledge of the project process. It is not to say that this is for all engineers, but many engineers. The awareness of how the CVDE engineering activities affect other activities that have to be done within the project lifecycle is not known nor understood. The project managers on the other hand have greater process knowledge. They work with the process on regular basis and the project lifecycle so of course they know the process better. Some project managers have made attempts to capture the knowledge they have created through experience, in particularly time management knowledge. They have tried to do this by creating templates with regular activities within a project. The templates include activities that occur in most projects. Some templates are even more precise by having the standard lead times for the activities as well as links between them. This knowledge is captured but the study shows that it is rarely reused and transferred. Here again it seems that the communication is lacking within the CVDE PMO as well as

throughout the organisation. According to the knowledge management specialist as well as Söderquist (2006) it is important to have an ownership of knowledge and in that way share it and transfer it throughout the organisation. Within Volvo GTT there are different types of knowledge management functions but within the CVDE PMO there is only one. The knowledge managers for quality are functionally located within the CVDE PMO but there is no knowledge manager for time management at the office. If there is no one working explicitly with time management and there is no common platform for capturing and documenting time management knowledge, how is it then going to be transferred and reused?

Knowledge can be shared either through a codification strategy or a personalisation strategy (Hansen, Nohria and Tierney, 1999). The authors argue that both should be used where one is chosen as the primary strategy and the other as a supporting strategy. Whichever is chosen it should be aligned with the competitive strategy of the company. Volvo GTT seems to have the strategy of documenting knowledge by codification in white books. However, this is something noticed from observations and in reality there is no clear knowledge management strategy. Furthermore, the organisation is attempting to use the personalisation strategy as well where important and valuable knowledge is captured in individuals and with socialisation transferred throughout the organisation. However, it is not something that the whole organisation attempts to do. Instead it is parts of the organisation that have been trying to do this on their own and there is no common way to work with this in the organisation. Because of this I would argue that Volvo GTT does not have a knowledge management strategy. Nevertheless, the company has shown interest in considering this issue and is something they are working on.

The benchmarking in Lyon revealed that the CVDE PMO on that site and other functions in France work more with time management than the office in Gothenburg does. My view on this is that it is probably due to the culture. The office in Lyon used to be Renault before AB Volvo bought it and maybe the Renault organisation was more concerned with time management and this has stuck to the Volvo GTT there but has not been transferred throughout the whole organisation yet. In Lyon the knowledge management strategy is to have functionally located people that are in a network with each other and discuss issues and solutions. However, these people are not specialized in any areas nor are they knowledge managers. They are support for the project in terms of different areas, one of them time management and time planning. This knowledge management strategy that exists in Lyon is strength for Volvo GTT and enables the project managers in Lyon to concentrate on more tasks because they have support in some areas by the PMS. Furthermore the strength lies in working more efficiently within the project if large tasks and responsibilities are divided within the CVDE PMO.

6.3.1 Strengths, weaknesses, opportunities, threats

If process knowledge was as great as the product and technical knowledge engineers have there would be few problems with time management within Volvo GTT. Unfortunately, most of the engineers within CVDE do not have good process knowledge and lack awareness of how their work and the activities they conduct affect other commodities and functions within the company. They lack the knowledge of how it affects the overall project work and process. This is a major weakness that should be handled in order to increase efficiency. If the process knowledge were to increase more consideration might be put on making sure the delays are as small as possible.

Due to employees within Volvo GTT being experts and having high technical knowledge the company tries to capture this using white books and a common database. If this knowledge cannot be accessed it cannot be reused and it cannot be transferred to others within the company. How can the organisation then reuse this knowledge that is created and captured? This is a major weakness for the organisation and can be a huge threat if the employees try to reinvent the wheel over and over again.

Furthermore, when the process changes, which it does, it has to be properly communicated throughout the organisation. Within the CVDE PMO the project managers are not aware when the GDI changes and other important processes that they use on a daily basis. As mentioned above there is poor communication between functions in the organisation.

Even though there are several weaknesses within Volvo GTT in regards to time management knowledge the organisation has strength in the office in Lyon and in some parts of the organisation in Gothenburg. There are knowledge managers within the company located within different functions working explicitly with certain areas and are experts in these. This increases the quality of the work within the company and the output of the projects as well as increases the efficiency. If Volvo GTT were to introduce this way of working throughout the organisation the work would be more consistent as well as more efficient.

6.4 Summary

Following part summarises the strengths and weaknesses of Volvo GTT and the CVDE PMO in Gothenburg. Threats and opportunities are discussed but since this case study was internal and no external data was gathered these are only assumptions and are not included in the summary illustrated in table 3.

Table 3. Strengths and weaknesses

Strengths	Weaknesses
Use of GDP and a common project process	Unclear project scope and project goals
Knowledge on <i>what</i> to measure	Poor measure of QDCF
Close collaboration and planning with	Workload throughout the project not

engineers	defined in GDP
CVDE PMO in Lyon consistent in time management process	Poor communication throughout the organisation
	Inconsistency in time management process
	No common platform for sharing time management knowledge

As described above the major strengths that Volvo GTT and the Chassis and Vehicle Dynamics Engineering (CVDE) Project Management Office (PMO) in Gothenburg have are that the use of the Global Product Development Process (GDP) is well established throughout the whole organisation. By using a common process for projects with already defined stages and gates it provides a common baseline for expectations of each project in terms of quality, delivery, cost and features. By measuring in terms of these four parameters everyone within the organisation has a common language and the status of each project is easy to understand by people not involved in the project as well since each project is measured in the same way.

Nevertheless, it is not enough to know how to do something and how to measure deliverables and results if it is not carried out in that way and in a proper way. Even though the GDP is determined and the scopes as well as the goals are determined early on, this changes throughout the project lifecycle. If the goals are unclear it is hard to reach them and if they cannot be met while competitors do in fact meet their goals this weakness will turn into a threat for the organisation. Furthermore, the changing of the scope and adding to the project will delay the project and time plans will no longer be valid. Also, if the quality, delivery, cost, and feature (QDCF) is not measured properly the status of the project is unclear and is a threat to the internal time management process since it is not clear how much of the work is done and how much is left to reach the target. A smiley is not the same as a percentage of how much is done and how much is left to do.

Another major weakness within not only the CVDE PMO in Gothenburg but also within the entire Volvo GTT organisation is that time management is handled in different ways in different parts of the organisation and there is no consistency and a common project time management process. As mentioned the process for project time management does in fact exist but is not read by the project managers nor used. This study shows that this is due to another major weakness within the organisation, namely poor communication. By not communicating and presenting that there is a common way of working everyone will work in their own way and there will be no consistency. It is not to say, that it is bad to work in an own way and that there must be a process for everything. However, if everyone works approximately in the same way and parts of the project time management process is standardized it will enable better communication and more efficient work within functions as well as across functions within the organisation.

However, the major strength within the CVDE PMO in Gothenburg is the close collaboration with the engineers. This is a major strength for time management because for the project time plan to be as realistic as possible it is necessary to plan with the people who are to carry out the activities. This seems to be something most project managers within the office do and should continue doing since it enables them to have a more realistic view of the project lifecycle and time plan and reduces the risk of poor time planning. Another strength within the Volvo GTT organisation that should be used within the CVDE PMO in Gothenburg is to have dedicated people working with time management within the office. As described, the benchmarking revealed there being dedicated people in Lyon that work with time management and planning and the project managers in Lyon have expressed that this is very much needed and it makes the work more efficient. This is something that does not exist within the CVDE PMO in Gothenburg. Therefore, this is a weakness for the CVDE PMO in Gothenburg but strength for Volvo GTT in France.

Additionally to work more efficiently with project time management within the CVDE PMO office it is essential to have a common platform where information and knowledge in regards to time management is captured and shared throughout the department. Today the common platform is the internal database of the department but the information and knowledge created in regards to time management is spread out within this database and is not gathered in one and the same place. In order for employees to find this created knowledge it has to be captured in one place. This will then enable the reuse of the knowledge and transfer from project to project.

In general, the project lifecycle and time management process can be more efficient if the major weakness of lacking knowledge does not exist. The weakness is mainly within the engineering departments and not within the CVDE PMO but it affects the projects since the engineers are involved in them. The knowledge that is poor is the process knowledge and in order to make the projects more efficient the process knowledge has to increase.

7. Recommendations

As a result of the analysis in previous section, several recommendations for future actions at Volvo GTT and the CVDE PMO in Gothenburg could be constructed. These are presented and described below.

As mentioned above one major concern within the whole organisation is the common way of measuring quality, delivery, cost, and features (QDCF). Even though the smileys used today enable a visual and very clear overview on the project status it does not say much else than if the status is good, bad, or okay. In order to improve the time management process within the organisation a more specific description of the status might be better. Namely, a percentage of how much of the target that is reached and how much that is left would be better than just smileys. The numbers can then be green, red, or yellow if the colours make it more visual. By having specific numbers, it is easier to compare the status with the time plans for the project to see if there are delays and why these delays have occurred and how long the delays are.

Standardisation of activities should not be pushed but what can be standardized should be standardised in order to reduce inefficiency. Nevertheless, flexibility should be kept and in order to have both of these within the project time management process within Chassis and Vehicle Dynamics Engineering (CVDE) Project Management Office (PMO) in Gothenburg I suggest balancing these. Today the office has too much flexibility and no standardization. Standardization with the time management process in the office can be done in two ways. I suggest including both.

First, when creating the time plans everyone should work by a common and underlining base, namely, from the same time plan templates. By studying the organisation and the projects within the company it became clear that the easiest way to construct templates that can be used by most project managers within the CVDE PMO is to create three different templates. I suggest creating templates in regards to class one, two, and three projects. By having three different templates project managers can choose one depending on what class the project is. It is not to say that the templates are written in stone because each project is different and the time plans will therefore be different from project to project. However, using a template will give the same base to all project managers within the office and then activities can be added or removed, etc. however it is suited. In order for the templates to actually be used by the project managers it is important that they themselves create them. As mentioned before the office has several different templates today that are created by individual project managers and shared to the others through the internal database. I believe that the templates are not reused by others because either they are not aware that any templates exist or they do not understand it fully because someone else created it. By allowing the project managers to construct the three different templates themselves the likelihood of the templates be reused is higher than if one person creates templates and shares it to the others. Further, it is the project managers that have the experience of

knowing what activities that should be included in each of these templates and how they are connected to each other.

As illustrated in the theoretical framework time management knowledge should be created, captured and reused throughout the whole project lifecycle. After a project is finished the overall knowledge will be greater than in the beginning of the project. This time management knowledge needs to be transferred to other projects where the loop of creating, capturing, and reusing is existent as well. Interviews and observations have shown that the project managers within the CVDE PMO in Gothenburg are sometimes not able to do this because the projects are too big and there is basically no time left. In order to create, capture and reuse knowledge as shown in figure 14 below the project manager will for larger project need help with managing time. This is the second part of the standardisation of the time management process. I believe that for larger projects a project planner should be responsible for conducting time management activities. In other words, the time management responsibilities that lie on the project managers today should in larger projects be handled by a project planner. The division of work between the project manager and the project planner within the CVDE PMO office has been illustrated, described and handed to Volvo GTT. However, due to confidentiality agreements, this will not be illustrated in this thesis.

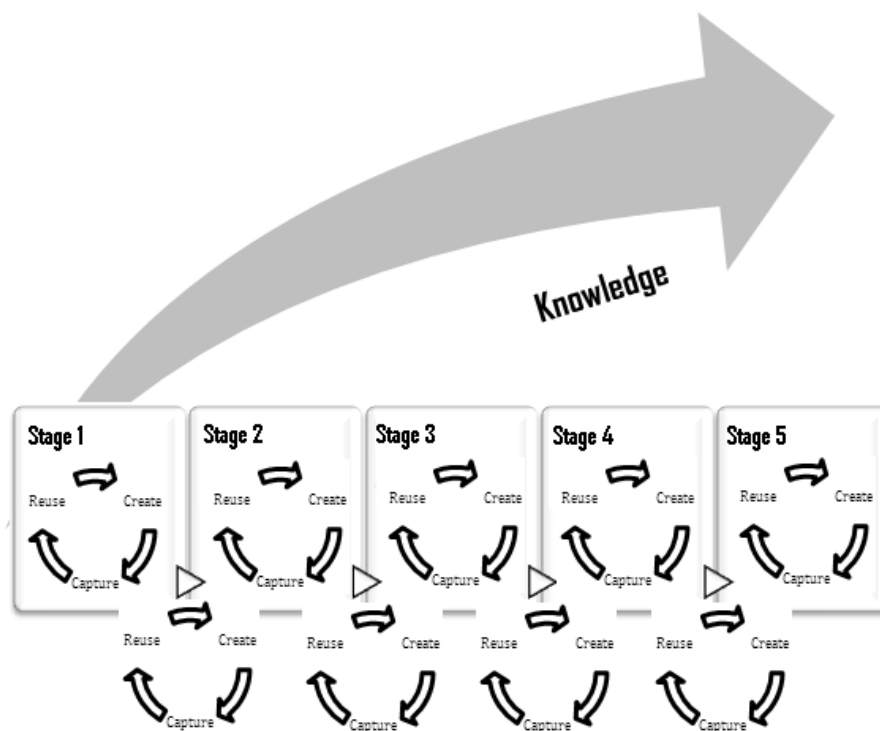


Figure 14. Knowledge creation, capture, and reuse within and between projects

The knowledge management specialist within the organisation as well as some authors has described the importance of having a defined ownership of certain knowledge. The ownership of time management knowledge has to therefore belong to project planners and

not project managers. Project managers (PM) work with not only time, but also cost, quality, risks, etc. In order to have great time management knowledge where new knowledge is continuously created, captured and reused it is important to have people dedicated to time management. These people should belong to the project management office (PMO) where they are close to the project managers and collaboration between them can be easy. The project planner should work with all time management issues within a certain project. The benchmarking in Lyon revealed that the project management support (PMS) in France belong to the engineering offices and not to the project offices. The PMS manage the time of the engineers and therefore within one project there are several PMS involved. However, in Gothenburg I suggest having one project planner for one project conducting the planning and managing the activities for the whole project. There are advantages and disadvantages with everything and so with this. If a project planner is dedicated to manage the project time the technical knowledge and collaboration with the engineers might be lower than if the project planner is dedicated to managing the time of the engineers. However, by having a project planner in the project management office it will give a better overview of the project and the overall activities will be better managed cross-functionally.

Furthermore, the point with having a project planner in certain projects is to make the time management process within projects more efficient. In order to do this it is important for the project planner not to have only an administrative role of constructing time plans and not solving any issues. It is essential to give the project planner the responsibility of creating the time plans but also the responsibility and authority of driving the activities within CVDE and making sure that the project is on time. This will not only give a clearer role to the project planner but it will also provide a more understandable distinction between the project planner and the project managers. Additionally, a role with some authority rather than no authority at all gives more motivation to the person working with this. In order to provide an understanding of what the project planner should work this thesis has resulted in a role description of a project planner within the CVDE PMO. This has been presented to the company but due to confidentiality agreements this cannot be presented in this report either.

As described above time management knowledge will be captured in templates as well as people. The knowledge management strategy that the organisation should use should be analysed more and this is not something this study can provide. However, the CVDE PMO should have both codification and personalisation as a knowledge management strategy for time management. The office should have templates as described above but this study has also revealed an existing IT tool within another project management office in Gothenburg where valuable and up to date project management knowledge can be stored, found, and reused. This is something that I suggest the CVDE PMO to investigate if it is something that can be applied to their office as well.

With the above mentioned it is clearer how the CVDE PMO can create and capture the time management knowledge. But how can this knowledge be reused and transferred? The

personalisation side of the strategy should include a network of the project planners. If there are project planners in other functions it can be very valuable to have a network of project planners and own the time management knowledge within this group. With this network the transfer of knowledge from project to project will be easier. Furthermore the project planners should have the expertise in time management and provide trainings in the tools used as well as trainings and knowledge of the overall process to the engineers.

To finalise this part, I recommend the organisation to choose one tool to use for planning so that the synchronisation between different level time plans as well as different project time plans is easier. After investigating different type of time plans it also seems that four levels can be reduced to three. However, no investigation has been made in what level that should be removed but interviews point to the second or third level time plan being removed. It is not to say that this study and the recommendations made will solve all problems with time management in the CVDE PMO and within Volvo GTT but it is important to start somewhere and go from there.

7.1 Summary of recommendations

This final part tries to sum up the recommendations in order to give a quick view on what improvements the organisation should consider doing and why it is they should do so.

Table 4. Summary of recommendations

What	Why
Measure QDCF in percentage rather than smileys	Percentage is more objective and gives a greater accuracy of how much of the target is reached and how much is left
Standardise what can be standardised and use time plan templates	This reduces the amount of administrative time (creating a time plan)
Have three different time plan templates constructed by the project managers	The project managers are more likely to use this if they have developed it themselves
Have project planner(s) for larger projects within the CVDE PMO	This will increase the efficiency and quality on the overall delivery for a project
Introduce a project planner network with the role of project planner	A network where knowledge is shared and transferred strengthens the time management process within the organisation
Use the IT tool that exists within another PMO within Volvo GTT	This is a better way of creating and sharing knowledge than white books and this tool already exists
Use the same time planning tool throughout the Volvo GTT organisation	Easier to connect different levels of time plans and cross-functional as well as top-down synchronisation will be improved

8. Discussion

In the supplied value of this dissertation following is a discussion and analysis of the possible contributions to academia in regards to project management, time management, and knowledge management respectively.

This study has revealed gaps in the project time management process within a large organisation. The insight that the project time management process is not mature is not new to the interviewees. Rather, everyone knows about it but does not have time to solve this issue. In order to have more efficient projects and projects that actually follow the time plan to some extent it is essential to have time management guidance. Previous research discusses how there is no “one-way” solution on a time management process and on how to conduct time plans and drive time management activities. To some extent I believe this is true since every project is different every time plan needs to be different as well. However, the process on how to conduct time plans and manage time within a project needs some guidance in order to increase the efficiency. Standardisation to some extent brings efficiency and I would argue that this is necessary for a large organisation to have. It is important that some activities are mechanistic so that time and money is not spilled and used inefficiently. Nevertheless, it is important to keep flexibility since this enables creativity and creates ideas on better ways of working and it creates new knowledge.

Previous research has shown that knowledge needs to be created, captured and transferred throughout the organisation in order to continue competing. This is valid for both technical and organisational knowledge. How can time management knowledge be created captured and reused then?

The research made shows that it is necessary to continue creating knowledge within a project in order to increase the overall knowledge and transfer it to other projects and throughout the organisation. The time management knowledge has to be captured through experts within time management. My main argumentation for this is that within larger projects the project manager does not have the time to conduct all project management activities all on own. Instead some support is needed. Previous research as well as empirical data describes how a project manager is responsible to control many aspects within a project. If a project is very large one project manager cannot conduct all this work and have a successful project. Instead I believe it is necessary to divide the project manager role, even if the project manager is the one that has the overall responsibility. For time management a good idea is to have a person that is responsible for the planning of the project. Not only responsible to create the time plans but also to solve time management issues and drive time management activities. According to previous research and interviewees this is something that the project manager does today. By dividing the responsibilities of a project between different roles and experts within different areas I believe that the overall quality and efficiency of a project increases.

Furthermore, in order to introduce a somewhat standardised process for project time management and due to this not being mature within this organisation this “new way” of working will create new knowledge and more improvement suggestions. This knowledge has to be managed in a correct way for it not to get lost. This study has revealed that the most important thing is to have ownership of that knowledge. Ownership of certain expert knowledge cannot be managed by project managers since they work with many different aspects of the project and not only time management. Because of this it is also critical to have someone else as an expert that owns new knowledge and is responsible to capture it as well as transferring it. An expert within time management is a good way to do this and a network of time management experts within the organisation enables transfer not only between projects but also throughout the organisation.

One could argue if introducing a new expert role within the organisation is valid for all projects or not and all parts of the organisation or not. What is certain to say is that it is valid for the project management office (PMO) within Chassis and Vehicle Dynamics Engineering (CVDE) and that it can be beneficial for other commodities within the vehicle engineering function as well. However, based on the extensive data collection it is safe to say that within a large organisation and for large projects one person is not enough for controlling all project management activities. Even though the project manager is the one that has the overall responsibility of delivering success he/she needs support on the way. The project manager activities can therefore be divided within the project management office where experts within certain areas are responsible of controlling this. Dividing the project manager role in terms of responsibilities is something not mentioned by previous research covered in this dissertation but I believe it is critical to take this approach for larger projects.

The results of this master thesis show that the ownership of time management knowledge should lie in the hands of an expert within the area at the project management office. The knowledge process within and between projects has been constructed by connecting the three cornerstones of this dissertation, namely, time management, project management, and knowledge management. This process has been described earlier and is provided again in figure 15.

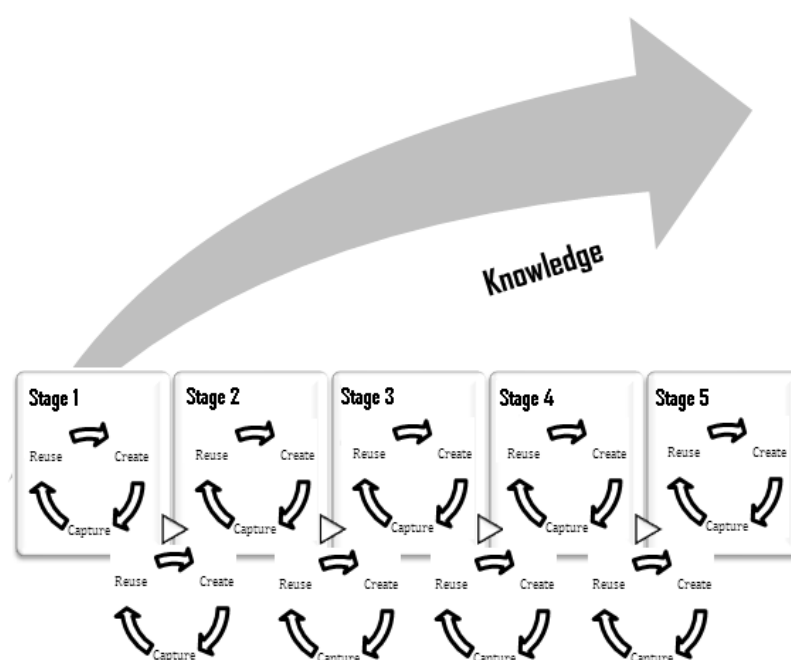


Figure 15. Knowledge creation, capture, and reuse within and between projects

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10. Appendices

In this part the interview guide constructed for the semi-structured interviews as well as the interview schedule for the semi-structured interviews is illustrated.

10.1 Interview guide

Interview guide – Time management

Part A: Introduction

Hi! Thank you for taking the time to talk to me. My name is Helena Ladan and I am a thesis worker here at Volvo GTT, at the Project Management Office of CVDE. I'm writing my master thesis for my program Management and Economics of innovation at Chalmers. My thesis is about Time management and Knowledge management. Rather how knowledge in regards to time planning can be created, captured, and shared within and between projects at Volvo GTT. I contacted you because I was told that you...

Part B: The role of the person and description of responsibilities

- *What is your name and what department are you working for here at Volvo GTT?*
- *What is your role in your department and what are your responsibilities?*

Part C: How do you think the work with Time management can be improved here at Volvo GTT?

- *How do you define time management?*
- *How do you work with time planning?*
- *What tools do you use when working with time planning?*
- *Is there a common way to work with time management throughout Volvo GTT's all departments?*
- *What do you think is good and what do you think needs improvement here at Volvo GTT in regards to time management?*
- *How do you think the work with time management can be improved at Volvo GTT?*

Part D: Wrap up

I think I got everything I need for now. Thank you again for taking the time to speak with me. I hope that I can contact you again if I have any follow up questions? Also, feel free to contact me if you come to think of anything else that you think can be of value to me.

Interview guide – Knowledge management

Part A: Introduction

Hi! Thank you for taking the time to talk to me. My name is Helena Ladan and I am a thesis worker here at Volvo GTT, at the Project Management Office of CVDE. I'm writing my master thesis for my program Management and Economics of innovation at Chalmers. My thesis is about Time management and Knowledge management. Rather how knowledge in regards to time planning can be created, captured, and shared within and between projects at Volvo GTT. I contacted you because I was told that you...

Part B: The role of the person and description of responsibilities

- *What is your name and what department are you working for here at Volvo GTT?*
- *What is your role in your department and what are your responsibilities?*

Part C: How do you think the work with Knowledge management can be improved here at Volvo GTT?

- *How do you define knowledge management?*
- *How do you work with knowledge management?*
- *Do you use any special tools for knowledge sharing?*
- *Is there a common way to work with knowledge management throughout Volvo GTT's all departments?*
- *What do you think is good and what do you think needs improvement here at Volvo GTT in regards to knowledge management?*
- *How do you think the work with knowledge management can be improved at Volvo GTT?*

Part D: Wrap up

I think I got everything I need for now. Thank you again for taking the time to speak with me. I hope that I can contact you again if I have any follow up questions? Also, feel free to contact me if you come to think of anything else that you think can be of value to me.

10.2 Interview schedule

Organization	Role	Date	Duration	Type	No. of interviews
Volvo GTT	Section Manager, Project Management & Support CVDE Europe	21 January 2013	60 minutes	Exploratory	1
Volvo GTT	Knowledge manager quality, CVDE PMO GOT	30 January 2013	30 minutes	Exploratory	1

Volvo GTT	Knowledge manager quality, CVDE PMO GOT	1 February 2013	30 minutes	Exploratory	1
Volvo GTT	Chief Project Manager, RnP GOT	1 February 2013	60 minutes	Exploratory	1
Volvo GTT	Project Manager, Global order office CVDE GOT	1 February	60 minutes	Exploratory	1
Volvo GTT	Global Process Manager, Global Order Office CVDE	4 February 2013 12 March 2013	60 minutes 60 minutes	Exploratory Semi-structured	2
Volvo GTT	Project Manager, CVDE PMO GOT	11 February 2013	60 minutes	Exploratory	1
Volvo GTT	Knowledge manager planning, CAB PMO GOT	13 February 2013 4 March 2013	60 minutes 30 minutes	Semi-structured	2
Volvo GTT	Project Planner, RnP GOT	14 February 2013	60 minutes	Semi-structured	1
Volvo GTT	Project planner, RnP GOT	14 February 2013	60 minutes	Semi-structured	1
Volvo GTT	Project Manager, CVDE PMO GOT	26 February 2013	60 minutes	Semi-structured	1
Volvo GTT	Global Management Coordinator, CVDE	27 February 2013	60 minutes	Semi-structured	1
Volvo GTT	Project Manager, CVDE PMO Bangalore	28 February 2013	60 minutes	Semi-structured	1
Volvo GTT	Knowledge management specialist, Process Development and Manufacturing	4 March 2013	60 minutes	Semi-structured	1
Volvo GTT	Project manager for	5 March 2013	60 minutes	Semi-structured	1

	knowledge management, FVV PMO GOT				
Volvo GTT	Project Manager, CVDE PMO GOT	6 March 2013 3 April 2013 10 April 2013 19 April 2013 22 April 2013	60 minutes 30 minutes 60 minutes 40 minutes 60 minutes	Semi-structured	5
Volvo GTT	Project Manager CVDE PMO Lyon	7 March 2013	60 minutes	Semi-structured	1
Volvo GTT	Project Manager, CVDE PMO GOT	19 March 2013 10 April 2013	30 minutes 60 minutes	Semi-structured	2
Volvo GTT	Project Manager CVDE PMO Lyon	25 March 2013	60 minutes	Semi-structured	1
Volvo GTT	Project Management Support, CVDE Lyon	25 March 2013	90 minutes	Semi-structured	1
Volvo GTO	Process & IT Strategic Roadmap Coordination Manager	25 March 2013	60 minutes	Semi-structured	1
Volvo IT	Enterprise Architect, Product Planning & Project Management Lyon	25 March 2013	60 minutes	Exploratory	1
Volvo GTT	Project Management Support, CVDE Lyon	25 March 2013	60 minutes	Semi-structured	1
Volvo GTT	Project Management Support, CVDE Lyon	25 March 2013	45 minutes	Semi-structured	1
Volvo GTT	Group Manager Project Management	25 March 2013	45 minutes	Semi-structured	1

	Support, RnP Lyon				
Volvo GTT	Project Manager, CVDE PMO Lyon	26 March 2013	60 minutes	Semi- structured	1
Volvo GTT	Project Management Support, RnP Lyon	26 March 2013	60 minutes	Semi- structured	1
Volvo GTT	Project Manager, CVDE PMO Lyon	26 March 2013	45 minutes	Semi- structured	1
Volvo GTT	Project Manager, CVDE PMO Lyon	26 March 2013	60 minutes	Semi- structured	1
Volvo GTT	Knowledge Manager quality, CVDE PMO Lyon	26 March 2013	40 minutes	Semi- structured	1
Volvo GTT	Consultant CVDE, Cooling Air System	4 April 2013	40 minutes	Exploratory	1
Volvo GTT	Program Manager, RnP GOT	10 April 2013	60 minutes	Semi- structured	1
Volvo GTT	Project Manager and PMS, RnP Lyon	10 April 2013	30 minutes	Semi- structured	1
Volvo GTT	Project Manager CVDE PMO GOT	22 April 2013	60 minutes	Semi- structured	1