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Knowledge Transfer Between Projects

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Master of Science in Informatics
Submission date: June 2008
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Problem Description

The aim of this thesis is to investigate how knowledge transfer is carried out in the public sector and what potential there is for improvement through the use of technology and supporting methods in knowledge transfer.

The thesis will use a specific government organization as an example and analyze how the employees and the organization as a whole transfer knowledge, and also analyze the possibilities for supporting knowledge transfer through the use of technology.

Assignment given: 15. January 2007

Supervisor: Trond Aalberg

Summary

The practice of knowledge management in organizations is an issue that has recieved increasing attention during the last 20 years. This focus on knowledge management has also reached the public sector in Norway. Since 2001 the Directorate of Taxes has shown an interest in adopting methods and technologies to improve management of knowledge especially through the use of technology. This thesis aims to evaluate the current transfer of knowledge between projects in the Directorate of Taxes' IT and service partner. The thesis also suggests and evaluates an approach for knowledge transfer based on two tools, the post mortem analysis and the wiki. I wish to show how this approach, based on one technical tool and one non-technical, covers all stages of the knowledge transfer process and helps the organization create and retain their knowledge.

To examine the current situation of knowledge transfer in the Directorate of Taxes and to evaluate the suggested approach for knowledge transfer data was collected in six different stages. In spring 2007 I observed a meeting of project managers which provided me with information on how knowledge transfer is done on the managerial level. Documents that are used in project work were studied throughout the fall of 2007 to learn more about what project work consists of and what routines they have around the work. In late fall 2007 I conducted 8 interviews with employees at the Directorate of Taxes. I enquired about the use of the documents and meetings, and about other routines and practices concerning knowledge transfer. I also asked the employees about what they expected and desired from a potential new approach of knowledge transfer and what they thought of using the two tools that constitute my approach.

In spring 2008 I observed the execution of a post mortem analysis and interviewed the participants afterwards. This gave me new insight as to how the tool works and how the employees of the organization respond to it. I studied documents containing previous research done on organizational learning at the Directorate of Taxes, and gained insight on the organization from the perspective of others. I also used the findings from this research to evaluate the suitability of the two tools.

I learnt that the project members at the Directorate of Taxes chiefly transfer knowledge directly through people by a so called open-door-policy, where people are encouraged to seek and give help when they need it, face-to-face. There are some problems with this method including that it can be hard to find the right people and it is open for constant interruptions. At the managerial level sporadic meetings are conducted where knowledge is transferred, but problems with this method include that they are low in attendance and that the knowledge shared is not optimal. The third attempt of knowledge transfer reported is the use documents and templates. The Directorate of Taxes spends time and resources trying to transfer knowledge through the documents, but there are no routines around their use.

The two interview sessions and the execution of the post mortem analysis show promising results for the suggested approach. The interviewees and participants of the post mortem analysis were very positive to the adoption of the method. There are however some employees who are skeptical to the suitability of the post mortem analysis and to using an electronic system for knowledge transfer. The organization has to make sure that it has its employees on board when taking these methods into use if they are to be successful.

Preface

This thesis is the final part of the Masters of Science degree at the Norwegian University of Science and Technology. The degree is in Computer Science with a specialty in Information and Knowledge Management.

The thesis was written between January 2007 and June 2008. Trond Aalberg has been my supervisor throughout this period and I would like to thank him for his guidance and advice. I also want to thank Jeanine Lilleng for taking an interest in my work and inspiring me. Tor Stålhane was kind enough to join me and perform the post mortem analysis in Oslo at the Directorate of Taxes, for which I am very grateful.

I also owe thanks to my contact person at the Directorate of Taxes, Jan-Henrik Stubberud, who has made the data collection easy by helping me to organize and coordinate it and answering dozens of emails. I wish to thank my significant other, Steinar, for his patience and advice.

NTNU, 6. June 2008

Anne-Lise A. Høisæter

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Those who cannot remember the past are condemned to repeat it.

– George Santayana

1 Introduction

This thesis is about knowledge and organizations, specifically the transfer of knowledge between projects in organizations. Peter Drucker (1969) pointed out that what was once an economy of goods in the USA had now shifted to a "knowledge economy", meaning that the basic resource of the economy is knowledge (Stewart, Baskerville et al. 2000). By 1989, when Fortune Magazine compiled their list of the Fortune 50 (top rated by gross revenue), several of the CEOs agreed that knowledge was a fundamental factor behind the enterprises' success (Wiig 1994). Since then the focus on knowledge management has increased rapidly. More and more research papers, books, and articles are written about the subject. By today, many thousands of articles can be found online concerning knowledge management.

The realization of the fact that knowledge itself and the way it is handled, are success factors in the corporate world today, has led to a focus on knowledge management within organizations. That is, organizations are now aiming to manage their intellectual capital by becoming learning organizations. According to Garvin (1998) "a learning organization is an organization skilled at creating, acquiring, and transferring knowledge, and at modifying its behavior to reflect new knowledge and insight". In other words a learning organization is an organization that practices knowledge management. Garvin (1998) also mentions five activities that an organization should practice well in order to call themselves learning organizations, these are: "systematic problem solving, experimentation with new approaches, learning from their own experience and past history, learning from the experiences and best practices of others, and transferring knowledge quickly and efficiently throughout the organization".

The aim of any knowledge management initiative involves transforming the organization into a learning organization step by step. However, no matter how skilled an organization is at the five activities, it will not qualify as a learning organization unless it also continuously changes work routines and practices to match its newly acquired knowledge. As Garvin (1998) puts it, "without accompanying changes in the way that work gets done, only the potential for improvement exists".

An organization that has realized the importance of knowledge and being a learning organization is the Norwegian Directorate of Taxes. One of their strategies for 2001-2004 (Skatteetaten 2001) was to transform the Directorate of Taxes into a learning organization by, among other things;

- Using information- and communication technology actively as learning, work and decision tools,
- Using systems and routines where one can collect, adapt, and transfer knowledge of strategic importance.

In 2007 the Directorate of Taxes formed an agreement of cooperation with the Norwegian University of Science and Technology (NTNU). Through this cooperation the Directorate of Taxes wishes to enhance its ability to take new technology into use and find new ways to do work. This thesis is a result of the cooperation, and I was given the assignment of suggesting how knowledge from project experiences can be transferred to upcoming projects. I was also encouraged to examine how the use of a wiki can be incorporated in knowledge transfer. The focus in this thesis will therefore be on the third and fifth of Garvin's (1998) five activities for learning organizations; learning from one's own

experience and past history, and transferring knowledge quickly and efficiently throughout the organization.

1.1 Objectives

The broad topic of this thesis is knowledge management. Specifically, the overall objective of the paper is to suggest and evaluate an approach of knowledge transfer between projects in the Directorate of Taxes. This approach consists of using two tools; the post mortem analysis (PMA) and the wiki. I will attempt to show how these two tools cover four stages of knowledge transfer; collection, preparation, storage, and dissemination. I have defined four research questions that I will attempt to answer in my thesis:

- How is knowledge transfer done currently at the Directorate of Taxes?
- Is using the post mortem analysis (PMA) a good way of collecting and preparing knowledge?
- Is the wiki a good tool for the storage and dissemination of knowledge?
- Is the combination of the PMA and the wiki a good way to transfer knowledge?

1.2 Outline of the thesis

First the theoretical basis for this paper will be introduced in **chapter two**. Various concepts like knowledge, knowledge management and IT in the workplace are discussed here. **Chapter three** is about the Norwegian Tax Administration (NTA) and the Directorate of Taxes. It offers some insight to the organization, their work and projects, and the ISO standard that laid the foundation for the Directorate of Taxes' work on improving knowledge management. **Chapter four** contains a description of the two tools that I have chosen for my approach to knowledge transfer, the post mortem analysis (PMA) and the wiki. The **fifth chapter** describes the research methods that were used when conducting this research and how it was carried out. **Chapter six** presents the findings from the six different parts of data collection, consisting of interviews, observations and documents. The **seventh chapter** contains an analysis and discussion of the findings and other results of the data collection. **Chapter eight** contains the conclusion based on the data analysis and discussion.

2 Knowledge Management

In order to understand the conditions and implications of knowledge transfer, one has to comprehend and keep in mind theory about knowledge and knowledge management. Knowledge transfer is after all only a part of the field of knowledge management, and neither can be readily understood without a clear comprehension of knowledge itself.

2.1 Knowledge

Defining knowledge is important in this thesis because we need to be aware of what exactly it is that we are aiming to transfer. As discussed here, data, information, and knowledge are related concepts, but not synonymous. When we talk about knowledge transfer it is knowledge we are after. By understanding what it implies it is easier to know where to look for it. As Davenport and Prusak (1998) state, it does not only exist in documents and repositories, but can be found in routines and processes.

Knowledge is a term most understand but few would be able to properly define. Even among scholars and students of epistemology (the theory of knowledge) there will be disagreement on the subject. Some will even say that it is not possible to define knowledge. Most of the debate is centered on how the concept of knowledge relates to the concepts of truth and belief. Another debate around this subject is less epistemologically centered and more of a practical nature. This debate is especially related to knowledge management, and comprises of how the concept of knowledge is related to the concepts like data, information, experience and judgment.

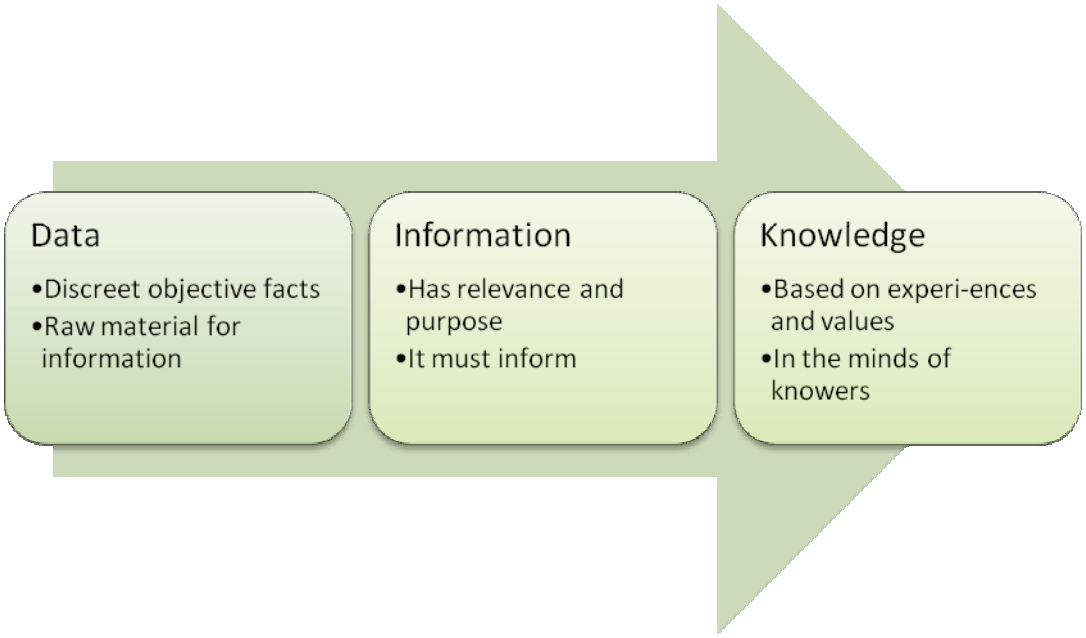

Figure 1: Data, Information, and Knowledge (Davenport and Prusak 1998)

According to Davenport and Prusak (1998) it is important to differentiate between these related concepts, especially between knowledge, information and data, as these often are used interchangeably to describe intellectual capital in an organization. In their opinion it is critical for organizational success to "know which of them you need, which you have, and what you can and can't do with each" (Davenport and Prusak 1998). Data is the simplest form of intellectual capital. It

can be as simple as a digit or a letter and will not impart any meaning to a reader unless it is put in a context. Data is often found in the form of records of transactions in an organization and are stored in databases or other types of information systems. Data can be seen as discrete objective facts. Information on the other hand is data put in a specific context. It is data that makes a difference; it must inform and have meaning.

Unlike data and information, knowledge is dependent on individuals and focuses on activities and not codification. The following is Davenport and Prusak's (1998) definition of knowledge: "Knowledge is a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of knowers. In an organization knowledge often becomes embedded not only in documents and repositories but also in organizational routines, processes, practices, and norms." According to this theory, knowledge is much more complex than data and information. It comprises of various elements. As information derives from data, knowledge derives from information. But the latter involves a new part, humans. This transformation of information to knowledge involves humans doing some of the following activities:

- Comparing: different pieces of information
- Consequences: contemplating the implications of pieces of information
- Connections: relating information/knowledge to other pieces of information/knowledge
- Conversation: exchanging pieces of information/knowledge with other people

2.2 The theory of organizational knowledge creation

One of the widely acknowledged and cited theories on knowledge in organizations, is from: "The Knowledge-Creating Company" by Nonaka and Takeuchi (1995). The concepts of tacit and explicit knowledge, the four modes of knowledge conversion, and the knowledge spiral that are all defined here will be brought up later in the discussion and analysis parts of this thesis.

Nonaka and Takeuchi (1995) declare that the key to knowledge creation lies in the mobilization and conversion of something they call "tacit" knowledge. The theory of tacit and explicit knowledge was written by Michael Polanyi in 1966. Nonaka and Takeuchi's articles and books on the subject of knowledge in organizations build heavily upon Polanyi's theory. His theory classifies human knowledge into two categories, "tacit" and "explicit" knowledge. Explicit knowledge on one hand is codified and transmittable in a formal, systematic language. Tacit knowledge can be defined as knowledge that is personal, context specific, and therefore hard to communicate. This type of knowledge is often found in habits, routines, or as a part of a culture that we do not identify in ourselves.

Nonaka and Takeuchi (1995) state their assumption that knowledge is created through the interaction between tacit and explicit knowledge. According to them, there are four different modes of knowledge conversion (Figure 1): socialization (from tacit to tacit knowledge), externalization (from tacit to explicit knowledge), combination (from explicit to explicit knowledge), and internalization (from explicit to tacit knowledge). "These modes are the mechanisms by which individual knowledge gets articulated and "amplified" into and throughout the organization (1995).

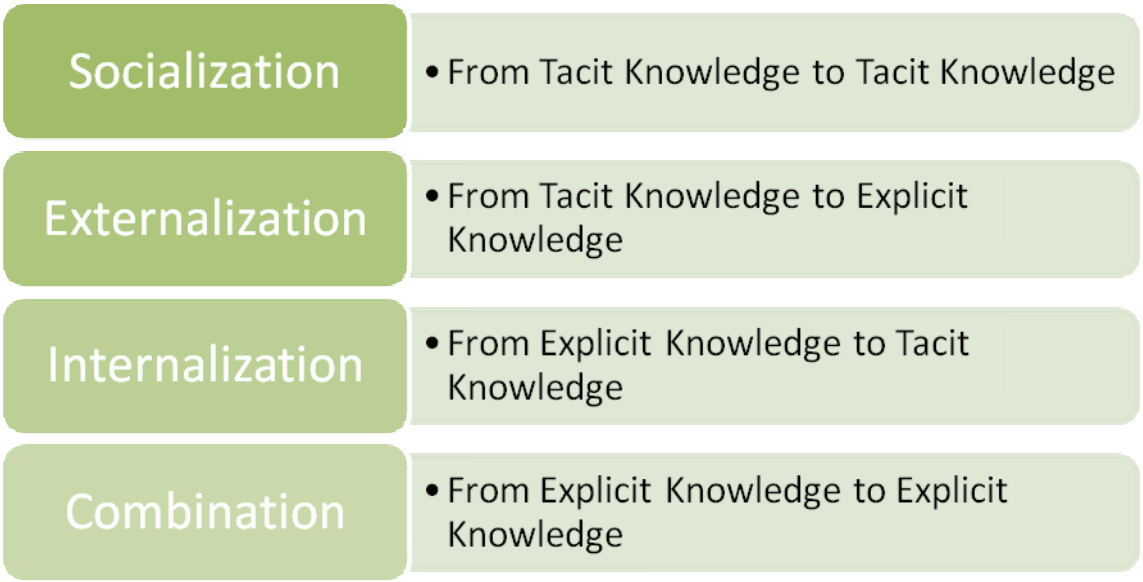

Figure 2: The Four Modes of Knowledge Conversion (Nonaka and Takeuchi 1995)

Socialization, converting some tacit knowledge to some other tacit knowledge, is a process of sharing experiences and thereby creating tacit knowledge such as shared mental models and technical skills (Nonaka and Takeuchi 1995). One common way to practice socialization is through observation and imitation. The shared experience allows an individual to project into another individual's thinking process. A typical example of socialization would be an apprentice learning a craft through watching his master. Context is of particular importance when learning through socialization. Most of the knowledge would be directly linked to its context.

Externalization is perhaps the most difficult of the four modes of conversion to accomplish, and involves articulating tacit knowledge into explicit concepts. The tacit knowledge often takes the shape of metaphors, analogies, concepts, hypotheses, or models. Externalization is often triggered by dialogue or collective reflection, concepts evolving through deduction, induction or a combination of both. Examples of externalization are metaphors and analogies. Metaphors can be used as a tool for creating networks of new concepts by imagining the relationships between terms symbolically. An analogy helps us see similarities and differences between two things and bridges a gap between the known and unknown.

Combination is converting explicit knowledge into some other explicit knowledge, and is a process of systemizing concepts into a knowledge system and combining different kinds of explicit knowledge. Methods used in this kind of process include: sorting, adding, combining, categorizing, and mining. An example of combination can be comparing sales of two different products over time to see if there is any correlation in the sales of the products.

Internalization, from explicit to tacit knowledge is closely related to learning by doing and consists of internalizing experiences from the three other modes into a person's knowledge base. This is done through shared mental models or technical know-how. For explicit knowledge to become tacit it helps if it is codified in a common recognizable form like documents, diagrams, and manuals. One example of internalization is when someone reads a well written description of an experience and feels the realism and essence of the story, this experience can change into a tacit mental model.

The Knowledge Spiral

Organizational knowledge is created by continuously and dynamically shifting between tacit and explicit knowledge using the four modes of knowledge conversion. This knowledge conversion is induced by several triggers. The first phase is called “field building” and is the building of the field of interaction where sharing of experiences and mental models can take place. This phase triggers socialization. Externalization is triggered by the second, which is a dialogue or collective reflection using a metaphor or analogy to articulate the tacit knowledge. The third trigger is the networking of newly created knowledge together with existing knowledge to start the combination mode. The fourth and last trigger is “learning by doing” and triggers the internalization mode.

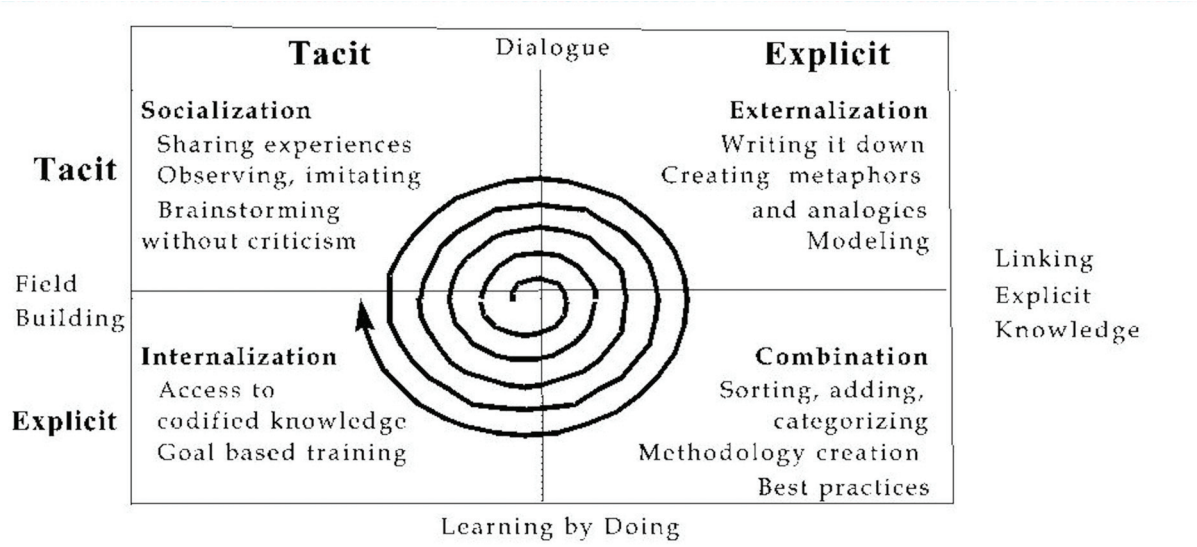

Figure 3: Knowledge Spiral (Nonaka and Takeuchi 1995)

The type of knowledge that is created in the different modes is of different types.

- Socialization -> Sympathized knowledge (e.g. shared mental models, technical skills)
- Externalization -> Conceptual knowledge (e.g. metaphors and analogies)
- Combination -> Systemic knowledge (e.g. prototypes and component technologies)
- Internalization -> Operational knowledge (e.g. project management, production processes)

These types of knowledge interact with one another in the spiral of knowledge creation. The knowledge usually starts as sympathized knowledge on the individual level, since, as mentioned earlier knowledge “originates in the minds of knowers” (Davenport and Prusak 1998). The knowledge then transforms into the other types by the four modes of knowledge conversion, and amplifies and transforms throughout the organization. Through interaction the knowledge goes from individual, to group, to sectional, until it reaches the entire organization.

2.3 Knowledge Management in Organizations

There are many different ways to handle knowledge in an organization. The strategy one chooses for knowledge management affects the result of the knowledge management initiative. In this section I will discuss two classifications of knowledge strategies or schools. These classifications will be used in later chapters to shed light on what kind of knowledge management strategies that are used in the Directorate of Taxes and the implications of these.

While there is no doubt that knowledge management concerns itself with the handling of knowledge assets in the organization, there is no unambiguous way of defining and categorizing it. Many case studies have been conducted in organizations with the purpose of categorizing knowledge management, each focusing on different things, the type of knowledge, the objective of the organization etc. Perhaps one way to illustrate the diversity of knowledge management is to compare and contrast known taxonomies of the field. In this paper I have chosen two very well known articles, each written by academics that are widely recognized and cited in the field of knowledge management.

The first of the articles I have chosen to take a closer look at is written by Hansen, Nohria, and Tierney (1999) for the Harvard Business Review. In the article, two different knowledge management strategies of the consulting business are presented, the codification strategy and the personalization strategy. The codification strategy concerns itself with the codification and storage of knowledge in databases and other information systems, where it can be easily accessed by a company's employees. A company using the personalization strategy focuses on using technology as a means of communicating knowledge, not as storage media. This is because companies using this strategy view the employees and the knowledge each of them have as inseparable. A company has, according to Hansen et al. (1999), to choose a strategy carefully based on the type of clients, the type of employees and the economics of its business. Neglecting to choose, and trying to pursue both, can undermine a business.

Michael Earl proposes a different way to view knowledge management in his article "Knowledge management strategies: Toward a taxonomy" (Earl 2001). He divides knowledge management into seven strategies or "schools", aiming to help executives to make informed decisions when initiating knowledge management projects. The first school is called the systems school due to its centering on information systems or knowledge bases and codification of validated knowledge. This overlaps with the codification strategy from Hansen et al. (1999). The second school is concerned with mapping the organization's knowledge and is called the cartographic school. It is often called "yellow pages" as it aims to make the organizations knowledgeable people accessible to others. This overlaps perfectly with the Hansen et al. (1999) personalization strategy. So far these two taxonomies seem relatively alike, but Earl proposes five more strategies or schools of knowledge management.

The engineering school can be seen as a derivative of business process engineering and aims to improve performance by making the knowledge the employees need available when they perform their tasks. A typical way to implement this strategy is to employ an intranet or a shared database. All three aforementioned schools belong to a category named technocratic, which implies that the strategies are centered on information or management technologies. The fourth school is in a category by itself, labeled "economic", because of its focus on exploiting intellectual capital to make

money, and not to improve some aspect of the organizations functions. This school is called the commercial school and concerns itself with managing knowledge property like patents.

Table 1. Schools of Knowledge Management

SCHOOL / ATTRIBUTE	SYSTEMS ← TECHNOCRATIC →	CARTOGRAPHIC	ENGINEERING	← ECONOMIC → COMMERCIAL	← BEHAVIORAL → ORGANIZATIONAL	SPATIAL	STRATEGIC
FOCUS	Technology	Maps	Processes	Income	Networks	Space	Mindset
AIM	Knowledge Bases	Knowledge Directories	Knowledge Flows	Knowledge Assets	Knowledge Pooling	Knowledge Exchange	Knowledge Capabilities
UNIT	Domain	Enterprise	Activity	Know-how	Communities	Place	Business
EXAMPLE	Xerox Shorko Films	Bain & Co AT&T	HP Frito-Lay	Dow Chemical IBM	BP Amoco Shell	Skandia British Airways	Skandia Unilever
CRITICAL SUCCESS FACTORS	Content Validation Incentives to Provide Content	Culture/Incentives to share Knowledge Networks to Connect People	Knowledge Learning and Information Unrestricted Distribution	Specialist Teams Institutionalized Process	Sociable Culture Knowledge Intermediaries	Design for Purpose Encouragement	Rhetoric Artifacts
PRINCIPAL IT CONTRIBUTION	Knowledge-based Systems	Profiles and Directories on Internets	Shared Databases	Intellectual Asset Register and Processing System	Groupware and Intranets	Access and Representa-tional Tools	Eclectic
"PHILOSOPHY"	Codification	Connectivity	Capability	Commercialization	Collaboration	Contactivity	Consciousness

Figure 4: Schools of knowledge management (Earl 2001)

The three last schools belong to the category called “behavioral”. The first of the three is the organizational school which is also often described as a knowledge community. “The essential feature of a knowledge community is that they exchange and share knowledge interactively, often in non-routine, personal, and unstructured ways, as an interdependent network.” (Earl 2001). A typical tool in this school would be a wiki. This school does also, according to Earl (2001) using the framework from Hansen et al. (1999), combine both the codification and personalization strategies.

The spatial school focuses on the use of space to encourage knowledge transfer between people in the organization. Typical examples are open office spaces and meeting point by a cooler. The seventh and last school is called the strategic school and uses knowledge management as part of a competitive strategy. The aim of this school is to fully exploit knowledge assets to improve products and services. Knowledge is here viewed as the key resource and uses it to compete and to create values.

One can try and divide Earl’s schools between the codification and socialization strategies of Hansen et al. (1999) to see how the strategies fit together. Some schools are easier to place than others. As mentioned before the systems school clearly has common characteristics with the codification strategy, and the cartographic school just as clearly resembles the personalization strategy. In Earl’s own word the organizational school of the behavioral category combines both the codification and personalization strategy. The four last schools however are not as easy to place. The engineering school, for instance, at first seems a good fit for the codification strategy. However it does rely heavily on learning from past experience, which could include people learning from other people. This in turn suggests that the personalization strategy is a better match. The spatial school is certainly not a codification strategy, but can it be categorized as a personalization strategy? Likewise it is difficult to categorize the two last schools. One may say that which category matches depends on the specific implementation of a school, or perhaps one may also say that this type of division is not applicable to the other schools.

There is no reason however for the schools to overlap perfectly. It is possible that different initiatives stemming from the same of Earl’s (2001) schools fit into separate strategies of Hansen, Nohria et al. (1999).

2.4 Using Information Technology in Knowledge Management

In this section different types of technologies for knowledge management are presented with the purpose of giving an overview of what is commonly used in organizations today. The technologies are divided into four groups after Nonaka's (1995) four modes of knowledge conversion, and are presented here categorized by the four modes. One of the technologies mentioned here is the wiki. The wiki plays a central role in my approach for knowledge transfer in this thesis, and will be discussed further in chapter four.

According to Marwick (2001) there is, in many cases, a need for an appropriate technology in knowledge management initiatives. He classifies the different technologies for knowledge management according to Polanyis definitions of tacit and explicit knowledge. These are the same definitions that Nonaka and Takeuchi (1995) use for his theory of organizational learning that was discussed in chapter 2.1. Marwick uses Nonaka and Takeuchi's (1995) four modes of knowledge conversion, socialization, externalization, combination, and internalization to show how different technologies provide or aid knowledge conversion.

Socialization typically happens through meetings and shared experiences, and has little IT involvement. There are however tools that can aid this type of knowledge conversion as supplements or replacements of the conventional meetings and other activities (Marwick 2001). Groupware is a broad term for tools that aid work in teams. Groupware provides a virtual reality where participants can share experiences. This is particularly a benefit with organizations with geographically distributed offices. A sub-category of groupware is tools for online synchronous communication, which is a meeting that can include audio and video as well as text.

Another type of technology that can be useful in socialization is expertise location systems. In a system like this, all employees need to have an updated profile where their level of expertise in different areas is stated. Automatic approaches can be used by using people's resumes. Either way, people can search and locate individuals within their company who have the expertise they desire. This tool aids people in finding each other so that socialization between the right people can take place. If these types of technologies are compared to Earl's (2001) schools of knowledge management one can see that the different schools can be used for the same mode of conversion. In this case, groupware is a typical implementation of the organizational school, while expertise location systems are of the cartographic school. Groupware is a good fit for the externalization category as well.

The wiki is another potential tool. The big difference between a wiki and traditional groupware is that the participants can be total strangers, because the forums are usually open for all. There are some downsides of this openness. However these problems tend to disappear when used within the organizational context. The archive of the wiki forum becomes a knowledge repository full of useful explicit knowledge. What makes the knowledge that is contributed tacit, is that the contributor is faced with a question or problem which forces him to contemplate his own experience, thereby using his own tacit knowledge. As wikis are a type of groupware it also falls into Earl's (2001) organizational category.

Combination is the type of knowledge conversion that is easiest to support with IT since it only deals with explicit knowledge. There are tools for capturing, browsing, searching, categorizing and organizing explicit knowledge. Tools for capturing explicit knowledge exist in abundance; word

processors, e-mails, documents, etc. Employees in an organization do however often need to be motivated to capture knowledge, this can often be a barrier for the needed codification of the explicit knowledge so that it can be combined. Tools for browsing and searching include tools that provide document summaries, search engines, and thesauri. A thesaurus is also a good categorization and organization tool as is shows how different explicit concepts relate to one another.

The last type of knowledge conversion is from explicit knowledge to tacit knowledge, internalization. Technology in this category aims to help users acquire tacit knowledge by processing and showing explicit knowledge in a way that gives it more context and value than if just simply stated. Tools that support on-line learning or long distance learning aim to internalize knowledge. Also due to the large amounts of information available in organizations, ways to organize this information so that one does not have to sift through too much or redundant information, is needed. Internalization will go faster if the right kind and amount of information is reviewed. There exist tools that identify and remove redundant information, and that filter or prioritize some information over others. There also exist tools with visualization techniques that can help the user understand the information more easily through subject based browsing and navigation.

2.5 Knowledge Transfer

In this section Elvenes's (1987) five stage process of knowledge transfer is presented. This process is later used as a basis to evaluate my suggested approach for knowledge transfer in chapter seven.

Alavi and Leidner (1999) have developed a framework for organizational knowledge management. They see knowledge management as a knowledge system consisting of four knowledge processes; creation, storage/retrieval, transfer, and application. We focus here on the third process, knowledge transfer as it is the topic of this thesis. Knowledge transfer can occur at various levels, i.e. between individual, between individuals and groups, between groups, and between groups and the organization (Alavi and Leidner 1999). We are primarily concerned with the type of knowledge transfer occurring between groups of individuals, specifically between projects.

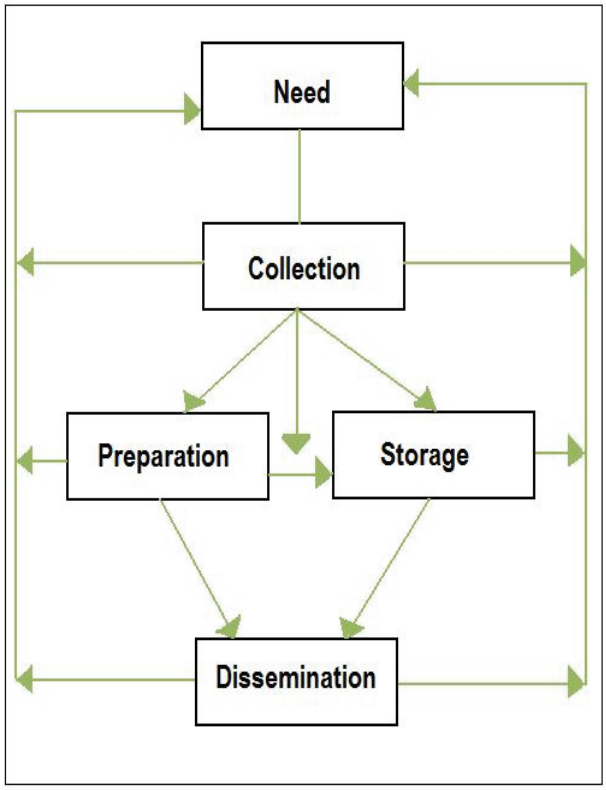

Figure 5 : Model for knowledge transfer (Elvenes 1987)

Knowledge transfer can be seen as a systematic process consisting of a set of stages. Elvenes (1987) made a model of the knowledge transfer process consisting of five stages: need, collection, preparation, storage, and dissemination. The first stage is the **need** for knowledge, which is the stage that starts the entire process. In this stage the needs are identified and ranked so that available resources are placed correctly. In the figure 4 one can see that the other stages point back towards the need stage, this indicates that new needs are identified along the way and that the model is dynamic. Elvenes (1987) also points out that if the members of the organizations do not feel the need to learn from other's experience the initiative will fail.

The next stage in the process is the **collection** of knowledge and is based on the need stage. Knowledge should ideally be collected directly from sources as this knowledge is of the highest quality. The more sources that the knowledge passes through, the more distorted it will get. It is also important to identify the right source for knowledge in each individual case and the level of detail that it should contain. Identifying the right source is important for the quality of the knowledge while the level of detail is important so that all relevant knowledge is gathered, but not more, so that one can avoid information overflow. Methods for collection can vary, ranging from strict formal methods and completely informal ones.

After the collection stage three possible directions can be taken, preparation, storage or direct dissemination. If the **preparation** stage is chosen, one selects, organizes, and transforms the collected knowledge, preparing it for the storage or dissemination stages. Any change in the knowledge collected might potentially change the meaning of the knowledge and preparation should therefore be performed by someone knowledgeable of the area in question. **Storage** is the stage where the knowledge is stored in a system so that the users have easy access. Elvenes (1987) uses four elements to evaluate a storage system; availability, security, level of detail and type of storage. Availability means that the knowledge in the system should be easy to locate physically, easy to search, easily recognizable, and it should not be time consuming. Security implies that sensitive information has to be protected. The level of detail chosen is important for the same reasons as in knowledge collection, avoiding information overflow while getting all necessary information. The type of storage chosen depends on the individual organization; it can be a database, a file cabinet or just the memory of the employees.

Dissemination is the final stage in the process and is where the knowledge is shared with the users of the storage system. Elvenes (1987) uses five factors to determine effective knowledge dissemination. These are:

1. Communication between the sender and receiver of knowledge should be supported
2. The receiver has to be willing to use the knowledge available
3. The receiver should have the possibility of searching for knowledge
4. The dissemination method should be well designed; easy to understand, covers the user's needs and effective
5. The organization needs to secure availability of knowledge and training of personnel

In the Directorate of Taxes they have identified the need to improve methods for knowledge transfer and have, as previously mentioned, initiated a cooperation with the NTNU. The first stage in the process is therefore already established. This thesis proposes a way to handle the rest of the knowledge transfer process using two tools to support the stages of knowledge collection, preparation, storage and dissemination. These tools, the post mortem analysis (PMA) and wiki, are presented in chapter four.

3 The Norwegian Tax Administration

The Norwegian Tax Administration (NTA) is responsible for setting taxes and collecting them in a proper manner, as well as for updating the national population register. Each year, the NTA issues tax cards, collects advance tax, and processes the tax-return forms that are required to be submitted. In 2006 the NTA had 6600 employees and an annual operating budget of NOK 3,6 billion. The NTA consists of the Directorate of Taxes and tax offices organized into five tax regions. The Directorate of Taxes is placed under the Ministry of Finance and is led by the Director of Taxes. The tax regions are placed under the Directorate of Taxes and led by regional directors.

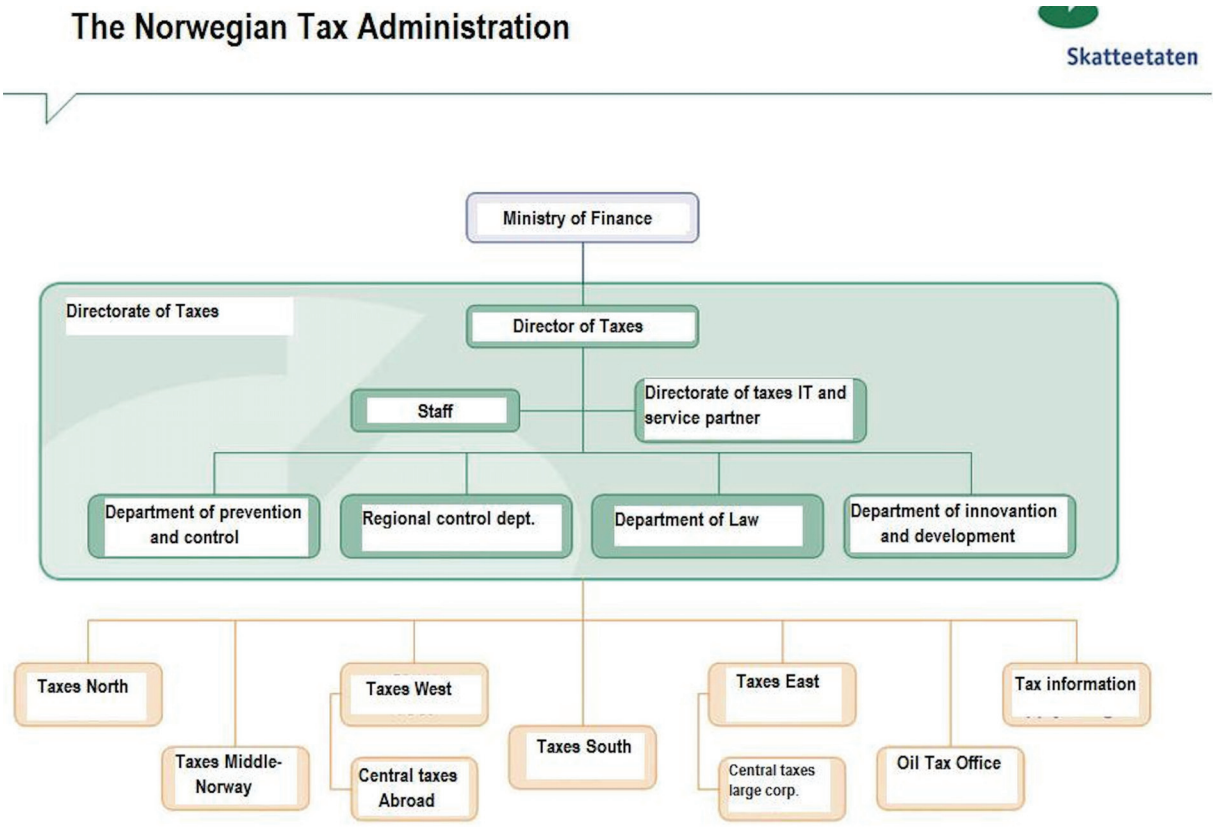

Figure 6: The Norwegian Tax Administration (Skatteetaten 2008)

The Directorate of Taxes is controlled by the Ministry of Finance and is responsible for the central technical and administrative management of the five regional tax offices as well as the Oil tax office. The Directorate of Taxes is led by the Director of Taxes and comprises of staff for information technology, human resources, media, internal audit and corporate staff (see figure 3). In addition there are four departments; Department of Prevention and Control, Department of Innovation and Development, the Regional Control Department, and the Department of Law.

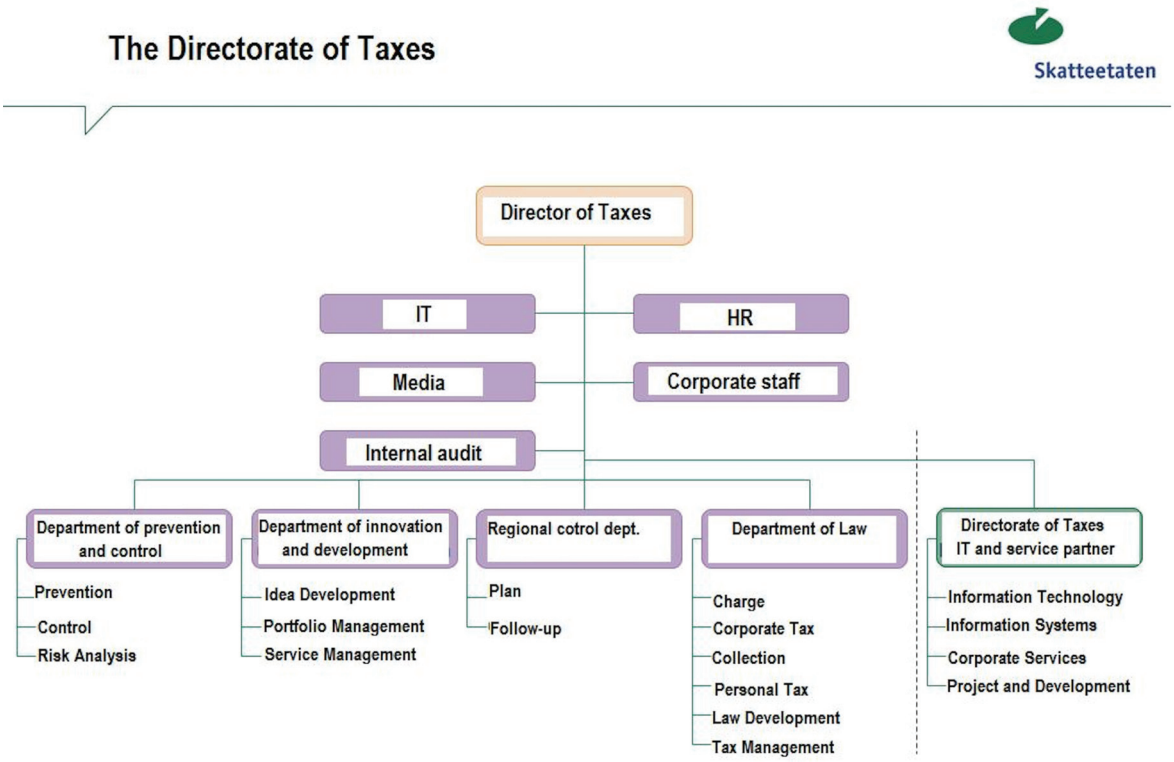

Figure 7: The Directorate of Taxes (Skatteetaten 2008)

Directorate of Taxes' IT and service partner (DTIS) is the part of the Directorate of Taxes that is responsible for developing, handling, and operating the various IT-solutions. It has 580 employees and is organized into four sections: system, operations, technical and project. The department also has a security and quality function. The Directorate of Taxes implements several costly IT-projects every year.

The project section is meant to be SDK's competency center for project management, with specialized abilities attached to planning and management of complex IT- development efforts. On the departmental level, this section takes care of the DTIS responsibilities having to do with larger IT-decisions on procuring and development projects. The project section comprises of 14 highly competent co-workers with project management assignments within the fields of system development, procurement, development methods, IT-strategy, quality management and technology use. The section also has the responsibility for the follow up of the Directorate of Taxes' collected project portfolio, which currently comprises 30 IT-projects and programs (Skatteetaten 2008).

The DTIS became a department as of 01.01.08. The NTA has reorganized itself entirely and what is now the Directorate of Taxes IT and service partner, used to be the IT- department.

3.1 Knowledge transfer in the Norwegian Tax Administration

In 2001 a document was published on the NTA's webpage concerning strategies for the years 2001-2004 (Skatteetaten 2001). The document known as "Strategy plan for 2001-2004" consisted of four strategies known as: "Economic life", "User orientation", "Organizing", and "Competence". The last of the four strategies, "Competence", has as its primary goal to develop the NTA into a competency based organization. This strategy also includes the NTA's goals concerning technology and knowledge transfer:

"Use of information technology is strategically important to the NTA. It gives us the opportunity to improve, increase the efficiency and development of new services and products. It is especially important to make use of the new possibilities of exchanging, managing, and transferring information and knowledge electronically, as well as creating and making new knowledge available." (Skatteetaten 2001)

Furthermore, the "Strategy plan for 2001-2004" lists several concrete actions that the above intentions are supposed to be fulfilled through:

- Making the workplace an important arena for knowledge sharing and experience based learning
- Using information- and communication technology actively as learning, work and decision tools
- Using systems and routines where one can collect, adapt, and transfer knowledge of strategic importance

The first of the four research questions presented in chapter one concerns how knowledge transfer is done at the Directorate of Taxes in 2007/2008. Through the data collection and analysis (chapters 6 and 7) this question will be answered and it will also show how the implementation of the aforementioned strategies went.

3.2 The ISO 9001:2000 standard

The Directorate of Taxes wishes to certify itself according to the ISO 9001:2000 standard for quality management systems. According to the International Organization for Standardization (ISO), the "ISO 9001:2000 is the standard that provides a set of standardized requirements for a quality management system, regardless of what the user organization does, its size, or whether it is in the private, or public sector." The standard presents the requirements the system must meet, but does not dictate exactly how they are supposed to be met, which allows the organization to implement them as they see fit (ISO 2008).

The standard is process oriented and emphasizes on ongoing improvement and customer satisfaction. It is accommodated to all corporate processes that affect quality. The most important elements of the standard are (Veritas 2008):

- Quality management system
- Management responsibility
- Resource management
- Product sales
- Measurement, analysis, and improvement

In 2005 Det Norske Veritas (DNV) made an evaluation report of the Directorate of Taxes concerning the ISO 9001:2000 standard. They found room for improvement in a few areas of the Directorate of Taxes' work. A program was created to deal with these areas. The program consists of several projects and it is still ongoing. One area with room for improvement concerns knowledge transfer and is described by DNV like this:

"The IT department at the Directorate of Taxes (now DTIS) should establish a process for systematic analysis of project experiences (positive and negative), and ensure that possible correcting and preventive actions are taken and that there are documented traces of that these are carried through".

When the cooperation with NTNU was formed, I was shown the above point and encouraged to use my thesis to contribute with ideas on how project experiences can be transferred to future projects.

3.3 Projects in the Directorate of Taxes

As the title of this thesis indicates, it is knowledge transfer between projects that is of interest. This chapter introduces what projects in the Directorate of Taxes are. The approach to knowledge transfer that this thesis suggests is meant for these projects.

The Directorate of Taxes defines a project as a unique multidisciplinary task that is performed once, with limits in time and cost, and that has a clearly defined goal. When considering if a task should be organized as a project or not, Directorate of Taxes uses three guiding questions:

- Is the task to be done a one-time task and/or is it a development task?
- Does the task demand coordinated and multidisciplinary contributions?
- Is there a limited timeframe for the execution of the task?

If the answers to all three questions are yes, then the task should have the form of a project.

Projects in Directorate of Taxes are categorized by type and size. Projects can be of one of three sizes, small, medium, and large. Size in determined solely by budget. A small project is a project with a budget under 1 million NOK, a medium project has a budget between 1 million and 20 million NOK, and a large project is defined by a budget over 20 million NOK. The following list of types describes the most common projects in Directorate of Taxes, but it is not an exhaustive list.

Type/Size	Small	Medium	Large
Internal project	**x**		
Preliminary project	**x**		
Procurement project	**x**	**x**	**X**
IT project	**x**	**x**	**X**
Organizational development	**x**	**x**	**X**
Departmental project	**x**	**x**	
Delivery and reciever project			**X**

Table 1: Types of projects

An internal project is a small project that primarily uses internal resources to establish and carry out the project. A preliminary project prepares the organization for a larger project. A procurement project involves purchasing a larger solution and is often done through competitive tendering. An IT project involves either development or procurement of an IT solution for use in Directorate of Taxes. An organizational development project can vary in size and often involves other government departments. It can also be a part of an IT project or a procurement project. A departmental project has representatives from other government departments to solve a current problem like tax or legal charges. The Directorate of Taxes often splits larger projects into a delivery project and a receiver project due to lack of available resources. Usually the delivery project is governed by an external supplier, while the Directorate of Taxes controls the receiver side. This split is often used when dealing with large procurement projects.

4 The Post Mortem Analysis and the Wiki

This chapter contains descriptions of the two tools that I use in my suggested approach for knowledge transfer at the Directorate of Taxes. Next the problem to be addressed is repeated:

”The IT department at the Directorate of Taxes (now DTIS) should establish a process for systematic analysis of project experiences (positive and negative), and ensure that possible correcting and preventive actions are taken and that there are documented traces of that these are carried through”.

In chapter 4.1, my reasons for choosing to examine the post mortem analysis (PMA) as a tool for knowledge collection and preparation are presented. Then a more detailed description of what a PMA is and how it is conducted, is given. Chapter 4.2 presents some examples of how the approach has been used in organizations up till now. Wikis are the subject of chapter 4.3 where the origin and history of wikis are described as well as an introduction to their use and functionality. In chapter 4.4 experiences with the usage of wikis in organizations are discussed.

4.1 The post mortem analysis

When I started this thesis, my focus was on wikis and how they should be used to transfer knowledge effectively between projects. I could assume that the experiences were already collected and that I should only focus on the dissemination part of the knowledge transfer process. However, when I was given the whole problem description I realized that I could also incorporate the parts of knowledge collection and preparation into my thesis, thereby shifting the focus onto the whole process of knowledge transfer. By taking knowledge collection and preparation into account I felt I could address a larger part of the problem.

The PMA method came to mind when I read the problem description because of the focus on capturing both positive and negative experiences. I came across this method in a class about projects in software development the previous spring and felt it was a good way to reflect and learn from project experiences. Several professors and researchers at NTNU have researched the subject and written articles around it. The results that they have obtained when using PMA are promising. I chose to focus on the PMA as a method for knowledge collection and preparation because it covers both stages of the knowledge process, it captures both positive and negative experiences, and because the method has proven to be a simple and effective way to collect and learn from experiences (Birk, Dingsoyr et al. 2002).

Using the PMA to collect experiences

The post mortem analysis (PMA) is a method of gathering experiences and knowledge after the achievement of a milestone in a project or after the final completion of a project. The PMA was originally meant for improving the software development process, but can be applied to other types of processes as well, i.e. projects. A PMA usually consists of two stages; brainstorming and analysis.

Two factors drove Hanssen, Stålhane et al. (2001) to designing the PMA as they did. First, in order to improve software development, the developers have to learn from both positive and negative experiences that are made along the way. Second, learning is easier when it’s related to ordinary everyday work. To learn from one’s own experience one has to be given the opportunity to reason about one’s own work, what went according to plan and what did not, and why. In addition, when

the material is larger, learning will go at a quicker pace if other people's experience is taken into account. Thus, according to Hanssen, Stålhane et al. (2001)"it is a goal to transfer experiences from one project to another in order to make individual and project-based learning helpful for, say, a whole organization". With this statement it is possible to see that the reasoning behind the PMA and the subject of this thesis coincide well, even though the PMA's original aim was to improve the software development process. In this case improving the software development process is just a positive side effect of collecting and preparing experiences for reuse. This positive side effect is one of many reasons to consider PMA as a part of knowledge transfer initiative (see chapter 7.2).

A PMA session usually consists of these two methods:

- The affinity diagram, (a structured brainstorming technique)
- The Ishikawa diagram, (a root cause analysis)

Sometimes also structured interviews are used either as a supplement to the diagrams or as the main technique for experience collection. Here I will focus on the affinity and Ishikawa diagrams and describe how they are made during the PMA session, as these are the techniques I choose in my data collection.

The affinity diagram

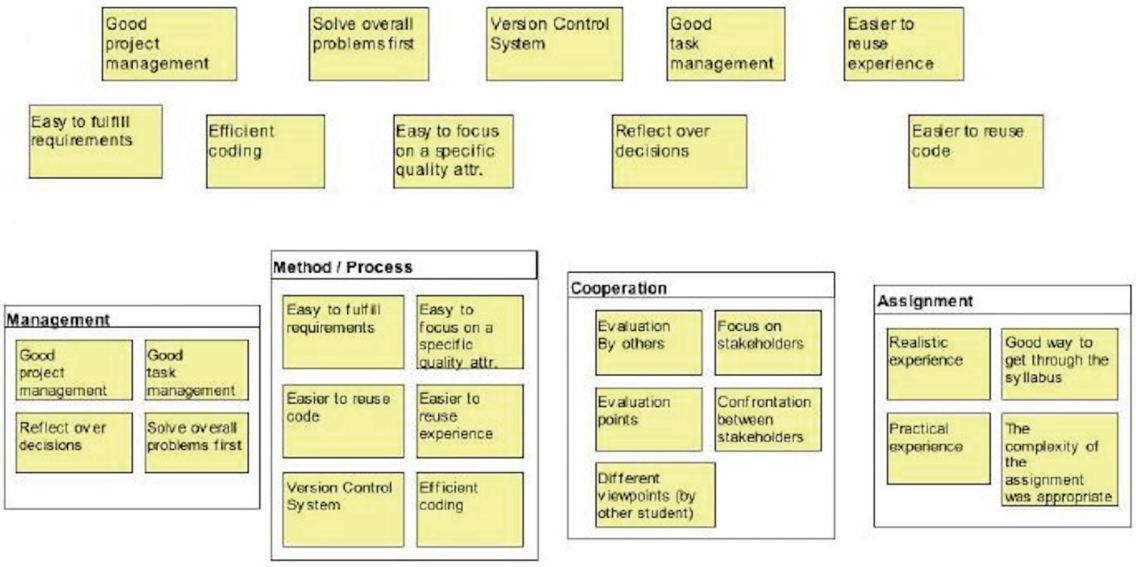

Figure 8: The affinity diagram

The six steps of the affinity diagram creation (Wang and Stalhane 2005):

1. The topic of the affinity diagram is stated for the participants. The topic might be broad, concerning the project as a whole, or it may be focused on specific areas of interest within the project.
2. The participants pair up to discuss and make some notes of important points. This is mainly done to prepare for the next step.

3. Each participant, on his own, writes down his perceptions and ideas on post-it notes. According to the rules there should be one idea per note and each idea should be stated in one sentence containing at least one verb and one noun. An upper limit to the number of post-it notes made by each participant can be useful at times.
4. Each participant is given a few minutes to present his notes on a whiteboard and explain them.
5. When all post-its are on the whiteboard, the participants collectively approach the whiteboard and start organizing the notes into groups. The participants name the groups of notes with a theme and draw connecting lines to indicate relationships and influences.
6. Finally, a priority of importance is assigned to each theme.

An affinity diagram, also called the KJ method after its inventor Kawakita Jiro, is a particular method for doing brainstorming. It has two advantages over traditional brainstorming; all participants get the same amount of attention and the participants themselves do the analysis during the session. The technique was originally meant for solving problems, but is also applicable to successes. Experience has revealed that there has been too much of a focus on the negative experience in project work, so emphasis should be put on explaining that both positive and negative experiences should be handled.

The Ishikawa diagram

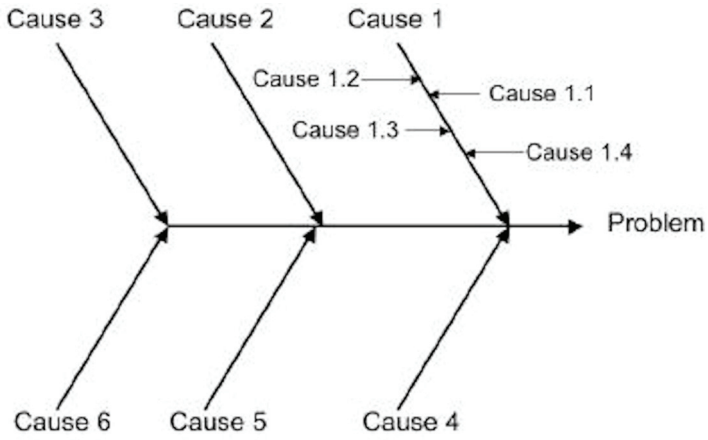

Figure 9: The fishbone diagram

The Ishikawa diagram has its name from its inventor, Ishikawa, it is also called the root cause analysis (RCA). A third nickname is the fish bone diagram because of the appearance of constructed diagram. There are several ways to start an RCA, one is to start by identifying and stating a problem, another is to start by some predefined main causes. Wang and Stålhane (2005) argue that one should start by stating the problem at hand as their research shows that stating main causes may inhibit creativity. However, the initial statement does not have to be a problem, it can be a positive issue as well (see Figure 6). Following their preference, one starts by drawing a horizontal line and writing the problem statement at the right end. Then the participants are given some time to ponder the main causes of the issue. Each main cause that is found is connected to the horizontal problem line with an arrow

pointing towards it. When the search for main causes has been exhausted, the search for the causes of the main causes starts. The question to keep in mind is “what are the causes for this cause?” This can be repeated as many times as feasible for the problem.

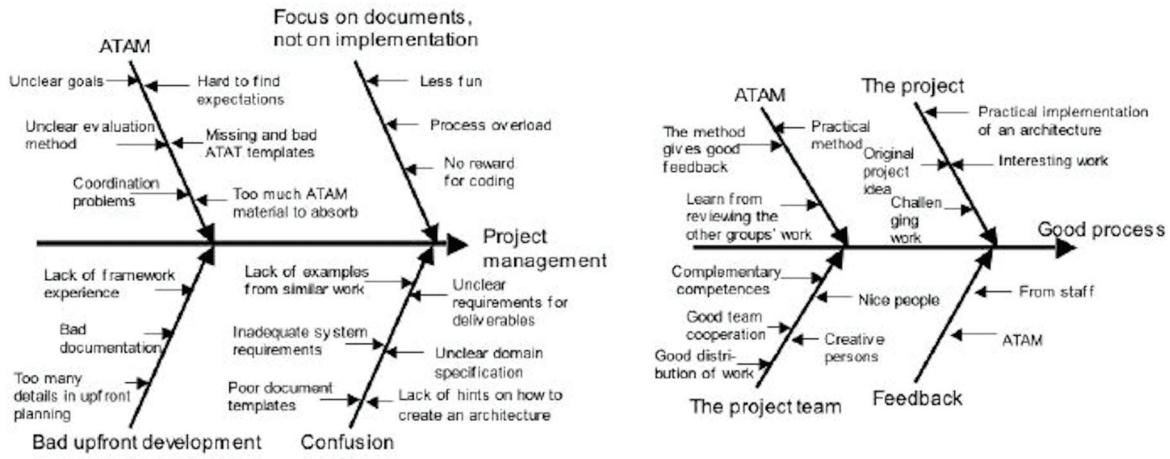

Figure 10: Fishbone diagrams for a problem with project management and for a good process

Advantages and disadvantages with the PMA

There are both advantages and problems when performing a PMA. Participants using PMA in Hanssen, Stålhane et al. (2001) saw it as a “highly positive experience”. They felt that they got better insight in their work and saw new ways to improve. Discussing the positive aspects of a project is not only a source of learning but can be motivating, as one is not usually encouraged to contemplate over what went well in a project, but what didn’t. PMA is an easy way for a company to document its knowledge. A big advantage by using PMA for documenting knowledge is that many people of different roles and biases are allowed to participate in harvesting the knowledge, which makes the knowledge more deeply rooted in the organization.

A problem with the PMA is that is creates a large amount of information which requires some work if the knowledge gained is going to be put to use at a later occasion. Separating important information from not so important information can be a difficult and time consuming task. Another problem that Wang and Stålhane (2005) and Hanssen, Stålhane et al. (2001) discovered was that when several cultures are represented in a group it can prohibit communication, especially when there is a language barrier. It can be a lot harder to express oneself in another language than one’s own.

Guidelines for conducting successful PMAs:

- The PMA session should be open to the entire project team and stakeholders
- An external facilitator that has no biases should be used
- Participants should represent all parts of a project when doing a general PMA
- One should try to find the right amount of structure for each project
- A focused PMA needs to be steered in order not to end up too general

4.2 Using PMA in organizations

Desouza, Dingsoyr et al. (2005) conducted several case studies using PMA on projects teams in medium sized companies. They learnt that a number of issues are important to ensure the successful execution and interpretation of a PMA;

- **The environment**: As the aim of the PMA is to capture tacit knowledge, the environment in which the PMA is conducted is important so that the participants are comfortable reflecting on and sharing problems and successes.
- **Intentions:** The main motivation for conducting a PMA should be learning, not project evaluation. If the participants think they are being evaluated it may prohibit them from sharing their experiences because they are afraid of being embarrassed.
- **Versions of reality**: All participants of the project and the PMA are by nature biased and will only convey a certain version of reality. There exists no absolute truth in the experiences collected by the PMA and therefore, the PMA should be viewed as an "integrated collection of realities on lessons learnt" (Desouza, Dingsoyr et al. 2005).
- **Taking the time to reflect**: It is common for there to be little time between finishing one project and starting another for project workers. However, taking the time to perform a PMA and reflect may impart new knowledge and prevent errors from being made in the future.
- **Detecting patterns**: In order to learn as much as possible from conducting post mortem analysis' on projects, the collected results from several projects need to be mined for common patterns. It is therefore important that the results from the PMA are collected and stored in a way that makes analysis and pattern detection possible.

In 2003, Scott and Stålhane tried combining the PMA with a different knowledge dissemination tool, a combination between an electronic process guide and an experience repository (EPG/ER) (Scott and Stalhane 2003). This tool works by connecting experiences from the experience repository to specific software development activities in the electronic process guide. The aim of this effort differs from the aim of this thesis because its main focus is on improving the software development process, while the aim of my approach is to better the process of knowledge transfer between projects.

The PMA was used as an experience collection tool to populate the ERP/ER with experiences and then the ERP/ER was used to analyze the data to direct the collection of data through the PMA. By doing this Scott and Stalhane (2003) hoped to improve the quality of knowledge collected in the PMAs. They found that the information that was both most accessed and most valued by the users in the ERP/ER was the templates and examples. That led them to recommend structuring the results of a PMA into templates or examples so that the chance of reuse is higher. They also found that the existence of significant experiences and a discussion forum encourages the use of the EPG/ER.

4.3 Wikis

Including a wiki in my approach for knowledge transfer was first suggested by the Directorate of Taxes. By examining articles about wikis as tools for storage and dissemination of knowledge, I came to the conclusion that using wikis as part of my approach for knowledge transfer was a good idea.

What is a wiki?

"A wiki is a piece of web-based software that allows all viewers of a page to change the content by editing the page online in a browser. This makes the wiki a simple an easy-to-use platform for cooperative work on texts and hypertexts" (Ebersbach, Glaser et al. 2006). A software engineer named Ward Cunningham is credited for developing the very first wiki. It was called WikiWikiWeb and was introduced in 1995. Cunningham's objective was to provide a means of communication between programmers that would enable collective work on software code that could be published immediately. Wikiwiki is a Hawaiian word that means "quick" or "hurry". Wikis are no longer used exclusively by programmers but in a great variety of areas, e.g. content management, notepad, and discussion forums. Also many companies have chosen to employ wikis as a user-friendly alternative to conventional groupware. Many wikis have the same legal definitions as open, free software. Most of these are subject to the GNU General Public License (GPL), which gives you as a writer or programmer rights that will prohibit your creation to be converted into proprietary software.

Wikipedia

The fact that the term wiki is so widely known in the modern world can probably be accredited to Wikipedia. "Wikipedia is a multilingual, web-based, encyclopedia project operated by the non-profit Wikimedia Foundation", according to Wikipedia's entry of itself. All of Wikipedia's articles have been written by a collaboration of volunteers, and nearly all the articles can be changed by anyone who wishes to. Wikipedia currently (November 2007) has approximately 9.1 million articles in 252 languages, and is ranked among the top ten most-visited websites worldwide (Wikipedia 2008).

The open nature has made Wikipedia prone to vandalism, which has given critics reason to question Wikipedia's reliability and accuracy. However, research upon this subject has shown that vandalism is generally short-lived and that Wikipedia is normally just as accurate as other encyclopedias. Although Wikipedia does not require contributors to give their legal names or provide proof of identity otherwise, studies have shown that anonymous sources are just as reliable as those that are registered. Wikipedia does however require that everyone that publishes or edits an article adds references to verifiable and published sources. Wikipedia also has guidelines on citing from their articles, and gives this warning on citation:

"Most educators and professionals do not consider it appropriate to use tertiary sources such as encyclopedias as a sole source for any information — citing an encyclopedia as an important reference in footnotes or bibliographies may result in censure or a failing grade. Wikipedia articles should be used for background information, as a reference for correct terminology and search terms, and as a starting point for further research."

Although I follow this guideline on other topics I have chosen to let Wikipedia speak for itself in this description.

Figure 11: Wikipedia (Wikipedia 2008)

Functionality

As we have already established, a wiki consists of a set of pages or articles that are created or edited by a group of people discussing related subjects. Typical wiki functions include editing, links, history, recent changes, sandbox, and search. Wikis may differ but most include these core functions, most of which can be found in Wikipedia (figure 10).

- Editing is the most typical wiki function. Most pages in a wiki can be edited by anyone, but in some cases a wiki page can have editing limitations or complete blocks.
- Linking is done by making a hyperlink in one article to another page or article. In this way the pages form a networked structure.
- History is a function that saves all versions and modifications of a page. With history it is possible to track the editing process and also do rollback, which is to reinstate a former version.
- Recent changes is an automatically produced overview of the recent changes to the wiki pages. This function can also be selected to monitor a certain page, or number of pages so one does not have to look through all the recent changes to get the ones that are of interest.
- Sandbox is a wiki test page that is emptied on a regular basis which serves as an introduction to the environment, where you can try out different solutions.
- Search is a function that can be found in most wikis and it is usually implemented as full-text search or title search. This is a shortcut to the articles so they can be found quickly.

4.4 Using wikis in organizations

It has become increasingly common to use wikis on the intranets in organizations. Both *Wall Street Journal* and *Business Week* have acknowledged wikis as an "up-and-coming technology to support collaboration within and between firms" (Majchrzak, Wagner et al. 2006). In this section I will present two articles that raise different issues concerning the use of wikis in organizations.

Results of a survey on wiki use

In 2005, Marjchrzak, Wagner et al. carried out a survey of 168 wiki users where five main questions were addressed. These five questions were:

1. Are wikis sustainable?
2. Do wikis create different forms of benefits for their users?
3. What factors affect the benefits that users receive?
4. Are there different types of contributors to wikis?
5. What factors encourage different types of contributors to contribute?

The results of the survey uncovered the following. The most common work activities where wikis were used are: software development, e-learning, project management, posting of general information and knowledge management, communities of practice and user groups, ad-hoc collaboration, technical support, marketing and customer relationship management, resource management, and R&D. Regarding sustainability, answers in the survey revealed that the older wikis had more users, more lurkers, were accessed more often, and had more participants. Thereby showing that usage increases in time and hence the wikis are sustainable.

Findings in what benefits wikis create, showed that wikis can help organizations by improving work processes, collaboration and knowledge reuse. The answers to this part of the survey did however produce an unexpected result which was that most respondents did not feel that the wikis could enhance reputation. This result is quite opposite from results of wiki research in the open source community. The study showed further that there are two core factors that contribute to achieving all three of the benefits mentioned above. These are: when users are undertaking an assignment where new solutions are required and when the users believe that the other users possess credible knowledge.

When analyzing the survey responses on whether there are different kinds of contributors, two main kinds were revealed. The one kind called "adders", mostly adds material to the wiki, while the other kind "synthesizers", mostly edits and integrates other's material. There were also two other types: one that does both adding and editing, and one that does neither. Further it was shown that the factors that encourage different types of contributors differ. Synthesizers are more likely to be affected by the impact they have on the organization, the task or the people that read the wiki. Adders, on the other hand, are not as concerned with their impact, but interested in helping the organization and about carrying out their responsibilities (Majchrzak, Wagner et al. 2006).

5 Research methods

This chapter gives a short introduction to research paradigms and strategies. The research methods chosen for this thesis are described as well as the rationale for choosing these methods. Further the methods of data collection (section 5.2) and analysis (section 5.3) are described along with how they were carried out.

5.1 Research design

When conducting a research project there are some choices to be made about what approaches or methods to use. In addition to these methods one has to consider which research paradigm one belongs to.

Research Paradigms: Positivist, interpretivist, and critical research

There exist a number of schools of scientific belief, called paradigms, to which researchers belong to and practice by. The paradigms differ in the way they view the world and what they consider valid knowledge. The three most common schools are positivism, interpretivism, and critical research. These represent opposing philosophies and here I will take a closer look at all three of them.

According to Cornford and Smithson (2006), "**positivists** believe that all true obtainable knowledge is based on observation or experience of phenomena in an objective and real world". Therefore the results of positivist research will have no social value, but claim to be objective facts that cannot be disputed. Positivist research is derived from the natural sciences, and underlies what is called the scientific method. This approach is, to many of positivism's followers, the only way to do proper research. The scientific method operates with three basic techniques (Oates 2006);

- Reductionism: breaking complex phenomena into smaller parts that are easier to study
- Repeatability: experiments are repeated to make sure they obtain the same results
- Refutation: hypothesis are refuted if other researchers cannot repeat the results

An anti-positivist school is one that does not see a clear distinction between facts and values, but sees them as intertwined (Cornford and Smithson 2006). Many of the anti-positivist schools argue that all knowledge is socially constructed and therefore influenced by society as a context. These schools are based on the notion that reality is socially constructed and research centers around comprehending this reality and its origin, rather than creating "facts". The main anti-positivism school is interpretivism. Unlike positivist studies, interpretive studies do not attempt to prove or disprove a hypothesis. The goal of interpretive studies is often related to a particular social setting, where one tries to investigate and describe elements that are related and interdependent. Interpretivist research has the following characteristics (Oates 2006):

- Multiple subjective realities
- Socially constructed meanings
- Reflective researchers
- Study of people in their natural settings
- Qualitative data analysis

Critical research is based on the notion that society has innate structural faults that should be exposed. This type of research is heavily influenced by the researcher's own view of the world and his personal ideology (Cornford and Smithson 2006). Critical research is "concerned with identifying power relations, conflicts, and contradictions, and empowering people to eliminate them as sources of alienation and domination" (Oates 2006). Unlike interpretivists who seek to interpret and understand an issue, critical researchers wish to do more. They question the status quo and attempt to get rid of the unfairness and domination, by identifying and analyzing hierarchies of power and authority.

Quantitative vs. qualitative research

Another way to look at research is by distinguishing between quantitative and qualitative research. Although there is no one-to-one relationship between the aforementioned schools of research and the division into quantitative and qualitative research, one will often find that positivist research is quantitative while interpretivist and critical research are often qualitative. Quantitative research describes phenomena using metrics which then can be analyzed using statistical analysis. Quantitative data is typically produced by experiments or surveys and analysis of is done by looking for patterns in the data and drawing conclusions (Oates 2006).

Qualitative methods on the other hand can be defined as methods that seek other ways than metrics to collect and analyze data. Qualitative data is typically produced by case studies, action research, and ethnographies and includes all non-numerical data like words and images. Analysis of qualitative data usually involves abstracting themes or patterns of importance from the research data (Oates 2006). The researcher's role is more visible in qualitative research as he/she chooses the way to review, analyze and structure the data.

When collecting data from people involved in the subject of research, one can go about the collection in either a qualitative or a quantitative manner. Likewise a qualitative or quantitative approach must be chosen to analyze the data. If one of the two is chosen for data collection, it does not however imply that the same must be used for analysis. In a case study involving a project team, for example, the most common way of collecting data using a quantitative approach would be to hand out questionnaires to the project members. The answers from the questionnaires could be analyzed statistically (in a quantitative manner) or by constructing new theory from the results (in a qualitative manner). The most common qualitative approach to data collection in case studies involving project team would be using interviews. The data from interviews can also be analyzed quantitatively (statistically) or qualitatively.

Choosing a research approach

It is not always easy to choose a research approach. Sometimes it is clear which approach is most fitting for a project, or which are required in a certain area of study, but other times the research area opens for multiple ways of investigation. The type of research performed and described in this thesis is closely related to research in the social sciences, even though part of the approach for knowledge transfer discussed here is technical in nature. In order to learn more about knowledge transfer between projects, one should in one way or another, interact with the people involved in the projects (a study of only documents is possible but not desirable in this case).

It is clear that a positivist stand would not be applicable here as people's experience with projects is subjective and, if measurable at all, is not measurable in the same way as natural science is with the

scientific method. When looking at people's experience I will not look for undisputable facts with no social values, as Cornford and Smithson (2006) describe the aim of positivism, but exactly the opposite, their opinions and feelings. I will not be concerned with power relations and hierarchies either, as in critical research, but how people view their own work, experiences, and knowledge. It is therefore safe to say that the research conducted here is within the interpretive school or paradigm.

When trying to collect data by extracting information from people there are, as mentioned previously, two common opposing ways to do this; the quantitative way by using questionnaires, or the qualitative way by using a form of interview. There are many advantages with using questionnaires to generate data, including that they are of low cost on resources such as time and materials, they are easy for respondents to complete and the researcher to analyze, and they require no "people skills" from the researcher. Disadvantages include that one cannot be sure of the truthfulness of the respondent, that the pre-defined answers may not fit, and that there is no way to clear up misunderstandings. The most important disadvantage in this case, is that one does not get answers with depth like one could do in, for instance, an interview.

When it comes to interviews, advantages include that one can obtain detailed information, ask complex questions, and adjust each interview to each subject as one sees fit. Disadvantages include that the subject loses its anonymity which may prohibit them from answering truthfully, they are time consuming, the researcher can influence the interviewee's answers, and they require good people skills so not to make the interviewee uncomfortable. As the information I seek from my research is about how people work with knowledge, I am looking for answers with depth and detail that can explain not only how knowledge transfer is done, but how the people involved envision a future of effective knowledge transfer. Therefore I find that interviews and qualitative methods in general are better suited for my purposes. Two other qualitative methods that are common sources of information are observation and documents. Observation is a good supplement to interviews as it can uncover information about thing that participants are unaware of or that seem mundane. Drawbacks of this method of data collection are that it can be hard to generalize from the data as finding may be unique for a particular observation. Using documents as a source makes it possible to "go back in time" and get information that may not be available otherwise because the people involved do not work at the organization any longer. A disadvantage with using documents as a source is that they cannot be relied on to give objective accounts of reality, even though they might seem more authoritative than other sources.

Interviews

Interviews can be classified according to the level of structure one chooses to employ. On the one end of the spectrum we have the unstructured interview where a topic is chosen and the conversation that follows is directed only by the interviewee's answers. The researcher has little control and tries to be as little intrusive as possible so that the interviewee gets the opportunity to develop and elaborate on his own ideas and opinions freely. The complete opposite of the unstructured interview is the structured interview which is when the researcher has a list of preplanned question to go through without much room for adjustment or change. All interviewees are asked the same questions and all interaction between researcher and interviewee not concerning the questions is limited to necessary clarifications. This type of interview is chosen when it is vital that the answers are influenced as little as possible by the researcher (Oates 2006).

The interview type on the level between the two extremes is called the semi-structured interview and is the most popular in student projects (Cornford and Smithson 2006). In this case, the researcher prepares an outline for the interview and some guiding questions. This is meant to act as a guide throughout the interview and it is not necessary to follow to the point. With this type of interview the researcher assures that all topics are covered, but at the same time lets the conversation be guided by the interviewee when appropriate. If new topics of interest are discovered through the interview, the researcher has the opportunity to ask follow-up questions and also introduce new issues based on the responses.

Observations

"Researchers use observation as a data generation method to find out what people actually do, rather than what they report they do when questioned" (Oates 2006). This does not necessarily imply that the interviewees or respondents of a survey do not answer truthfully, but that what we think we do and what we actually do does not always coincide. Through observation valuable insights in the work environment including the employees and locations may be acquired, insights that would not be attainable through interviews or surveys alone. There are many ways to carry out observations, some decisions have to be made according to the aim of the observation (Oates 2006):

Highly systematic observations of predefined events	←→	**Observations of anything or everything**
Narrow concentration on particular type of event	←→	**Broad focus**
Observer takes no part in the proceedings	←→	**Observer participates fully in proceedings**
Fact of observation taking place is known to all	←→	**Fact of observation taking place is known to none except the researcher**

Table 2:Types of observation (Oates 2006)

Documents

Documents can be used as a source in any research strategy, either on its own, or in combination with other data sources. The use of documents in research as sources for data is called use of secondary data and can be of several types. Organizations produce large numbers of formal documents and reports, individuals produce documents in their work, publications are made and previous research might have been conducted. In some cases secondary data are the only data source, especially when events have occurred in the distant past. Secondary data has the advantage of being free in most cases, and if accessible through a database, easy to get hold of. Sometimes documents might contain classified or sensitive information. To get a hold of them might prove more difficult as you must convince the owners of the data that the confidentiality will be respected.

5.2 Data collection

The data collection and analysis described in this section and the next were designed with the aim to qualitatively answer the four research questions from section 1.1:

Research questions
How is knowledge transfer done currently at the Directorate of Taxes?
Is using the post mortem analysis (PMA) a good way of collecting and preparing knowledge?
Is the wiki a good tool for the storage and dissemination of knowledge?
Is the combination of the PMA and the wiki a good way to transfer knowledge?

Table 3: The research questions

The data collection was done in six separate stages using three methods; interviews, observation, and documents:

Data Collection
D1 – Observation of a manager meeting
D2 – Documents and templates for project work
D3 – Interviews of 8 employees
D4 – Observation of PMA session
D5 – Interviews about the PMA session
D6 – Research documents about the Directorate of Taxes

Table 4: The data collection

The observation of the **manager meeting (D1)** was done in May 2007 with the intention to observe how the managers transfer knowledge between themselves, but it was also the first meeting I had with the Directorate of Taxes as an organization. Therefore in addition to observing how knowledge transfer was done at the managerial level I also paid attention to their offices and customs. The idea was to get to know the organization better by participating at the meeting as well as getting shown around the offices and meeting some employees. These observations are described in section 6.1 and are part of the findings concerning the first research question about how knowledge transfer is done currently at the Directorate of Taxes.

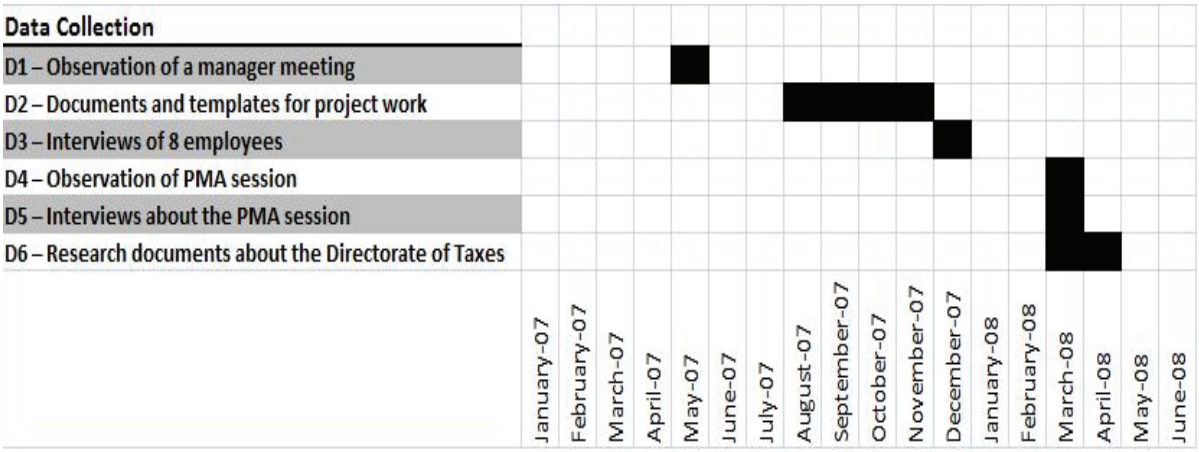

Table 5: Timeline of the data collection

I was at an early point (September 2007) given access to some **project documents (D2)** including project mandates, plans, status reports, and final reports. I studied examples of these documents and their templates, as well as two books about project work, the project management book and the book of project routines. Through these documents I wanted to learn how project work in the Directorate of Taxes is supposed to be done and what routines they have. I also wanted to see what kind of knowledge these documents contained, who has access to them and how they are written. The study of these documents was also done to answer the first research question about the current situation of knowledge transfer in the Directorate of Taxes. The findings from the documents are described and discussed in sections 6.2 and 7.1 respectively.

In my research I choose to carry out two sets of interviews. In both cases the semi-structured form of interviews was chosen. This made it possible to cover the pre-planned themes, but at the same time it opened for follow-up questions and discussions of themes emerging during the interview. The first **interview (D3)** session was conducted in December 2007. By this time I had already been to the manager meeting and read the project documents, both of which had given me valuable insight to the organization. The interviews however, were crucial to get an understanding of how knowledge transfer actually is done between projects, how the project team members perceive this transfer, and what how they would like to a future system for knowledge transfer to include. The interviewees chosen represented several different projects, had different roles and project responsibilities and different backgrounds. This made for a more nuanced and complete view of the organization and its project work. The interviews were eight in total and lasted about an hour each. They were recorded with the interviewee's permission and transcribed at a later point in time. This interview session was designed to help answer the first three of the research questions. The findings from the interviews are presented in section 6.3.

The **observation of the PMA (D4)** session was conducted in April 2008. I arranged the PMA with a project team of five members and an external facilitator. The facilitator was Tor Stålhane, a professor from NTNU who has researched the PMA method and has extensive experience both with project work and facilitating PMAs. Only three project members were able to attend the PMA session but it was nevertheless executed successfully. The session lasted about two hours, and all the attendants participated eagerly. Immediately after the PMA session I got the opportunity to interview the participants in what is described in later chapters as the **interviews about the PMA (D5)**. This interview focused on how they felt about the experience of the PMA session and if they found the PMA suitable as a part of the process of knowledge transfer. Both the observation and interviews were performed with the third research question in mind, the one concerning how suitable the PMA method is for knowledge collection and preparation. With the performance of the PMA and the following interviews I wanted to see for myself how the PMA worked, how the participants

responded and how the method fits projects in the Directorate of Taxes. The findings from these two parts of the data collection are found in sections 6.4 and 6.5 respectively.

The last part of the data collection consisted of studying **research documents (D6)** from previous research projects concerning the Directorate of Taxes related to the topic of mine. Two documents were found, both were theses and on the subject of organizational learning. The documents were also both fairly recent, one dating from 2004 and one from 2007. I chose not to read these documents before finishing the other parts of the data collection. I did this so that my view of the organization when performing the other parts of the data collection would not be influenced by someone else's observations and views. The information gained from these documents is used to answer the research questions about how knowledge transfer is done currently in the Directorate of Taxes, if a wiki is a good tool for the storage and dissemination of knowledge, and if the combination of the PMA and the wiki is a good way to do knowledge transfer. Findings from these documents are described in section 6.6.

5.3 Data analysis

Researchers that uses qualitative data analysis have been criticized for not proving enough information on how they performed the data analysis and came to the conclusion that they did (Oates 2006). I will therefore explain my data analysis in detail in this section.

After collection the data the first thing I did was to prepare it for analysis by transcribing the interviews that were on tape so that all data was in written form. When I was done transcribing I read through all the interviews thoroughly to make sure that no content had lost its meaning in the process. E.g. irony and sarcasm is easily misunderstood when taken down in writing. I then continued by reading through all the data from all the stages of collection several times to get an overall impression of it. While reading, I also wrote down ideas and key thoughts in a memo so that I would not forget them. I then sorted the data into three types of segments as recommended by Oates (2006):

- Segments that are not relevant to the research purpose
- Segments that are not directly relevant but provide descriptive information
- Segments that are relevant to the research question

I then focused on the segments from the third of the points above and tried to identify themes through coding. Coding is often used as a way to do data reduction by using symbols or numbers, e.g. Morse code. In relation to qualitative data however, coding is used about data retention, where the goal is to learn from the data, and keep revisiting it throughout the research process, until you understand the patterns and explanations (Richards 2005). Coding allows you to bring together all the different parts of a topic so they can be reviewed together, while still being able to go back and see the data in its original context. It is a good way to categorize and find new themes.

After having several iterations of changing themes and categorizing in different ways I found a categorization that suited my findings well. I used different color on text from the same findings source and copied and pasted into the categories so all the text was divided into the right categories but still traceable to its original context. I designed the categories so each could be placed under one research question and so the four research questions thus became the four main categories.

Theories
T1— Knowledge creation
T2— Schools of knowledge management
T3— Knowledge transfer
T4— IT in knowledge management

Table 6: The theories

Since I kept track of the origins of all text in each category I knew which of the six parts of the data collection (D1 to D6 in table 4) answered each of the four research questions (table 3). I also categorized the theory I presented in chapter 2 into four categories (T1 to T4 in table 6). Table 7 shows which parts of the data collection was used to answer each research question and which of the four theories that are related to each research question. In chapter 7 each of the research questions are discussed in light of the corresponding theories and findings.

Research Questions	Data Collection	Theories
How is knowledge transfer done currently at the Directorate of Taxes?	D1, D2, D3, D6	T1, T3
Is using a PMA a good way of collecting and preparing knowledge?	D3, D4, D5	T3
Is the wiki a good tool for the storage and dissemination of knowledge?	D3, D5, D6	T3, T4
Is the combination of the PMA and the wiki a good way to transfer knowledge?	D6	T1,T2, T3

Table 7: Combining table 3, 4 and 6

6 Findings

This chapter contains six parts, corresponding to the six parts of the data collection. First, an account of the observations made in relation to the project managers' meeting is given. Second, a description of the findings from studying the documents and templates that are most central to project work is presented. Third, the observations and findings from the 8 initial interviews will be described. Then, in the fourth section the observation of the PMA will be described as well as its results. In the fifth part, the findings from the interviews connected to the PMA will be presented, and in the sixth and final part findings from documents concerning Directorate of Taxes and knowledge transfer will be presented.

6.1 Observing a project manager meeting

Once in a while, with irregular intervals, a meeting is held for all project managers with the purpose of exchanging knowledge. This is done with one thing particularly in mind, and that is to give new project managers the opportunity to ask for advice and discuss situations with more experienced co-workers.

The meeting I attended was open to all project managers but only a fraction had the opportunity to attend. There were altogether seven managers present for the meeting. Some managers were not interested in attending, some did not have the time and some had signed up to attend, but were prevented by some occurrence and/or their presence was needed elsewhere. These are of course all typical situations in a hectic work life and a higher number of attendance might not be expected. A large room was set aside for the meeting, as the number of participants was hard to determine in advance. The room contained among other things a large area with a circular sofa where the all the attendees fitted comfortably. This setting gave the meeting a much more informal tone, as one could sit a bit more laid back than in a regular meeting. The circular sofa also fulfilled its surely intended purpose of enabling everybody to see each and follow the conversation without having to turn to face one another. Being face to face also ensures that people pay attention (or at least pretend to), as it is easy to notice when someone drifts off.

The participants of the meeting were eager and willing to share. They discussed mostly problems they had encountered from past projects and how these problems were solved. A few of the experiences discussed did not occur at Directorate of Taxes but at other firms that where the participators previously held positions. Questions were answered as they came up and the threshold for participation seemed low. The problems discussed were often of a general nature, like not making budget and personnel conflicts. Ongoing project were taken up but not discussed in detail. Openness was visibly lower when talking about ongoing projects as people refrained from mentioning names and often stopped mid-sentence.

The meeting was interrupted a few times, by people popping in wondering when the room would be free, or needing to use the adjacent bathroom. This took some attention away from the discussed topics, but attention soon returned and the meeting continued. These interruptions did not cause any obvious irritation among the participants and seemed like a common occurrence. One of the participants had to leave the meeting while it was still in session and did not get a chance to speak as the turn-taking had not yet reached that part of the sofa. The meeting ended when the two hours were up, even though the participants seemed eager to discuss more topics.

6.2 Documents and templates for project work

In total six documents and templates connected to project work were studied. The first two are documents that aim to be of aid and guidance to the project team and manager during the project lifetime. These are called:

- The project management book
- The book of project routines.

The next four documents examined are documents based on document templates that are supposed to be created by the team at different points in the project lifecycle. These are:

- Project mandate
- Project plan
- Status report
- Technical and economic final report

These documents were studied because they represent the only formal outward communication that a project produces and therefore one may expect to find traces of any attempt to transfer knowledge here.

The project management book

This document describes project work in the Directorate of Taxes and is a part of the project framework. It aims to contribute to the reuse of experience, to share best practices and to ensure communication in a multidisciplinary working environment. It describes, among other things, what a project in the Directorate of Taxes is, how project wok and the line organization are connected, how projects are organized, methodology and project phases, and also methodology and phases in software development. This document is meant especially for the managers of the line organization, also internal and external managers to the project are expected to have knowledge of its content. Team members are not required, but encouraged to read the document so as to extend their knowledge of project work at the Directorate of Taxes:

The book of project routines

This book's target audience is the project manager and other members of the team. It aims to help manage projects by describing routines and standards associated to project work, and also follow-ups and quality control. The book contains guidelines on, among other things, how to conduct meetings, administrative affairs, handling of documents, routines on document archiving, communication within the project and with the organization, follow up of plans, quality control, risk management, handling of errors and in-house training. Each team member is expected to be familiar with the contents and use it as a reference work to better understand their own work in relation to the rest of the project, the line in the Directorate of Taxes and also collaborating partners and suppliers.

Project documents

The Directorate of Taxes has an extensive collection of templates that cover most areas of their work. In project work, the main document templates include, among others, templates for project mandates, project plans, status reports, and final reports. All projects are expected to deliver a final report. The larger projects are also required to deliver a separate report on the project process. The

smaller projects have the opportunity to comment on the process in the final report. These and other documents are available in an electronic archive.

The ***project mandate*** is a description of a task given by the Director of Taxes to the project supervisor and the project manager. The project plan is then drawn up with the project mandate as a basis. The target group for the mandate is the projects supervisors and leaders. The mandate's main intentions are to describe:

- The projects purpose and scope
- The projects plan of progress and deliverables
- The organization of the project
- The projects budget

The ***project plan*** is written with the Project management book and the requirements specification as steering documents. Its target readers include the project supervisor and the project members. The main intentions of the project plan are to:

- Describe the project
- Describe its scope and distribution of responsibilities
- Give an overview of all plans for carrying out the project, including the projects deliverables, milestones, and activities
- Describe the project's organization and staff
- Give account of the initial risk assessment
- Be a foundation to follow up, secure, and attend to quality assurance

The ***status report*** is a report that states the current state of the project in relation to the project plan. The ***final report*** is steered by all the aforementioned documents and has all interested parties as target readers. Its main intentions are to give an account of:

- How the project's progress, deliverables and goal achievement went
- The project's budget
- The most important process experiences
- Recommendations for further work

All four documents produced during the project lifecycle are written by and for the projects interested parties. The documents are stored in an electronic archive. The only documents that are supposed to be made available to anybody outside the project are the final reports. Some of these are posted online through the intranet. Naturally these will be the focus of the study of knowledge transfer through project documents, as none of the other documents are meant for knowledge transfer between projects.

6.3 Interviews December 2007

The purpose of these interviews was to find out how the employees in the Directorate of Taxes perceive the current situation concerning knowledge transfer and how they envision a future where new methods and systems might come into play. In order to get an overall impression the interviewees chosen had different levels of experience, came from different projects, and had a variety of roles and responsibilities. Most of the interviewees were very open and seemed happy to share their experience. A couple of the interviewees seemed to not be interested in sharing, either because they did not feel the need for improvement or because they did not feel they had anything worth sharing.

The interview form chosen was of the semi-structured kind so as to allow the participants to steer the topics discussed in any direction they saw fit. This resulted in a wide range of discussed topics but also gave each of the participants leeway to focus on the way knowledge transfer relates to his/her own work. Even though the interviews ended up very diverse, when analyzing the data, four main themes emerged that were present in all interviews. These are:

1. The project documents, especially the final report
2. Communication and cooperation
3. Use of PMA as a tool for knowledge capture
4. Use of an IT system for knowledge transfer.

The two first points concern how knowledge transfer is done at present in the Directorate of Taxes. The interviewees were encouraged to give an account based on their own experiences. The latter two points concern future possibilities and the use of tools for knowledge capture and dissemination.

The project documents

When the concept of knowledge transfer was first mentioned in the interviews, several of the interviewees seem to associate knowledge transfer with the Directorate of Taxes' collection of document templates, and especially the final report. One of the interviewees put it like this:

"The templates are used for knowledge transfer, and the most important form is that you write the final reports."

Some of the final reports from previous projects are available on the intranet. Many of the other documents and templates one is expected to produce during a project's lifecycle are available through the electronic archives. However several of the interviewees mention that this archive is hard to navigate and does not support search functions on contents. The two documents that direct project work in Directorate of Taxes, the project management book and the book of project routines, mention nothing of routines regarding use of final reports, and according to the respondents there is no established routine around the use of the final reports. One of the interviewees said:

"How the final report is used is up to each individual. I might tell someone about a report that might be useful to them and vice versa."

Another person states that: *"A project is closed while it is going on. I do not have access to their reports."* Several of the interviewees question the usefulness of the reports, stating: "I have read some final reports, but they contain very little information" and "I don't think I would benefit from reading the other project manager's reports".

According to a few of the interviewees that are project managers, the reports are usually written by the project manager in cooperation with a member or two from the project team. Some of the respondents that are team members and not managers say they are not involved in writing reports at all and wish to contribute more. One of the respondents was used as an interviewee in a process report for a large project. He read the report after it was finished and was pleased with the result. He was told however that the report most likely ended up in a drawer somewhere. He (read all he, as he/she) now works on a project that is based on the one he was used as an interviewee in. He said the following about the use of the report. “It would be interesting to know if the current managers have read that report. It was very clear that there were some things that should have been done differently.” Several of the other interviewees mention that reports tend to end up in drawers.

Communication and cooperation

One thing mentioned by all interviewees is that when it comes to acquiring knowledge, you can always go and talk to somebody and get the information you need. This is a so called open-door-policy. At the Directorate of Taxes there is a low threshold to go and ask for help from one’s co-workers. It is encouraged from the organizational level to provide guidance when it is needed. This is also shown by the workspace arrangements. People working on the same projects often sit in an open office space so that communication is easy. Others have offices close to each other. In some cases the whole project team does not have the possibility of sitting together, but part of it usually is. There is no formal description or routine that describes how to proceed to get the information you need, but it is an arrangement that is understood between the co-workers. In each project there is the possibility of assigning a few people to help with knowledge on different topics. These people are not a part of the project, but are listed as resources.

The project managers have meetings once in a while where they have the opportunity to learn from each other. One such meeting is described in 5.1. This meeting gives a precedence for further conversation with other more experienced managers. “You only need to dare to ask for help”, as one fairly new manager put it, “people will lend you their time if you just ask”. Other interviewees agree, there is a culture for aiding each other.

There are a few issues that make going to talk to people to get knowledge more difficult. One interviewee that had not worked in a company for a long time mentioned that it is not always easy to know whom to ask as a new employee. “Constant reorganization of the department does not make it easier to find people either”, one other said. It is also dependent of personal connections, one has to know the person one asks for help, one of the interviewees claim. A different person points out that not everybody wants to share their knowledge. “Knowledge is power”, he says.

The open-door-policy has another disadvantage. It may not be in the company’s best interest to pursue this alone as a strategy for knowledge transfer in the long run. When people leave their job, they take their knowledge with them. The company is left with nothing. As one interviewee pointed out: “The open-door-policy works as long as the knowledgeable people are around. But what happens when they are gone? It is not a situation we want to last. It is not good enough.”

Using PMA as a tool for experience collection

Most of the interviewees are positive when introduced to the concept of performing a Post Mortem Analysis as a way to collect experiences. Some say it is a good idea and that they would like to

participate in a PMA. A few mention cases where they wish they had been asked their opinion, especially relating to finishing up projects, and that PMA sounds like a good way to do it. “The way projects are finished now is not good enough”, one respondent says, “one should discuss what has worked as it should and what not. We need to get better at collecting our experiences and make them visible.” Another respondent points out a benefit of doing PMA: “I think everybody on the team should get to say their opinion.” “It is incredible what one can learn from others” a third respondent states. He has had some experience using experience repositories from another company and feels that the others at the Directorate of Taxes don’t realize what they are missing.

Some of the respondents are skeptical to the PMA. One says that projects are too different to benefit from it. “Projects are unique” he says, “it happens only once, or else they would not be projects”. “For a project team to use PMA, it has to be a part of the mandatory deliverables”, one respondent believes. “And then one must agree on a structure for the deliverable. It is not certain that one structure would suit all kinds of projects. It requires that someone has knowledge about it.”

A IT system for knowledge dissemination

One interviewee does not see the need for a wiki or any technical solution at all: “I do not see the point; there are wikis for everything online. Why would we need our own here? It is not such a big company, after a few years you know whom to ask. In the company I used to work for they had such an experience repository, but it was too advanced, you ended up doing full text search on people’s resumes instead.”

Another interviewee also has experience using an it system for knowledge dissemination from a previous position. He says: “I miss it a lot, being able to just log on and read about something you have a question about. It is amazing what you can learn from others. I think many people are skeptical to start using something new like it (wiki) because they do not understand what it can do. But I know. I know what I’m missing”.

Some of the other interviewees focus on what would make it useful. One would like an overview of who knows what. Another interviewee wishes some topics could be discussed on a wiki instead of through emails, he feels that there is too much email taking up his time. A third interviewee sees the advantage of a wiki especially when the project team is spread around in different locations, as the numbers of distributed projects are increasing. The same interviewees also noted some disadvantages with using a wiki. The first person pointed out that he did not want to lose the human contact in his everyday work life. He asks himself that if management wants verbal communication to be replaced by a wiki what is then the point of sitting in open office spaces. The second interviewee points out that one needs to know that one will find something useful when one uses the wiki, someone needs to maintain it.

6.4 Observing the PMA

The PMA was conducted with a project team of five members. Some of the people in the team were not interested in participating and one was not able to attend the meeting. Out of the two members of the team that participated was the team manager and one was a team member. A third person was also a part of the PMA, even though he was not part of the team, he was an experienced team manager that had been involved in the administrative parts of the project at hand. Professor Tor Stålhane from the Norwegian School of Science and Technology (NTNU) conducted the PMA. Prior to the meeting, the participants were given two articles to read through about the PMA and how it was conducted. Although it is not required that the participants prepare for the PMA, it does give them time to deliberate which topics they wish to bring up and discuss at the meeting.

The participants arrived a few minutes apart while the researchers readied the room for the meeting. Out of the three participants, two seemed pleased to attend, while one seemed more skeptical, quiet, and withdrawn. The room in which the meeting took place was a well lit, comfortable room with a large round table. With the table being round it was easy to observe all participants during the meeting. It seated about ten people so the five people that were present were very comfortable. A large paper sheet was taped to the wall as the whiteboard in the room was quite small. This was also practical for the researchers as they could take the results of the PMA back to NTNU with them. The participants sat down side by side with some space between them, not facing each other and each of them had a stack of post-its as well as a pen at his seat.

Stålhane started by introducing himself and his research around PMA briefly. He then introduced the concept of the PMA and its parts. Both the affinity diagram and the fishbone diagram were described and Stålhane reasoned that starting with the negative aspects one would leave the room in a lighter mood when finishing with the positive. The participants were then told to write down experiences form the project on post-it notes. They started with negative experiences like things that did not go according to plan, things that took longer than expected, things that they were not able to do, etc. They were given about ten minutes where each person sat alone thinking and writing down the experiences they thought of.

The participants seemed to have a difficult time coming up with negative consequences. They started writing down things after a while, some waiting longer than others. Some seemed unsure of what to write and alternated between, looking at the others, looking worried, concentrated, and serious. When the ten minutes were up, each participant had about 5 notes with negative experiences. They were then told to present their notes one-by-one so that everybody understood what they meant. The participants kept their serious facial expressions while doing this. When all the notes were presented they were told to collectively place the notes in groups after theme. One person got up and started, stating that he had done similar things before. The other participants lingered and got up somewhat reluctantly.

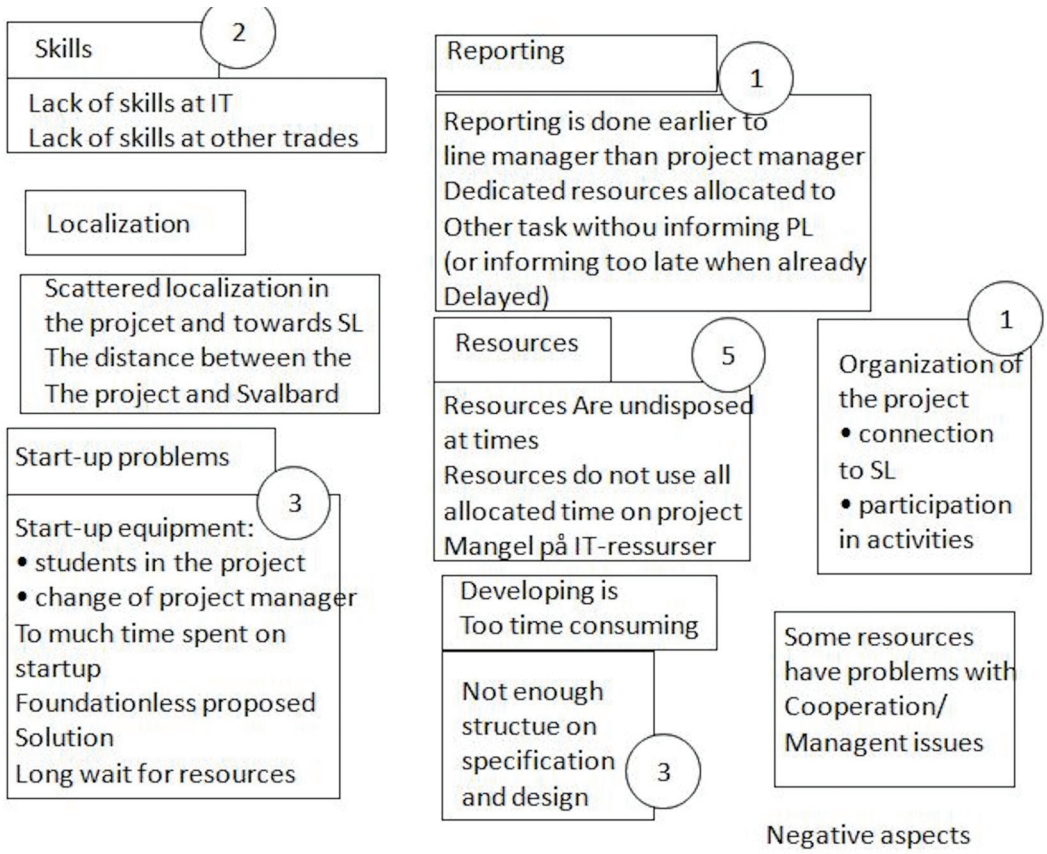

Figure 11: The affinity diagram of negative aspects

They divided up the notes with some discussion among them on what belonged where, what was no longer consider a problem, which problems were triggered by others, etc. The person that had done something similar before was more forward than the others, moving the notes as he saw fit. The others started out observing him but got bolder while they were interacting and participated more in the grouping of the notes. The contents of the post-it notes showed that the three participants had different concerns according to the roles that they had in the project. I.e. the project leader was more concerned with the administrative issues, while the project member was focused on technical skills. The discussion was rather hushed, sentences were not always finished but trailed off and it was obvious that these were not comfortable issues. Sentences like “was that before … or after …?” were heard a few times and names and specific events were avoided. The looks between them that started out shyly became more confident as they discussed. They also seemed to agree on most points, or they came to an agreement after some discussion. The discussion continued while filling out the fishbone diagram.

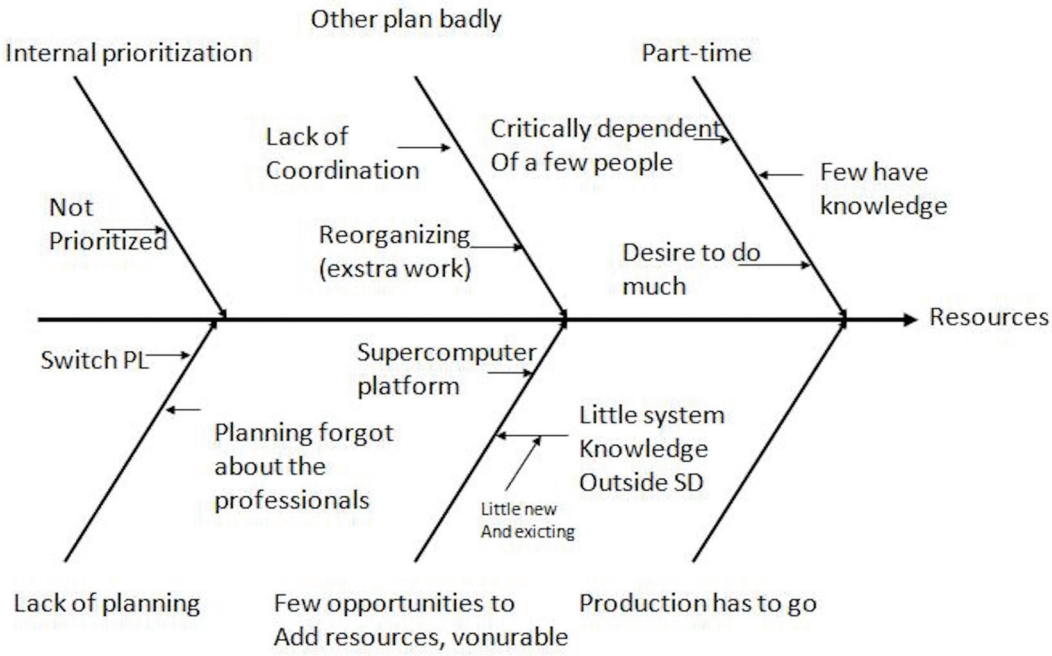

Figure 12: The fishbone diagram of negative aspects

The participants then got ten new minutes to write down positive experiences on the post-it notes. This time it did not take so long before they started writing. The writing was also done quicker than with the negative experiences. The expressions on their faces were also visibly changed, the smiled and did not look worried, even a few small laughs erupted. The whole atmosphere of the room changed and suddenly seemed much lighter. The participants that were hunched over their notes when writing the negative experiences were now more laid back in their chairs and relaxed. This time the arranging of the notes also happened easier, with less reluctance, and more eager participation than the previous time. It took less time to arrange to the notes and for the participants to agree on what fitted where. The discussion that accompanied the drawing of the fishbone diagram was also much more pleasant. Stålhane was probably right about choosing to do the positive notes last, as the participants left with smiles on their faces.

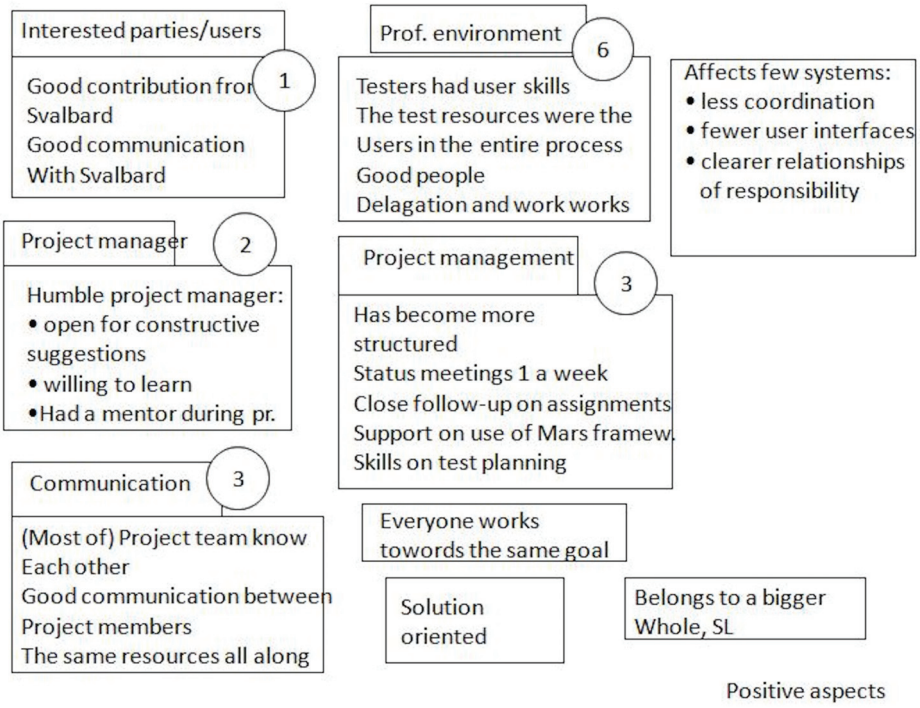

Figure 13: The affinity diagram of positive aspects

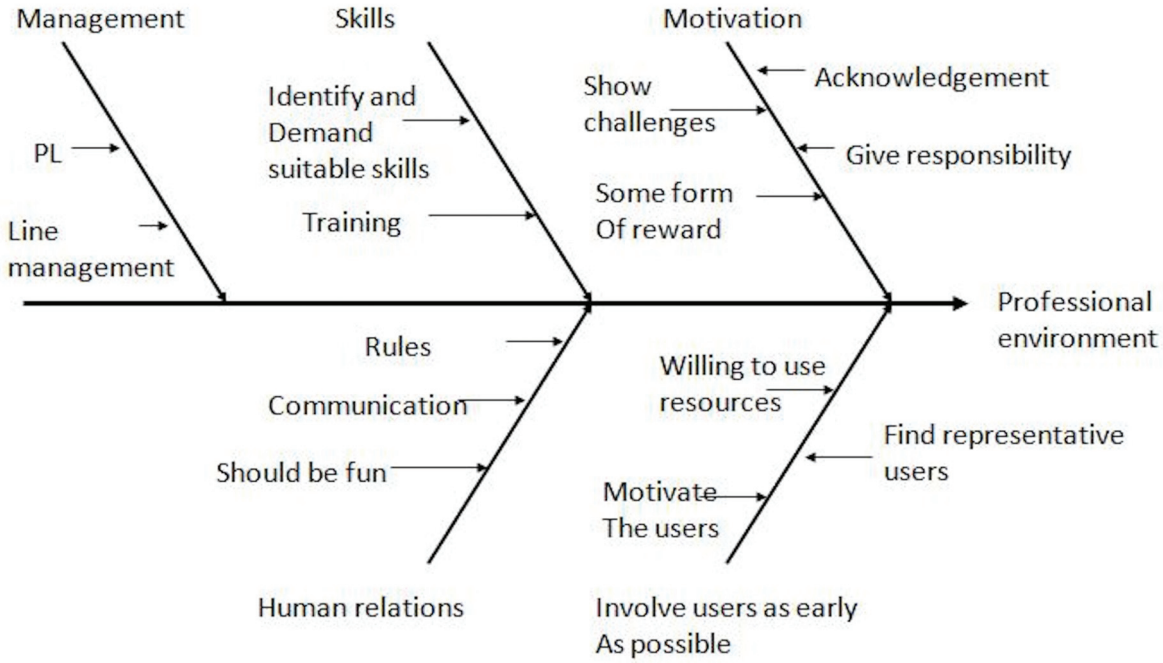

Figure 14: The fishbone diagram of positive aspects

6.5 Interviews April 2008 (Part 2)

Three personal interviews were conducted with the participants of the PMA right after completing it. The results from these are presented here.

The three participants all had positive things to say about participating in the PMA, they saw it as an overall positive experience. They mentioned that it was easy to understand, effortless to carry out, and gave good results. The project leader mentioned that he would like it to last longer as there was much to learn through performing it and that he had collected a lot of content for the final report from it (he took notes during the PMA). All participants also thought of it as a good idea to make the PMA a regular fixture in a project, especially to use at the end of a projects lifecycle. They also all agreed they would access other projects' PMA results through a wiki if they had the opportunity. One advantage that was pointed out is that PMA can be used on projects of all sizes as one can choose to focus on only parts at the time or the whole project. They also felt that they got to know the other team members' opinions and feelings about the project better. One of the interviewees said:

"I have become more aware of the fact that a team member and the team manager can experience the project quite differently. It is useful to see that we have quite different viewpoints and experience problems in different ways. At the same time we agree on what the problems are and how they came to be. It is nice to know that others agree with the things you have been thinking."

The interviewees also saw some disadvantages using the method. One thing that was noticed in this case is that not everyone wishes to or is able to participate. This can have several explanations; not everyone is comfortable talking about their opinions and feelings in public, there can be some issues between project members that are hard to discuss in front of the whole team, or one can be called away on more urgent business even though one would like to attend. Having the PMA without the entire team present might make the ones not attending think that things are being said behind their backs, and is therefore not desirable.

Another problem that is pointed out by an interviewee is that it does not help collecting this kind of information if nobody is going to use it afterwards. At the Directorate of Taxes, he points out, reports tend to end up in a drawer or in a electronic archive where they are hard to find. Inexperienced project managers and members will not find these as there are no practical ways to search. "We need a system to make this information accessible", he says. An issue with publishing the results of the PMA is it requires that someone oversees the posted results. One has to make sure that no personal information is published.

6.6 Documents about the Directorate of Taxes

Two documents about the Directorate of Taxes were examined to learn more about the Directorate of Taxes as an organization and how knowledge transfer is done. Both documents are thesis' concerning the Directorate of Taxes and organizational learning. Here the findings from these documents that are relevant to knowledge and knowledge transfer are presented.

The first thesis is written by two employees of the Norwegian Tax Administration (NTA) and is an investigation of learning and skill development in the NTA. It is based on their collective experience and extensive interviews (Hind 2007). The Directorate of Taxes is a part of the NTA and therefore it is safe to assume that facts concerning the entire organization are also true for Directorate of Taxes and its IT department.

"*Knowledge and the ability to exploit it in an optimal way is becoming of essential significance for task solving in the NTA*" Hind (2007) says. Other strategy documents say that the employees' skills are the NTA's most valuable resource. This indicates that the NTA regard knowledge as an important factor for their ability to succeed. The focus on knowledge was already present in the strategy plan for 2001-2004 and continued in the strategies for 2005-2008 documents. Hind perceives that knowledge and knowledge sharing are given much attention and publicized in well designed brochures. These brochures however, are not made with the purpose of guiding the work for the employees. The documents that are meant to guide the employees in their work do not have the same focus on knowledge. Hind calls attentions to what she calls a gap between the strategic level and the parts of the organization that are supposed to operationalize the strategic plans, and backs her opinion with citations from a manager in an interview: "*We have many planning documents that say that we are a learning organization, but are we? It does not say how we get there, does it?*"

The thesis also points out that the production tasks of the NTA seem to be prioritized over the long-term goals like knowledge enhancement. Production is expected to maintain or improve production requirements at the same time as one wants to focus on knowledge. Some of the managers in Hind's (2007)research are sorry to lose manpower to studies and courses for skills development, some see this as a temporary situation, and some see it as the employees being demanding, while only one manager recognizes the positive effect educating the employees will have on the company. Hind concludes that the managers seem to be refusing change and wanting to keep the gap between strategy and practice. Three different potential reasons for this are mentioned, fear of the unknown, change in the division of power, and the demand of learning something new. Hind concludes with what she thinks the managers at NTA should do so that the NTA becomes the learning organization it wishes to be; "the managers should make it possible, support, and stimulate processes so that knowledge is identified, developed, and created, that is exercise knowledge management" (Hind 2007).

The second thesis is written by three students at the BI Norwegian School of Management and is concerned with how organizational learning must take place so that it is possible to find, spread and make use of marketing information (Kvisten 2004). The research is based on 22 interviews with employees from seven different departments at the NTA. Several subjects are discussed in this thesis, the NTA's visions of being a learning organization, communication and knowledge, incentives for learning, etc. Here we are most concerned with communication of knowledge and technology.

When the interviewees were asked about the use of information systems some said that they use mainly email. Some also use the intranet. The majority of the interviewees are skeptical to the quality of the information on the intranet and they do not use it. An interviewee in one particular department said that the intranet is used extensively in his department and that there are online discussions and useful information available. Most of the interviewees however feel that they possess the knowledge they need to perform their work.

Kvisten (2004)) says: “Within several subject areas there is an understanding that the greatest skill is to be found at the Directorate of Taxes. If this is true, there will not be an ideal sharing of knowledge before the expertise can be used where it is needed, when it is needed”. He also points out that bureaucratic structure and information flow can restrain learning and innovation, and that even if the formal communication lines are long and slow, it does not need to be determine the actual communication in the organization. The document also refers to a study (Meyer 1999) that showed findings indicating that communication and cooperation across bureaucratic levels can be more valuable than the traditional chain of bureaucracy.

The thesis also brings the seating arrangements into attention. Kvisten (2004) thinks that just placing people together does not help knowledge transfer, but can inhibit innovation by creating strong sub cultures within specializations in a department. Knowledge can in his opinion be limited by the large degree of homogeneity within the department. He further argues that with today’s technology, physical location does not limit communication, but the ability to engage the employees to interact through intranets and online forums does. Getting these communication channels to work requires that the employees have enough knowledge and understanding to take them into use. The use of the intranet can be a way of transferring knowledge and communication without following the traditional hierarchy. Kvisten expresses that if the NTA is going to move towards being the learning organization it wishes to be, it has to exploit the possibilities of the intranet further.

7 Discussion and analysis

In this chapter the findings will be analyzed and discussed in relation to the four research questions posed in chapter one:

- How is knowledge transfer done currently at the Directorate of Taxes?
- Is using the post mortem analysis (PMA) a good way of collecting and preparing knowledge?
- Is the wiki a good tool for the storage and dissemination of knowledge?
- Is the combination of the PMA and the wiki a good way to transfer knowledge?

Each of the four questions will be discussed in the four upcoming sections in turn. I will also use the previously presented theories about knowledge, knowledge management, wikis and PMA, in the analysis and discussion.

7.1 Knowledge transfer at the Directorate of Taxes

In the Strategy plan for 2001-2004 (Skatteetaten 2001), one of the plans was to take into use systems and routines for knowledge transfer. Now, four years later, I will attempt to uncover how knowledge transfer is done currently at the Directorate of Taxes. Have the plans made in 2001 been executed? I have identified four separate methods to transfer knowledge between projects in the Directorate of Taxes, these are:

- Documents and templates
- Project manager meetings
- Open-door-policy
- Spatial design

Documents and Templates

The use of documents and templates can trigger both internalization and combination out of the four modes of knowledge creation (section 2.2). For internalization to happen, someone must read experiences of others in documents and internalize these experiences. For combination to happen a person writing a report might use another report or a template to aid him in the writing.

The book of project routines mentioned in section 6.2 contains descriptions of routines around project work in the Directorate of Taxes, and it is available to all project members. Only one single sentence in the book of projects routines relates to knowledge transfer between projects. This says: “The IT department collects experiences from finished projects and makes them available through the intranet, templates and other channels”.

From the interviews conducted of the 8 employees I have learnt that this in practice means that the project documents (project mandate, project plan, final report, etc) from all projects are collected (1). All documents are stored in the electronic archive (2). Some of the final reports are then chosen (3) to be made available on the intranet (4). These four steps correspond to the collection, storage, preparation, and dissemination stages in Elvenes’ model for knowledge transfer (Elvenes 1987).

The first step of the knowledge transfer process, the collection of the documents, does not necessarily capture the knowledge that is needed. The documents are usually written by the project manager alone, or in cooperation with a person or two from the project team. The other participants of the project team are not consulted and therefore do not get a say as to which experiences are collected. People from different roles in the project might have quite different experiences. By excluding the majority of the team from the knowledge collection, valuable experiences may be lost. Another problem with the step of knowledge collection is the type of contents of the final report. Most of the contents of the final report have nothing to do with knowledge or experience collection, but with deliveries, goals and budget. Only a small part of the report is related to the process of the project and their experiences.

The second step of the knowledge transfer process, the storage of the reports, also has some issues. First of all, only a few final reports are made available through the intranet. The rest of the final reports, and the other kinds of reports are stored in an electronic archive. This archive is not searchable by content, which means that if you want to read about a certain kind of experience, you need to know where to look. Another problem pointed out by one of the interviewees is that the projects that are ongoing have sealed their documents in the electronic archive and are thereby not available at all.

The third step of the knowledge transfer process, knowledge preparation, is practically non-existent. The only thing that can qualify is the selection of which final reports that are chosen to be posted online on the intranet. Otherwise the reports are posted in their entirety without any transformation to aid knowledge transfer. This dissemination of reports on the intranet makes the reports available to all the employees, but there is however no description in the book of routines about how to use previous final reports. The intranet that is accessible by all the employees. In 2004, which was at the end of the period for implementing this strategy, a study was done concerning organizational learning (Kvisten 2004). This study showed that the intranet was not used by most of the interviewees, and that many were skeptical to the validity of its content. The intranet was not mentioned at all by the interviewees when I interviewed them about how they did knowledge management. The intranet could be used as a tool to disseminate knowledge through the organization, but is not currently.

The interviewees confirm that there is no routine around the use of the final reports that are available on the intranet. Most of the respondents answered that they do not read the project reports that are available. The ones that answer that they do read reports some times and recommend reports to others are managers that use the reports as templates for their own reports. Therefore one can conclude with that only combination, and not internalization happens through the use of documents and templates. Also this combination only benefits the project managers, as the rest of the project team is not involved in writing or producing the documents.

The project manager meetings

The project manager meeting that was observed and described in chapter 6.1 brought up a few issues. First of all, a meeting of this kind is a good arena for creating knowledge through socialization, that is, converting the tacit knowledge of someone into tacit knowledge of someone else. There are a few things that stand in the way of this great opportunity to transfer tacit knowledge.

- Attendance: Unfortunately only a small fraction of the project managers had the opportunity to attend and share their knowledge. Attendance seemed to be a problem in general with meetings at the Directorate of Taxes. This problem came up all the times that I was at the offices of the Directorate of Taxes to observe or perform other data collections. When performing the PMA session some the team members did not attend due to other obligations, while others just did not want to. Obviously there is less knowledge transfer between projects when fewer people in the organizations have the possibility to attend these meetings.
- Interruptions: The project manager meeting was interrupted several times by people wondering when the room would be free. One time one person even came in the room to use the facilities that belonging to the room, even though other facilities were available in the hallway. The problem of constant interruptions was also noticed at other visits to the Directorate of Taxes. The interruptions hinder the flow of the conversation taking place in a limited amount of time, and thereby also the flow of knowledge transfer.
- Willingness to share the right knowledge: While the tone among the managers was good and they all seemed eager and willing to share there seemed to a focus on projects encountered before they came to work at the Directorate of Taxes. The managers seemed to avoid talking about current projects, and projects they had worked on at the Directorate of Taxes. When projects in the Directorate of Taxes were discussed it was with few details, and in mostly general terms. As long as current problems are avoided and not discussed knowledge transfer will not be optimal.

The open-door-policy

People at the Directorate of Taxes are encouraged to talk to each other and have an open-door-policy. This is also a kind of socialization and is beneficial to the individual getting the knowledge. There are however also a few problems attached to this method:

- No explicit knowledge: With this method alone, only the people in the organization have the knowledge, too little knowledge is made explicit and the organization will lose the knowledge when the employee leaves. Also by making knowledge explicit it can be shared more easily.
- Getting the right knowledge: When seeking out knowledgeable people to ask for help there are some factors that decide whom we ask. These are: whom we know, who is closest and who is willing to help. The factor that should decide whom we ask on the other hand is one: who has the best knowledge.
- Interruptions: The interruptions mentioned in when discussing the project manager meeting can be a result of the open-door-policy. The policy makes sure there is a low threshold for going and asking other people for help. Normally a low threshold for communication is good, but if the threshold is too low, one might end up interrupting people when it is not needed, i.e. when information is also available elsewhere. At some point the open-door can be taken too far and the knowledgeable people might spend their day helping others instead of doing their own job.

Spatial design

The Directorate of Taxes has organized its projects so that most people in the same project sit close to each other so that people have easy access to others they might need to work with. Some people sit in office landscapes, while others have private offices. In addition there are many “water-cooler”

spots, like coffee machines, hallway seating areas and water coolers. The furniture in the seating areas is inviting and built to facilitate communication. E.g. the circular sofa placed in the room where the manager meeting took place.

There are no pronounced routines or systems in use for knowledge transfer at the Directorate of Taxes at the moment. Knowledge transfer between projects at the Directorate of Taxes is currently done through the use of documents and templates, manager meetings, and the open-door-policy which is enhanced by the use of spatial design. The intranet is a possible channel for knowledge transfer. A few of the employees use the intranet for work and communication, but only a few, and within projects, not between them. Everybody else just talk to people around them. They have good spaces that encourage talking and socialization. They do however have problems with constant interruptions as a result of the open-door-policy. Manager meetings are not focused on current problems and projects but those in the past not related to current work. Attendance is another problem which is partly due to that people are not always able to attend, and partly because they do not want to (as shown in the PMA session of section 6.4).

7.2 Using the PMA for knowledge collection and preparation

The post mortem analysis aims to collect experiences from projects. The primary reason for doing this is to identify opportunities to improve the project process, but also to extract important reusable information. The latter is of course the reason that PMA is discussed here. The PMA method first came to mind when I read the problem description written by the DNV about how knowledge management in the Directorate of Taxes should be improved. The description said that the Directorate of Taxes "should establish a process for systematic analysis of project experiences (positive and negative)". The PMA seemed like a good fit as its objective is to capture both positive and negative project experiences for reuse, and therefore I decided to try the method out on a project group in the Directorate of Taxes.

For the PMA method to work as a tool for experience collection and preparation, the employees of the Directorate of Taxes have to be willing to try the method. If the PMA is to become a regular part of project work they employees have to feel that they get something out of it.

Results from the data collection concerning the PMA

In the first interview round, where I asked questions about how knowledge transfer was done currently between projects, I also mentioned the PMA and asked what the interviewees thought of incorporating a PMA session as a part of a project. Most of the interviewees considered it a good idea because they felt it would be a good way to round off the project and also let the entire project team speak their mind about different issues (see chapter 6.3). When the PMA was performed the attendance issues became evident as not even half the team was able to participate. The part of the team that was able to attend participated eagerly.

The interviews following the PMA session showed that the participants were positive to the method and felt they had learned a lot about what the others in the team perceived and how perception of a situation is dependent on the role you have. Although I observed that the moods and conversations among the participants changed with the topics being positive or negative (see chapter 6.4), the participants only had positive comments about the method and considered it a good idea to make the PMA a regular fixture in the project lifecycle. The PMA helps the project manager get information to write the final report, it lets everybody contribute to the report and gives a more nuanced and accurate view of what actually happened in the project.

Reasons for using the PMA for collecting and preparing knowledge

There are a number of reasons why PMA can be seen as a good choice for collecting and preparing experiences:

1. It is easy to understand the PMA method
2. It is a cheap tool, requires few resources
3. It generates large amounts of information
4. It includes the whole project team
5. It collects both positive and negative experiences
6. Preparation is done automatically through using diagrams
7. Collection and preparation is done directly through the sources

First of all, the method is **easy to understand** and therefore does not demand preparation from the partakers. It is possible to give the participants an article about the PMA with the invitation to the

session so that they have time to reflect on their experiences for some time before the session. This is an advantage, but not crucial to the execution of the PMA. Second, the PMA is a **cheap tool**; it requires a minimal amount of resources. Only a few hours are needed to perform the PMA with the project team, and the only physical artifacts required are post-it notes and a whiteboard. It is also possible to use video or audio to record the session if these are available and the participants have not objections. However, using recording devices might make the participants more self-conscious and prevent them from sharing their experiences fully.

Third, the PMA generates **large amounts of information** in little time. The use of the post-it notes makes it possible to formulate an idea with few words. Each idea is then discussed with the whole group where you get everyone's opinions on each subject, generating a lot of information to collect. Fourth, it **includes the whole project team** in the project evaluation. In comparison to one or a few project members writing a project report, the PMA session includes the whole team and thereby the collected experiences represents a fuller and more nuanced view of what really happened in the project.

Fifth, the PMA collects both **positive and negative experiences,** which was a point made by the DNV to ensure knowledge transfer in section 3.2. Collecting both positive and negative experiences is important as one can learn "what works", and not just "what doesn't work", and try to repeat successful performances of tasks. Including positive experiences will also make the PMA session a more positive experience for the participants as one will remember and get praise for things that went well. Sixth, the **preparation of the data is done automatically** as the diagrams made through the PMA session are the prepared data. The diagrams will include all the collected knowledge and thereby all collected knowledge will be prepared as well. If using the PMA becomes a regular part of the projects at the Directorate of Taxes anyone seeing the diagrams of another group will understand what it means. If a video or audio of a session is available as well no further preparation is needed. If not it is possible to write a report based on the PMA session to complement the diagrams so that they are easier to read.

Seventh, the collection and preparation of knowledge is done **directly through the sources**. According to Elvenes (1987) knowledge should ideally come directly from the source because the more sources it passes through, the more distorted it gets. Elvenes also warns that the preparation should be done carefully as any change in the knowledge could change the meaning of it (see section 2.5). This is not a problem when using the PMA since the source is part of the preparation stage. If video or audio are used no further preparation is needed. If a report of some kind is used to supplement the diagrams one needs to be more careful of not distorting the meaning.

The findings from the data collection show that:

- the employees at the Directorate of Taxes welcomed the idea of using the PMA for knowledge collection and preparation when interviewed
- the execution of the PMA went well
- the participants of the PMA saw the experience as positive and felt that they learnt from it

The seven reasons for using a PMA for knowledge collection and preparation given above show that the PMA is a cheap and easy tool, which generates a lot of information on both positive and negative issues, by including the whole project team in the collection and preparation. The collected

experiences are prepared automatically through the use of diagrams in the PMA session. Since both collection and preparation are done directly through the sources there is less chance of the knowledge being distorted.

7.3 Using the wiki for knowledge storage and dissemination

Collecting and preparing the experiences is only part of knowledge transfer process. For the word transfer to apply, somehow the collected and prepared knowledge must reach the members of other projects. These parts, known as knowledge storage and dissemination need to be taken care of by another tool or tools.

Results from the data collection concerning wikis

Tools to disseminate knowledge can take many forms; word processors, e-mails, documents, and tools for browsing and searching. Tools for storage usually include databases or other repositories. Currently the Directorate of Taxes have all these tools available, however they lack a common place where knowledge and experience can be found. As mentioned in section 6.3 the existing solutions consist of an electronic archive for storage and an intranet where knowledge is disseminated through reports. The tools for browsing and searching for knowledge in the electronic archive and the intranet are very limited.

While the employees complain about the current system, and say that they do not use it much, some are skeptical to taking a wiki into use. They do not see the need for one when one can just ask people for help. Not all the employees felt this way, some answered that would like to use a wiki for knowledge transfer. Also the participants of the PMA session seemed positive to a wiki and answered that they would indeed spend time on accessing the wiki in order to view results from other projects PMA sessions (see section 6.5). The research of Kvisten (2004) which is described in section 6.6, also has some findings related to the use of information on the intranet. This can be compared to using a wiki as both involve using an IT system for knowledge transfer. According to him the majority of his interviewees did not use the intranet because they did not believe there was any knowledge in it relevant to them.

Reasons for using the wiki for the storage and dissemination of knowledge

I was first encouraged by the Directorate of Taxes to examine the wiki as a tool in the context of knowledge transfer. The Directorate of Taxes wished a wiki to be a part of the solution and had already made plans for developing one. As this was the case I reviewed literature on the wiki and its use in organizations (see section 4.3 and 4.4). Through this literature review I came to the conclusion that the wiki was a good tool for knowledge transfer and I chose to use it as part of my approach. The wiki is a tool that fulfills both storage and dissemination. All knowledge stored in the wiki is directly accessible through the interface. The reasons to why I chose a wiki for storing and disseminating knowledge are listed and discussed below:

1. Wikis are sustainable
2. Wikis are simple tools
3. Wikis are available for free
4. Wikis provide a search function
5. Wikis contain up-to-date information
6. Wikis create voluntary social connections
7. Wikis may decrease spamming of emails

First, the wikis in the workplace have proven to be **sustainable** (Majchrzak, Wagner et al. 2006). The results of a survey on wikis showed that older wikis had more users, lurkers, accesses, and participants (see section 4.4). Second, the wiki is a **simple tool**, and research has shown that the

simpler the tool for knowledge transfer, the more likely that it will be used, because too much structure in the tool may hinder growth. A simple tool is less time consuming and has a lower threshold of usage (Dingsoyr and Royrvik 2003). According to Desouza et al. (2005) simplicity both lowers the threshold of usage and is less time consuming. Third, wikis are **available for free**, although proprietary solutions exist, there are several free wiki software solutions. Many companies have turned to open-source solutions when choosing a wiki because they have only a fraction of the front-end cost, and in a matter of years one can save millions of dollars. Some also insist that the numerous eyes inspecting the code affects performance positively, while also greater customization is possible (Gonzalez-Reinhart 2005).

Fourth, a wiki provides a **search function** which the current systems of the Directorate of Taxes do not. Elvenes (1987) points out that search in an important function for the knowledge transfer to be effective. The wiki is also browse-able because of the linking between pages and related concepts. Fifth, a wiki is built to always have available **up-to-date information**, which comes with the easiness of editing and adding new information. Sixth, wikis encourage a type of group participation which **creates voluntary social connections** said to help realize personal goals (Gonzalez-Reinhart 2005). This participation through voluntary social connections goes across traditional and natural hierarchies in the workplace and opens for communication and knowledge exchange between everybody in the organization. More people can also be reached than one has access to physically. Seventh, use of a wiki in the workplace may **decrease the occupational spamming of emails**, (Gonzalez-Reinhart 2005), which interviewees in section 6.3 mention to be a problem. This is possible since the wiki enables communication between sender and receiver of knowledge, which is another function Elevenes (1987) considers vital for effective knowledge transfer (see section 2.5).

The findings from the data collection show that:

- some of the interviewees from sections 6.3 and 6.5 think that using a wiki for knowledge storage and dissemination is a good idea
- some other interviewees were skeptical to the idea
- the employees at the Directorate of Taxes are skeptical to the validity of the content of the intranet

The seven reasons for using a wiki for knowledge storage and dissemination that are given in this section show that wikis are sustainable, simple tools that are available for free. The knowledge in the wiki that is made through voluntary social connections is up to date and searchable. In addition a wiki may decrease the spamming of emails.

7.4 Combining the PMA and the wiki

As mentioned in section 1 of this paper, the Directorate of Taxes aims to transform the organization into a learning organization, through a series of actions. Two of these actions include: using systems and routines to collect, adapt, and transfer knowledge of strategic importance using information, and using information- and communication technology as learning, work and decision tools. The combined approach of the PMA and the wiki cover both of these two points, and brings the knowledge collected using the PMA into the technology of the wiki.

Through reviewing and analyzing the two methods, I have discovered some factors that show that the PMA and the wiki can make a good combination.

1. Access to several PMAs through wiki
2. Populating the wiki with PMAs
3. Continuing the PMAs on the wiki
4. Keeping the experiences in long term memory

First, the results from the PMA sessions need to be used in some way to make them valuable for the organization. According to Dybå et al.(2000) for generally applicable knowledge one needs to view the results from the **PMA from different projects together**. The wiki can be used to store the PMAs and facilitate a discussion around the results. Common problems and successes can be discovered and help make strategic changes. Second, the results from the PMAs can be used to **populate the wiki** in an early phase. In addition to the project documents and templates, the results from the PMA can be used to populate the wiki. The participants of the PMA described in section 6.4, all mentioned that they would access the wiki to see the results of other projects' PMAs. Third, the wiki gives opportunity for **continuing the PMA** even after the session is done. The discussion pages that accompany each wiki page make it possible to have informal conversation. Fourth, a wiki is a good way to keep experiences from each project in the organization's **long term memory**. Patterns can be mined from the combined knowledge over time.

7.4.1 Knowledge strategies

In this section the strategies for knowledge transfer used in the Directorate of Taxes will be classified according to the two classifications schemes presented in section 2.3. I will also show how these strategies are influenced by incorporating my suggested approach of the PMA and the wiki.

Strategies currently pursued by the Directorate of Taxes

In section 7.1 I identified how knowledge transfer is done currently in the Directorate of Taxes through four methods. These are the use of documents and templates, the project manager meetings, the open-door-policy, and the spatial design. When looking at these methods together as a strategy for knowledge transfer they do not fit into one of the categories of Hansen, Nohria et al. (1999). However looking at the methods separately makes them easier to classify. The use of documents and templates obviously fits into the codification strategy as they are explicit and codified. The project manager meetings, open-door-policy, and spatial design all belong to the personalization strategy as facilitating communication between people is the key factor in all three methods.

As the result of the data collection show, people are happy with both personalization methods, but not very satisfied with the use of documents and templates. The interviewees that had attended manager meetings were very happy with the arrangement and had nothing negative to say about them. Most interviewees were also happy with the open-door-policy, but here there were some issues with this arrangement; finding the people you need is not always easy, not everybody is eager to share, and you have to know the person that you ask for help. The interviewees commented on that sitting in close together was practical. The use of documents and templates does not get as good reviews as the other three methods. The interviewees that were managers reported that they used the templates and were content with that arrangement. Neither the managers nor other project members among the interviewees seemed to use any of the different types of reports from other projects systematically. Several of the employees also mention that the archive where reports are stored does not support search, so findings material based on subject is impossible.

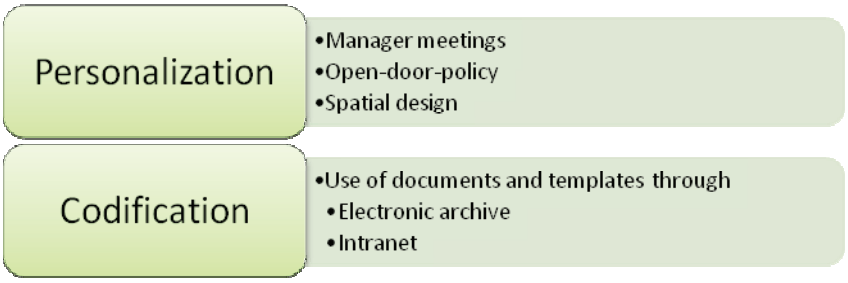

Figure 15: Classification of strategies according to Hansen, Nohria et al. (1999)

The four methods for transfer knowledge can also be classified according to Earl's schools of knowledge management. The use of documents and templates through the intranet and electronic archive belong to the systems school, which overlaps with the Hansen, Nohria et al. (1999) codification strategy. The manager meetings and the open-door-policy belong to the organizational school, which is defined by sharing knowledge interactively, often in personal and unstructured ways. The spatial design naturally falls into the spatial school which focuses on the use of space to encourage knowledge transfer.

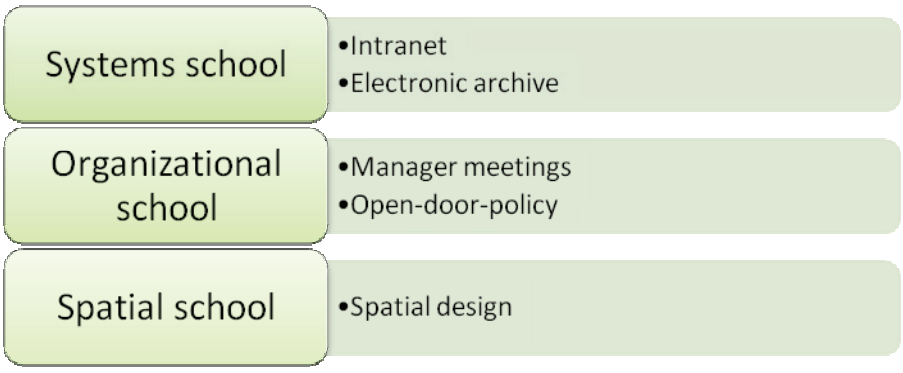

Figure 16: Classification of strategies according to Earl (2001)

How the strategies are affected by implementing my approach for knowledge transfer

That the four methods cover both of Hansen, Nohria et al. (1999) strategies is not a problem in itself. According to Hansen, Nohria et al. (1999) most companies that use knowledge efficiently pursue both strategies, but focus on one of them. Ideally the split is 80-20, 80% focus on one strategy and 20% on the other, with the second strategy supporting the implementation of the first and dominant. Trying to pursue both strategies equally and aiming high might result in failing at both of them. Obviously the focus is on the personalization strategy at the Directorate of Taxes. This works well, but there is room for improvement. The organization may be aiming for a 20% utilization of codification but through the data collection it becomes clear that this strategy does not work very well as most employees do not use the codified knowledge. In addition, the codification strategy does not support the primary strategy but is a completely separate attempt at knowledge transfer.

Taking the approach of the PMA and wiki into use will not change the existing strategies, but make them better equipped to handle the process of knowledge transfer. Using the PMA session as a part of every project gives the project team members the opportunity to exchange knowledge like the managers do in the manager meetings. The PMA session can therefore be seen as an extension of the current personalization strategy which makes the strategy more complete by including everybody involved in project work in the transfer of knowledge. Using the wiki as a vessel for the codified knowledge makes the knowledge searchable by subject. It is also easier to have all codified knowledge in the same system instead of two. By having the codified results of the PMA available on the wiki, the wiki as the part of the secondary strategy supports the first as Hansen, Nohria et al. (1999) recommend.

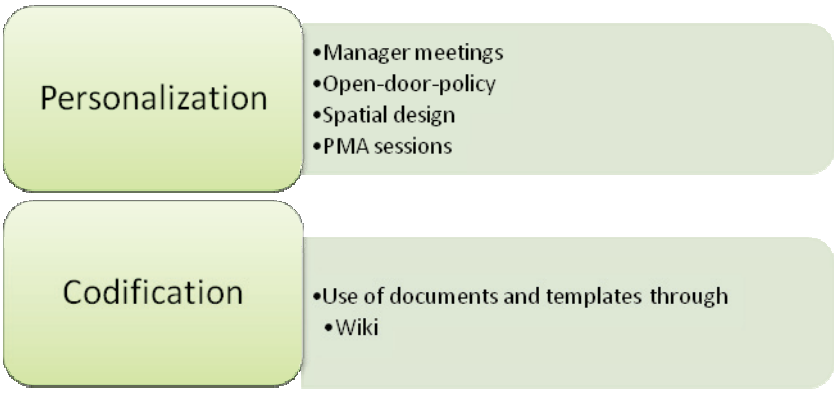

Figure 17: Classification of strategies with wiki and PMA (Hansen, Nohria et al. 1999)

According to Earl (2001), the organizational school combines the codification and personalization strategies of Hansen, Nohria et al. (1999). Since the intranet and electronic archive are systems that are unrelated to the other parts of the knowledge transfer methods they belong to a school of their own. But if these systems are replaced with a wiki, it can be seen as a part of the organizational school, as it extends the opportunities of informal knowledge transfer as well as being a codified information system. The PMA sessions facilitate interactive knowledge exchange between the whole project teams, not just the managers, and therefore also belong to the organizational school.

With the PMA sessions and wiki as part of the knowledge transfer strategy, all the methods fit into the same school except the spatial design. This is still a strategy in its own right, but also supports the organizational school, by facilitating informal knowledge transfer between people. Having all the methods in the same school makes the strategy more focused as all the methods support the same way of handling knowledge.

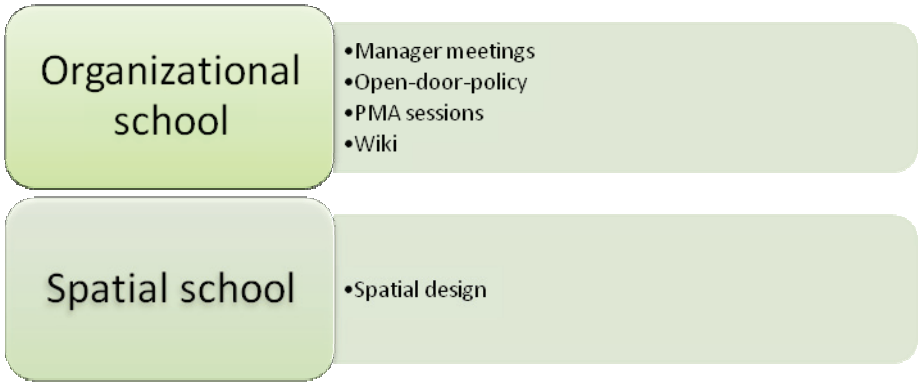

Figure 18: Strategies with wiki and PMA sessions (Earl 2001)

7.4.2 Knowledge creation as a side effect of combining the PMA and the wiki

In addition to the number of positive outcomes of combining the PMA and the wiki to transfer knowledge, there is the side effect that knowledge is created through the four modes of knowledge creation. The PMA creates knowledge through socialization and externalization. The wiki creates knowledge through internalization and combination. All of Nonaka's (1995) four modes of knowledge creation are covered.

Socialization is as mentioned in section 2.2 the conversion of tacit knowledge to some other tacit knowledge. The PMA session brings the project group together to talk about their experiences, which are tacit. The environment that the socialization is done in is important so that the people involved feel comfortable when sharing their experiences. The Directorate of Taxes has invested in the spatial design of their offices and should take advantage of this actively when conducting the PMA sessions. They have multiple meeting rooms of several sizes, with inviting furniture, which makes them suitable for doing PMA sessions.

Externalization, which is converting tacit knowledge to explicit knowledge, happens during the PMA session by the use of the fishbone and affinity diagrams. Since the affinity diagram starts with articulating concepts and ideas in a short form on post-it notes it makes externalization easier than by having to write an entire report. Externalization is also aided by the fact that each idea is discussed with the entire group once it has been formulated. The discussion may also help new related tacit knowledge to be externalized.

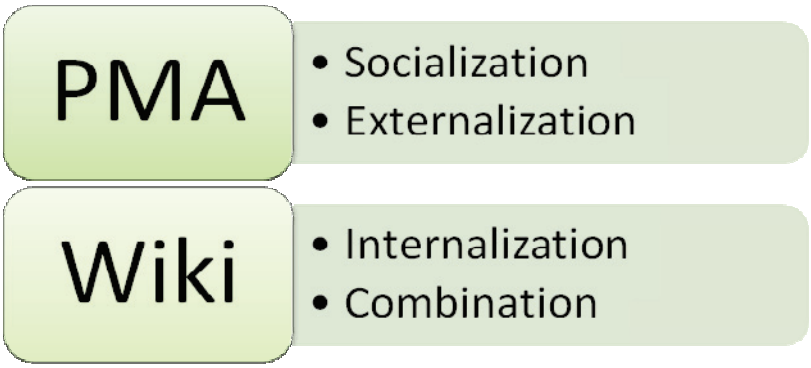

Figure 19: The modes of knowledge creation covered by the PMA and the wiki

Internalization, converting explicit knowledge to tacit, happens through the use of the wiki. When the PMA results are posted on the wiki and people read about them or watch the session on video, they can internalize the experiences that they learn of. According to Nonaka (1995) "if reading or listening to a success story makes some members of the organization feel the realism and essence of the story the experiences that took place in the past may change into a tacit mental model." Especially if video is used the chance of getting the employee to feel the realism is high. If a report of the PMA session is compiled, some effort should go into making the report so that it feels realistic.

Combination, which is converting explicit knowledge to some other explicit knowledge, is also covered by the use of the wiki. One of the strong points of wikis is the fact that the information in it is easy to edit and link. Knowledge is created through sorting, adding, combining and categorizing, all if which are actions supported by standard wiki. Thus, by using the wiki as it is intended to, combination occurs naturally.

7.4.3 Is the Directorate of Taxes ready to take a new approach into use?

As shown in the two previous sections the PMA is a good way to collect and prepare knowledge, while the wiki is good for storage and dissemination of knowledge. Together they cover four of the five stages of Elvenes's (1987) model of the knowledge transfer process (Figure 1). The first stage, that is not covered, is called "Need". Through evaluating their organization for ISO 9001 eligibility, the Directorate of Taxes discovered that they need knowledge transfer. Earlier the need had been identified in the Strategic plan for 2001-2004 (Skatteetaten 2001). That the leaders and decision makers of organization has identified this need does not however mean that the employees feel this need as well. The employees need to be consulted in this matter as it is they that are supposed to benefit from knowledge transfer. Elvenes (1987) goes as far as saying that if the members of the organization do not feel the need to learn from other's experience any initiative for knowledge transfer improvement will fail.

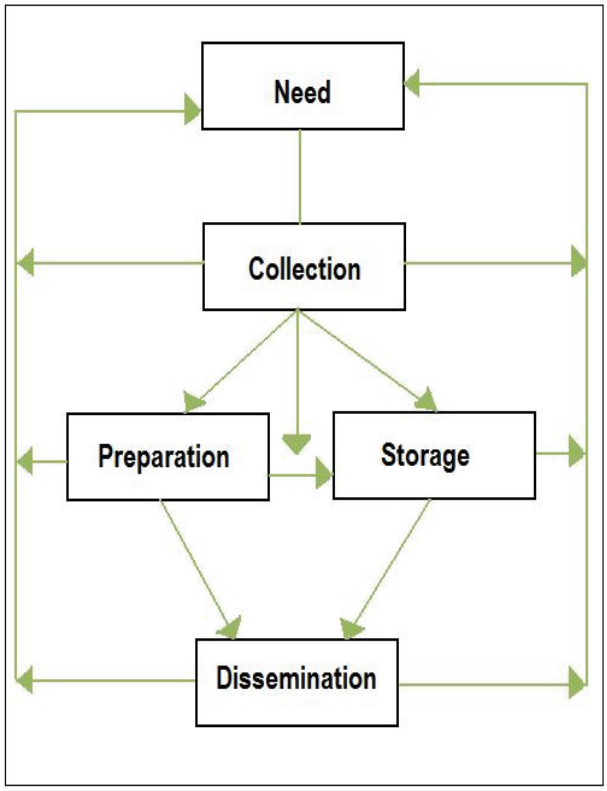

Figure 20: Model for knowledge transfer (Elvenes 1987)

Not all good ideas catch on. The Romans invented the steam engine, but as they had plenty of slaves available, they never felt the need to use it. So they never did. If the usefulness of something is not apparent, it will be forgotten until the surroundings make it useful (Toldnes 2002). In this case implementing a system for knowledge transfer by using the PMA and the wiki might not catch on if the employees prefer asking someone they know for a quick answer. The need for transferring knowledge must be founded in the employees.

In 1997 Earnst and Young conducted a study of 431 organizations and attempted to find out "what firms are doing to manage knowledge, what else they think they could or should be doing, and what they feel are the greatest barriers they face in their efforts" (Ruggles 1998). 56 percent of the respondents answered that "changing people's behavior" is the biggest difficulty in managing

knowledge in an organizations. When they were asked what the biggest impediment to knowledge transfer was, 54 percent of the participants answered “culture”. This goes to show that when one plans to introduce a knowledge management initiative, one has to prepare the organization for it. Overcoming technological limitations was considered of much less importance to the respondents than the social factors of culture and behavior.

According to Marwick (2001) one needs an appropriate combination of organizational, social, and managerial initiative along with any technology for knowledge management. On the other hand, Marwick (2001) also states that “people can and do adapt their way of working to take advantage of new tools as they become available, and this adaption can produce new and more effective communication within teams”. Kvisten (2004) also hints at this in his research when he sees that the employees do not use the communication channels that are available at the Directorate of Taxes. He states that the employees must have enough knowledge and understanding of these channels to take them into use.

My research and Kvisten’s (2004) both show that the employees may not be that interested in knowledge transfer. In Kvisten’s (2004) case this is seen through the employees feeling that they are in possession of enough knowledge to perform their work and that they do not see the need to use the intranet. In my case through the interviewees that do not see any reason to use a wiki because they feel talking to people is good enough for their purposes. It can also be seen through the problems of attendance in activities related to knowledge transfer, the manager meetings and the PMA session.

If the Directorate of Taxes wishes to incorporate the suggested approach for knowledge transfer it has to take the employees into account. If the employees do not feel the same need that the organization does, some effort should be made to show them the benefits of improving knowledge transfer through some organizational, social, or managerial initiative, as suggested by Marwick (2001).

7.5 Evaluating the research

This section gives a reflection upon the research methods and explores how well they served their purpose. It also describes things that could have been done differently.

When conducting the observations of sections 6.1 and 6.4 I did not participate at all in the proceedings, but watched and took notes. I noted both conversations and events that occurred, as well as the behavior of the participants. The method of observation as a type of data collection has some shortcomings. Since the researcher is the main "tool" in the collection of data the outcome is very dependent on what the researcher notices. Different people might notice different things, and each person is more sensitive to some type of information than others. This is inevitable, but the information gained can be checked by other participants to validate it.

I chose to have all the parts of the data collection read through, not only the observation, by participants of the manager meetings, interviews and PMA session. They had no objections to the content of my data, so I can therefore assume that it captured the essential parts. Another problem with observation is that people often change their behavior when being observed. This is also inevitable, unless you hide the fact that you are observing, which was not an option in my research because I had no way of doing so. In conclusion, when it comes to observation I cannot guarantee that another researcher present would have gotten the exact same results as I did, and I can also not guarantee that the observations I did are a reflection of how things are usually done since people might have altered their behavior.

The interviews that were conducted were recorded and transcribed and so do not depend on my memory. However, in interviews like in observations one chooses to focus on some things and not others. I believe that it is possible for another researcher to find the themes I identified in the raw data. Another researcher could come to find other main themes and categorize differently if working directly from the raw data, since this qualitative data analysis is heavily dependent on the researcher. As mentioned previously, the findings from the interviews were read through by several interviewees for approval. I tried to support my findings from the interviews by using direct quotes in all of the categories. This was done so not only my own interpretation of the interview was presented in the findings.

There are some things that could have been done differently in my research. If I had the opportunity to do more PMA sessions I would have more data to base my conclusions on. Ideally I could have conducted several PMA sessions with trial teams of different sizes and projects of different kinds. This was not possible because I needed project teams that were at the end of the project work and that were willing to try the PMA session. There were no such teams available. I would also have needed facilitator for each session, as it is best to have a facilitator with some experience when conducting the PMA.

I could have used a survey instead of semi-structured interviews. This would have given me quantitative data so that I would have obtained numerically measurable results concerning how many of the employees of the Directorate of Taxes were interested in using the wiki, PMA etc. This information would have been interesting and given a broader coverage of the employees opinios, but I believe that the data I have collected through interviews have given me deeper and more detailed knowledge about how the Directorate of Taxes is as an organization and how the employees feel about including the PMA and the wiki in their work.

8 Conclusion

In this thesis I have investigated how knowledge transfer is done at the Directorate of Taxes. I have also suggested and evaluated an approach for knowledge transfer consisting of two tools, the post mortem analysis and the wiki. I have discovered that there are currently no official routines around knowledge transfer in the Directorate of Taxes. They do make a few attempts to transfer knowledge through conducting meetings among the managers, using documents and templates, and having an open-door-policy supported by the spatial design. However, my research has shown that the documents and templates are not used systematically and that there are no outspoken routines around their use. The manager meetings are low in attendance and the type of knowledge shared is not optimal, as they focus much on the far past and not the current projects. The open-door-policy is an arrangement that the employees are happy with, but causes frequent interruptions in their work.

Using the post mortem analysis for experience collection was an idea welcomed by the employees at the Directorate of Taxes. The session performed with a trial project team went well and the feedback from the participants was positive. Examining the post mortem analysis for suitability as a tool for knowledge collection and preparation revealed that it is a simple tool that does not require many resources, and which generates large amounts of information using the whole project team's experience. The wiki was likewise examined as a tool for knowledge storage and dissemination, and was found to be a simple sustainable tool that enables knowledge transfer across hierarchies in the organization and between distant physical locations. The employees at the Directorate of Taxes are divided in their opinions of employing a wiki. Some welcome the idea while others are more skeptical to using technology for the purposes of knowledge transfer.

In addition to examining the post mortem analysis and the wiki separately I examined my suggested approach as a whole and found several factors that indicate that the combination of the two methods might work well for the transfer of knowledge. The methods complement each other; the post mortem analysis needs a channel to be communicated through, while the wiki needs to be seeded with content in the early phases of its use. The two together enable the organization to keep project experiences in its long term memory. The approach will also have the positive side effect of creating knowledge through all four of Nonaka's (1995) modes of knowledge creation, with two modes covered mainly by the post mortem analysis and two by the wiki.

The combined approach of the post mortem analysis and the wiki would influence the Directorate of Taxes' strategies for knowledge transfer positively. I have shown, using the theories of Hansen, Nohria et al. (1999) and Earl (2001) that by implementing my approach the existing strategies will be enhanced by the inclusion of the whole organization in knowledge transfer and by the use of suitable tools. Thereby also making the organization better equipped to handle the process of knowledge transfer.

My approach combines the post mortem analysis and the wiki in order to cover the four stages of the knowledge transfer process that follow the first stage of "Need". The Directorate of Taxes have discovered the need for knowledge transfer and wish to improve the way knowledge is handled through, among other things, the cooperation with NTNU. However, this need does not seem to be felt as much by all the employees of the organization. This can become a significant impediment to

the implementation of a method for knowledge transfer and needs to be addressed in order for the implementation to be successful.

8.1 Further work

Future research on the combination of the post mortem analysis and the wiki could be done by testing a wiki in the Directorate of Taxes. It would be interesting to see how it would be used and what incentives and managerial initiatives would be needed in order to make it a part of knowledge transfer.

Research can also be done on the use structures to represent the PMA results electronically. If structures are employed there are extensive opportunities related to the mining of patterns, which could help improve work processes, resource planning, and decision making.

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Abbreviations

NTA – The Norwegian Tax Administration (Skatteetaten)

DTIS – The Directorate of Taxes' IT and Service Partner (Skatttedirektoratets IT og service partner)

PMA – Post Mortem Analysis

NTNU – The Norwegian University of Science and Technology (Norges teknisk-naturvitenskapelig universitet)

RCA – Root Cause Analysis (The Ishikawa Diagram)

KJ – Kawakita Jiro (The Affinity Diagram)

EPG – Electronic Process Guide

ER – Experience Repository