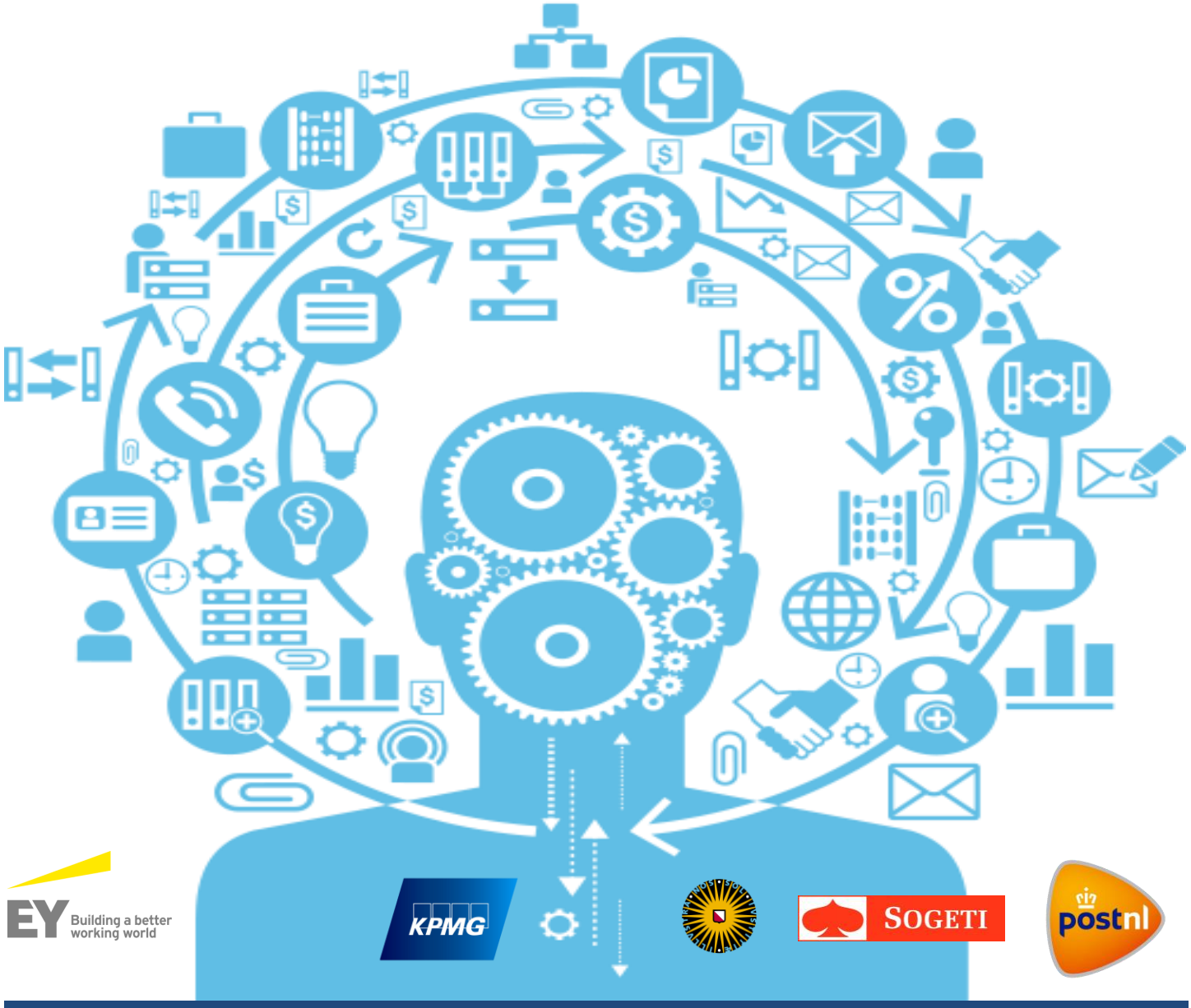

The influence of NWOW principles on Knowledge sharing

A multiple case study

Supervisors:
Prof. dr. ir. R.W. Helms
A. de Kok, MBA

Roel Esten, 3078671

11/9/14

Master thesis Business Informatics @
Utrecht University

Abstract

This thesis report is about the intersection between the New Way of Working (NWOW) and knowledge sharing. Both subjects are well documented in scientific literature, however crossover literature is hard to find and lacking in quality. NWOW contains a list of principles on how to work in order to improve employee satisfaction and increased employee effectiveness. Knowledge sharing is the science of how knowledge is shared in corporate environments, be it SME or large corporations. Companies are discovering that knowledge is their most valuable asset, but how do you make sure that knowledge is shared, or how do you prevent knowledge from leaving your company?

This thesis report starts with an introduction into the subject and the research questions that I will try to answer, secondly I will discuss the way I performed this research, from a literature review to a multiple case study research design in order to gain solid data to form a conclusion. Then the literature review on the topics of NWOW and knowledge sharing will be divulged, followed by 4 expert interviews to bridge the knowledge gaps that exist due to the low amount of scientific publications on the crossover between knowledge sharing and NWOW.

Case studies will be introduced, including the 5 case study companies, PostNL, Sogeti, EY, Comp. X and KPMG. I will discuss the company and department structures, and their current knowledge sharing infrastructure, what are their possibilities to share knowledge. Then the results of the multiple case study research will be presented, in which we see the results of the NWOW monitor combined with the different knowledge types that are shared. These results lead to an analysis, what can the data tell us, how can we interpret it, and what are the variables that are of influence?

Finally I will give some conclusions on the research questions, but also some general conclusions that can be made about knowledge, knowledge sharing and NWOW implementation levels. Finally I will propose a discussion on the validity and integrity of this thesis and a short section on the future work that can be performed, based on the data that was acquired.

Acknowledgements

In this section I would like to offer my thanks to the following people and companies:

First off I would like to thank Arjan de Kok and Remko helms, my supervisors during this thesis, even though we did not spar that much, it has given me enough insights into finishing. I would also like to thank Marco Spruit for being a substitute supervisor during my thesis defense.

Secondly I would like to thank the companies that helped me, Suzan Kuiper from PostNL, Joep Sars from Sogeti, Inge Stegeman from EY, Peter S from Comp. X, and Mark Beukers from KPMG, thank you for arranging the interviews and assisting me in collecting the data. And of course all the interviewees: Suzan, Denise, Babs, René Adosh, Rob, Antoinette, Brian, Stan, Imre, Peter, Mark, Maarten, and Liselore.

Thirdly I would like to thank Tim de Vos from Veldhoen+Company, for the excellent expert interview, your knowledge on the combination between knowledge sharing and NWOW principles was valuable.

Fourthly I would like to thank my girlfriend Willemijn Kuper, without her I might never have finished, thank you for the support and the daily reminders 'done yet?' But I would also like to thank my family for 'supporting' me with every visit and being there at my thesis defense.

Overall this thesis was a hard job to perform due to the length and the difficulty in finding the right companies, but with the support of the above mentioned people I got through it with a satisfactory result.

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1 INTRODUCTION

In this chapter I will introduce the subject of this master thesis, namely knowledge sharing in NWOW environments I will and I will introduce the problem statement which is the motivation for writing a thesis on the subject of knowledge sharing in NWOW environments.. I will then state the main research question and several sub questions which, once combined give an answer to the main research question. After this I will quickly summarize the scientific and social relevance of this research and indicate how the rest of this document is structured.

1.1 PROBLEM STATEMENT

In 2002, Bødker & Christiansen first coined the term 'the New Way of Working' or NWOW in short, to what it means to us today. Many new ways of working exist and can be found in literature, however the new way of working this document will discuss relates to the overall way that people work. NWOW stands for the principles of working time and place independent and everything that is related to that, including aspects like empowerment, result-based work and supporting those principles by IT and real life aspects (Baane, Houtkamp, & Knotter, 2010a).

NWOW is becoming more common in companies these days (Kluwer, 2011), or at least many companies have some level of NWOW implementation, providing an improvement in the way people work, however when NWOW principles are wrongly or only partly implemented, detrimental effects can occur (Baane et al., 2010a).

In NWOW environments, knowledge sharing becomes more important due to the place and time independent work style (Blok, Groenesteijn, Schelvis, & Vink, 2012), requiring better IT solutions and culture in order to keep knowledge sharing a priority. Take for example the 'working from home' concept within NWOW (D. Bijl, 2007) which allows employees to work at home where no other colleagues are present, how do you share knowledge? You cannot walk up to someone anymore and discuss a topic, you need IT solutions in order to make an appointment to discuss a topic, you need IT solutions to connect to one another and you need IT solutions to share the actual knowledge. That means three IT solutions to share knowledge whereas in more traditional ways of working, you would walk up to someone and share.

Over the years, many papers have been published on the effects and workings of knowledge sharing in organizations, predominately focused on knowledge intensive organizations. Knowledge sharing is an important aspect in today's corporate world (King, 2006) where knowledge workers become more important (Appel-Meulenbroek, Groenen, & Janssen, 2011), more and more of the knowledge that make companies so valuable is in the heads of people instead of on paper or on IT systems. The question is therefor, how you can make sure that the right knowledge is at the right time at the right place (Uriarte Jr., 2008). The field of knowledge sharing therefor is aimed at understanding how knowledge is shared within and between organizations, what kinds

of knowledge is there and how can we support processes by improving the knowledge sharing situation.

Currently there is hardly any literature on the crossover between NWOW and knowledge sharing (PwC, 2011), even though this subject is of great importance to companies who are currently struggling with implementing decent knowledge sharing pracitices (Kluwer, 2011).

Bellefroid (2012) has performed a similar study into the effects of NWOW on knowledge sharing practices and he has focused his research on the channel choice difference between NWOW environments and companies that have yet to operate under those principles.

Within this master thesis I will extend on the different aspects of knowledge sharing, namely on the subject of knowledge itself, specifically on different knowledge types that are shared within organizations. Therefor I have come with the following problem statement:

It is unknown how the adoption of NWOW practices influences knowledge sharing behavior and whether this requires a change in IT support for knowledge sharing.

1.2 RESEARCH QUESTIONS

In order to investigate this problem statement, I have chosen to focus on the following research question:

'How does NWOW influence knowledge sharing among knowledge workers in knowledge intensive organisations?'

Supported by the following sub questions:

1. What is NWOW and what are the changes involved compared to TWOW**?**
2. What is knowledge sharing, how is it traditionally used, and what are typical knowledge types and sharing practices?
3. How does NWOW influence knowledge sharing and how will IT support this?

By answering these research questions, I want to create a better understanding of how the new way of working influences knowledge sharing, and how IT can best support this.

1.3 SCIENTIFIC RELEVANCE

As mentioned before in this document, there is not a lot of relevant literature on the combination of NWOW and knowledge sharing. This theses therefor hopes to expand the knowledge and literature on these subjects by giving an insight on how NWOW implementations affect the knowledge sharing situation. At the end I hope to give a clear view of what the possibilities are in this small research area for future research. With this theses I also hope to encourage other scientists to investigate this research area.

1.4 SOCIAL RELEVANCE

The social relevance of this thesis involves the current problems companies are experiencing with NWOW and their knowledge sharing practices. Because not that much is known about this combination, companies are not able to implement IT systems that are aligned to the NWOW principles. This thesis hopes to improve this situation by giving an understanding of what is required in order to improve knowledge sharing in NWOW environments.

1.5 DOCUMENT STRUCTURE

In the remainder of this document I will first discuss the research approach I am taking in order to answer the research questions mentioned above, explaining the literature study I performed, the expert interviews that are held and the multiple case study design I am using in order to investigate if there is a change due to NWOW or not.

In the next section I will lay out the theoretical background to support this research paper, looking into both aspects, NWOW and knowledge sharing, and how these relate to each other.

In Chapter 4 I will discuss the expert interviews that were performed, in order to give a view of what leaders in the field think about the subjects and how they relate.

In the 5th Chapter I will show information on the case studies I performed, give a description of the companies and the respective departments I interviewed. I will show the current knowledge infrastructure, what are the tools that employees have in order to share knowledge with each other and finally I will tell about the people I interviewed, their backgrounds and what types of knowledge sharers they are.

In the next chapter I will discuss the results and following that up with a chapter containing my analysis on the NWOW monitor questionnaire and the interviews and how these relate to each other. I will give several insights into the NWOW implementation score of the companies and how this affects the knowledge sharing environment.

Finally I will give a conclusion on the research questions, including a discussion on the results and the validity of the research that was performed. I will end this document with a small section on future work and the practical implications this research has.

2 RESEARCH APPROACH

In order to research the topic of this thesis, a research approach needs to be formulated to define what steps to take in order to achieve the goal of answering the research questions. The research steps are shown in Figure 1.

First a literature review will be performed in order to understand the background information of NWOW and knowledge sharing, specifically to the different aspects of knowledge. These different aspects will be investigated in order to get a classification of knowledge types that can be used in the interviews later on in the research.

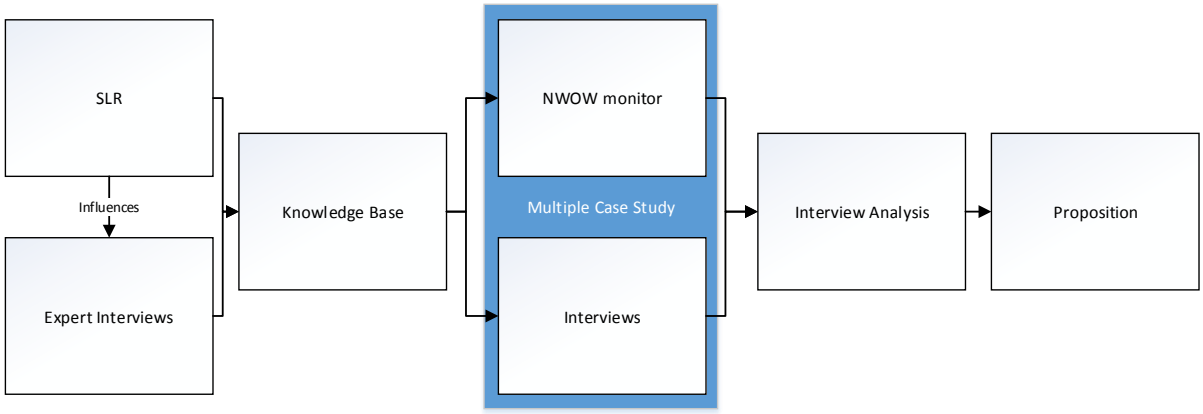

Figure 1: Research approach

Secondly, expert interviews will be done to elicit knowledge about the different fields of this research, in order to gain a better understanding not only of the results of the literature study, but also to fill in some of the blanks that might arise from the literature. This is also due to the fact that NWOW is a relatively new field of research and not that many publications can be found about it.

After the background information is available, a multiple case study will be performed in order to gain clear data about the interaction between NWOW and knowledge sharing. In this multiple case study, I will first gather company information, containing information about for example size and sector, but I will also have them fill in a questionnaire that will determine in what implementation score the company is in. The interviews will be held using a semi-structured interview approach based on the background information. During this multiple case study, 5 companies will be interviewed that are in varying implementation scores of NWOW. In each company, 5 interviews will be held in order to gain an overall rating for each company.

Finally I will analyses the interviews that were performed and tag the relevant audio sections using NVivo, a qualitative analysis tool. From this I will create propositions.

2.1 LITERATURE STUDY

For the literature study, the method of Duff (1996) was used, this method describes the following steps: (see also Figure 2)

1. Create set of search terms
2. Formulate search statement
3. Estimate search parameters
4. Search information sources
5. Record and evaluate references

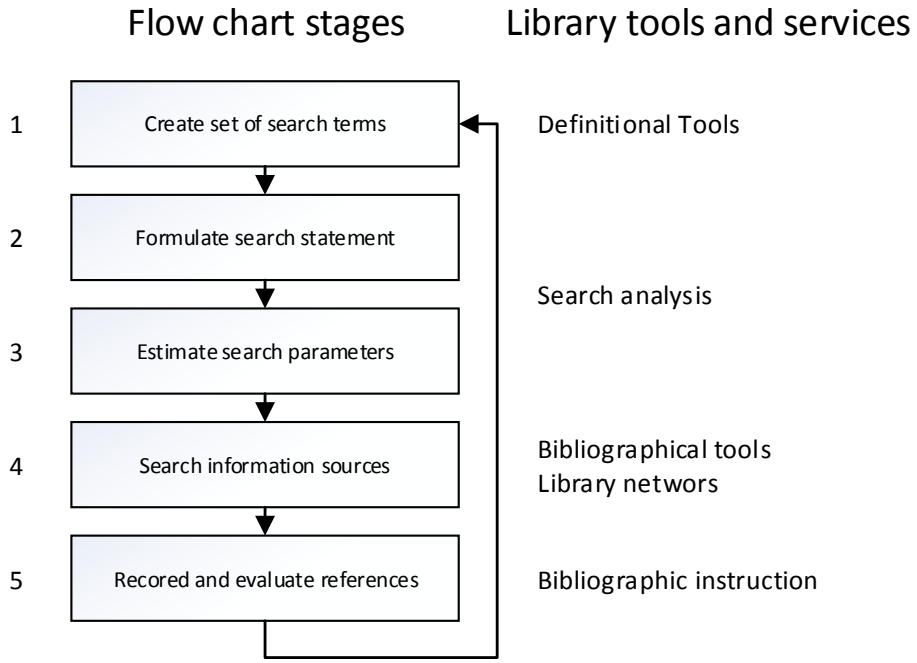

Figure 2: The 5 steps of literature review by Duff (1996)

2.1.1 Create set of search terms

The first step consists of creating a set of search terms, since this research is about knowledge sharing and the new way of working, we came up with the following 2 sets of search terms:

- 'Het nieuwe werken', 'The New Way of Working', 'NWOW', 'teleworking', 'Alternative way of working', 'NWW', 'HNW', 'telecommuting', 'virtual working', 'virtual teams'
- 'Knowledge sharing', 'knowledge exchange', 'knowledge transfer'

Because NWOW is a small research field, there is no one clear name for this area yet, therefore a list of keywords that are similar in nature have been chosen. However not all of these are implemented in the final search statement.

2.1.2 Formulate search statement

With the search terms created in 2.1.1, a search statement was created for the main literature search.

"Knowledge sharing" AND ("the new way of working" OR "het nieuwe werken" OR "NWOW" OR "NWW" OR "HNW")

This search statement combines the two research areas, knowledge sharing and a combination of several different search terms for NWOW.

2.1.3 Estimate search parameters

Duff mentions 4 different search parameters that can be used in a literature study, these are

1. Spatial parameters
2. Temporal Parameters
3. Disciplinary parameters
4. Formal Parameters

I will discuss each of these parameters in detail and show why they are either used or not used.

- The **spatial parameter** is about from where should the information come from? NWOW is something that is mostly researched in the Netherlands, however, because NWOW is such a small field of research, few articles are expected to be found, therefor I will not use a spatial parameter and will search for papers globally.
- The **Temporal parameter** is about the timeframe in which the research has been performed. Because NWOW is such a young research area; it started around 2002 when (Bødker & Christiansen, 2002) created the term 'New Ways of Working'; I will create a temporal parameter, looking only for papers created after 2002.
- The **Disciplinary parameter** describes the subject domains that the research is performed in. This parameter will not be used in this research in order to gain as many results as possible in this small field of research.
- The **Formal parameter** describes the types of information you choose, for example using only academic journals or books. Due to the nature of the current research into NWOW, the decision has been made to search for any information in relation to NWOW, so not only academic journals or conference publications are used, but also business literature, books and master theses that have yet to be officially published. This is done because there is no real platform yet to publish papers on NWOW and therefor the search should be widened to also include other sources of information. A strict distinction will be made between the different sources and in the discussion a section will be devoted to the confidence of these non-academic sources.

2.1.4 Search information sources

In this step, you determine what sources you are going to use. For this research it was decided to focus on the following sources:

- Google Scholar
- IEEEXplore
- ScienceDirect
- JSTOR
- SpringerLink

However during the research we discovered that Google Scholar searches in the other 4 sources as well, therefor the decision was made to only use Google Scholar.

2.1.5 Record and evaluate references

For this final step, Duff (1996) mentions that *critical thinking* must be applied in order to discriminate between references. For this he proposes the use of QRAQ, a critical thinking tool, which is an acronym that stands for Quantity, Relevance, Authority and Quality.

- **Quantity**: Quantity is an important aspect in this case, but cannot be influenced, due to the small amount of papers retrieved.
- **Relevance**: the relevance of this subject content is most important, because NWOW is a new concept in literature. Finding references to this subject with a high enough intellectual level is what creates a decent SLR. The recency aspect of relevance is negligible in this case due to the young character of NWOW.
- **Authority**: Due to the small amount of literature on NWOW, less is being looked at who wrote the information source, therefor also master theses will be used. Another aspect of authority is country of origin, since the Netherlands and the Scandinavian region are the main source of NWOW articles, the research will mostly look at these articles.
- **Quality**: Quality of the resources is important, therefor this research will look at the origin of the information sources, what source they come from and if they are trustworthy. The focus will mainly be on primary sources.

2.2 EXPERT INTERVIEWS

Due to the limited amount of information sources, gaps exist in the knowledge that we have about NWOW in combination with knowledge sharing. In order to fill these gaps in knowledge, an expert interview will be held, and several interviews of Bellefroid (2012) will be re-examined. These interviews by Bellefroid cover the same area as my research, and in order to not ask the same questions to the same people, I have chosen to use his audio tapes. If there are still questions, another interview will be required.

The interviews will be based on the semi structured interview style (Wood, 1997)(Robert Wood Johnson Foundation, 2014), in which a set of open questions will be defined that also enables further questions for more knowledge elicitation. The use of this method allows for the interviewer to go outside the predetermined questions and go into depth in subjects. It also allows the interviewee to express their view in their own terms.

The interview will be recorded and afterwards analyzed. This analysis will be done using NVivo, a software tool to analyses qualitative data.

The following list includes the interview I performed, and the interviews from the audio tapes from Bellefroid (2012).

- Tim de Vos from Veldhoen + Company who are experts on the area of the new way of working, and give advice on the topics of workplace innovation and cooperation. (Esten)
- Bart van den Hooff who is a professor and expert at organizational communication and information systems. (Bellefroid)
- Dik Bijl who is an esteemed author of business literature about NWOW, much of the literature found online is written by either Dik Bijl or Ruurd Baane (Bellefroid)
- Ruurd Baane who is an esteemed author of business literature about NWOW (Bellefroid)

2.3 MULTIPLE CASE STUDY

The third step of this research approach is to gather the actual data that will answer the research questions as mentioned in section 1.2. This data will be gathered by using the multiple case study method of Yin (2009), a highly used method by researchers (91624 citations) . Yin proposes the following framework to perform a case study research (Figure 3):

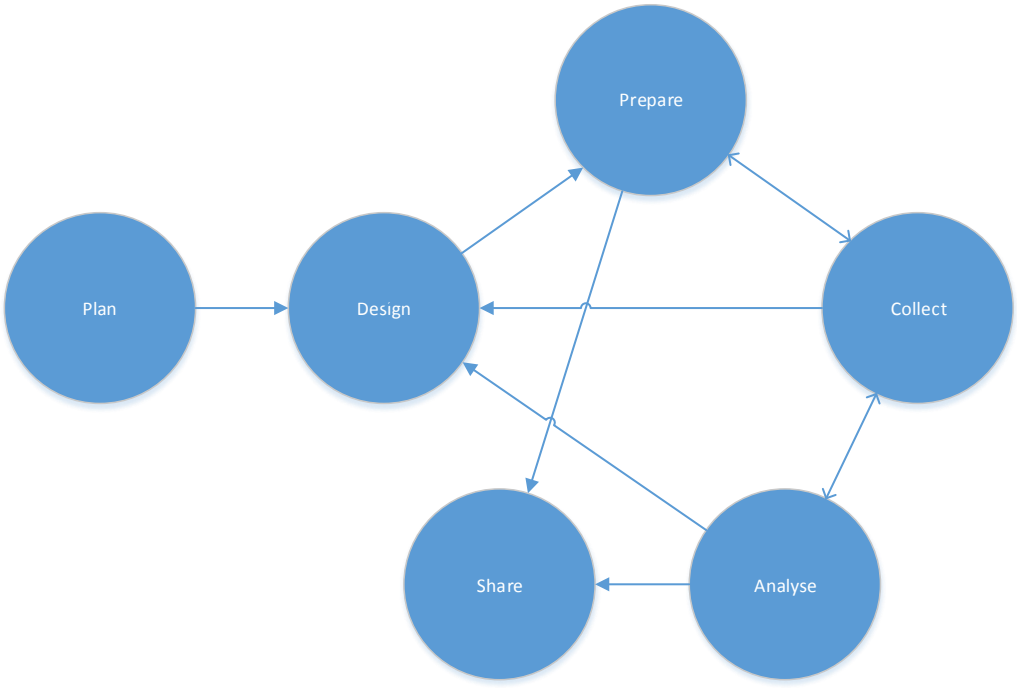

Figure 3: Multiple case study design

The first phase, 'Plan' entails identifying the research questions which we did in section 1.2 and understand the strength and weaknesses of this method. The second phase 'Design' covers defining the unit of analysis and the cases to be studied, develop theory underlying the anticipated study, identifying the case study design (single, **multiple**, holistic or embedded), and defining the procedures to maintain case study quality. The

third phase 'Prepare' is to educate yourself in case study research, to develop a case study protocol and if possible conduct a pilot case to iron out the kinks. The fourth phase 'Collect' is about following the case protocol to gather the data, in which you use multiple sources of evidence and create a case study database in which you store your results (in this case, this will be done in NVivo, a qualitative analysis tool). The fifth phase 'Analyze' entails using theory to interpret the data, analyses by using either qualitative or quantitative methods, fitting to your research, and explore rival explanations.

The multiple case study research protocol has been chosen because of its strength in research outcome, it uses the triangulation principle (Blumberg, Cooper, & Schindler, 2011) by gathering data from multiple sources, and each source is gathered by interviewing multiple people on the same subject.

The data will be gathered by using the same interview method (Wood, 1997) as in the expert interviews, however the company interviews will be a bit more controlled in order to get more structured data. The semi-structured interviews will be held in the exact same order as mentioned in the interview guide. The interview guide will not be changed between interviews to guarantee that the order of questions stays the same. If all the interviews are held in the same order of questions, the same information is provided to the interviewees.

Before the interviews take place, company information needs to be elicited in order to gain a better understanding of what the company does, what the interviewees' functions are and what those entail. The company information will also include an NWOW assessment, which is in the form of a questionnaire created by Arjan de Kok and Jonas Koops. This will decide in what phase a company is in the implementation of NWOW principles. I will explain the NWOW monitor in more detail in the next section. The company information will be used in the interpretation of the results from the interviews.

For the interviews an interview guide is created in consultation with the supervisor in order to elicit the needed information to answer the research questions. The companies will be interviewed in the following structure:

Each of the interviews will be recorded for later processing. The interviews will be stored as audio streams in NVivo and will be tagged in order to easily retrieve the correct data. From this the analysis will be performed, to gain an answer to the research question.

2.3.1 NWOW Monitor

The NWOW monitor was created by Jonas Koops as a bachelor thesis project in order to see in what phase of implementation companies are (Koops, 2012). This monitor has been used to assess several companies on their NWOW implementation and will be used in my research in order to investigate the effect of NWOW implementation stages on knowledge sharing practices.

The monitor works on the basis of the NWOW framework, that defines three dimensions: Bricks, Bytes, and Behavior (Baane, Houtkamp, & Knotter, 2010b), standing for the principles of office design, IT infrastructure, and company culture and agreements between employees and management. For each of these dimensions several aspects are chosen, mentioned in Table 1.

Table 1: Brick, Bytes & Behavior aspects:

BRICKS	BYTES	BEHAVIOR
Flexible work location	Devices	Result-based steering
Workplace design	Information availability	Result-based working
Sustainability & Mobility	Knowledge availability	Trust & autonomy
	Communication	satisfaction & fulfillment
	Collaboration	Culture & motivation

In each of these aspects several statements are presented on the current situation at the company with a 4 point Likert scale varying from not true, to completely true. There is also the same statement for the future, asking about the importance of these aspects in a future implementation, once again on a 4 point Likert scale varying from not important to very important.

The result of these statements is than analyzed in the NWOW monitor excel sheet and gives a result on the basis of a maturity model. A maturity model calculates the maturity of a certain situation and can be used in many situations, from supply chain management, to software product management. The NWOW monitor is based partly on the CMMi that proposes different maturity levels.

This model has been adapted to many different situations and is the foundation of the NWOW monitor, in essence it gives you the maturity score of the current situation of the three dimension from Baane et al. but it also shows the improvements that companies find important.

In general maturity levels are indexed at the base of the level, for example if you are at maturity score 3,1 or 3,9 does not really matter, both are at a maturity of level 3. However because there is not enough validation on this model, I will be using the un-standardized scores like 3,1 and 3,9.

2.3.2 Interviewees

For the interviews I looked for knowledge workers within large companies. In order to gain a good overview of the different types of workers, I have two companies with interviewees at management level, but with a focus on performing the normal work themselves, and three companies with interviewees at the general workforce level (Table 2). I have added this distinction in order to better analyze the results since management is still part of their work.

Table 2: Company overview in management and non-management interviewed

COMPANY	MANAGEMENT	NON-MANAGEMENT
POSTNL	X	
SOGETI		X
EY		X
COMP. X		X
KPMG	X	

2.3.3 Interview topics

Within the interview, the goal is to elicit information about who the interviewee is, at what department or company he is working, what the current knowledge sharing possibilities are, what kind of knowledge sharer the interviewee is and finally to find out what knowledge types the employee has, shares, how he shares it and an example from a knowledge area. For this part of the matrix by Alavi & Leidner (2001).

2.3.4 Interview analysis

In this final section of the research approach, the interview audio files will be imported into NVivo, a qualitative analysis tool that assists in structuring the interviews by tagging important pieces of information and from that an analysis can be performed that gives an insight into the interviews. The outcome of the analysis will be in the form of a predetermined framework that will paint a clear picture if there is a difference in the knowledge that employees share.

2.4 PLANNING AND DELIVERABLES

2.4.1 Planning

Figure 4 gives an indication of the planning that I used for this thesis, however there was a large delay due to the companies that were available at a much later time. (September/October instead of July/August)

ID	Task Name	Start	Finish	Duration
1	Create Long Proposal	1-5-2014	14-6-2014	45d
2	Find companies	1-6-2014	14-6-2014	14d
3	Systematic Literature Review	1-6-2014	1-7-2014	31d
4	Expert Interviews	1-7-2014	14-7-2014	14d
5	Transcribe & Analyze expert interviews	3-7-2014	16-7-2014	14d
6	Create interview guide for company interviews	15-7-2014	18-7-2014	4d
7	Create company information	15-7-2014	21-7-2014	7d
8	Do company interviews	23-7-2014	22-8-2014	31d
9	Transcribe interviews	25-7-2014	24-8-2014	31d
10	Stsructure + Analyze transcriptions	25-8-2014	7-9-2014	14d
11	Create conclusions	8-9-2014	14-9-2014	7d
12	Write Final Theses	15-9-2014	30-9-2014	16d

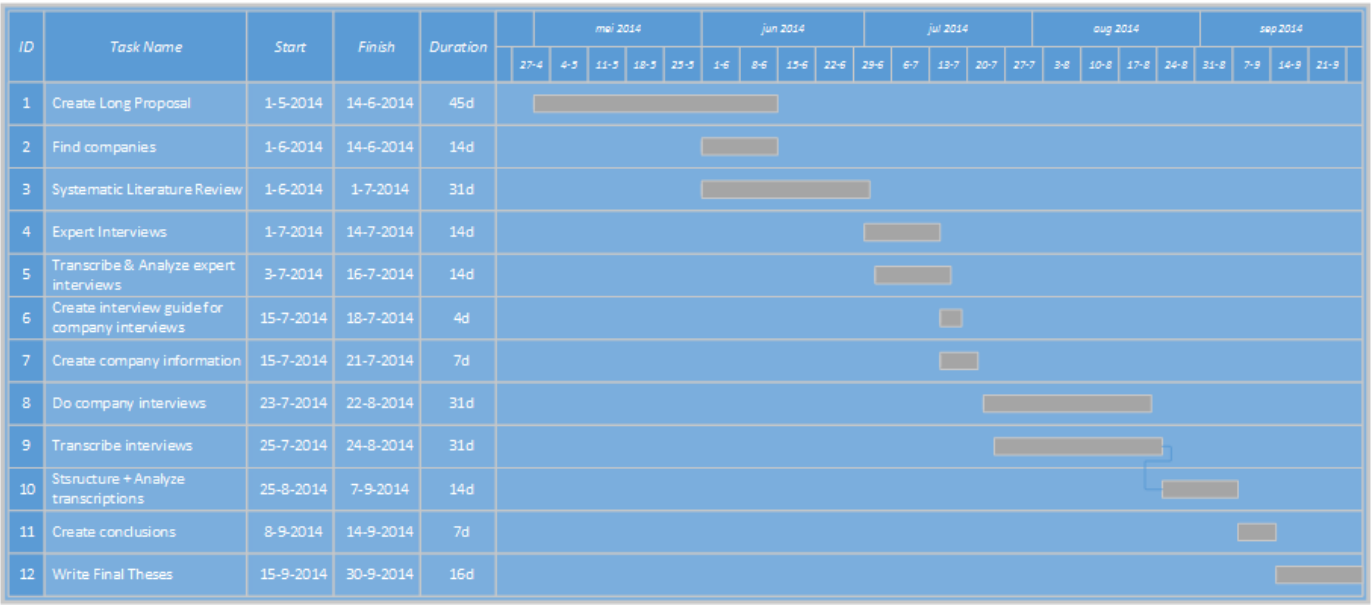

Figure 4: GANTT planning chart

2.4.2 Main deliverables

This thesis aims to provide the following deliverables

- *Long proposal containing the literature study, with references in Mendeley, a reference manager.*
- Interview reports with the experts
- Interview guides for the company interviews

- Interview data from the company interviews will be delivered in NVivo, a tool that supports qualitative research.
- Final thesis report
- A proposition for the ideal combination of tacit and explicit knowledge in NWOW implementation phases.

2.5 SUPERVISORS

For this thesis project there are two supervisors.

- **first supervisor** A. de Kok MBA, HQ-Consult and Ph.D. at Utrecht University
- **Second supervisor** prof. dr. ir. R.W. Helms, Utrecht University

Remko Helms will be the daily supervisor since Arjan de Kok is an external Ph.D. and therefor is not at the university on a regular basis for discussions and immediate feedback.

3 THEORETICAL BACKGROUND

During the literature study, a promising number of articles was found, however after careful consideration, many of the articles had a different meaning in the new way of working. Many of the articles found described a change in the way that employees work and call it a new way of working, giving the impression that they are about the topic of NWOW. Due to this, the initial number of 858 articles was reduced to 41 articles that looked to be about knowledge sharing and NWOW. Of these 41 articles, only 19 are published, 1 is a book section and 21 are master theses.

After reading the 19 published articles, many were about knowledge sharing and 'a new way of working', however they did not correspond to the principles of NWOW. Finally 5 of the 19 published articles are usable within the literature study. Due to this low number of articles we have decided to use the master theses to get a deeper insight into the workings of NWOW and knowledge sharing. Secondly, we are looking into papers about NWOW and knowledge sharing as separate subjects and see how we can connect these through the use of expert interviews.

In this section I will first explain what NWOW is and where it comes from, how we can classify NWOW and what are the benefits and drawbacks of implementing NWOW in a company. Then I'll discuss what knowledge sharing is, beginning with the definition of knowledge itself, then I will discuss what the different types of knowledge are, the factors that are of influence on knowledge sharing and the different frameworks that are used to classify knowledge sharing. I will quickly touch the subject of knowledge workers, how IT can support knowledge sharing and finally the combination of knowledge sharing and NWOW will be presented.

3.1 NWOW

In this section I will discuss the literature on the new way of working, what is it, where does it come from and what are the mentioned advantages and disadvantages of using NWOW.

3.1.1 What is NWOW?

The new way of working has many definitions, one of the first definitions is that of (Bødker & Christiansen, 2002), who describe the New Ways of Working as follows:

> *'New work' is characterized by a mobile, networked technology, project-managed organization, and new office designs. The office designs are explicitly motivated by the wish to facilitate creativity, knowledge sharing and communication, carried out across a variety of settings: office, home, airports, coffee shops and cars.*

Bijl (2009) is one of the major authors on the area of NWOW and has written an extensive book on it, he defines NWOW as a vision:

> *A vision for making work more effective, efficient, pleasurable and valuable for both the organization and the individual. Giving employees more*

freedom on how, where & when, with what and with whom they accomplish their work.

As mentioned, there are many definitions for NWOW, Bellefroid (2012) compared 6 of these definitions and analyzed the different aspects of each of these and created a matrix. Within this matrix you can clearly see what the most important aspects are (those that are used in multiple definitions) and those that are less relevant. From this he created one overall definition that includes the most important aspects.

NWOW is a vision for organizations to work more efficient and effective by providing employees with all required facilities, giving more freedom and flexibility to work time and location independent and steering on results, utilizing and developing employees' capabilities in an optimal way, creating a higher work enjoyment.

For the remainder of this research, I will use this definition as the foundation of what NWOW is, and will explain the aspects of NWOW in relation to it.

3.1.2 Where does it come from?

The new way of working has a long history, but under different names and incomplete until 2002(Bødker & Christiansen, 2002). However it is good to understand the history of NWOW and the several aspects that finally formed it.

Niles was one of the first to describe telecommuting (Nilles, 1975), one of the aspects that is related to NWOW. Telecommuting was defined as (Mokhtarian, 1991):

Telecommuting is working at home or at an alternate location and communicating with the usual place of work using electronic or other means, instead of physically traveling to a more distant work site.

This term was later changed to teleworking, because this fitted better to the developments in the field. Teleworking was defined as (Sullivan, 2003):

Telework is remote work, it involves the use of information and communication technologies

This definition is a lot broader than that of Mokhtarian, as it just refers to remote work by anyone by using IT possibilities, whereas she defines it as one person working remotely with the people that do not work remotely. Sullivan also gives project-specific definitions, understanding that for certain sectors, this generalized definition does not always apply.

Telecommuting and teleworking were initially devised to handle the increase of traffic, due to the increase in privately owned cars and the shortage of fuel. But traffic was not the only thing that was improved due to teleworking, it also showed an increase in productivity and quality of work and overall employee morale (Bailey & Kurland, 2002; Hughson & Goodman, 1986) . Teleworking was first used in organizations as a strategy to decrease real estate costs, allow for a healthier work-family balance, and for the 1990 American Disabilities Act (Bailey & Kurland, 2002). Teleworking was a precursor to virtual work.

As mentioned, the term NWOW as we know it today was first used in 2002 (Bødker & Christiansen, 2002), but it lost some momentum there, and was not really picked up until Bill Gates wrote a white paper called 'the new world of work' (Gates, 2005)(D. Bijl, 2011). In this paper, Gates describes how technology can help to improve the way we work, because software will improve in the areas of support and helping set priorities in ones work. Gates wrote this article at the time the Dutch division of Microsoft was moving to a new building and they used his ideas to design it. This white paper also increased the interest in this topic in the Netherlands and caused many researchers to write about the subject.

Bijl (2009)describes the origins of the term NWOW, and mentions that the second origin (the first one being the whitepaper by Gates) of NWOW comes from Veldhoen (2005). In his book, Veldhoen describes his vision on NWOW in which he distinguishes between three environments:

- Physical
- Virtual
- Mental

These three environments can be translated to office, information technology and people. In the next section I will expand on this and several other views on how to classify NWOW.

As mentioned before, NWOW was especially well researched in North-West Europe, especially in the Netherlands and in the Scandinavian area. De Kok (de Kok & Helms, 2012) mentions 4 cultural dimensions that are required for NWOW to be successful:

- Power distance
- Individualism vs. Collectivism
- Masculine vs. Feminine
- Uncertainty avoidance

Since companies in the Netherlands generally adhere to a horizontal power structure, the power distance is low, which is required for NWOW to be applicable. Individualism is one of the Netherlands great strengths, also a main requirement for NWOW, just as being a more feminine country, leading to less competitive behavior internally and less assertive behavior. Lastly uncertainty avoidance is what the Dutch score highly on, leading to the perfect situation for NWOW. Another reason according to Bijl (2009) is the high concentration of home IT, meaning that over 90% has a home computer and 80% has a broadband internet connection.

Steve Ballmer once said concerning NWOW while visiting the new Dutch headquarters of Microsoft:

"This is great! But it will never work in the States"

Reiterating on the above mentioned differences in cultural dimensions, America having a high power distance, more focus on collectivism and a more masculine society.

3.1.3 Classify NWOW

NWOW can be classified using several frameworks, each using different but similar dimensions on which to focus. The overall literature is separated in three dimension frameworks and four dimension frameworks.

3.1.3.1 Three dimensions

There are three frameworks within this section, who all mentions the same three aspects but verbalize them differently. The most known framework is that of Baane et al. (2010b) who mentions 'Bricks, Bytes and Behavior'. Which are more or less identical to those of de Kok (de Kok & Helms, 2012) 'physical, technical and personal dimensions' and Pous & van der Wielens'(2010) 'Physical, Information and Social domains'.

3.1.3.2 Four dimensions

There is also a framework that works with four dimensions, created by Bijl (2009). He mentions the following four dimensions: 'ICT, physical work environment, organization and people (or personal mentality)'. Two of the four correspond to the three dimensions frameworks mentioned above. However the behavior aspect of Baane et al. (2010b) can be seen as split up in two dimensions in that of Bijl. Where organization and culture can be seen as behavior, however Bijl gives a reason why he splits it up into one more dimensions. He says that Organization is the most important dimension because the other three revolve around it, but that Organization is also the most ignored NWOW principle.

For the remainder of this research I will be using the three dimensions framework from Baane et al. (2010b), because it gives a good overall definition of NWOW and due to the questionnaire I am using in order to measure the score of NWOW implementation in companies. The NWOW monitor created by de Kok uses the three dimensions: Bricks, Bytes and Behavior in order to capture the implementation score of companies, and the possible steps that can be taken in order to improve. I will therefore go more in-depth on this framework.

3.1.3.3 Bricks, Bytes and Behavior

The **Bricks** dimension refers to the working environment and its facilities. Veldhoen +Company (Hartmans & Kamperman, 2009) have coined the term activity-based working (ABW), which they define as:

> *The activity-based work approach entails putting the activity at the center and giving employees the leeway to choose when and where they perform that activity and make their own decisions, focused on the best result for their clients and colleagues.*

Within ABW, they advise to design the workplace for all possible activities that an employee has to perform. For example, create meeting rooms for meetings, a big open room for normal work in which employees can walk up to each other for questions or knowledge sharing, concentration booths in which employees can sit individually to concentrate on a job without being disturbed. In order to stimulate knowledge sharing which is also a work situation, relaxation hubs and chat places should be implemented. In short, for each type of activity, an acceptable working space should be available.

An investigation by Appel-Meulenbroek et al. (2011) on the use of different workplaces, one of their results was that workplaces meant for a certain activity are not always used predominantly for that activity, which could result in a loss in productivity, increased illness and dissatisfaction. The cause of this is according to them the lack of good ergonomics and availability of the appropriate IT facilities but also the personal preference of employees of where to work.

Another aspect of NWOW is time and location independent working, pushing companies to rethink their business hours and opening offices longer hours. For example people have different optimal working hours, some work better in mornings, other work better in evenings. In order to optimize working efficiency, offices should support this by opening earlier and close later.

The **Bytes** dimension refers to the use of information technologies in order to support employees in their work, including hardware, software and information. The Bytes dimensions also corresponds with the ABW of Veldhoen +Company, it is required to support employees in their activities, if it be working from a remote location and requiring a direct link to internal systems, or assisting employees in having presentations and conference calls. In the current work environment it is necessary for an employee to always have access to the content that he needs, wherever he is and on whatever device. In 2011, Techcrunch (Perez, 2011) posted an article on the adoption grade of smartphones and Europe had a penetration level of 51%, that is now 3 years ago and it is expected that this number has increased dramatically. This leads to a new way of using IT systems for employees that require more and more work to be done remotely from their phone or tablets.

The **Behavior** dimension refers to the people within the company and the human-work relation. According to de Kok (2012), the most important aspects are autonomy of the employee, delegation of responsibilities (empowerment) and result-based work agreements. In recent years work has been about hierarchy and managerial control, however this has changed to freedom and mutual trust. This leads back to section 1.1.2 and the four cultural dimensions, making the Netherlands a good candidate for NWOW.

Empowerment has many definitions, therefor I refer to the definition by Lee & Koh (M. Lee & Koh, 2001) who've combined many definitions into one:

> *The psychological state of a subordinate perceiving four dimensions of meaningfulness, competence, self- determination and impact, which is affected by empowering behaviors of the supervisor.*

This definition has 4 aspects, meaningfulness, competence, self-determination and impact, in other words make people feel meaningful; the belief of people in their own abilities; giving people the choice of what work to perform; and the perception of degree of influence on strategic, administrative or operating outcomes. This definitions always refers to the relationship between supervisor and subordinate, and not between peers, which falls under the definition of encouragement.

From a managerial standpoint, empowerment is giving the employee the power to do his work as he sees fit and only guiding them in the larger lines of work. No more micro management is allowed since this reduces the competence dimension of the employee.

One important aspect that is directly linked to empowerment is result-based work agreements, or result driven work (Baane et al., 2010b), when you empower employees according to the definition by Lee & Koh, some rules need to be created, in the form of agreements. These agreements are about what and when results need to be delivered. For example, a manager makes an agreement with his employee that a job with these requirements has to be handed in at a certain future date. How or when the employee performs this work is for him to decide, as long as it is finished in time with adequate quality.

Appel-Meulenbroek et al. (2011) describe that interaction is an important part of knowledge sharing in NWOW environments and most profoundly informal interaction, where a high amount of knowledge and information is shared .

3.1.4 Benefits

Research done by Erasmus University and Novay (van Heck, van Baalen, van der Meulen, & van Oosterhout, 2011) mentions the difference between the expected top 5 of effects and the realized effects (Table 3). It shows the percentage of organizations that planned to implement NWOW components, and that have realized this.

Table 3: Top 5 benefits of NWOW, expected and realized in 2011

EFFECT	EXPECTED	REALIZED
Increased employee satisfaction and/or involvement	54%	40%
Improved work/life balance	48%	40%
Improved employers image (44%)	44%	32%
Increased productivity (41%)	41%	25%
Reduced housing costs (37%)	37%	34%

Table 3 indicates that the overall difference between expected and realized effects is not significant, there are small differences meaning that the goals that companies have set themselves are almost at their target.

In the 2014 version of this report (Van der Meulen, 2014), we get very different result (Table 4). Here we see large gaps between expected value and realized value, either meaning that the expectations were set too high, or not enough is achieved.

Overall these realized effects show a good picture of what the benefits are of using NWOW.

Table 4: Top 5 benefits of NWOW, expected and realized in 2014

EFFECT	EXPECTED	REALIZED
Increased employee satisfaction and/or involvement	68%	40%
Improved work/life balance	68%	44%
Attractive employer Image	64%	15%
Improved employee well-being	64%	36%
Reduction of office costs	60%	32%

Another research by PwC gave the following positive macro-economic effects after implementing NWOW principles.

- Increased employee productivity
- Increased labor participation
- Decrease commuting time
- Decrease in CO2 emissions
- Decrease in environmental noise
- Decrease in traffic accidents
- Decrease in infrastructure maintenance

Blok et al. (2011) report an increase in communication between employees as being one of the biggest benefits of the flexible office environment, however they do mention that it is unknown if this will result in an increase in performance.

3.1.5 Drawbacks

Wherever there are benefits there are usually also drawbacks, Bijl (2011) mentions 5 possible side effects of implementing NWOW principles:

- *Pragmatism:* There is a chance that the work becomes too pragmatic when managers only use result agreements to manage employees.
- *Soloist behavior:* If everyone is only working with result agreements, everyone is working for themselves and forms one-man-bands. This is relatively averted by including targets on group and departmental level, instead of only on individual level.
- *Social cohesion disappears:* Because everyone starts working at different places and times, one-on-one communication disappears and this can lead to a loss of social cohesion. There is no more 'we' feeling. If there is no 'we' feeling, employees can feel lost and this can reduce productivity. (Gajendran & Harrison, 2007)
- *No division between work and private life:* If there is no 9-5 mentality anymore, nor a fixed work location, people tend to bring their work home to do it there, outside normal working hours. This can lead to problems at the home situation, where the family requires more of your attention than you can give. However this can also be seen as a benefit, since it gives people the flexibility to be more available during the day for their families.

- *Never stop working:* Enabling employees to work at any time leads to the danger that employees will work all the time. Especially when NWOW has just been implemented and the employee is empowered, he might think he needs to perform extra work in order to please his manager.

3.2 KNOWLEDGE SHARING

In this section I will discuss the literature on knowledge sharing, what is it? Where does it come from? What are the solutions that are being used to improve knowledge sharing?

3.2.1 What is knowledge

In order to discuss what knowledge sharing is, knowledge in itself first needs to be defined. One of the most commonly used frameworks to explain what knowledge is, is that of Rowley (2007), he explains the concept through the DIKW pyramid, which stands for Data, Information, Knowledge and Wisdom. See Figure 5 for the pyramid.

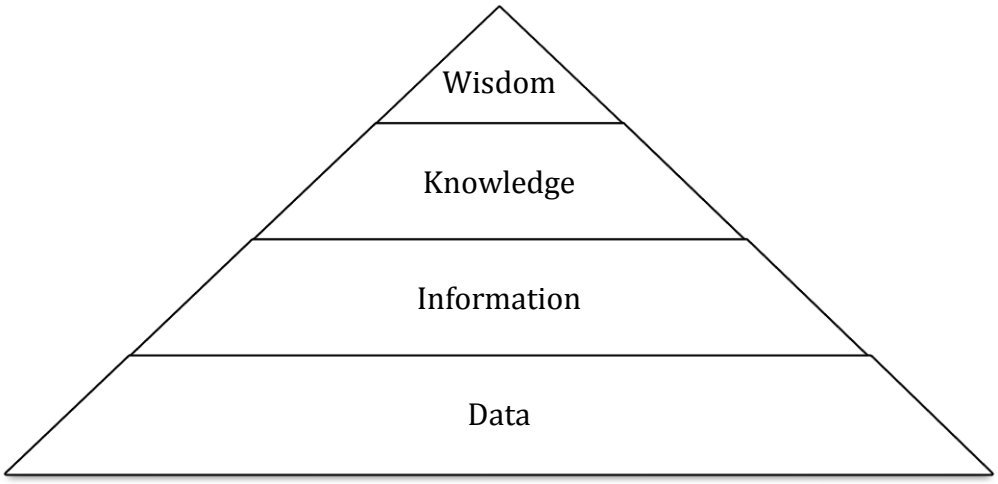

Figure 5: DIKW Pyramid

As can be seen from this pyramid, it builds up from data to wisdom. The most used explanation of these four concepts comes from Ackoff (1989), who describes the four as follows:

- Data are defined as symbols that represent properties of objects, events and their environment. They are the products of observation. But are of no use until they are in a useable (i.e. relevant) form. The difference between data and information is functional, not structural.
- Information is contained in descriptions, answers to questions that begin with such words as who, what, when and how many. Information systems generate, store, retrieve and process data. Information is inferred from data.
- Knowledge is know-how, and is what makes possible the transformation of information into instructions. Knowledge can be obtained either by transmission from another who has it, by instruction, or by extracting it from experience.
- Wisdom is the ability to increase effectiveness. Wisdom adds value, which requires the mental function that we call judgment. The ethical and aesthetic values that this implies are inherent to the actor and are unique and personal.

Hislop (2005) has a slightly different explanation of first 3 stones of the DIKW pyramid:

- “Data is raw numbers, images, words and sounds which are derived from observation or measurement.”
- “Information is defined as a layer on top of data representing data arranged in a meaningful pattern, data where some intellectual input has been added.“
- “Knowledge, the third level in the knowledge pyramid can be seen as another layer of intellectual analysis on top of data and information. Here it is interpreted, meaning is attached, and it is structured and linked with existing systems of beliefs and bodies of knowledge.”

Uriarte Jr. (2008) describes the same four concepts, however he does not talk about a pyramid but as a flowing line from data to wisdom (Figure 6).

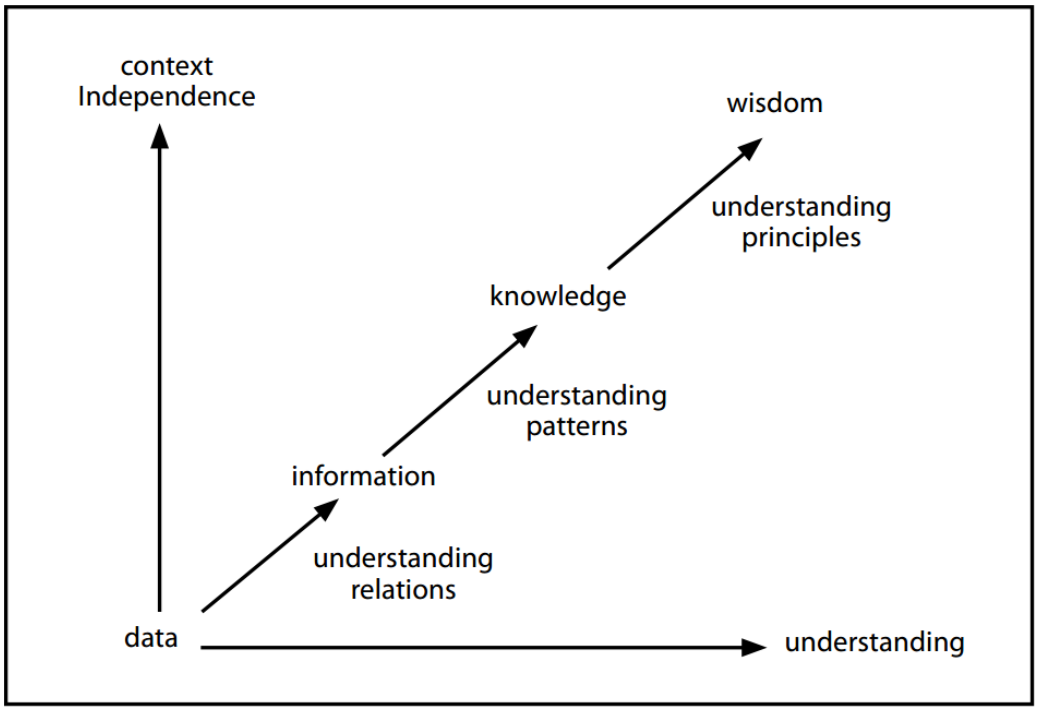

Figure 6: Data, Information, Knowledge, and Wisdom according to Uriarte Jr. (2008) in relation to context and understanding

These explanations of the different levels of the DIKW pyramid give a good insight into where knowledge fits in relation to others, however it still does not give a good definition of what knowledge really is. Therefor we look at the different definitions that can be found in literature.

Davenport & Prusak (1998) Mentions the following definition:

> *“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 organizations, it often becomes embedded not only in documents or repositories but also in organizational routines, processes, practices, and norms.”*

This definition encompasses three of the most important aspects of knowledge; it comes from the heads of people; it is mostly context specific; and it is required to understand new situations.

3.2.2 What are the types of knowledge that are shared?

Now that we have a working understanding of what knowledge is, something which people possess, we can expand on this by examining the different types of knowledge. To start this section I will present a quote by Polanyi(1966):

"We can know more than we can tell"

He explains this quote with the following example: We can recognize a face among thousand others, even millions, however it is hard to explain why we recognize this face. So not everything that we know, we can explain, to ourselves or to others.

This leads to the first distinction of knowledge types, **explicit knowledge** and **tacit knowledge.** Nonaka (1994) explains these two types of knowledge as followed:

- Explicit or codified knowledge refers to knowledge that is transmittable in formal, systematic language
- Tacit knowledge has a personal quality, which makes it hard to formalize and communicate. Tacit knowledge is deeply rooted in action, commitment, and involvement in a specific context.

In easier words, explicit knowledge is knowledge that can be easily transferred between people and systems, take for example work reports or how the different parts of a bike match together. On the other hand there is tacit knowledge, which is personal knowledge that is not easily shared and is acquired through study and experience. If we follow the example of the different bike parts, which is explicit knowledge, tacit knowledge then refers to knowledge about how to ride a bike. Riding a bike is something that is almost impossible to explain to someone else, you learn this tacit knowledge by trial and error, by experiencing the action and learning from it.

Hislop (2005) gives a short overview of the different characteristics of tacit and explicit knowledge in his book, explaining shortly what the most important differences are. See Table 5 for more information:

Table 5: Tacit & Explicit knowledge and their aspects according to Hislop (2005)

Tacit knowledge	Explicit knowledge
Inexpressible in a codifiable form	Codifiable
Subjective	Objective
Personal	Impersonal
Context specific	Context independent
Difficult to share	Easy to share

Another framework of knowledge types is that of Spender (1998), who makes a clear distinction between individual and social knowledge. He proposes the following four knowledge types:

1. Individual/explicit (conscious) knowledge
2. Individual/implicit (automatic) knowledge
3. Social/explicit (objectified) knowledge
4. Social/implicit (collective) knowledge

Another framework that can be used is that of Empson (2001), who gives the following oversight of the different types of knowledge (Hislop, 2005)(Table 6).

Table 6: Knowledge types according to Empson (2001)

Types of knowledge	**Sub-categories**	**Description**
Technical knowledge	Sectoral	Technical knowledge, commonly understood and shared at a sectoral level by staff from a range of companies.
	Organizational	Organization-specific knowledge, such of company products, processes, routines, and procedures.
	Individual	Personal knowledge acquired through formal education or work experience.
Client knowledge	Industry level	Knowledge of industry-level factors, such as the factors shaping the dynamics of competition.
	Company	Knowledge of specific organizations, such as having an understanding of and sensitivity to their cultures and ways of working.
	Individuals	Having a knowledge of and acquaintance with the key individuals in specific organizations.

The last framework I will show is that of Alavi & Leidner (2001) who gives a very extensive taxonomy of the different types of knowledge. He has some overlap with previously mentioned frameworks but also adds new insights;

Table 7: Knowledge types according to Alavi & Leidner (2001)

Knowledge types	Definitions	Examples
Declarative	Know-about	What drug is appropriate for an illness
Procedural	Know-how	How to administer a particular drug
Causal	Know-why	Understanding why the drug works
Conditional	Know-when	Understanding when to prescribe the drug
Relational	Know-with	Understanding how the drug interacts with other drugs
Pragmatic	Useful knowledge for an organization (know-what)	Best practices, business frameworks, project experiences, engineering drawings, market reports

Table 7 shows that they have a distinction of knowledge types, know-about, know-how, know-why, know-when, know-with and know-what. Each of these refers to a different view of knowledge. Especially in this area, useful questions can be created in order to gather data in the multiple case-study research later on, therefor I will use this framework of Alavi & Leidner.

3.2.3 What is knowledge sharing

Now that we have a decent understanding of what knowledge is and what the different types of knowledge are, we can ask the next question, how is this knowledge shared?

Knowledge sharing as a subject is well described in literature, below is a list of different definitions of knowledge sharing:

- "We define knowledge sharing as activities of transferring or disseminating knowledge from one person, group or organization to another. " (Lee, 2001)
- "We define knowledge sharing as individuals sharing organizationally relevant information, ideas, suggestions, and expertise with one another." (Bartol & Srivastava, 2002)
- "Knowledge sharing involves the generation and exchange of new ideas, concepts, and insights, often with the implication of meaningful action (e.g., solutions to a problem)." (Bosua & Scheepers, 2007)
- The activity in which participants are involved in the joint process of contributing, negotiating and utilizing knowledge. Knowledge sharing is a joint process in nature because participants need to be engaged in the process if they really want to share knowledge." (Li, 2010)

There is some disparity in the different definitions, for example the definition by (Bartol & Srivastava (2002) defines knowledge sharing purely for individuals, while the other

definitions take a more broad view and encapsulate groups (J.-N. Lee, 2001), or even completely avoid mentioning a source and destination (Bosua & Scheepers, 2007).

Ipe (2003) gives a more thorough definition that also includes the conversion of knowledge from one form to the other and talks about an intention to share. "Knowledge sharing between individuals is the process by which knowledge held by an individual is converted into a form that can be understood, absorbed, and used by other individuals. The use of the term sharing implies that this process of presenting individual knowledge in form that can be used by others involves some conscious action on the part of the individual who possesses the knowledge."

In literature there is a distinction between knowledge sharing and knowledge transfer, which Bosua & Scheepers (2007) describes, he gives the definition of knowledge transfer as follows: "Knowledge transfer has been defined as the movement of knowledge between its origin and destination within a specific context." Which is a unidirectional action, from sender to receiver, no intentionality of the knowledge and it lacks the process of creation and dissemination of mage through the exchange. Think of knowledge-transfer as an e-mail sent from one person to another, the actual sharing, pressing the send button, does not create new knowledge, it just transfers it.

3.2.4 Factors of influence on knowledge sharing

Sharing does not always occur without problems, there are several factors that can influence if people share and what people want to share. Ipe (2003) distinguishes between 4 major factors that can influence the level of knowledge sharing within a company and between individuals.

- The nature of knowledge. Knowledge exists in tacit and explicit form and is valued differently from each other. This value determines if and or how certain knowledge is shared. For example, some workers think their knowledge is an asset that once shared makes it less valuable, and therefor might not be shared.
- Motivation to share. This can be subdivided into two factors, internal factors and external factors. Internal factors are associated with the willingness to share and the possibility of reciprocity in knowledge sharing. External factors are associated with personal relationships and reward systems.
- Opportunities to share. Opportunities can be divided into two categories, formal and informal. Formal opportunities are created by the company in order for employees to share knowledge, these opportunities include training programs, IT possibilities and structured work teams. Informal knowledge opportunities are for example personal relationships and social networks that increase knowledge sharing.
- The culture of the work environment. Each company has its own culture and the above-mentioned factors are all influenced by the culture.

Ipe describes these factors not as factors standing alone, but each of the factors influences the others in how knowledge is shared within the company. He gives the following figure to show the different dependencies (Figure 7).

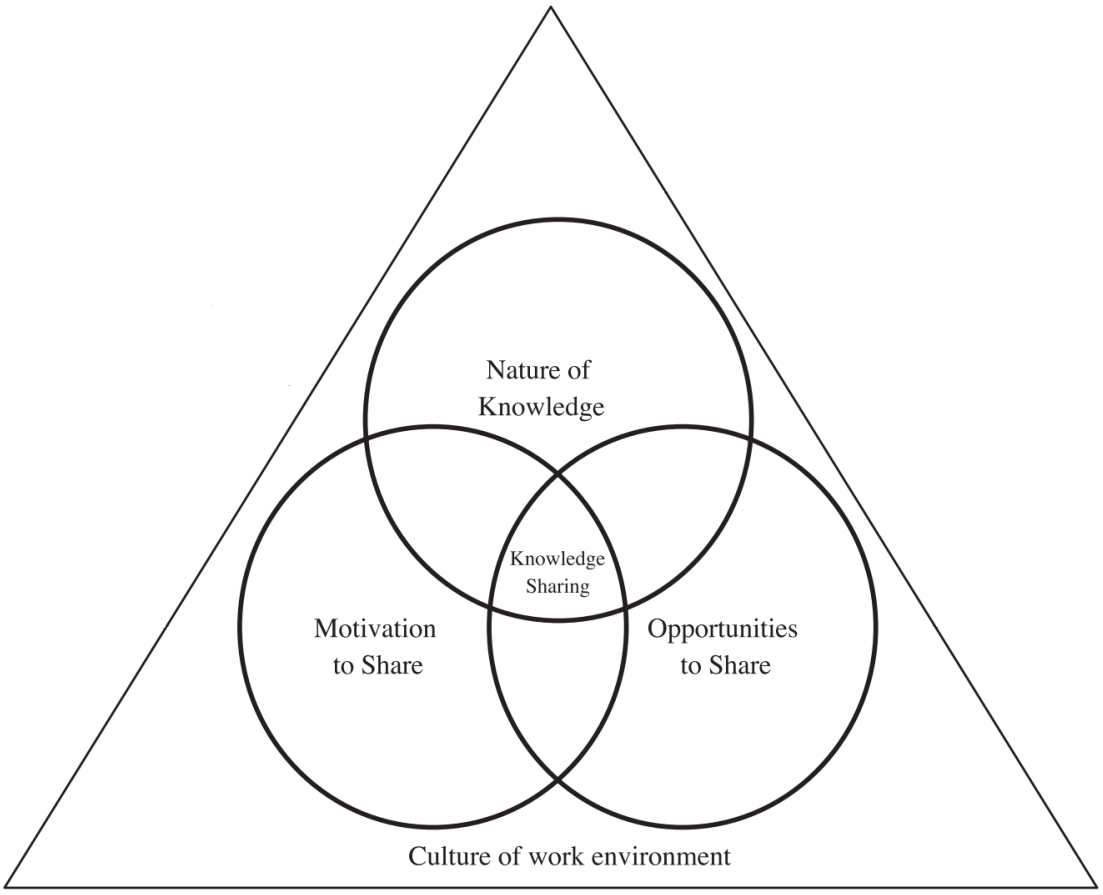

Figure 7: Knowledge dependencies and their interactions

3.2.5 Different frameworks for knowledge sharing

To go deeper into the subject, I need to discuss the different ways people share knowledge, for this there are several framework to work with. The first is that of Greenberg & Roseman (2003) who work from the mind-set that in order to share knowledge, several variables should be taken into account, for Greenberg and Roseman this is about time and place independent sharing. Table 8 indicates that they have an overview of the different time and place possibilities indicating what the modus of knowledge sharing is for each possibility.

Table 8: Time and Place knowledge sharing exchanges

		Time	
		Same	**Different**
Place	**Same**	Face-to-Face	Ongoing tasks
	Different	Distributed interaction	Coordination

Another framework that works with the tacit/explicit types of knowledge is that of Nonaka & Takeuchi (1995), in which the knowledge exchange between the different knowledge types is illustrated. See Table 9.

Table 9: Tacit and Explicit knowledge sharing exchanges

		Knowledge	
		Tacit	**Explicit**
Knowledge	**Tacit**	Socialization	Externalization/ Codification
	Explicit	Internalization	Combination/ Communication

3.2.6 What are different types of knowledge workers?

In order to be able to take all variables into account when doing the interviews during the multiple-case study, I need be able to distinguish between the types of people I interview. So for example if I interview two people who have different results but who perform the same tasks and share the same knowledge, it might be because one has a completely different work mentality as the other.

First we need to define what knowledge work is, Greene & Myerson (2011) give the following definition:

> *This type of work depends less on following a repeating formula or script, and more on applying theoretical knowledge and learning in an unpredictable culture of collaboration, exploration, autonomy and initiative.*

From that we take a look at what knowledge workers are, Harrigan & Dalmia (1991) explain it as follows:

> *We define knowledge workers as key employees who create intangible value-adding assets, and who often transport those assets in their heads when they change employers.*

A better definition is that of Brown & Duguid (1996) who define it as "a 'learning person' who is at the core of knowledge transfer in an organization.". They also mention one of the key features of knowledge workers being increasing mobility and the consequences of this to the organization. How do you ensure good knowledge sharing when your knowledge sources are increasingly mobile and not available for (informal) knowledge sharing?

In order to make a distinction between knowledge workers, I use the framework presented by Greene & Myerson (2011), who distinguish between 4 different types of knowledge workers (Figure 8).

- *The Anchor:* sedentary office working, always in the office every day and likely to be found at their desk during this time. Usually the person people go to for information, therefor they have a vital role in knowledge transfer within an organization.
- *The Connector:* The needle and thread of an organization, spend the day in different places around the building (meeting rooms, café or at others' desks). Especially focused on interaction between departments
- *The Gatherer:* Relies on relationships gathered away from the office, is mostly located at clients or gathering information during appointments with external parties.
- *The Navigator:* Rarely in the office, works for the organization at arm's length. For example consultants performing longer jobs abroad, only visiting the home office to report in and leave again for the next job.

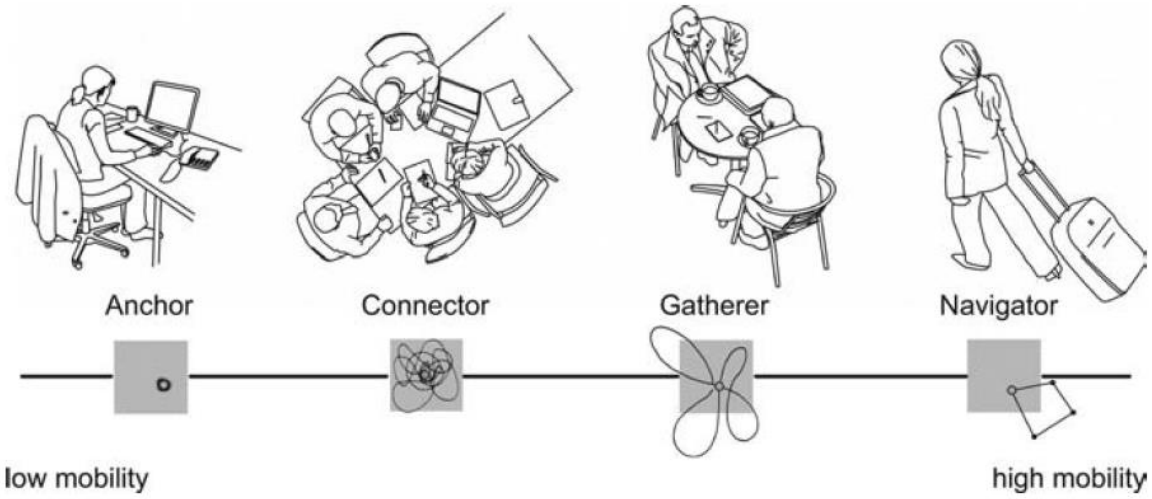

Figure 8: Different types of knowledge sharers

3.2.7 Knowledge sharing & IT

King (2006) says that knowledge management systems or KMSs can be primary enablers for of knowledge sharing in an organization. There are two important aspects for knowledge sharing support with IT solutions, namely the change between knowledge types, and supporting time and place independent work. Knowledge systems should support externalization or codification, in other words making explicit knowledge out of tacit knowledge, and combination or communication, in other words making explicit knowledge out of explicit knowledge(Nonaka & Takeuchi, 1995). One can argue that IT should also support socialization, the transfer of tacit to tacit knowledge, however this is more focused on non-IT solutions. Secondly for the time and place independent work, a solution needs to be found to allow employees to work together and share knowledge while not at the same location or time. Here three of the 4 quadrants of the time/place matrix are useful (see paragraph 3.2.5) (Greenberg & Roseman, 2003), the final quadrant, where time and place are the same, IT support should only focus on supporting presentations and direct interaction.

Marwick (2001) suggests several IT solutions for the different combinations of tacit and explicit knowledge sharing, even though this paper is quite old and new ways have emerged, it gives a good view of the possibilities (Figure 9).

Tacit to Tacit	**Tacit to Explicit**
E-meetings	Answering questions
Synchronous collaboration (chat)	Annotation
Explicit to Tacit	**Explicit to Explicit**
Visualization	Text search
Browsable video/audio of presentations	Document categorization

Figure 9: IT solutions for combinations of Tacit and Explicit knowledge

Alavi & Leidner (2001) discuss the different types of knowledge and IT solutions, and how they support the different types of knowledge use:

- Knowledge creation: which requires among others a virtual environment for discussion knowledge and creating new knowledge. For example social media or direct communication solutions like video calling.
- Knowledge storage/retrieval: IT systems that can store the knowledge that has been created and where employees can retrieve this knowledge for re-use purposes or further knowledge creation. Think for example of SharePoint environments.
- Knowledge transfer: IT systems that allow knowledge to transfer from one individual to the next. For example direct communication systems like mail, chat services or videoconferencing solutions.
- Knowledge application: IT systems that allow employees to easier apply the knowledge that is stored in Systems when they need it, for example by publishing manuals on the intranet for a job an employee is on.

3.2.8 Knowledge sharing in NWOW environments

In relation to the earlier framework of Bricks, Bytes and Behavior (Baane et al., 2010b), Hartmans & Kamperman (2009) propose a sharing framework based on flows, mental flow, virtual flow and physical flow. Virtual flow and physical flow are used as supportive flows for employees to share knowledge by making sure the correct IT is available to share knowledge and that the office design is specified to knowledge sharing. The first flow, mental flow is enabling employees to see freedom, trust and responsibility as the basis of their work style, this way they can work on their own strengths through interaction with others.

Koetsveld & Kamperman (2011) continue on the aspects of Activity Based Working and flows. ABW promotes knowledge sharing and collaboration and through technology aims to disconnect information and knowledge from time and space to fully support knowledge exchange. An important aspect of the change from the traditional way of working is taking the step from 'knowledge is power' to 'sharing knowledge' and making sure that all information is available to everyone.

Blok et al. (2011) mention that there is a relationship between collaborative tools and productivity, where 100% collaborative tools or 100% direct contact both have a negative effect. Leading to the conclusion that both are required in order to optimize workflow and productivity.

In another paper Blok et al. (2012) discusses that "NWW might increase ad hoc interaction and communication of colleagues, but this does not imply improvements in knowledge sharing or collaboration Even if knowledge sharing and collaboration at the office itself improves, this might be counteracted by the fact that more time is spent working at home or at other remote locations where less ad hoc interaction and communication takes place. "

In their book, Pot et al. (2012) discuss workplace innovation, and how it influences knowledge sharing. They mention that workplace innovation is about open dialogue, knowledge sharing, experimentation and learning, in which diverse stakeholders including employees, trade unions, managers and customers are given a voice in the creation of new models of collaboration and new social relationships.

An important investigation that gives insight into knowledge sharing in NWOW environments is that of Bellefroid (2012), who wrote his master thesis on the area of knowledge sharing and channel choice in NWOW compared to that in more traditional ways of working. His conclusions are that in NWOW environments, more informal opportunities to share knowledge can be recognized, meetings between NWOW employees become shorter and more effective.

3.3 CONCLUSIONS AND WHAT TO USE FOR THIS THESIS

In this section I will give some conclusions from theory on the sub research questions as proposed in paragraph 1.2, and discuss some of the frameworks that I will use in order to investigate the main research question. Below are the first two sub research questions:

1. What is NWOW and what are the changes involved compared to TWOW**?**
2. What is knowledge sharing, how is it traditionally used, and what are typical knowledge types and sharing practices?
3. How does NWOW influence knowledge sharing and what will the effect be on IT support?

3.3.1 New Way of Working and changes compared to TWOW

What is NWOW is the first aspect of SRQ1 and has been answered in the theoretical background section (3.1.1). Bellefroid (2012) gave the following definition after a literature review of many definitions on NWOW.

> *"NWOW is a vision for organizations to work more efficient and effective by providing employees with all required facilities, giving more freedom and flexibility to work time and location independent and steering on results, utilizing and developing employees' capabilities in an optimal way, creating a higher work enjoyment."*

In non NWOW environments, employees worked in a more controlled environment, with everyone having their own spot and terminal, each department sat together on a floor or section of the office building, everyone worked from 9 to 5, and there was little interaction with others outside the department. This led to knowledge sharing being confined within the department and with less IT to support it, since you can always walk up to someone. With the change to NWOW, the environment in which we work has changed, people can work anywhere and anytime, leading to a difference in time and location for knowledge sharing. This difference gives problems if you see knowledge sharing from the traditional perspective, you cannot walk to someone anymore with questions.

Because place and time independent work is a key aspect of NWOW, several other supportive measures need to be taken when implementing NWOW. These supportive dimensions were defined by Baane et al. (2010b) as Bricks, Bytes, Behavior. Shortly explained:

- The **Bricks** dimension refers to the working environment and its facilities
- The **Bytes** dimension refers to the use of information technologies in order to support employees in their work, including hardware, software and information.
- The **Behavior** dimension refers to the people within the company and the human-work relation.

Changes in the Bricks dimension allow employees to work at activity-based workplaces (Koetsveld & Kamperman, 2011). Several ABWs are developed in an office for different activities, allowing employees to focus highly on the task at hand. These ABWs deliver value, however it also causes a lower density of workplaces and therefore less space to fit everyone at the same time.

Changes in the bytes dimension allow employees to work whenever and wherever they require, with IT supporting them in this. Take for example remote work in a coffeehouse with a Wi-Fi connection, being able to access your files at any time and at any place and staying in contact with colleagues through virtual possibilities. Another big change is that more or more of the company information will be on computers instead of on paper, allowing employees to access methodologies and frameworks everywhere.

Finally, changes in the behavior dimension are required, allowing employees to work whenever and wherever has some dangers to it. This is solved by the concepts empowerment and result-based work agreements. Empowerment gives employees the power to work time and place independent, result-based work agreements are made in order to secure that the work is done and with good quality.

3.3.2 Knowledge sharing & knowledge types

What is knowledge sharing was the first aspect of SRQ1, and this was answered in the literature section, best described by Ipe (2003) where he wrote:

> *"Knowledge sharing between individuals is the process by which knowledge held by an individual is converted into a form that can be understood, absorbed, and used by other individuals. The use of the term sharing implies that this process of presenting individual knowledge in a form that can be used by others involves some conscious action on the part of the individual who possesses the knowledge."*

Furthermore, a clear distinction needs to be made between knowledge sharing and knowledge transfer, where the latter is a unidirectional stream of knowledge, whereas knowledge sharing refers to bidirectional or multidirectional streams.

During this research, I used knowledge types to identify the changes in knowledge sharing in different implementation phases of NWOW. In order to categorize knowledge types, there are many frameworks available. The decision has fallen on two frameworks by Nonaka (1994) and Alavi & Leidner (2001). Nonaka categorizes knowledge into two types, *Explicit knowledge* and *Tacit knowledge*.

- Explicit or codified knowledge refers to knowledge that is transmittable in formal, systematic language.
- Tacit knowledge has a personal quality, which makes it hard to formalize and communicate. Tacit knowledge is deeply rooted in action, commitment, and involvement in a specific context.

Alavi & Leidner categorize knowledge in 6 types (Table 10):

Table 10: Knowledge types as determined by Alavi & Leidner (2001)

Knowledge type	Definitions	Examples
Declarative	Know-about	What drug is appropriate for an illness
Procedural	Know-how	How to administer a particular drug
Causal	Know-why	Understanding why the drug works
Conditional	Know-when	Understanding when to prescribe the drug
Relational	Know-with	Understanding how the drug interacts with other drugs
Pragmatic	Useful knowledge for an organization (know-what)	Best practices, business frameworks, project experiences, engineering drawings, market reports

3.3.3 Influence of NWOW on knowledge sharing & IT

NWOW has a big influence on knowledge sharing, as it creates time and place independent work, leading to a different knowledge sharing environment. No longer are you able to walk up to people to ask questions and share knowledge, but also because people work in different locations and times, colleagues are less aware of the knowledge others have. This means that a new way of knowledge sharing (NWoKS) needs to be created, where these factors are taken into account.

In order for NWoKS to be successful, IT will need to support time and place independent work, for this there are several options that are currently being used by companies in 4 categories which I created, they are loosely based on the work of Alavi & Leidner (2001) that talk about knowledge creation, storage & retrieval and transfer and application:

- *Direct Communication tools:* In order to share tacit knowledge, direct communication is required, therefor communication tools are needed that allow this. Examples are not just phones, but also video conferencing capabilities and chat solutions. (knowledge transfer)
- *Social media tools:* Allowing people to share knowledge in a broader sense, involving colleagues to respond and share their opinions and knowledge on specific topics. (knowledge transfer and creation)
- *Knowledge repositories:* In order to store knowledge that was attained during work, a central repository needs to be created. With his repository all employees can store and retrieve knowledge when required to perform their work. This can be on a project level, but also company-wide. (knowledge storage & retrieval, and application)
- *Locator tools:* In order to find the right tacit knowledge, you first need to know where this knowledge is located. Creating an index of what knowledge is in who should be a pivotal tool for employees, increasing knowledge sharing potential and work efficiency. (knowledge retrieval)

But not only IT support should change in the NWoKS, knowledge sharing cannot only be supported by IT, it should also be supported by the people. If place and time independent work is the new standard, then face-to-face interaction needs to be integrated in the work process and knowledge sharing infrastructure. During the interviews I have seen several possibilities ranging from general team meetings, to knowledge sharing meetings for people not currently on a project, to weekly drinks in which employees can discuss business in a more casual and social environment.

4 EXPERT INTERVIEWS

Within this chapter I will discuss the expert visions from several angles, first there is the interview that I performed with Tim de Vos from Veldhoen +Company who first coined the term activity based working and who are focused on implementing NWOW principles in companies that are still working in more traditional terms. Secondly the interviews with Dik Bijl and Ruurd Baane performed by Bellefroid (2012)will be discussed, both are NWOW authors in scientific literature and have extensive background information on this topic. Lastly I will talk about the expert interviews with Bart van den Hooff also performed by Bellefroid who is an expert on the topic of knowledge management and knowledge sharing. The interview with Tim de Vos was performed by me, the interviews with Dik Bijl, Ruurd Baane, and Bart van der Hooff were performed by Bart Bellefroid. The interviews by Bellefroid will not be explained completely, only the information that is relevant to the crossover between NWOW and knowledge sharing.

I will structure this section into the questions I asked and the answers that were given by the expert and how this relates to the theory as presented in Chapter 3.

4.1 TIM DE VOS – VELDHOEN +COMPANY

How do you see knowledge sharing?

You can look at this aspect in two ways, functional and social. One of the reasons that knowledge sharing is a problem currently is because social aspects are not taken into account correctly, social cohesion is an important factor with who knowledge is shared. If two colleagues do not like each other or there is no bond between them, knowledge will hardly be shared unless absolutely necessary. In order for this to be changed, a social aspects needs to be removed from employees, making them work together will require them to share knowledge.

There is a gray area between knowledge sharing and collaboration, they are intertwined because there is no need to share knowledge if you are not collaborating with one another, which is more the aspect of knowledge transfer. Collaboration requires you to share knowledge in order to perform the job to its fullest. De Vos mentions that a double pro-activeness is required for knowledge sharing, there needs to be an intention to ask for knowledge and an intention to share knowledge.

Overall knowledge sharing is a challenge, how do you effectively share knowledge in a company where knowledge sharing isn't the main focus where it should be. Several aspects can be barriers for a good implementation in NWOW environments:

- Hierarchy
- Reward systems
- Lack of social cohesion

All these are aspects related to an overabundance of individualism, where the individual is more important than the group, leading to problems in implementing NWOW. A horizontal hierarchy where everyone is equal is a prerequisite of good knowledge sharing,

reward systems are focused on the individual currently, but should be aimed at group rewards where collaboration and knowledge sharing are stimulated.

One of the ways Veldhoen performs knowledge sharing is by having a meeting every Monday with all employees, in which everyone sits in a circle and explains what they are doing that week and what they need in terms of knowledge. This way everyone is aware of what needs to be done, by who, but also who will gain what type of experience, who can we ask if we require knowledge for a certain aspect, who has done that?

Are there large changes from TWOW to NWOW principles?

There has been a large change, visible from the 1990. Office design has changed greatly, whereas some company are just trying to decrease costs by offering less space, other companies have a larger picture in mind. If there is less availability people are required to walk around more for a place, stimulating chance encounters in order to share knowledge with unexpected knowledge sources. The person you sit next to might not be in your team, but might have valuable insights that are not directly related to what you do, but are very applicable to it.

An important aspect is silos or buckets in which employees are stationed, you always work with group therefor you only share knowledge within this group. Within NWOW principles connections need to be made between these silos in order for more and more diverse knowledge to be shared.

De Vos also mentioned that collaboration as a goal of itself is wrong, collaboration should always have an external goal to solve a problem of situation, and therefor companies who steer on collaboration for collaboration purposes fail in their intent.

Where is most knowledge shared?

Activity based workplace (ABWs) have a distinction between workplaces, from places to actually work to places to share knowledge or to clear your mind. The knowledge sharing places are really used for that purpose the most. Colleagues who are looking for knowledge will invite a knowledge sources to for example a lounge where they are not disturbed during their conversation. They actively isolate themselves from the rest in order to be uninterrupted during the session, which would lead to disruptions but can also have a negative influence on the knowledge that is shared.

De Vos mentions that there are limits to project group sizes and durations that allow for the best knowledge sharing practices. For example projects between 4 and 7 people are within the ideal range, smaller will cause knowledge gaps that need to be filled from outside sources, whereas groups of larger than 7 will lead to not knowing where the right knowledge is. For project durations, de Vos mentions that the maximum time colleagues should be in the same project group is 2 years, after this an employee has nothing new to add to the project and no new knowledge will be added to the project, everyone will be familiar with each other's knowledge.

This is why job mobility is an important aspect within NWOW, in order to expand the knowledge that employees have, a diverse portfolio of jobs should be adhered to. Meaning that diversification of the work that is performed broadens the knowledge of employee

and this makes them more deployable on different jobs. However the problem is that currently the initiative of performing many different jobs is situated at management, instead of at the individual, who should choose to perform different tasks for self-improvement.

How do you change people to see knowledge sharing as important?

There are two main answers to this question, one is an open process, and the other involves management direction.

An open process is required in which employees and management together decide how the new way of working should be implemented, this way they discover for themselves that knowledge sharing is an important aspect of NWOW. Veldhoen+Company helps companies in this process, however the companies have to perform the process themselves.

Management needs to make a clear statement, this is the direction we are headed and there is no other option, everyone must comply with this heading, however this can only work if management adheres to the same heading and leads by example.

How has knowledge sharing changed with place independent work?

De Vos asks the question if place independent work is such a good feature in NWOW, since it leads to a loss in social cohesion on the work floor, the individualization of employees this causes leads to a decrease in knowledge sharing. He says that the image that NWOW = working at home is not a good view, it gives employees too much freedom which leads to employees only working and not sharing knowledge. He believes that this maximal freedom should be restricted in order to improve the socialization process and give employees the idea that they are not just soloists but also part of a team.

Working at home should be looked at on a day to day basis, does the work that I perform today require me to be at the office, if no you can work at home. However currently many people have a regular work at home day, every Wednesday or Friday. This leads to inefficiency because if you need to discuss something and it is Wednesday or Friday, knowledge sharing is impeded by the distance between colleagues.

How has knowledge sharing changed with time independent work?

De Vos comes with an example from LEGO, who state that you are always allowed to work, however core business hours are between 11:00 & 13:00 and 15:00 & 17:00. During those periods you should always be available for colleagues. So in order for people to work when they want, rules have been created to assure that knowledge sharing is still possible and that employees are aware of what these time periods are.

However within NWOW it should also be the responsibility of the individual, instead of just walking up to someone in more TWOW situations, you have to create appointments and agreements with each other on the time to share.

Is there a difference in what knowledge is shared from TWOW to NWOW?

Not really, in terms of what people share there is no fundamental difference, there is just a difference on the how people share. That being said, there is additional knowledge sharing in NWOW due to the accidental knowledge sharing in new office designs. New knowledge from previously unknown sources is shared and used in order to more effectively solve problems.

How do you see IT as a facilitator for NWOW principles?

IT should down the barriers for employees to share knowledge, however currently there are many IT solutions that raise barriers due to complexity or plethora of applications. For example SharePoint in essence is a good application to share project knowledge in order for other employees to follow-up on what you have done. However the complexity of SharePoint creates barriers to share, people are unaware of where or how to deposit knowledge.

A good accelerator of knowledge sharing are solutions that connect people on knowledge aspects, during the interview we discussed the social rolodex of Sciomino, a company that tries to gather who has what knowledge and storing that in a rolodex for everyone to access. This is not only a useful application for finding the right knowledge, but also when creating a team on a certain topic, with this you can find the right people or right knowledge to finish a project successfully.

The major problem with knowledge sharing and IT is that there is a plethora of applications, employees do not know which application to use to share knowledge and this leads to these systems not being used. De Vos says: “the greatest power of NWOW is that it cleanses, everything that isn’t required anymore should go”, this can be paper, closets but also IT landscapes. There should only be 1 application for knowledge sharing and it should incorporate all the possibilities of the old applications.

Is there a difference in acceptance between different generations on NWOW?

Yes, the older generation has been taught in school that individualism is important, it is about showing who you are and what you are capable of as an individual, however in NWOW the individual becomes less important and group work should be stimulated. The younger generations 30- were educated that collaboration is just as important as individual work.

Overall you see that the older generations have a lower speed in which they accept new principles of work, however this older generation is paramount in the company acceptance, if they don’t use it, the younger generations will not have the right example and will not accept these principles either.

4.2 BIJL & BAANE ON NWOW

Baane talks about the three domains of NWOW, bricks bytes and behavior and which of these is the most important to implement and which one is the most difficult to implement. According to him, bricks and bytes is easy to implement, they can be bought, however the behavior dimension cannot be bought, and it is not something you just implement. It is a culture change within the company that requires management and non-management to be in agreement of where it should head for. When the behavioral

dimension is not implemented, NWOW will have its limits and limitations. All three dimensions are required for a good implementation of NWOW, if one is missing the others miss the cohesion that the three dimensions offer and will result in less favorable situations.

On the topic of individualism and decreasing social cohesion he mentions that companies are looking for ways to improve knowledge sharing in NWOW, and that this is mostly done by looking at IT solutions like SharePoint environments, however in his experience it is difficult to provide the correct solution. Baane also mentions that companies look mostly at the Bytes dimension to solve this knowledge sharing issue, while the behavior dimension is also important. When employees do not think it is important to share knowledge, it will not be shared. Philips has the rule: "Share unless" which means that everything should be shared unless there is a good reason not to. This is in contradiction as to what many companies do, "don't share unless". Part of the reason why employees do not share that much knowledge is due to barriers, which should be removed as much as possible by creating an intuitive as possible solution where knowledge sharing is done without thinking.

Bijl mentions that physical contact is still very important and that the company should be the primary place to meet. People who prefer working at home should first work 2 months at the office before starting working at home in order to get used to your colleagues and to get to know them, this will increase success when working at home.

4.3 VAN DEN HOOFF ON KNOWLEDGE SHARING

On the topic of result-based working and coaching leadership van der Hooff mentions that this is the best way to stimulate knowledge sharing since it has a positive influence. In traditional ways of working, factory workers needed to be at the office to perform the processes, however in NWOW the processes can be performed anywhere, so why steer on attendance when you can steer on results. Result-based steering and coaching leadership are important, but it needs to be performed in the correct way, steering top-down on the topic of knowledge sharing is dangerous, because then it can be seen as a separate activity instead of knowledge sharing during collaboration which has the preference.

Van der Hooff also discusses activity based workplaces, in his opinion these ABWs are not used what they are intended for and therefor do not have the desired effect, however he also agrees that traditional offices where everyone has their own room with a closed door is undesirable, because this works against knowledge sharing. A more open solution where people work is preferable, if employees need a place to discuss matters they will find one, regardless of what that space is intended for.

5 CASE STUDIES

In this section I will describe the different participants of the multiple case study, what they do, what their background is and how they are doing in today's markets. Secondly I'll talk about the specific department that is being investigated and what they do.. Finally I will give an overview of the interviewees.

5.1 CASE STUDY PARTICIPANTS

Case study participants are departments at companies, where there is 1 department per company with a specific NWOW maturity. I've chosen for departments because the type of work that is performed within a department is generally the same, whereas between different departments, significant different work is performed (IT advisory versus Financial Audit is very different). There are 5 case study participants that were willing to cooperate in order to gain the data needed, they are located in Table 11. The table already mentions the different phases that the companies are in regarding the implementation score of NWOW, in the different sections about the companies I will go more in depth into this topic.

Table 11: Overview of the companies and their current NWOW maturity scores

Company	*Department*	*Interviews*	*Bricks*	*Bytes*	*Behavior*
PostNL	GroupIT	3	2,1	3,8	3,2
Sogeti	Consulting Services	2	1,8	2	2,0
EY	Advisory	3	1,1	2,2	2,0
Comp. X	Business Intelligence & Analytics	3	2,2	3,8	3,3
KPMG	Selection & Strategy	3	3	3,2	3,3

5.2 CASE STUDY PROTOCOL

The Case study protocol contains the NWOW questionnaire and the interview guide as used during the interviews. In this guide the questions and order of the questions is determined in order to keep the interviews as similar as possible.

The interview guide consists roughly of the following questions:

1. Who are you and what do you do at *company x?*
2. What does this company do, and in particular what does this department do? (but also looking at where the department fits in the overall corporate structure)
3. What are the possible ways of sharing knowledge within the company?
    a. Looking at people to people, IT to people.
    b. Looking at same place and different place
    c. What is each possibility used for, why do you use this and not that?

4. Where do you work? (based on the method by Greene & Myerson (2011))
    a. Workstation, Interior (Floor), Building, Local area, City, Region, Global
5. Which types of knowledge do you share?
    a. What types do you have, which do you share, give an example per type, do you think this type is overly tacit or explicit?
    b. The knowledge types used are: Declarative, Procedural, Causal, Conditional, Relational and Pragmatic.

With question 5, I am trying to fill in the following table (See Table 12)

Table 12: Knowledge types result framework

Knowledge Type	***Mostly Tacit***	***50/50***	***Mostly Explicit***
Declarative			
Procedural			
Causal			
Conditional			
Relational			
Pragmatic			

For the full Interview guide, see appendix 9.1.

5.3 CASE 1: POSTNL

5.3.1 Company description

PostNL is a Dutch postal company, originally part of TNT N.V. Their core business is the transport of physical mail, parcels and e-commerce. The company was founded in 2011, after a demerger with TNT. But it has a long history, descending from the government owned PTT in 1928 (Post, Telegraph and Telephony), which was privatized in 1993. (Wikipedia NL, 2014b)

PostNL currently has 31.016 FTE, where most is dedicated to delivering mail (~85%). Their revenue in 2013 was 4,345 billion euro which leads to a revenue per employee of 140000 euro. Per year, PostNL delivers around 3 billion mail items, however this number is slowly decreasing by around 10% a year, due to the introduction of digital possibilities of communication. Fortunately the parcel volume is steadily increasing. (PostNL, 2013)

PostNL focuses primarily on the Dutch market in distributing mail, however it is also internationally engaged in acquiring volume for throughput to the rest of Europe. Creating value by offering cheaper cross continental transfer.

PostNL has its main office in Den Haag and has several other smaller offices throughout the country; the remaining locations of PostNL are distribution centers and post offices.

5.3.2 Department description

Within PostNL there are 4 main business lines, **Production**, **Commerce**, **Parcels** and, **International**. My focus will be on neither of these business line but on the **Support** function. Within this function I will be focusing on the **GroupIT** group, which focusses on the IT support for the overall company (Figure 10).

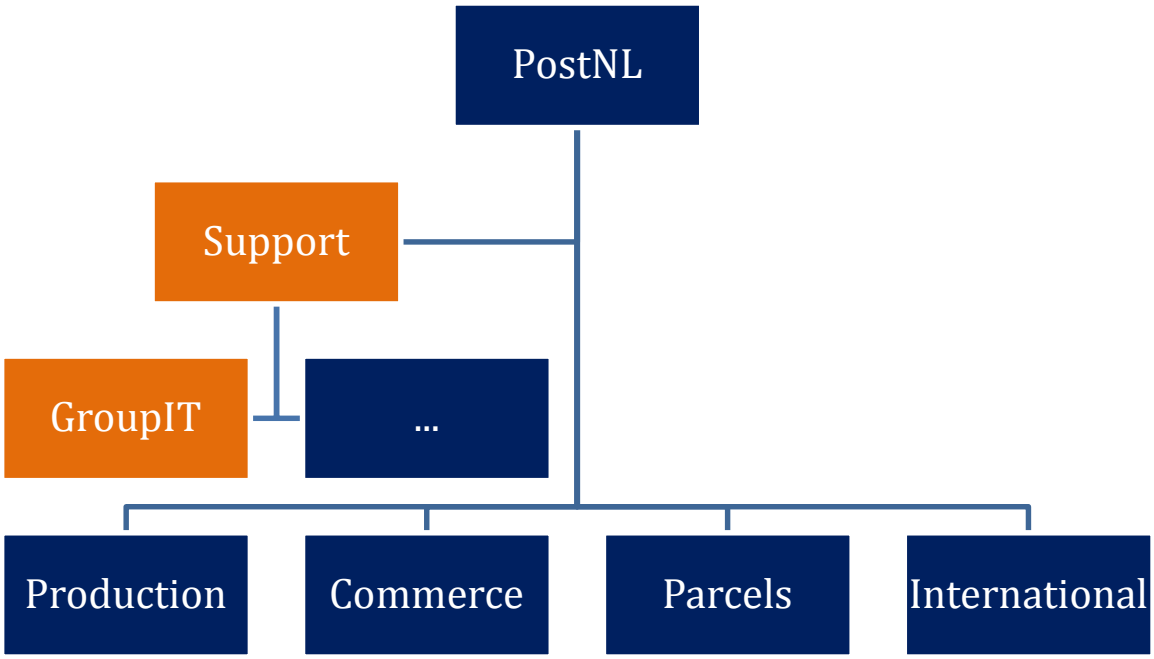

Figure 10: PostNL company structure

Within GroupIT, there are several portfolios like **telephone**, **collaboration**, and **voice & mobile data**.

5.3.3 Interviewees

Within PostNL I interviewed three people, working in different service portfolio areas. The three interviewees are all Service Portfolio Manager (SPM) and are responsible for their respective areas.

Table 13: PostNL Interviewees

NAME	DEPT	FUNCTION	HOW LONG	KNOWLEDGE WORKER
Suzan Kuiper	IT GROUP	SPM Telephone	4 years	Connector
Denise Jordaan	IT GROUP	SPM Collaboration	2.5 years	Connector
Babs Meelhuysen	IT GROUP	SPM Voice & Mobile data	10 years	Connector

In Table 13, it becomes clear that within the IT group of PostNL most of the employees perform their work within the building as each of the interviewees is a connector (Greene & Myerson, 2011). This was determined by where employees perform the bulk of their work, are they mostly at the office, or are they always on the road for customers? All of the employees have at least 1+ years of working experience in their respective jobs, indicating that they are familiar with the tasks they have to perform.

5.4 CASE 2: SOGETI

5.4.1 Company description

Sogeti is an information technology consulting company, with several name changes over the years. They were founded in 1967 as Sogeti, however due to several acquisitions (Gemini Computers Systems and CAP) they were renamed to CAP Gemini Sogeti in 1975, which was simplified in 1996 to Cap Gemini. In 2002, Sogeti was re-launched as a separate company.

I will focus on the Dutch side of Sogeti, but will give numbers of the overall company where possible in brackets. Sogeti currently has 2.538 (128.126) employees, with average revenue per employee of 88.000 euros (78.000 euros). The overall revenue of 2013 was 250 million euro (10 billion euro).

Sogeti focuses not only on giving advice in IT related questions, but is also capable of performing the entire process of an IT solution. From advice to implementation, Sogeti has the knowledge and the capability, in comparison to other consultancy companies who only provide the advice.

Sogeti is an international company with a local focus, with local offices for the local market. It has its global headquarters in Paris, France and in the Netherlands their local headquarters is located in Vianen. But there are many offices located in the Netherlands for employees to work.

5.4.2 Department description

Within Sogeti there are 6 main business lines, being Application New Technology (ANT), Infrastructure, Security & High Tech Services (HTS), Application Life Cycle Management (ALCM), **Consulting Services (CS)** and Total Quality Control (TQC). My focus will be on the Consulting services business line, within this there are three units, **Public**, **Private** and **Finance** (Figure 11), however employees do not always work for just one unit.

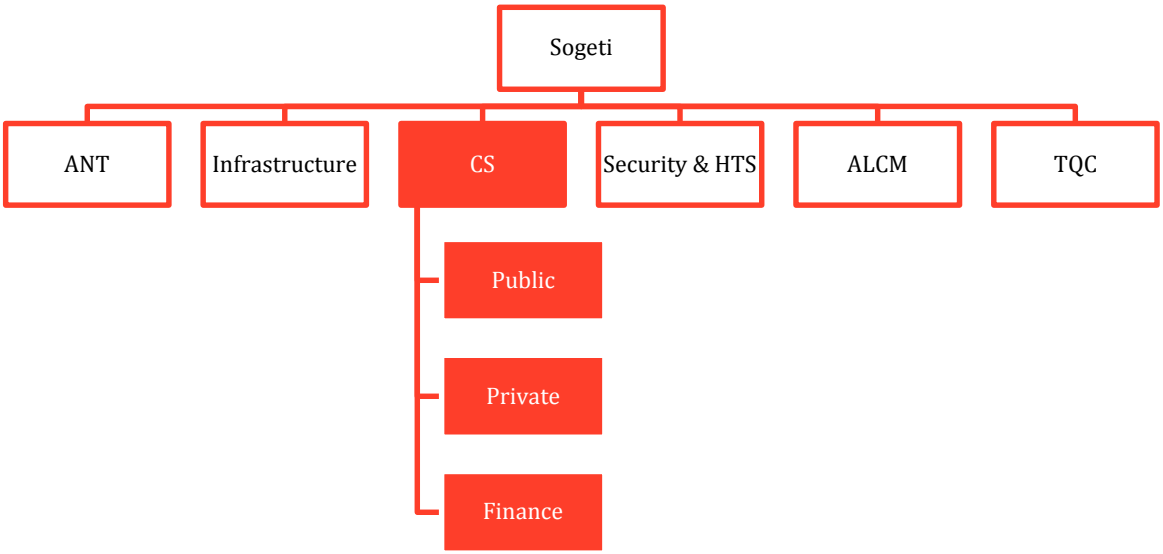

Figure 11: Sogeti company structure

The CS business line has about 440 FTE, which is then divided among the different units. In CS the focus lies on business and information control, this is also where data analytics and IT consulting takes place.

5.4.3 Interviewees

Within Sogeti I interviewed two people since a third interview was impossible to be scheduled within Sogeti. Therefor I decided that in this case I will use only two interviews, and will take this into account in the analysis in the next chapter. (For more info, see Table 14)

Table 14: Sogeti Interviewees

NAME	DEPT.	FUNCTION	HOW LONG	KNOWLEDGE WORKER
René Laterali	Private	Communications Consultant	3,5 years	Gatherer
Adosh van der Heijden	Public	Business Architect	8 years	Gatherer

René has a background in new media and continues this focus within Sogeti. He works primarily for the unit Private, however since his skillset is sparsely available within Sogeti, he also gets jobs from the other units.

Adosh is a well and broadly educated man, with a background in philosophy, German, and organizational science & business information. He has been working in the IT industry for 25 years. He is also the author of several knowledge related papers. The focus of Adosh his work is externalizing tacit knowledge, he is a thought leader within Sogeti that stores his ideas and shares it with colleagues.

Both René and Adosh can be categorized as gatherers (Greene & Myerson, 2011), since they are not at the office that often and perform their tasks at clients or at home. Each has a working experience in this particular function of more than 1 year, therefor we can assume that they are familiar with the tasks that they have to perform.

5.5 CASE 3: EY

5.5.1 Company description

EY, formerly known as Ernst & Young is part of the 'big 4' in audit firms, with its core business being auditing, mostly financial. However just as the other 'big 4' companies, EY is also focusing on advisory services. The firm in its original form was founded in 1849 with the name Harding & Pullein, but was renamed to Ernst & Young during a merger in 1989. It has recently been renamed to EY, which was already used internally for many years.

EY is divided in a network of member firms, which are all separate legal entities; therefore I will focus on the Dutch side of EY, but will give numbers of the overall company where possible in brackets. EY currently has 3.628 FTE (190.000) subdivided into 4 service lines: Assurance, Tax, Advisory, and Transaction Advisory Services (TAS). Their revenue in 2013 was 672 million euro (21.6 billion euro). This means a revenue per employee of 185.226 Euro (113684 euro).

EY has its main office in Amsterdam, whereas its global headquarters is located in London, UK. Besides the main office, EY Netherlands has 14 local offices for employees to work at in the Netherlands, giving employees flexibility in where to work.

5.5.2 Department description

Within EY I focused on the **Advisory** service line in the financial sector, this service line has several subservice lines called **FSRISK**, **ITRA** and **HVG**. FSRISK is focused on risk in financial services companies, ITRA is the IT risk assessment subservice line where they focus on **IT audits**, **IT security** and **data analytics** and HVG is a law firm that has a strategic alliance with EY (Figure 12).

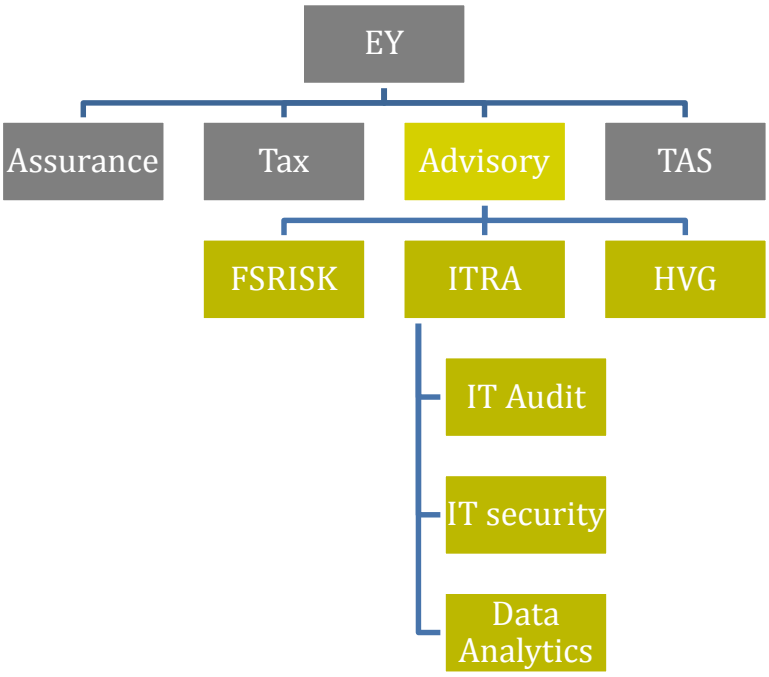

Figure 12: EY company structure

In the organizational chart HVG is part of EY, but that is not completely true, HVG is a separate company that works for EY and supports them in their affairs. They also take on jobs that are not related to EY, but most of the work is in collaboration. In these collaborative jobs with HVG, one of the parties takes the lead in a job and the other supports them. The reason why HVG is associated with EY is because EY is not allowed to perform the legal work themselves due to regulatory issues. HVG has around 250 employees in the Netherlands, England and America.

FSRISK is a subservice line based on risk management of financial companies, with around 55 people with a desire to grow to 100 in 2018. This department is very dependent on market information. This market information can only be found on one terminal in the office, this also means that all employees are usually at the office, since they cannot do without market data.

ITRA is the last subservice line of around 50 people, in which they are again divided into the three sub subservice lines IT Audit, IT security and Data Analytics, the focus during this research is on the IT Audit section of ITRA, this section performs IT audits at financial companies in which an examination is done on the management controls within an information technology infrastructure (Wikipedia English, 2014b).

5.5.3 Interviewees

Within EY I interviewed three people, each working in a different subservice line, each of these interviewees does vitally different work, but in cooperation with the others. This has already been explained in the above section of the department description.

Table 15: EY Interviewees

NAME	DEPT.	FUNCTION	HOW LONG?	KNOWLEDGE WORKER
Rob Balk	FSRISK	Senior Advisor	1 year	Anchor
Antoinette van Huls van Taxis	HVG	Lawyer	2 years	Anchor
Brian Bruinhard	ITRA	IT Auditor	4 years	Gatherer

Table 15 shows that Rob and Antoinette are both anchors, fixed in an office location at roughly the same spot every day, whereas Brian can be classified as a gatherer (Greene & Myerson, 2011), someone who spends most of his time at clients. Each of the interviewees has a working experience in this particular function of more than 1 year (Rob was an advisor before the position of senior Advisor for 2 years), therefor we can assume that they are familiar with the tasks that they have to perform.

5.6 CASE 4: COMP. X

5.6.1 Company description

Comp. X, is another of the 'big 4' companies in audit firms, focusing on professional services for companies. Most of their work is in the field of financial audit and tax, however they are also one of the leading companies in the field of IT security advisory. Comp. X was founded by William Delch Comp. X in London as the first independent auditor in 1845, and expanded to New York in 1880. Over the years many mergers and acquisitions have been made, and the name was changed often. (Wikipedia English, 2014a)

Comp. X is a the largest professional services company in the world, therefor I will focus on the smaller side and only use the Dutch brand of Comp. X, where possible I will mention global numbers between brackets. Comp. X currently has 4500 (210.400) employees divided over 4 core functions, being Audit, Tax, Consulting and Financial Advisory Services. Their revenue in 2013 was 632 million (25.6 billion euro). This means a revenue per employee of 140000 euro (121000 euro)(Comp. X Netherlands, 2013; Wikipedia NL, 2014a).

EY has its Dutch main office currently in Amstelveen, but it will move to a new main office in Amsterdam in November 2014, the global headquarters is positioned in New York, USA. Besides the main office in Amstelveen, Comp. X Netherlands has 18 other offices spread out over the Netherlands, in order for employees to work wherever they want.

5.6.2 Department description

Within Comp. X I am looking at the **Business Intelligence and Analytics** (BIA) team, who are part of the **Technology** section within the core function **Consulting** (Figure 13). This team consists of about 40 people with different backgrounds and different specialization areas. This team works on the areas of business intelligence and analytics, taking on jobs that require the team to create insights into the data that customers have, by analyzing the data, interpreting it and visualizing it. Work is seldom done alone, since most jobs require several aspects for a successful completion. For example, for a data analytics project, you need people that have background knowledge about the type of data, about the tools that are used, about designing a dashboard, in effect a multidisciplinary team. But there are also interactions with people outside the team, for example in a job that involves tax data, a tax guy is involved to translate the data.

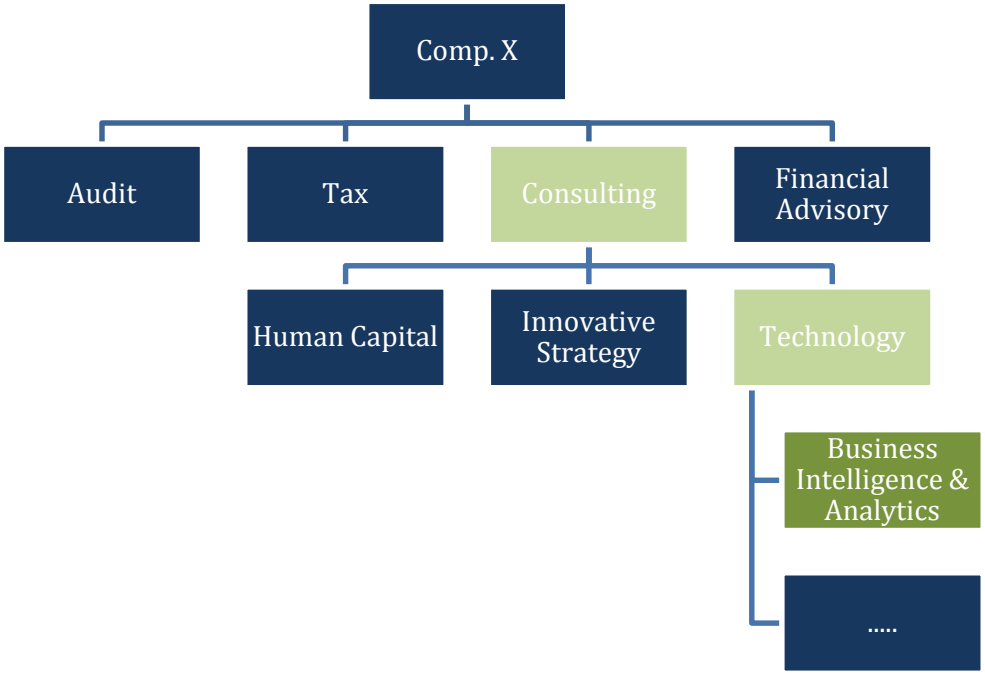

Figure 13: Comp. X company structure

5.6.3 Interviewees

Within Comp. X I interviewed three people, each working in the BIA team (Table 16).

Table 16: Comp. X Interviewees

NAME	DEPT.	FUNCTION	HOW LONG	KNOWLEDGE WORKER
Stan van W.	BIA	Business Analyst	1.5 year	Gatherer
Imre D.	BIA	Consultant	1 year	Gatherer
Peter van S.	BIA	Consultant	2 days	Gatherer

Each of these three interviewees does different things within the BIA team. Stan is working on data visualization and mathematical algorithms, he performs jobs within the Netherlands and is also focused on internal jobs. Within the internal jobs, part of his focus is on knowledge sharing.

Imre comes from a strategic management background and works more on financially focused jobs, he is a bit chaotic in how he performs work and works more through personal connections than by using systems to convey knowledge.

Peter is a former MBI student, his work involves data visualization via the creation of dashboards and giving insight into the data that customers have. He was promoted two days before the interview was held, he is now consultant but was a business analyst for two years prior.

Table 16 indicates that each of the interviewees can be categorized as a gatherer, someone who does not spend most of his time at the office but at clients or other locations in order to perform the work that is required of them (Greene & Myerson, 2011). Stan and Imre have a working experience in this particular function of more than 1 year, whereas Peter

has only 2 days working experience, however Peter was a business analyst for two years previous to his current function, therefor we can assume that they are familiar with the tasks that they have to perform.

5.7 CASE 5: KPMG

5.7.1 Company description

The last company, KPMG is also one of the 'Big 4' in the audit world, focused on professional services. In 1979, three companies merged into one company called KMG, this was the start of KPMG as we know it now, and in 1987 it joined forces with Peat Marwick to form KPMG. In 1997 KPMG and Ernst and Young tried to merge, however were not granted regulatory approval and was abandoned. (Wikipedia English, 2014c)

KPMG is a global company, therefor I will change my scope to KPMG Netherlands, which still has a very international character. For reference purposed I will mention numbers where possible about the global company between brackets. KPMG currently has 3131 FTEs (155.000+) divided over three main business lines, being Audit, Management Consulting and Tax. Their revenue in 2013 was 456.2 million euro (18.5 billion euro). This leads to an average revenue per employee of 145.000 euro (120.000 euro)(KPMG Global, 2013; KPMG NL, 2013)

KPMG has its main and global office in Amstelveen, the Netherlands. However there are 11 local offices for employees to work.

5.7.2 Department description

The group that I am investigating within KPMG is that of **Selection & Strategy** within the **Shared Services and Outsourcing Advisory (SSOA)** unit. This unit is positioned within the **Management Consultancy** business line. However because there is a lot of overlap within the SSOA unit, I will assume that the other 3 subgroups are also involved (Figure 14).

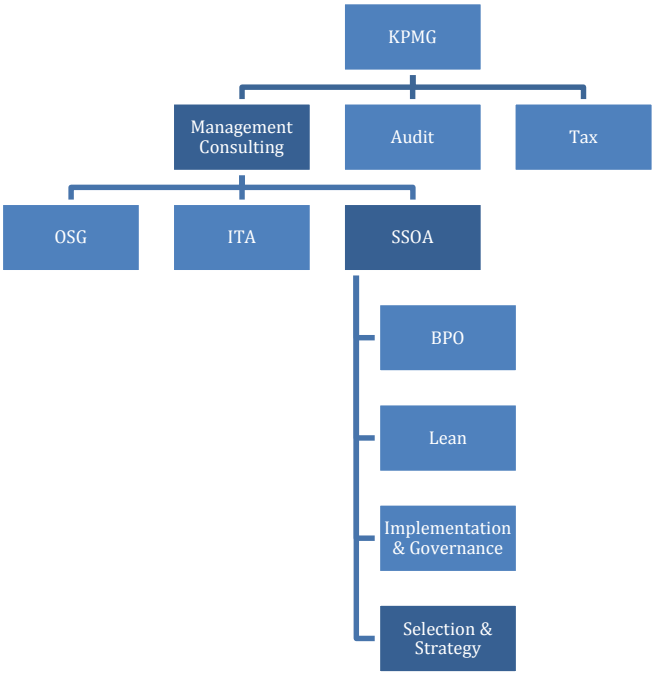

Figure 14: KPMG company structure

Within SSOA all aspects of the sourcing lifecycle can be performed for customers. This is a multidisciplinary team that handles several aspects of the sourcing process. A lot of the

work they perform is in cooperation with other units and business lines within KPMG, including Tax, IT, etc. The jobs that SSOA performs are largely international, about 60% of the work is done abroad.

5.7.3 Interviewees

At KPMG I interviewed three senior managers at the SSOA Unit (Table 17), each responsible for a different aspect of the sourcing lifecycle. Even though each of the three interviewees is a senior manager, all are still involved in the content of projects and performing the actual consulting work.

Table 17: KPMG Interviewees

NAME	DEPT.	FUNCTION	HOW LONG?	KNOWLEDGE SHARER
Mark Beukers	SSOA	Senior Manager	4 years	Gatherer
Maarten van der Wolf	SSOA	Senior Manager	4 years	Gatherer
Liselore Sauer	SSOA	Senior Manager	6 years	Gatherer

Mark comes from an MBI background and has been working for KPMG for 4 years, before that he was a sourcing consultant at EquaTerra which was bought by KPMG in 2011. Mark is focused on sourcing strategy and a little bit on selection within the SSOA unit. He is the streamlead for sourcing strategy.

Maarten has been working at KPMG for four years, with a background in business administration, with a minor in IT. He is the streamlead of Selection and focusses mostly on outsourcing projects within the sourcing lifecycle.

Liselore is a future streamlead in one of the coming centers of excellence. Next to being a senior manager she is also a performance manager which involves the personal development of colleagues within her team.

Table 17 indicates that each of the interviewees can be categorized as a gatherer, which means that the work they perform is mostly done outside the traditional office. Their primary work is executed at clients or other locations (Greene & Myerson, 2011). Each has a working experience in this particular function of more than 1 year, therefor we can assume that they are familiar with the tasks that they have to perform.

6 RESULTS

In this section I will present the overall differences between companies and their knowledge sharing infrastructure, after this I will give the results of the NWOW assessment, how the companies scored in Bricks Bytes and Behavior maturity. Then I will discuss the results of the interviews per company, the different knowledge types that are shared and how these relate to each other. Finally I will give a summary of the knowledge sharing infrastructures at the different companies.

6.1 COMPANY COMPARISON ON SIZE AND REVENUE (PER EMPLOYEE)

We can also compare the different companies by looking at their size measured in employees and their revenue. Table 18 indicates that PostNL is the largest company in terms of the Dutch market, with 31.000 FTE. However since PostNL only has a focus on the Dutch market, the other companies overshadow PostNL in international size with Comp. X being the largest company with 210.000 FTE.

In terms of Revenue, PostNL is again the largest in the Netherlands with 4.3 Billion euros, whereas it is the smallest on a global scale. The company with the highest revenue is Comp. X with 25.6 billion euro in 2013.

Finally we can compare revenue per employee, here we see that EY is the largest in the Netherlands, whereas PostNL performs best on a global scale. However it is hard to compare revenue per employee on a global scale if you only perform services in the Netherlands, therefore the PostNL revenue per employee globally is a skewed indication.

For the Dutch market we can summarize this where Sogeti is the smallest company and PostNL is the largest company in terms of size and revenue, but looking at revenue per employee EY is clearly the highest. This can be explained by looking at the type of work performed, where PostNL performs largely non-knowledge work, EY is almost fully knowledge work based.

Table 18: Size and Revenue overview. (*=in FTE, **=in Million Euros, ***= revenue per employee in 1.000 Euros)

	POSTNL	SOGETI	EY	COMP. X	KPMG
SIZE NL*	**31.000**	***2.500***	3.600	5.600	3.100
SIZE GLOBAL*	***31.000***	128.000	190.000	**210.000**	155.000
REVENUE NL**	**4.300**	***250***	670	630	460
REVENUE GLOBAL**	***4.300***	10.000	21.600	**25.600**	18.500
REV-EMPL NL***	140	***88***	**185**	140	145
REV- EMPL GLOB***	~~140~~	78	115	**121**	120

6.2 PostNL

6.2.1 NWOW assessment

Figure 15 shows the NWOW assessment for PostNL, these results were acquired by the NWOW monitor survey that each of the companies filled in, it gives maturity scores on the three knowledge types: Bricks, Bytes, and Behavior. The NWOW Monitor indicates that these three values for Bricks, Bytes, and Behavior for PostNL are quite different.

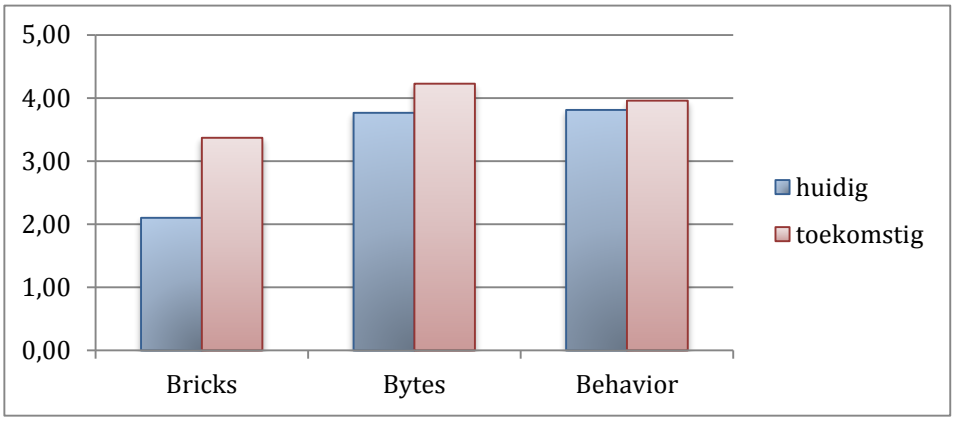

Figure 15: PostNL Bricks, Bytes and, Behavior dimensions graph

Bricks is currently the lowest value, being just over an implementation score of 2, which is consistent with the interview data and the overall work that is performed at the IT department of PostNL. The possibility of work at home is allowed, however most personnel prefer working at the office since the majority is there. The major improvement areas are currently optimizing the possibilities of flexibility in working and creating inspiring workplaces. The most important reason why this dimension is only at 2, is because PostNL does not reimburse employees with home office improvements or using a home office (Figure 16, Table 19).

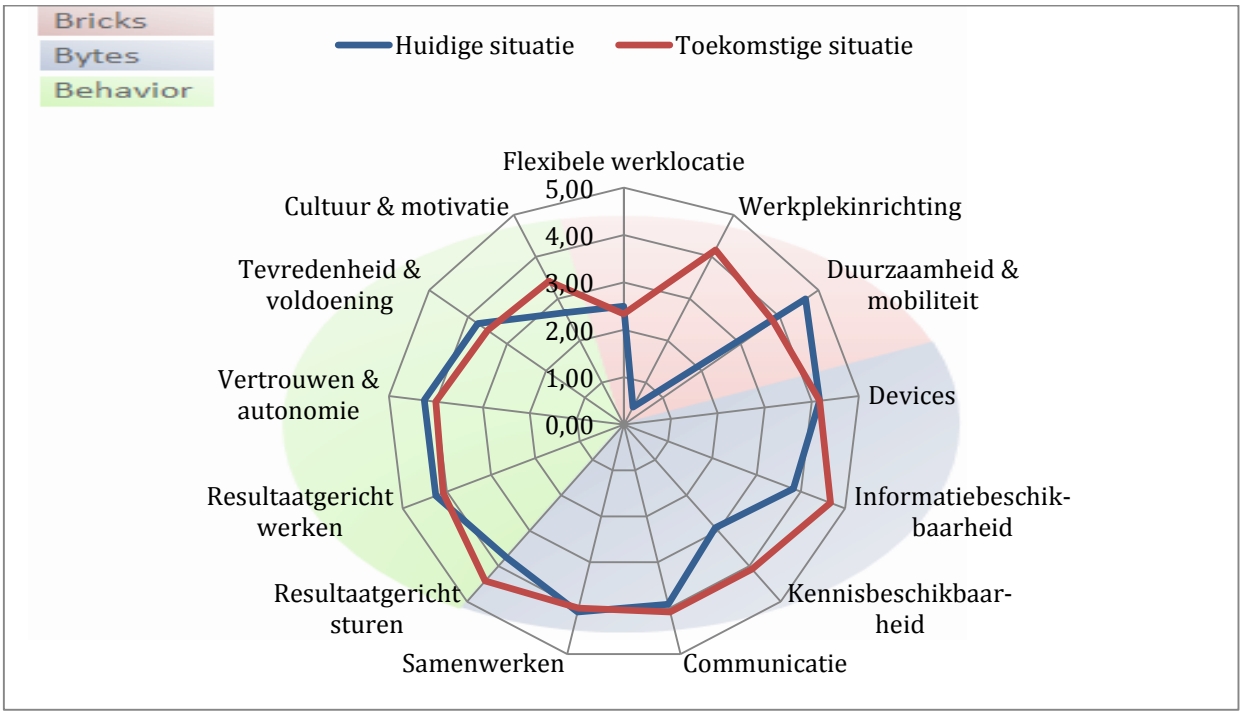

Figure 16: PostNL spider graph on the Bricks, Bytes, and Behavior dimensions

Table 19: PostNL gap analysis on the Bricks, Bytes, and Behavior dimensions

Subject	Gap
Workplace design	3,8
Knowledge availability	1,2
Information availability	0,8
Culture & Motivation	0,8
Result oriented steering	0,7

The Bytes dimension scores fairly high, which is not that strange since the department that was interviewed is part of the IT department. The main issues at this moment are

- *There is IT support for every device, provided or self-acquired.* This relates partly to bring your own device (BYOD), however PostNL indicated that it is not very important at this point in time, since most people get a company supplied phone and use a desktop at the office.
- *Knowledge can be easily stored*. There are currently many applications in the knowledge sharing landscape within PostNL that prevent employees from sharing knowledge to everyone, since not everyone uses or has available the same knowledge sharing systems.
- *Colleagues with specific knowledge can easily be found and are available*. Part of the problem is that it not always clear who has what knowledge; however once you know who you are looking for, there are several possibilities for contacting this person. (Lync, Chatter, working on the same floor)
- *Knowledge is openly shared within the organization*. I cannot give a clear reason why this is not fully implemented, however I can make an estimated guess based on the expert interview that it involves the overall age of the employees within PostNL. Overall the employees are older than what you would find in a consultancy company. These older employees come from an older generation who learned that knowledge is power and therefor sharing this knowledge would diminish your power and position in the company (Tim de Vos, Veldhoen+Company).
- *There is a good planning tool available that clearly indicates who does what and when*. I cannot give a reason of why this is not implemented fully, however PostNL has indicated that it is only partly important and therefore not a priority.

Behavior scores fairly high just as Bytes, this is partly due to the management layer that actively supports NWOW and makes sure that employees know that the result is more important than being at the office. There are some points of improvement

- *There is a clear mission, vision, and ambition known to employees.* This is mostly true, however there is a lack of knowledge about these among workers. Most workers know their work, however are partly unaware of where their work fits in the mission, vision, and ambition.
- *I act on feedback and am stimulated by my organization to give feedback.* Feedback is mostly given from management and less by employees, leading to a more one sided feedback, only top-down.
- *I am motivated by the unique company culture.* This is partially true within PostNL, however it is also only mildly important.

6.2.2 Knowledge sharing infrastructure

PostNL has an abundance of knowledge sharing possibilities, which differs per target group. For example, they use Salesforce, TopDesk, SAP, and SuccessFactors, which are all similar applications but are used by different groups within PostNL. This leads to the problem that the knowledge that is shared within the organization is not shared with the entire organization, only employees who use the same software as the sharer (usually within the same team) have access to this knowledge. PostNL is currently looking into this problem, how to centralize this data or merge the application landscape to one application for the whole of PostNL.

They mainly still use email and telephone and chat services like Lync and Chatter in order to converse and share knowledge with each other. Within the department that I am investigating they are having a pilot with Office365, that allows employees to work together on documents and allows for easier sharing of documents between them.

There is also the standard SharePoint implementation available for employees, here project files are shared with others, and this is in contrary to other systems company wide. In the past PostNL worked with a system where people could only see things that were directly relevant for them, they have changed this to full disclosure unless employees are explicitly forbidden to view content, e.g. classified materials.

PostNL uses just like many other of the larger companies a system called Yammer, this is a corporate social network in which knowledge sharing should take place, it is also used to discuss aspects of the Office365 pilot, what are their experiences with it and what could possible improvements be.

Several non-technical knowledge sharing possibilities are available at PostNL, including team meetings with the entire department (12 people, monthly) as with just the portfolio managers (5 people, two-weekly). PostNL also has a monthly IT Café, in which everyone from IT is invited to some presentations and drinks afterwards in which the focus lies on sharing knowledge between employees.

The final way that knowledge is shared is during the yearly PostNL New Year presentation, where the CEO discusses current topics of importance to PostNL and what to do in the next year.

6.2.3 Knowledge Types shared

Table 20 shows the interview results of PostNL, it shows that there is a general consensus on most of the knowledge types. Declarative (know-about) knowledge is predominantly shared in an explicit form, just as pragmatic knowledge. When we look at causal knowledge (know-why) and conditional knowledge (know-when), the knowledge that is shared is balanced between tacit and explicit with a slight preference for tacit, relational knowledge (know-with) on the other hand is completely balanced. Finally, there is a discrepancy with procedural knowledge (know-how), here we see that 2 of the interviewees have indicated that this knowledge type is overly tacit, whereas another has indicated that this is overly explicit. Listening back the audio files, the question regarding procedural knowledge has only been half answered by the interviewee that chose mostly

explicit for procedural knowledge, leading to a somewhat distorted view. For each of the knowledge types I will give an example of knowledge that is shared and how:

- **Declarative**: knowledge about problems that exist on the implemented systems is shared with the service desk, so that they know about the problems when they get help requests. This is shared mostly via direct communication tools like Lync and Email, because the services desk does not have that much time to discuss situations due to the constant incoming service requests.
- **Procedural:** knowledge about how things work and how to behave at PostNL. Take for example the culture values, these are shared face to face in coaching projects and mentorships.
- **Causal:** knowledge about deep technical aspects, why this method needs to be implemented is shared primarily in meetings.
- **Conditional:** Knowledge on when to perform certain steps when a major error occurs in the software services, what needs to be done first to solve this problem. This is mostly shared during meetings and courses.
- **Relational:** Knowledge about what the effects are of their IT solutions on other teams, if we implement Lync, what will happen to the other IT solutions that we have with similar functionality. This is mostly shared at the department meetings.
- **Pragmatic:** Knowledge about creating new call centers is stored in their knowledge repositories and is shared via this repository.

Table 20: PostNL knowledge types result

Knowledge Type	Mostly Tacit	50/50	Mostly Explicit
Declarative	0	0	3
Procedural	2	0	1
Causal	1	2	0
Conditional	1	2	0
Relational	0	3	0
Pragmatic	0	0	3

It is hard to compare data when you include a column with 50/50, since it is hard to define what 50/50 is precisely, therefor I split this column up, half of the points in the 50/50 column go to tacit, the other half goes to explicit, so if one person was in the 50/50 area, they are now 50% in tacit, and 50% in explicit. You get the following table after this reconfiguration (Table 21):

Table 21: PostNL knowledge types result split

KNOWLEDGE TYPE	TACIT	EXPLICIT
Declarative	0	3
Procedural	2	1
Causal	2	1
Conditional	2	1
Relational	1,5	1,5
Pragmatic	0	3
TOTAL	**7,5**	**10,5**

Table 21 indicates that overall there is a slightly higher explicitness to the knowledge that is shared at PostNL. This can be explained partly because the department that was interviewed only works for internal parties, there is no consultancy or project work for outside partners where previous experience can be reused easily.

6.3 SOGETI

6.3.1 NWOW assessment

Below is the NWOW assessment for Sogeti. You will notice that the three values for bricks, bytes, and behavior are quite balanced, all are between 1.5 and 2. However there is a big discrepancy on where they want to be (Figure 17).

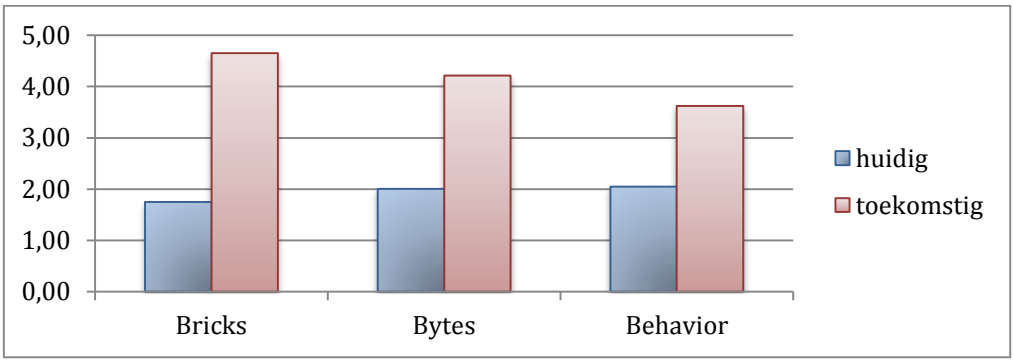

Figure 17: Sogeti Bricks, Bytes, and Behavior dimensions graph

I will only focus on the most important discrepancies between the current and the future implementation, else this section will become too big. The interviewee also mentioned that he found it hard to answer some of the questions as an employee because he could not with certainty say if some things were or were not performed by management to steer them (Figure 18, Table 22).

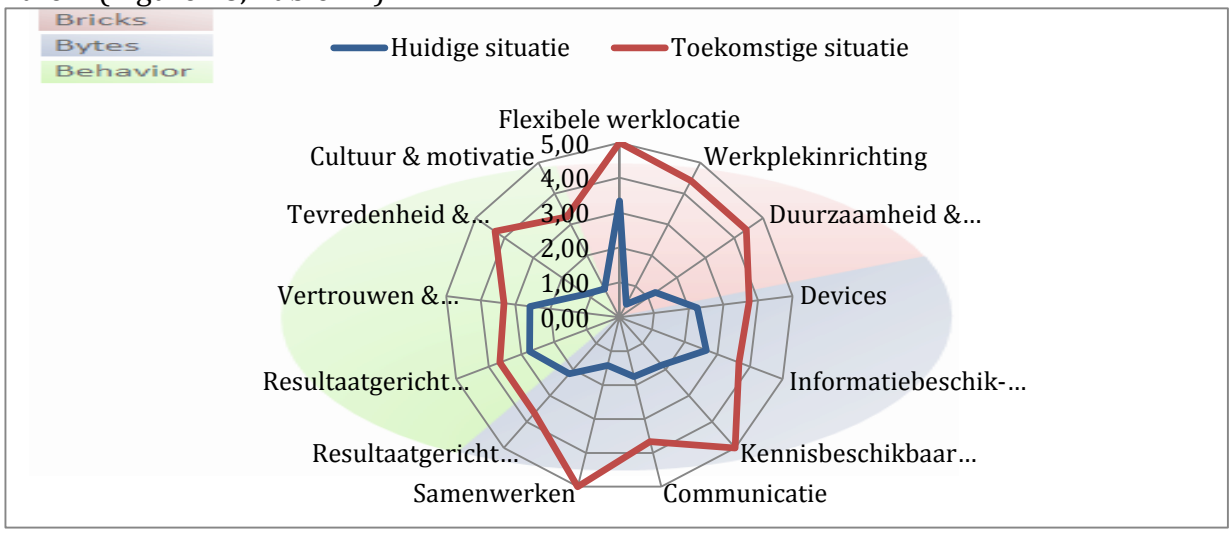

Figure 18: Sogeti spider graph on the Bricks, Bytes, and Behavior dimensions

Table 22: Sogeti gap analysis on the Bricks, Bytes, and Behavior dimensions

Subject	Gap
Workplace design	4,0
Collaboration	3,6
Satisfaction & fulfillment	3,2
Knowledge availability	3,2
Sustainability and mobility	3,2

I will start with the bricks section, the lowest of the three values. As Sogeti is mostly an IT services company, you would expect a bricks situation where workplace innovation is important, and as indicated in the diagram it is also thought of as important within Sogeti, however the implementation lags behind the wished situation. The most important statements for improvement are as follows.

- *Because working location is flexible, there are few or no internal relocations.*
- *The office locations are easily accessible by car and public transport.*
- *The office buildings are focused on sustainability.*
- *Improving the interaction with the environment, sustainable work and accessibility is a constant point of attention for my organization.*

These four statements have all been answered with not true, but they are highly important for a future situation. Figure 18 indicates that sustainability is an important aspect for NWOW that is not or hardly taken into account by Sogeti.

The bytes section scores an overall score of 2, which is low considering that Sogeti is an IT services company. This is also what the interviewee has indicated with a wished future implementation score of 4. There are several issues within bytes that I will try to explain.

- *My organization stimulates knowledge sharing.* This is probably the most important aspect that is not performed at Sogeti. As mentioned in the knowledge sharing infrastructure section, there are several ways in which to share knowledge, however if the use of these applications is not stimulated, there will be no incentive to share knowledge with colleagues.
- *Agreements have been made among colleagues about physical and virtual presence.*
- *I can co-work on documents in real-time.* This aspect leads to not knowing who is present at the office or available through virtual means. For knowledge sharing, this can pose a problem in sharing more tacit forms of knowledge, where direct or face-to-face interaction is important.
- *For the co-operation in projects with multiple external companies a platform can be used.* Sogeti is an IT services company that performs many aspects of IT, from pure consultancy to implementation of systems, because they also perform implementations of external products like SAP, a platform would increase the cooperation with external parties.
- *I can see the availability of my colleagues' agenda to easily plan appointments.* Because this aspect is not implemented currently, it is hard to determine when to create an appointment to share knowledge and information, leading to a less efficient way of working.
- *There is a good planning tool available that clearly indicates who does what and when*. An improvement in this aspect would lead to a better overview of who is working on what type of job, and what knowledge they have because of this. This also leads to a decrease in knowledge sharing due to the inability to know about others gain in experience.

Finally there is the behavior section, which scores an overall score of 2, with a future score of 3.5. In this section there is a clear view of the employee that filled in the questionnaire, however looking at the interview results of the other interviewee, there seems to be a

discrepancy. This is due to the fact that only 1 person filled in the questionnaire which can show a difference primarily in experience of the behavioral section. Therefor take into account the possible difference between the two interviewees and their views on this section. The biggest differences can be found in the sections *satisfaction & fulfillment* and *culture & motivation.*

- *I recommend my company to others as an employer.*
- *I receive satisfaction from the work that I perform.*
- *I am motivated by the unique company culture.*
- *I am involved in the company.*
- *I am motivated to perform optimally for the organization.*
- *I am proud of my organization.*

Note that these are serious statements relating to the experience of the interviewee of how the company and the work satisfies him. However when I look at the interview data from the other interviewee I see a more satisfied employee, who has specifically chosen for Sogeti due to the use of certain methods, e.g. transaction pattern (Enterprise Engineering Institute, 2014).

6.3.2 Knowledge sharing infrastructure

Sogeti has several ways in order to share knowledge between employees, technologically as non-technologically. The main way that employees share knowledge is still via a phone or email message.

Within Sogeti there are several systems that store knowledge and information, for example they use TeamPark, a social media platform on which employees can share knowledge on four key themes: our people, our clients, technology, and corporate social responsibility. It helps in connecting people and offers parameters such as work experience, interests and position (Sogeti, 2014).

Sogeti also works with an intranet called ShareNet, this allows them access to a virtual workspace where they can collaborate on documents and information. Here there is also training material for employees who wish to expand their knowledge on certain topics.

Employees at Sogeti also use Dropbox on occasion to share files with one another, however it is not sure if this is supplied by Sogeti or if employees choose to store files this way. Since Sogeti has SharePoint, which is a more secure way of sharing files.

There are regular business line meetings in which employees are informed about the latest developments within Sogeti, this session is usually led by the unit managers. If people are not working on a job, they have two-weekly meetings called inspiration discussion, during this session they share knowledge about jobs performed and how to attain a new job.

Every year there is a kick-off session for all Sogeti employees led by the CEO, during this session the CEO talks about the current state of business, the new goals and tries to inspire his employees. However this is more knowledge transfer than knowledge sharing.

6.3.3 Knowledge Types shared

The interview results of Sogeti show a somewhat like-minded view of the types of knowledge that are shared, with a focus on the tacit side (Table 23). However as previously mentioned, there were only two interviewees, giving a less clear image of the overall department on the aspects of knowledge sharing. Table 23 indicates that overall the two interviewees agree with one another, being either mostly tacit or mostly explicit. However if you look at declarative knowledge (know-about) there is a discrepancy. This is due to the fact that interviewee 2 is a thought leader, and therefor has more focus on using his tacit knowledge to improve the company, whereas interviewee 1 is more focused on a basic level of re-use knowledge. For each of the knowledge types I will give an example of knowledge that is shared and how:

- **Declarative:** knowledge about projects, the progress of the project and documentation on the project is shared via a knowledge repository like SharePoint.
- **Procedural:** Knowledge on how to create a community site, how to use it and what information should be placed where. This is mostly shared in meetings.
- **Causal:** knowledge on why certain steps are performed in a process to create an architecture overview at a customer. Why do you first need to know what IT solutions there are currently, before you can create an architecture overview? This knowledge is primarily shared in meetings and during collaboration with colleagues.
- **Conditional:** Knowledge on when to perform what step in the enterprise architecture process is shared on a face-to-face basis.
- **Relational:** knowledge on how architecture changes influence the workings of a company and how to share this knowledge with companies. This knowledge is internally shared predominantly on a face-to-face basis and through email conversations.
- **Pragmatic:** Templates on how you create documents and perform projects, this is mostly shared through the knowledge repositories, but also through mail and face-to-face.

Table 23: Sogeti knowledge types result

Knowledge Type	Mostly Tacit	50/50	Mostly Explicit
Declarative	1	0	1
Procedural	1	1	0
Causal	1	1	0
Conditional	2	0	0
Relational	1	1	0
Pragmatic	0	0	2

In Table 24 the consolidated results are shown.

Table 24: Sogeti knowledge types result split

KNOWLEDGE TYPE	TACITNESS	EXPLICITNESS
Declarative	1	1
Procedural	1,5	0,5
Causal	1,5	0,5
Conditional	2	0
Relational	1,5	0,5
Pragmatic	0	2
TOTAL	**7,5**	**4,5**

Table 24 indicates that overall there is a slightly higher focus on tacit knowledge sharing than on explicit knowledge sharing. This result was expected due to the work that is performed, requiring experience in applying methodologies at companies, instead of just following the methodology blindly.

6.4 EY

6.4.1 NWOW assessment

Below you can see the overall NWOW assessment for EY (Figure 19), as can you see the overall scores are fairly low, but there is hardly any difference between current and future maturity, indicating that they are at the place they want to be in relation to NWOW principles.

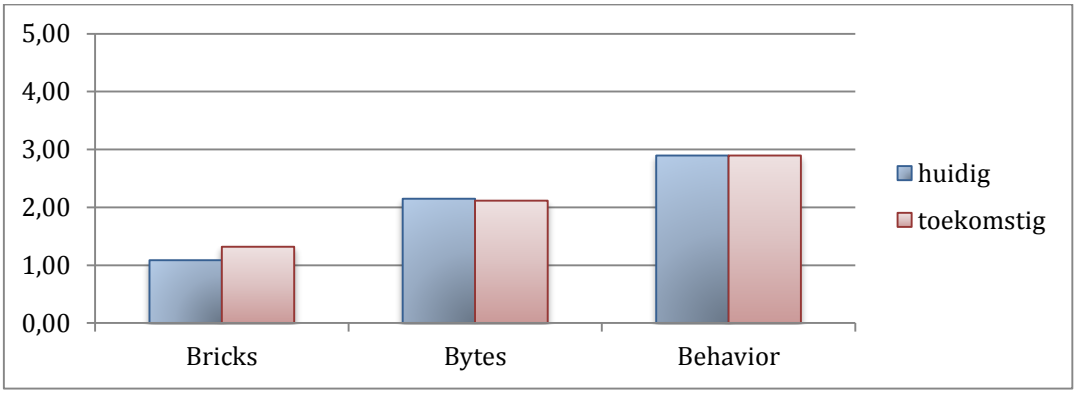

Figure 19: EY Bricks, Bytes, and Behavior dimensions graph

If you look at the Spider diagram (Figure 20, Table 25), you can clearly see that overall the aspects align quite nicely from current to future. Only on the aspects of flexible work location, workplace design and devices there is a visible difference. This indicates that the Advisory business line is currently at its desired maturity.

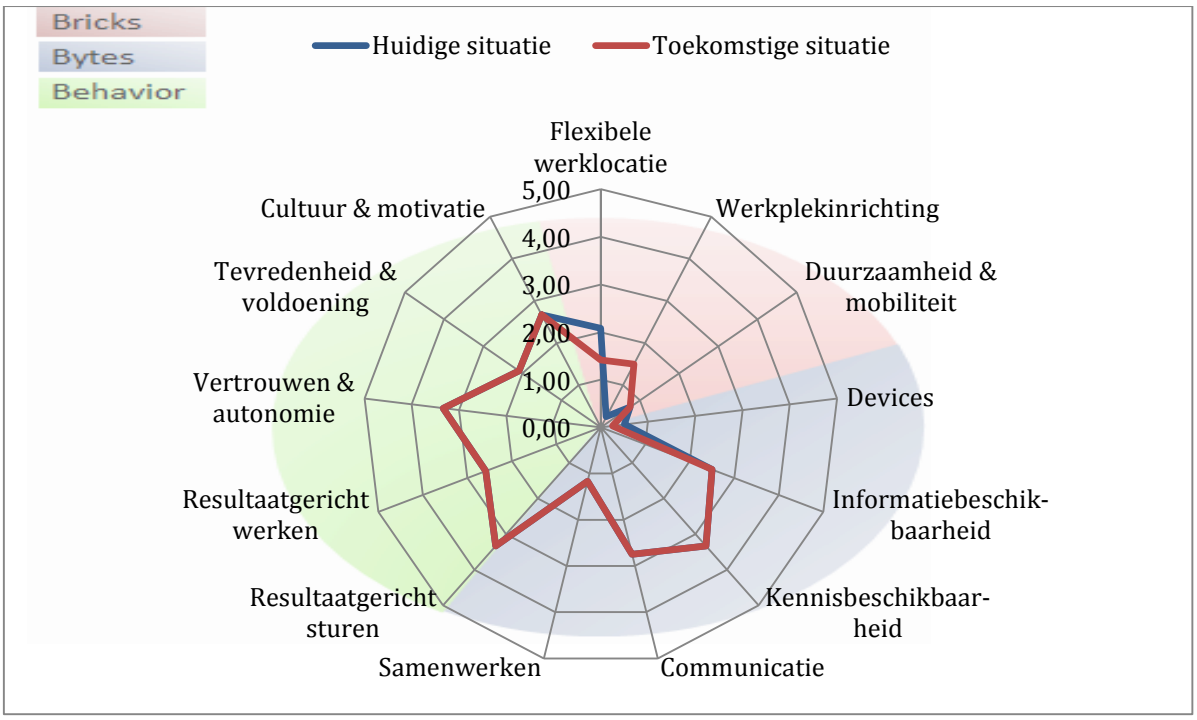

Figure 20: EY spider graph on the Bricks, Bytes, and Behavior dimensions

Table 25: EY Gap analysis on the Bricks, Bytes, and Behavior dimensions

Subject	Gap
Workplace design	1,3
satisfaction & fulfillment	0,0
Result-based working	0,0
Communication	0,0
Sustainability & mobility	0,0

I will quickly discuss the main difference from the three aspects mentioned above in the Bricks and Bytes dimensions.

In the Bricks dimension we see one major discrepancy, in the aspect of flexible working location we can see this difference in the following statement:

- *I control where I want to work.* They state that this is true, however it is also mentioned that this is only slightly relevant. This can be due to the nature of the work that is performed within EY Advisory, since most of the employees work at the office.

6.4.2 Knowledge sharing structure

Within EY there are many ways in which you can share knowledge, however most of the actual day to day knowledge sharing is still performed by using email, phones and face-to-face, but also by using Lync. There is also a weekly drinks session, for social interaction between employees.

EY uses two social network type knowledge sharing platforms, YoungEY which is for fresh EY employees, here they also organize networking events to get to know your fellow fresh colleagues. The other social network is Yammer, however this is not used that often.

The main knowledge database is called the Global Audit Methodology (GAM) database, here all concepts and procedures are stored, however it is hard to find what you are looking for in this database, therefor it is mostly used by more senior people, and they help juniors to find their way in GAM.

A monthly meeting is organized within the sub subservice lines, in which is discussed who is doing what and what they have learned from that. There is officially also a two-weekly meeting with the entire subservice line with a focus on content and experiences, however in the past 9 months it has been cancelled every time.

EY also shares knowledge with external parties, they sometimes hold presentations at other audit firms in which they explain how certain aspects work, but also to customers, so they know better what to expect and to what regulations they should adhere to.

There are also core meetings in which current affairs are discussed, the topics here are determined and given by the management.

For HVG there are also some separate knowledge sharing measures, since all their IT systems are separate from that of EY. They have a two-weekly professional competence meeting, every participant reads a scientific article beforehand and presents this during

the meeting, after which a discussion is held about the implications. This are usually articles about new laws or changes in the laws.

6.4.3 Knowledge Types shared

The interviews of EY gave the following results (Table 26), where you can see that there is a clear focus on explicit knowledge and hardly any in tacit knowledge. This can be explained by looking at the people I interviewed, a lawyer who relies on explicit knowledge for performing her work (laws, regulations, etc.), a consultant in a risk environment where they heavily rely on market data on a terminal, which is also explicit knowledge. Finally there is an IT auditor who has the most focus on tacit work, but this cannot compensate for the overly explicitness of the work. For each of the knowledge types I will give an example of knowledge that is shared and how:

- **Declarative:** Knowledge about the systems that they use, e.g. one of the systems has a problem that in order to share something with a colleague, you need to have that person in your address book first. This knowledge is shared with new colleagues via email and face to face.
- **Procedural:** Theoretical methods on how to calculate certain financial data, how do you get the right results? This is shared mostly face-to-face and via email.
- **Causal:** Knowledge on why they perform certain steps is documented in laws and regulations, for example why you perform certain steps in an audit, or why an audit needs to be performed. This is partly shared in the two-weekly meetings at HVG, but also at FSRISK in meetings and via email conversations.
- **Conditional:** Knowledge on which steps to perform first before you can perform a next step, the major step that needs to be done before the actual work can be done is an independence test, to test if you are allowed to work for this client (rules and regulations). Knowledge on why this step needs to be performed first is shared face to face, but also via web based learnings (knowledge repositories).
- **Relational:** Knowledge about the effects of the implementation of new rules and regulations, for example if certain independence rules change this might lead to you all of a sudden not being allowed to work for this customer anymore. This knowledge is shared via almost all channels, since this is very important knowledge for everyone in the company. So there are meetings, it is posted on the social network, it is send to everyone via the mailing lists and the knowledge repositories are updated with the latest knowledge.
- **Pragmatic:** All the methods that are used for audit jobs are stored in the Global Audit Methodology database (GAM). These methods are therefore mostly shared via this GAM, but because the GAM structure is sometimes confusing, this is also shared via email conversations.

Table 26: EY knowledge types result

Knowledge Type	Mostly Tacit	50/50	Mostly Explicit
Declarative	1	1	1
Procedural	0	0	3
Causal	0	1	2
Conditional	0	1	2
Relational	1	2	0
Pragmatic	0	0	3

Declarative knowledge (know-about) is evenly distributed in terms of tacitness and explicitness, which can be explained by the different interviewees, the IT auditor is more focused on tacit knowledge, whereas a lawyer focuses primarily on explicit knowledge. Procedural knowledge (know-how) is fully documented within EY, all he processes and how-to's are easily transferrable between employees. Causal knowledge (know-why) is also mostly on the explicit side, meaning that the reasoning of why to perform certain processes is stored and easily sharable. The same counts for conditional knowledge (know-when), which is related partly to procedural knowledge, when to perform what step. Relational knowledge (know-with) on the other hand shows a slightly more tacit focus, knowing how their products influence other aspects is located more in the heads of people. Finally there is pragmatic knowledge which is fully explicit, since this is documented firm knowledge.

Table 27 shows the consolidated results.

Table 27: EY knowledge types result split

KNOWLEDGE TYPE	TACITNESS	EXPLICITNESS
Declarative	1,5	1,5
Procedural	0	3
Causal	0,5	2,5
Conditional	0,5	2,5
Relational	2	1
Pragmatic	0	3
TOTAL	**4,5**	**13,5**

Table 27 indicates that overall there is a much higher focus on the sharing of explicit knowledge. There is one area where knowledge is balanced, this is declarative knowledge (know-about) and one area where knowledge is overly tacit, and this is relational knowledge (know-with).

6.5 COMP. X

6.5.1 NWOW assessment

Comp. X has a similar score as PostNL (Figure 21), a low bricks category and relatively high bytes and behavior scores. However the numbers tell a slightly different story here, the bricks category has a potential to grow from 2 to 3, however if you look at the bytes and behavior categories, Comp. X has already surpassed what it finds important.

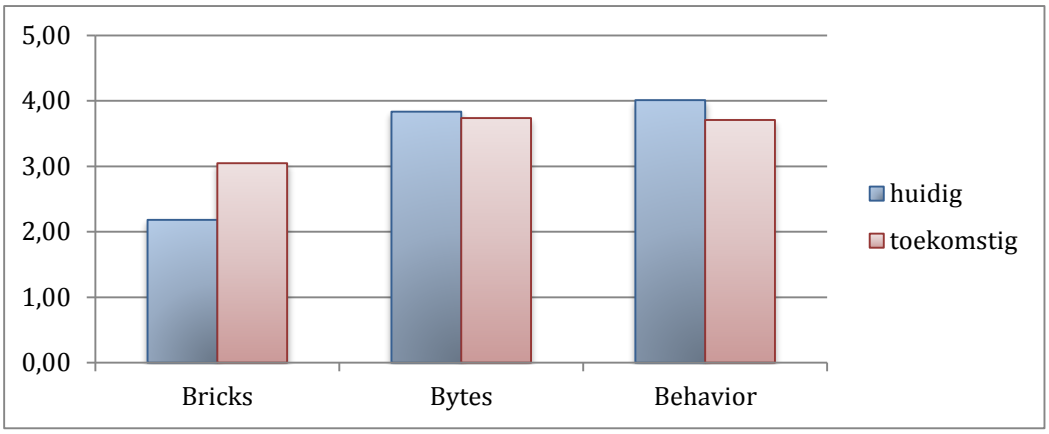

Figure 21: Comp. X Bricks, Bytes, and Behavior dimensions graph

The bricks category shows the biggest discrepancy between the current implementation and future implementation, however when looking at the results, there is no single statement that explains this discrepancy. It is the combination of all the questions combined that make up the difference. The main reason for the bricks category to be of only score 2,1, is due to workplace design (Figure 22, Table 28).

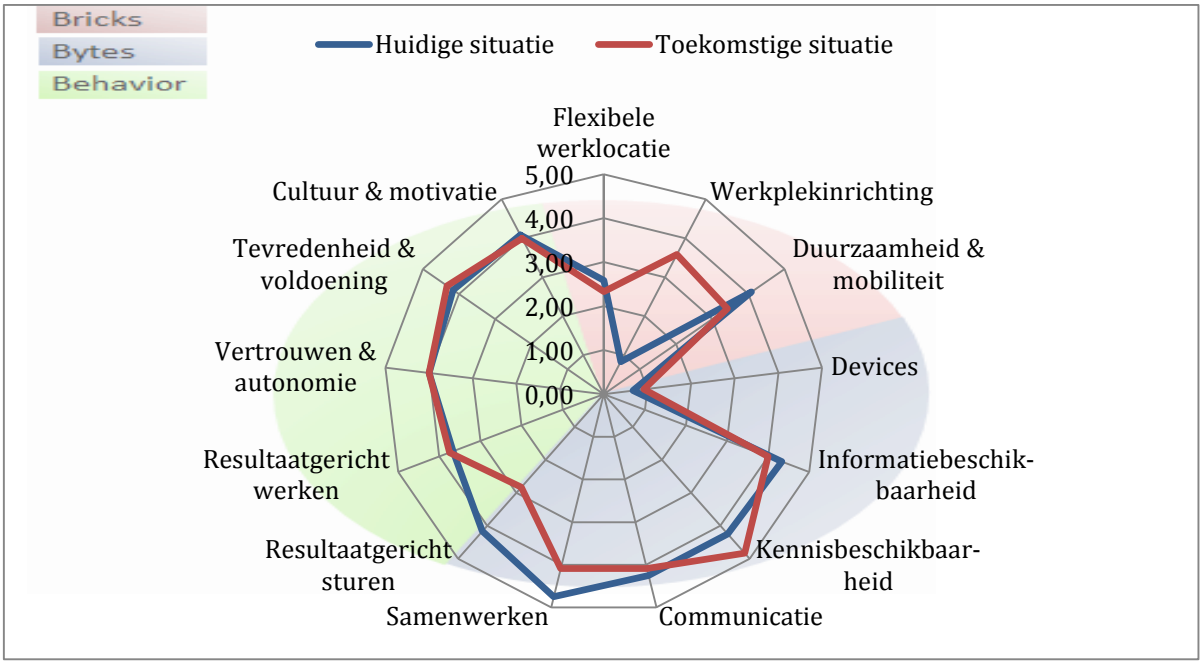

Figure 22: Comp. X spider graph on the Bricks, Bytes, and Behavior dimensions

Table 28: Comp. X Gap analysis on the Bricks, Bytes, and Behavior dimensions

Subject	Gap
Workplace design	2,8
Knowledge availability	0,6
Devices	0,3
Satisfaction & fulfillment	0,2
Result-based working	0,1

The bytes and behavior sections are relatively mature, both are around a maturity score of 4. Within the bytes overall all the functions are implemented except for devices, which is to be expected in a company that is also known for its IT security consulting. There is no BYOD within Comp. X in order to keep the data within the company secure. Finally in the behavior section, all aspects are implemented.

6.5.2 Knowledge sharing structure

Comp. X has a very extensive knowledge management infrastructure, comprised of several tools and non-technical interactions. The main ways of sharing knowledge during a job remains email and telephone solutions like Lync, but also working on the job and walking up to people to discuss topics related to a job. The new water boiler of today is the coffee machine, and here colleagues discuss work related aspects, what job they are on, etc. There is also a weekly drinks session on Friday for social interaction with colleagues.

Lync, a messenger and call tool by Microsoft is used to communicate directly with people, and it has an extra package called 'Ask me about' in which you can enter several topics of which you are an expert in. This allows employees to search for example clickview experts, and connect with them directly worldwide.

There is a general platform for best practices, where employees can look for inspiration on how to perform certain jobs. This also includes a general knowledge exchange site in which the most important aspects of a job are stored, including end result and presentations given. For the day to day documents, they have SharePoint implemented. Comp. X also has Yammer implemented, an internal social network, however not many people use this.

Every month there are two meetings to share knowledge between employees, one is a service line meeting in which knowledge gained during jobs is shared, the other is a 'learn and share' meeting, in which employees can pitch certain topics that they think are of interest to their colleagues (about 70% of the employees of BIA is at this meeting every time). There is also a yearly two day event called the BIA vakdagen in which workshops are given on topics related to business intelligence.

An interesting knowledge sharing capability are the competence centers, each of these covers an important topic within Comp. X. These topics can be tools that are being used but also just general practices. Each competence center has several experts worldwide that are available to answer questions. Comp. X also holds a quarterly questionnaire among all employees that asks them about their skills, this includes tools and programming languages amongst others.

Comp. X also offers a knowledge creation option, which is called the Innovation Platform, here you can submit new ideas, and if an idea is chosen to be elaborated upon the employee gets 10.000 euro in funding to make the idea real.

6.5.3 Knowledge Types shared

The interviews of Comp. X gave the following results (Table 29), a wide picture with some extremes on tacit and explicit knowledge, however there is an overall consensus for each knowledge type except for relational knowledge (know-with). Where two interviewees mentioned that this was due to the fact that everything is documented about the outcomes of projects and the possible other interactions with the results, the other interviewee spoke more about the experience of finishing jobs and seeing the results for himself, and discussing this with colleagues.

Declarative knowledge (know-about) is shared predominantly in an explicit form, whereas procedural (know-how) and conditional knowledge (know-when) are predominantly in a tacit form. Causal knowledge (know-why) is shared in a fully tacit form, this can be explained due to the fact that many of the processes and business frameworks are documented (Pragmatic knowledge), however there is never any rationale in these documents as to why certain steps need to be performed. For each of the knowledge types I will give an example of knowledge that is shared and how:

- **Declarative:** Knowledge about all the tools that you can use to create a dashboard and what the pros and cons are of each tool. This knowledge is stored and shared in knowledge repositories but is also shared in meetings and via the yearly workshops.
- **Procedural:** A simple example that was given was how to activate a tool called Clickview, where license control is important, so how to apply the correct license. This is shared in face-to-face situations.
- **Causal:** The knowledge of why certain actions are performed is not stored in systems and is almost completely tacit. For example why you put certain aspects in a presentation to give a possible customer a better understanding, ultimately to convince him/her to buy your services. This is predominantly shared in face-to-face meetings.
- **Conditional:** There is knowledge about mathematical models and these determine in what order steps need to be taken. This is not really shared that much, except via the knowledge repository where the models are stored.
- **Relational:** Knowledge of the results of implementing a dashboard, what the insights will add to a customers. This is shared via the re-use of proposals in which is stored what the results will be of a job. There proposals are stored in the knowledge repositories like SharePoint.
- **Pragmatic:** There is something called the Comp. X approach, in which the main processes and methods are described in order to perform the work and this is stored in and shared via the knowledge repository.

Table 29: Comp. X knowledge types result

Knowledge Type	Mostly Tacit	50/50	Mostly Explicit
Declarative	0	1	2
Procedural	2	1	0
Causal	3	0	0
Conditional	2	1	0
Relational	1	0	2
Pragmatic	0	0	3

Table 30 shows the consolidated knowledge types.

Table 30: Comp. X knowledge types result split

KNOWLEDGE TYPE	TACITNESS	EXPLICITNESS
Declarative	0,5	2,5
Procedural	2,5	0,5
Causal	3	0
Conditional	2,5	0,5
Relational	1	2
Pragmatic	0	3
TOTAL	**9,5**	**8,5**

Table 30 indicates that there is a balance of tacit and explicit knowledge sharing, with only a 1 point difference. In other words there is a good balance between having the knowledge in explicit form for the future, but also a lot of experience on the how, when and why to do that work.

6.6 KPMG

6.6.1 NWOW assessment

In Figure 23 you can see that KPMG has the highest overall score for the NWOW monitor, with all categories being above a maturity score of 3, however there are no exceptional values as can be seen at the other companies. This leads to a very balanced NWOW implementation.

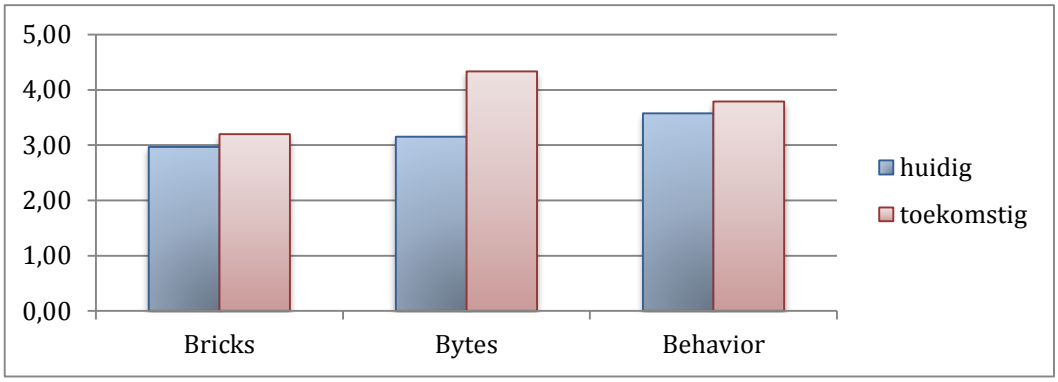

Figure 23: KPMG Bricks, Bytes and Behavior dimensions graph

However if you look at the spider diagram, there are clearly some areas missing (Figure 24, Table 31). You can see that there is a very low value for workplace design, while the other two values, flexible work location and sustainability & mobility are very high. This low value comes from the statements on occupancy of the offices and general computer accessibility.

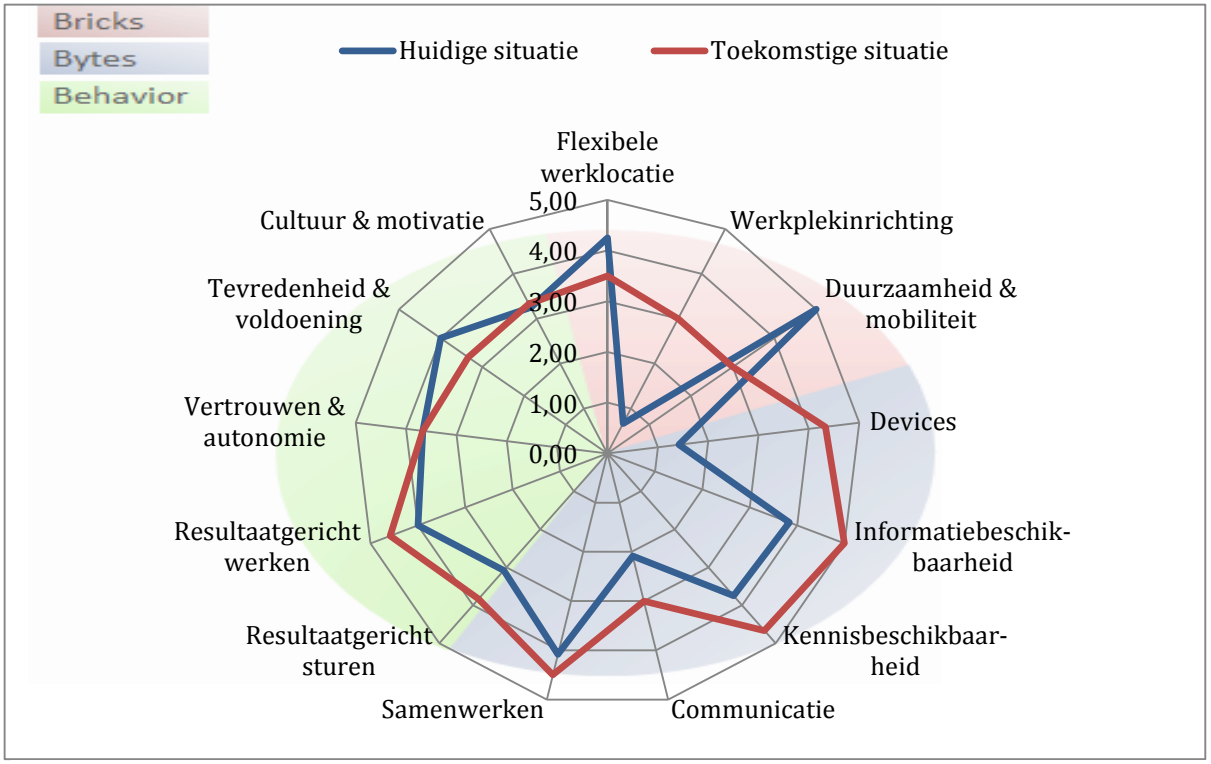

Figure 24: KPMG spider graph on the Bricks, Bytes, and Behavior dimensions

Table 31: KPMG Gap analysis on the Bricks, Bytes, and Behavior dimensions

Subject	Gap
Devices	2,9
Workplace design	2,3
Information availability	1,2
Knowledge availability	0,9
Communication	0,9

- *The occupancy is good (above 70%), there is hardly any vacant space.* KPMG has a very large international headquarters in Amstelveen with room to expand, however currently it is not expanded enough yet to require the full space. KPMG has also indicated that this was not important for them at this time.
- *On every desk there is an external screen present or available to connect to a laptop.* This is currently not true, even though KPMG has indicated that this is somewhat important. In the current age, more and more data needs to be visible, and that requires more screen space than laptops currently have.

Looking at the bytes section, we can see that most aspects have a high implementation maturity, however there are two aspects that are lower, Devices and Communication (communicatie). Just as with Comp. X, KPMG has a lot of data they want to keep within the company, which is why BYOD is not supported. However they have indicated that in a future implementation stage they find this aspect very important. The three main statements are:

- *I can choose/use a device that supports my work in an optimal way.*
- *I can and am allowed to use my own laptop, tablet, or smartphone for business.*
- *My organization is continuously working on creating a more flexible policy on hardware and applying concepts like BYOD.*

The second aspect, communication is low due to the following statements:

- *Agreements have been made among colleagues about physical and virtual presence.*
- *My company has its own (or uses a) protected social platform where I can get to know colleagues and share experiences with them.*

Finally we have the behavior section, which has overall a very balanced maturity of 3, with no real dips or peaks.

6.6.2 Knowledge sharing structure

KPMG has one major knowledge sharing capability and that is the recently implemented center of excellence. It is now operational for a year and it has become the central knowledge hub within certain aspects of the SSOA unit. There are currently two excellence centers, one for Selection and one for Strategy, and each of these centers has several streamleads. A stream lead is responsible for any knowledge that is created and shared with colleagues and the excellence center itself. The center has a dedicated office in Frankfurt where there is dedicated staff in order to keep the centers administrated and indexed correctly in order for the right information to be found easier. Having this

dedicated staff creates a well-structured center that allows for easier search, but also for easier storing and creation of new knowledge. The streamleads are divided over the different countries in which KPMG has offices that are involved in the SSOA process, they meet every two weeks in Amstelveen to discuss the excellence center, what is new, what has changed and how to better use the knowledge within the excellence center.

Within the center of excellence there is a SharePoint environment that stores all the good practices of KPMG, examples of jobs that had very good results and where there is an agreement between the streamleads that that was the correct way to do it. It also stores country specific aspects for the examples, for example when regulations or laws are different, certain steps need to be performed differently.

Streamleads are the central points for acquiring knowledge, since the streamleads know everything in the center of excellence or are aware of where what is stored, therefor employees meet regularly with a streamlead to ask questions regarding specific projects and how they should be performed. If the streamlead is unaware of what to do, he generally knows who does and will forward the employee.

For each project that is performed there is a separate fileshare in which all files are stored that are used during a project. This fileshare is created at the start of each project during the kickoff session of a project, in which is discussed what is performed, how it will be done and who is responsible for which aspects. The project manager is responsible for maintaining the fileshare. The idea is that good practices stored in the excellence center are used in order to start the project and define what to do, however since the center is still relatively new, not everyone sees its value and they still use files that have been used on previous projects.

Every three weeks there are two types of meetings, first there are team meetings in which relevant content is discussed in small groups, in order to keep employees up-to-date on new processes and procedures. The second meeting is an Intellectual Property (IP) meeting.

New employees get an onboarding introduction, here they get courses on how to work within KPMG; this is generally an international onboarding event, where new employees from all over the world gather to learn.

Of course KPMG uses the standard communication tools as all other companies use, telephone, email and Lync are being used often to coordinate and discuss during projects. Further most of the work is done within a team, therefor employees often work together in the same room which leads to face-to-face knowledge sharing.

Finally there is an intranet where every employee has a personal page containing his skills and the projects he or she has done, however this intranet isn't being used regularly due to the size of the groups.

6.6.3 Knowledge Types Shared

The results of KPMG show a distorted view at first glance (Table 32), however only one of the knowledge types does not have a consensus and this is in the conditional knowledge (know-when) type. During the interviews it became clear that this is due to the fact that

some work primarily on the documented files on when to perform a certain aspect of a project, while others do this more on experience or a combination of both.

Declarative knowledge (know-about) is shared predominantly in an explicit form, whereas causa knowledge (know-why) is shared exclusively in a tacit form. The remaining knowledge types (pragmatic not included) are balanced between tacit and explicit. Where procedural knowledge (know-how) has a small preference for sharing in an explicit form, relational knowledge (know-with) has a small preference for sharing in a tacit form. For each of the knowledge types I will give an example of knowledge that is shared and how:

- **Declarative:** Knowledge about the market, what are the parties that are on the playing field, what are their specialties, and what are the opportunities. This is shared via knowledge repositories but also in face-to-face meetings during projects.
- **Procedural:** How to perform a selection process, which is mostly documented however part is also experience. This is mostly shared via the center of excellence and during the kickoff.
- **Causal:** During a project kickoff session knowledge is shared about why they are going to do the project and what the goals are.
- **Conditional:** what are the conditions that need to be met before the next action can take place. This is shared in team-meetings.
- **Relational:** Expectations of the outcomes of projects are documented in methodologies and these are shared via the center of excellence. These are then re-used for new projects.
- **Pragmatic:** The center of excellence is the central repository with all the methodologies and frameworks that KPMG uses and it is therefore shared via this center of excellence.

Table 32: KPMG knowledge types result

Knowledge Type	Mostly Tacit	50/50	Mostly Explicit
Declarative	0	1	2
Procedural	0	2	1
Causal	3	0	0
Conditional	1	1	1
Relational	1	2	0
Pragmatic	0	0	3

Table 33 shows the consolidated version of Table 32.

Table 33: KPMG knowledge types results split

KNOWLEDGE TYPE	TACITNESS	EXPLICITNESS
Declarative	0,5	2,5
Procedural	1	2
Causal	3	0
Conditional	1,5	1,5
Relational	2	1
Pragmatic	0	3
TOTAL	**8**	**10**

Table 33 indicates that most of the knowledge that is shared is in the form of explicit knowledge, however there is not a big difference between the two types. This shows a decent balance of making a lot of knowledge explicit and using your tacit knowledge or experience to execute the projects.

6.7 COMPANY COMPARISON ON KNOWLEDGE INFRASTRUCTURES

Looking at the 5 cases, each of the companies has a more or less similar knowledge sharing infrastructure, with some small differences which I will try to elaborate on. I will base this on the different types of tools that each company has (Table 34).

Direct communication tools

All the companies that I interviewed used Lync as a main tool to connect and share knowledge with colleagues, and in all companies this is well implemented and well used, however the use is not always the same. Some use it as a primary form of communication (EY, Comp. X), whereas others use it as a tool to make appointments for a different type of knowledge sharing session (PostNL). Lync (Microsoft, 2014) is a Microsoft product that allows employees to connect via chat, phone or video call. More traditional ways of direct communication tools are using email and telephones to share knowledge, where most companies don't allow BYOD (Comp. X, KPMG, EY, Sogeti) PostNL does allow this, however this does not directly influence knowledge sharing since PostNL has an online environment that includes all functionality. PostNL also uses chatter as an extra chat possibility between colleagues, however this seems redundant with Lync already implemented.

Social Media tools

4 out of 5 companies use social media tools to allow employees to share knowledge with each other (PostNL, Sogeti, EY & Comp. X), and many of these do this in the form of the corporate social media platform Yammer. However even though this tool is available, many of the interviewees never use it, actively avoid it or get annoyed by the fact that much of the knowledge that is shared is not useful to them due to the large size of the company (EY, Comp. X, Sogeti).

EY also has a social media platform for starters called YoungEY, which is used to share experiences with fellow starters. This platform is also used in order to organize networking events for starters.

Finally KPMG used to have Yammer as a social media tool, however due its lack of effectiveness they removed it and currently there is no replacement.

Knowledge repositories

In this category PostNL has the most repositories to it available, however this is a negative situation. There are currently 5 repositories that are used by different departments within PostNL with no interaction between them. (SalesForce, TopDesk, SAP, SuccesFactors, and SharePoint).

All companies have SharePoint implemented as a central repository, used predominantly for project knowledge in order to document how projects went and what the lessons learned are. Besides SharePoint, the 4 consultancy companies each have a central knowledge repository in which their best practices are stored, the methodologies and frameworks. For Sogeti this is ShareNet, for EY this is GAM, for Comp. X they have a general best practices database and for KPMG there is the center of excellence.

Locator tools

Maybe the most important tool in highly tacit environments are locator tools, which assist in finding where the knowledge is that you need, in this case who has the knowledge. During the interviews it became clear that this is the biggest issue facing companies these days. Only Comp. X has some processes in play to index who has what knowledge, this index is then connected to their competence centers. They also use Lync where people can indicate on what topics they can answer questions about, however this is hardly used.

Table 34: Overview of different knowledge sharing tools

		PostNL	*Sogeti*	*EY*	*Comp. X*	*KPMG*
Direct comm.	Phone	x	x	x	x	x
	Email	x	x	x	x	x
	Lync	x	x	x	x	x
	Chatter	x				
Social Media	Yammer	x		x	x	
	TeamPark		x			
	YoungEY			x		
Reposit-ories	SharePoint	x	x	x	x	x
	TopDesk	x				
	SAP	x				
	SuccessFactors	x				
	SalesForce	x				
	Dropbox		x			
	ShareNet		x			
	GAM			x		
	Best practices DB				x	x
	Center of Excellence					x
	File save					x
Locator	Lync				x	

7 ANALYSIS

In this section the data that was presented in the results section will be analyzed. First a comparison will be made purely on the knowledge types that are shared, secondly the NWOW influence on knowledge sharing will be investigated and finally I show how the type of knowledge sharer influences the knowledge sharing situation.

7.1 PER KNOWLEDGE TYPE

One way of looking at the data is by looking per knowledge type how it is divided, this gives a good oversight of each knowledge type and if it is mostly tacit (T) or explicit (E) (Table 35). I will try to give explanations for each knowledge type.

Table 35: Knowledge types shared per company

	POSTNL		SOGETI		EY		COMP. X		KPMG		TOTAL	
	T	E	T	E	T	E	T	E	T	E	T	E
DECLARATIVE	0	3	1	1	1,5	1,5	0,5	2,5	0,5	2,5	**3,5**	**10,5**
PROCEDURAL	2	1	1,5	0,5	0	3	2,5	0,5	1	2	**7**	**7**
CAUSAL	2	1	1,5	0,5	0,5	2,5	3	0	3	0	**10**	**4**
CONDITIONAL	2	1	2	0	0,5	2,5	2,5	0,5	1,5	1,5	**8,5**	**5,5**
RELATIONAL	1,5	1,5	1,5	0,5	2	1	1	2	2	1	**8**	**6**
PRAGMATIC	0	3	0	2	0	3	0	3	0	3	**0**	**14**

Declarative knowledge or know-about has been mostly found explicit, which can be explained because this is knowledge about aspects, which is usually not based on experience but on learning and reading. For example market data mentioned by EY is purely data based, viewed on a terminal for everyone to use. However if you look at the description given by KPMG on market data, this is more tacit knowledge of who the players are in the market, what they do, what the customers are and where the possibilities are. So context in this is important, if you have a well-documented environment or topic this will be more explicit, but looking at undocumented environments, tacit knowledge comes into play, however always in a combination with explicit knowledge.

Procedural knowledge or know-how is exactly equal, this can be retraced in the interview in that many of the procedures that companies have tell employees how to perform a project, or how to perform a certain analysis, but in order to use this well, experience is needed. The overall process for projects is determined in for example EY's Global Audit Methodology database, however the individual steps require tacit knowledge on how best to execute these steps.

Causal knowledge or know-why has an overly tacit nature according to the interview. During the interviews it was clear that causal knowledge is hardly documented, the how is well documented, but the why is expected to be in the employees' heads. The odd one out in this case is EY which has a larger focus on explicit knowledge, leading back to the

second interviewee who is a lawyer. In law every 'why' is documented and the first interview, where it is well documented why certain aspects pose security risks.

Conditional knowledge or know-when is mostly tacit with a difference of 3 points, this difference however is mostly caused by the very explicit nature of the knowledge within EY, who contribute almost half the explicitness of the total score in relation to the other companies who score higher on tacitness. Apparently EY puts a higher focus on making knowledge explicit than other companies, and documenting when certain steps should be performed within the overall process.

Relational knowledge or know-with has a rather equal score, with all companies having a split on if it is tacit or explicit knowledge. This is due to the fact that in the interviews, many of them indicated that part of this is documented, what the effects are of the projects they perform, however part of this is also experience and undocumented, since every project is different and can result in unexpected and undocumented situations.

Pragmatic knowledge or company knowledge is completely explicit, however this was expected of this knowledge type since it is inherent. Pragmatic knowledge is focused on best practices and business frameworks, documented tools in order to perform the best possible job.

Overall this gives us the following score, 37 of the interviewees referred to tacit knowledge and 47 to explicit knowledge. However if we leave out the pragmatic knowledge aspect that is inherently explicit, we get a score of 37 tacit versus 33 explicit.

7.2 NWOW INFLUENCE ON KNOWLEDGE SHARING

In this section I will discuss the different companies in relation to their NWOW implementation score (Table 36), I will compare companies based on the three different aspects of NWOW, bricks, bytes, and behavior. The first aspect is bricks, looking at the overall results of the NWOW monitor there is a major discrepancy between KPMG (3), Comp. X (2,2) and EY (1,3), so for the bricks section I will compare these three. For the second aspect, bytes, I will compare Sogeti (2), KPMG (3,2), and PostNL (3,8). For the final aspect behavior, I will compare Sogeti (2,1), EY (2,9) and Comp. X (4). In this section I will leave out the pragmatic knowledge type since this is the same for all companies and because of its inherent explicitness. There might be a shift in how pragmatic knowledge is shared, but the knowledge type itself stays explicit. In the next few tables, the upper row consists of the company + their NWOW maturity score for that dimension of Bricks, Bytes, and Behavior.

Table 36: NWOW maturity scores per company

	POSTNL	SOGETI	EY	COMP. X	KPMG
BRICKS	2,1	1,8	**1,3**	**2,2**	**3**
BYTES	3,8	**2**	2,1	**3,8**	**3,2**
BEHAVIOR	3,8	**2,1**	**2,9**	**4**	3,6

7.2.1 Bricks

Table 37 shows that there is a big difference between EY, Comp. X, and KPMG. Whereas EY is still a highly explicit focused company, and Comp. X is largely tacit, KPMG has found a more balanced solution, equaling tacit and explicit knowledge. If we look at what the dimension of Bricks entails we can recall that it is about office design, flexible work location and sustainability and mobility. EY scores low on flexible work and office design, there is no real opportunity for them to work elsewhere, nor is the office currently well equipped to handle the different types of activity based workplaces. This means that more work is performed at the office and more work is based on explicit knowledge (market data from a terminal, laws and regulations). On the other hand if we look at KPMG who have a relatively high score for the Bricks dimension, and who score very highly on flexible work location and sustainability and mobility. They focus much more on having a good balance between explicit knowledge, the basis from which processes are followed, and tacit knowledge, translating to the experience of the employees in executing these processes. This is also required, because with a higher mobility, means generally more diverse work and therefore less reliance on pure explicit knowledge.

If we look at Comp. X, who score in-between EY and KPMG, we see something different. Comp. X scores highly on mobility and averagely on flexible work location, and they score highly on tacit knowledge. This could be explained by the difference in work that EY and Comp. X perform. Whereas Comp. X is very focused on jobs with individual differences, where every company requires something different, the department interviewed at EY is very focused on performing the same job over and over in regards to rules and regulation changes. Another difference is that at Comp. X the employees are almost never at the office but always at the customer, in contrary to EY where the employees are mostly at the office.

Table 37: Knowledge types shared in the Bricks dimension between EY, Comp. X and KPMG

	EY (1,3)		COMP. X (2,2)		KPMG (3)	
	Tacit	Explicit	Tacit	Explicit	Tacit	Explicit
DECLARATIVE	1,5	1,5	0,5	2,5	0,5	2,5
PROCEDURAL	0	3	2,5	0,5	1	2
CAUSAL	0,5	2,5	3	0	3	0
CONDITIONAL	0,5	2,5	2,5	0,5	1,5	1,5
RELATIONAL	2	1	1	2	2	1
PRAGMATIC	0	2	0	3	0	3
TOTAL	4,5	13,5	9,5	8,5	8	10
TOTAL - PRAGM.	4,5	10,5	9,5	5,5	8	7
PERCENTAGE	30%	70%	63%	37%	53%	47%

Between Comp. X and KPMG, the major difference in NWOW maturity score comes from the aspect of flexible work location, where KPMG scores a 4,2, Comp. X scores a 2,8. KPMG is much more focused on working from a set of methods and procedures originating in the center of excellence because the work they perform is centered on the same type of work, sourcing problems. And even though there are many different types of sourcing the work is more similar than that of Comp. X, who focus much more on tacit knowledge when deciding how to work.

7.2.2 Bytes

For the Bytes dimension (Table 38) we can clearly see that within Sogeti, who has the lowest bytes score, the focus lies on tacit knowledge, whereas KPMG and PostNL who have a much higher maturity have a more balanced score. If we look back at what the Bytes dimension entails, we remember that it is about how IT supports knowledge sharing. On the one hand of the spectrum we have Sogeti who scores low on all aspects in the Bytes dimension, especially on knowledge availability, communication and collaboration, we see that there is a high focus on tacit knowledge. This means that employees are more isolated and have less explicit knowledge available to them, therefore a higher reliance on tacit knowledge is required to perform the work correctly. On the other end of the spectrum we have PostNL, who score highly on knowledge availability, communication and collaboration. This means that more explicit knowledge is available via knowledge repositories, but also because communication and collaboration is more available for them, explicit knowledge is easily shared.

Between PostNL and KPMG there is not a big difference in the knowledge types that are shared compared to the difference in NWOW maturity scores. The biggest difference in the NWOW maturity scores between these two companies is on the area of devices. Where KPMG does not allow BYOD principles, PostNL does. However the question is if this is a big influence on knowledge sharing. In an environment where everyone uses the same devices, access to knowledge should be easier and the support of the devices should be higher. On the other hand, PostNL uses the office 365 suite as a pilot at the moment and this does not require specific devices anymore, any device is capable of performing the same functions. Therefor I conclude that the devices aspect of the Bytes dimension does not have a high influence on knowledge sharing.

Table 38: Knowledge types shared in the Bytes dimension between Sogeti, KPMG, and PostNL

	SOGETI (2)		KPMG (3,2)		POSTNL (3,8)	
	Tacit	Explicit	Tacit	Explicit	Tacit	Explicit
DECLARATIVE	1	1	0,5	2,5	0	3
PROCEDURAL	1,5	0,5	1	2	2	1
CAUSAL	1,5	0,5	3	0	2	1
CONDITIONAL	2	0	1,5	1,5	2	1
RELATIONAL	1,5	0,5	2	1	1,5	1,5
PRAGMATIC	0	2	0	3	0	3
TOTAL	7,5	4,5	8	10	7,5	10,5
TOTAL - PRAGM.	7,5	2,5	8	7	7,5	7,5
PERCENTAGE	75%	25%	53%	47%	50%	50%

7.2.3 Behavior

In this final dimension, you can see a big difference again between the lowest NWOW maturity score of Sogeti (2,1) and the higher maturity scores of Comp. X (4)(Table 39). If we think back of what the Behavior dimensions entails, we remember that it is about the way people work, how they are being managed and the culture. First we look at Sogeti, they score low on result-based steering, satisfaction and culture & motivation. The interviewee is obviously not very satisfied with the work he performs, this should not directly influence the knowledge types that are shared however it is possible that due to

this low satisfaction, he performs more tacit focused work and ignores the explicit knowledge that is available to him, but requires more work in accessing the IT systems. Because of this personal opinion in the Behavior dimension, it is difficult to say if this really influences knowledge sharing and knowledge types shared.

I will therefore focus more on the other two companies, EY and Comp. X. EY scores average on all aspects (±3) except for satisfaction (2). Due to the repetitive aspect of the work performed at EY which involves compliance work on the (inter)national rules and regulations, the work might be considered less interesting

Finally Comp. X scores high in the Behavior dimension, with the only low aspect being result-based steering (2,9), however result-based working does score high. Therefor it seems that result-based steering is less important.

Because there are so many aspects within the Behavior dimension that are different between the different case studies, it is difficult to say what within this dimension causes the change in knowledge types shared.

Table 39: Knowledge types shared in the Behavior dimension between Sogeti, PostNL and Comp. X

	SOGETI (2,1)		EY (2,9)		COMP. X (4)	
	Tacit	**Explicit**	**Tacit**	**Explicit**	**Tacit**	**Explicit**
DECLARATIVE	1	1	1,5	1,5	0,5	2,5
PROCEDURAL	1,5	0,5	0	3	2,5	0,5
CAUSAL	1,5	0,5	0,5	2,5	3	0
CONDITIONAL	2	0	0,5	2,5	2,5	0,5
RELATIONAL	1,5	0,5	2	1	1	2
PRAGMATIC	0	2	0	3	0	3
TOTAL	7,5	4,5	4,5	13,5	9,5	8,5
TOTAL - PRAGM.	7,5	2,5	4,5	10,5	9,5	5,5
PERCENTAGE	75%	25%	30%	70%	63%	37%

We can also look at it from the other side, where we look at the different dimensions, and how their score is over the different companies. In the Figure below (Figure 25), I have plotted the different companies on the NWOW maturity scores versus the balance between tacit and explicit knowledge. For clarification, I have added separate Figures for the three dimensions: Bricks, Bytes, and Behavior below.

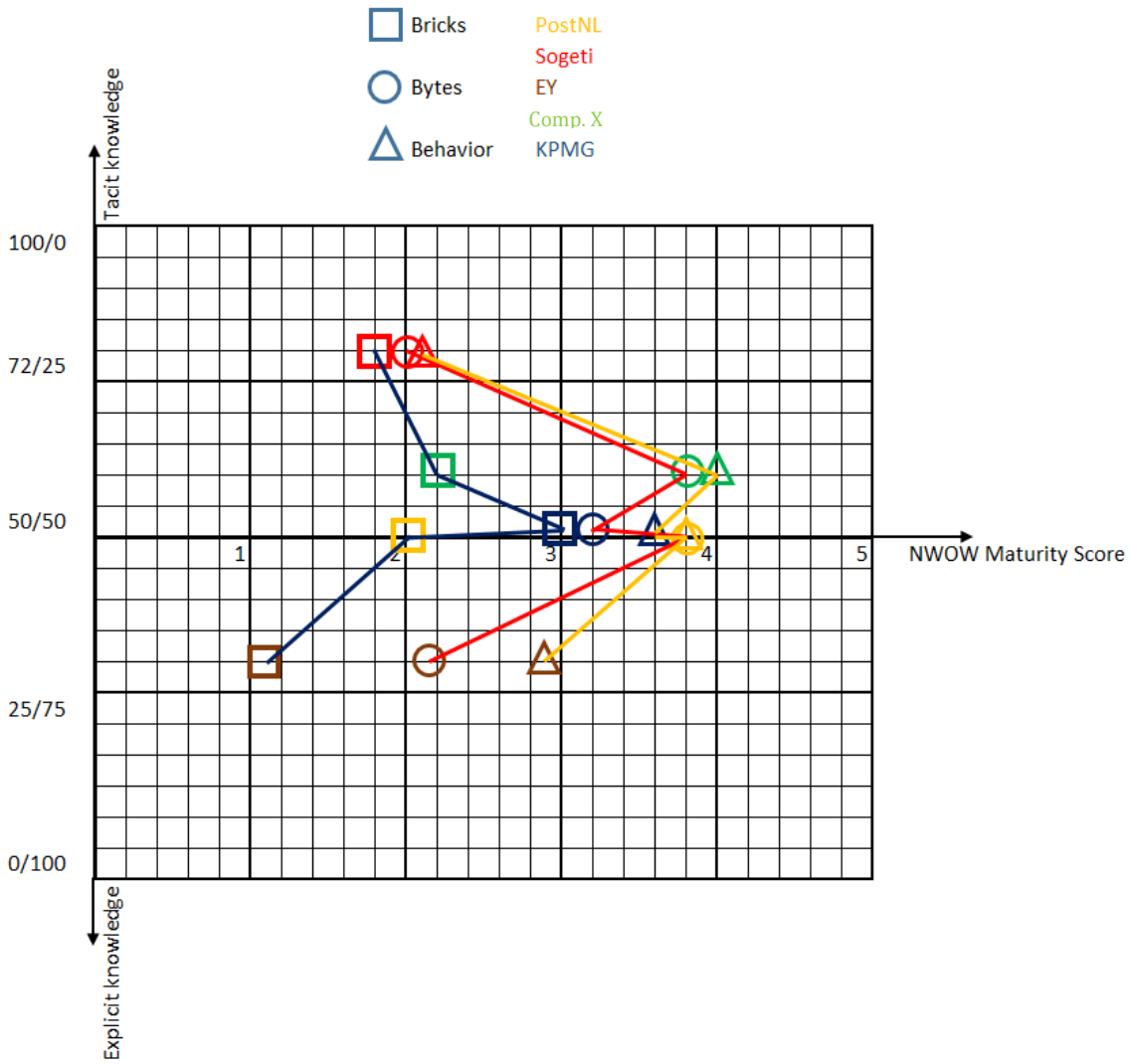

Figure 25: NWOW maturity score versus Tacit/Explicit balance plotted

For example take a look at Figure 26: Here we can clearly see a movement where the higher the NWOW maturity score in the Bricks dimension, the more the lines move to 50/50 in knowledge sharing types. Here we can conclude that there is a clear interaction between NWOW maturity score of the Bricks dimension and the knowledge types that are shared.

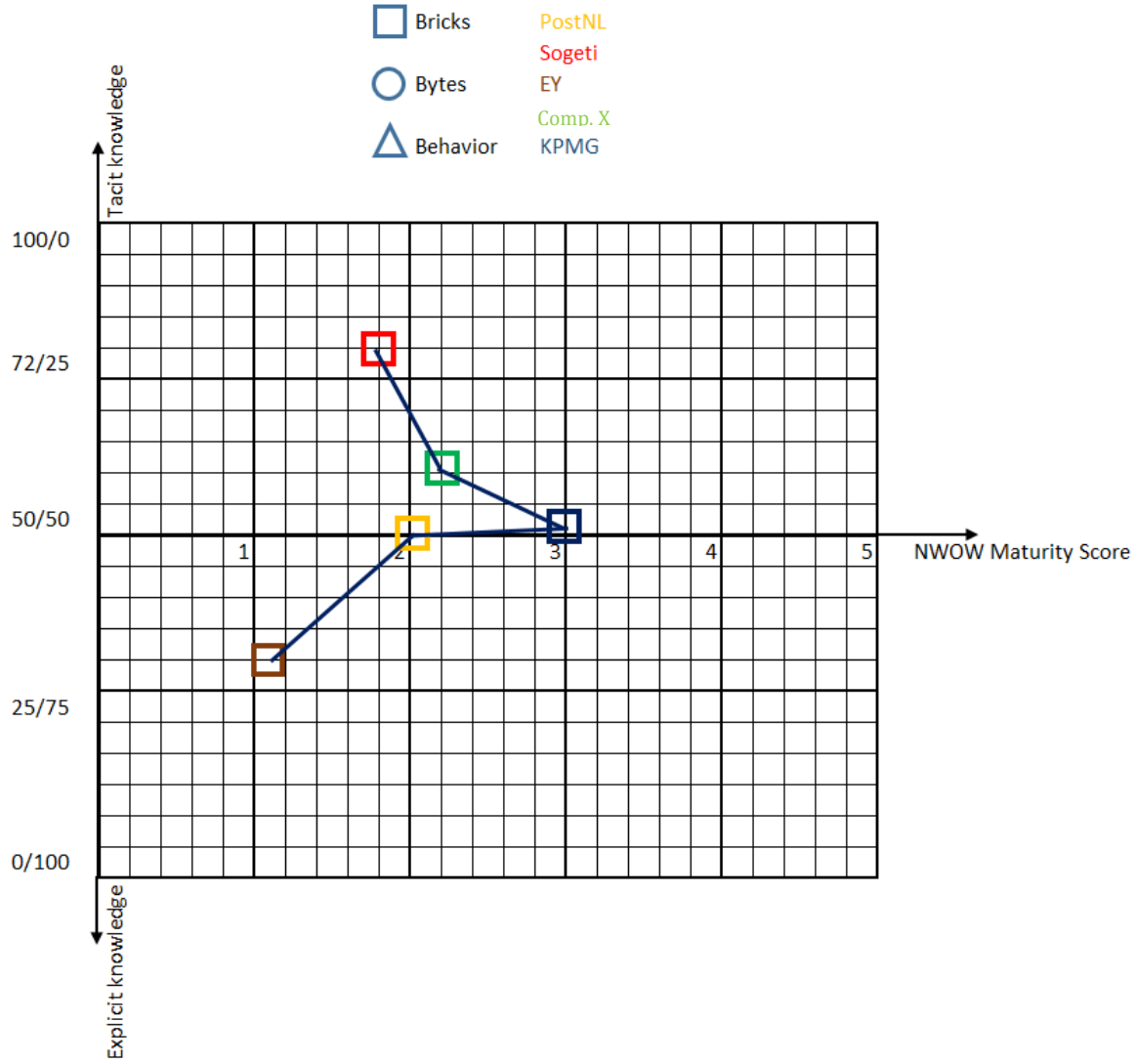

Figure 26: Bricks dimension versus knowledge types shared plot

The same can be said for the Bytes dimension (Figure 27): Here we see a small kink caused by KPMG but the overall line is similar to that of the Bricks dimension. Here we also see that a higher maturity on the Bytes dimension causes a better balance between knowledge types. Here we can conclude that there is a clear interaction between NWOW maturity score of the Bytes dimension and the knowledge types that are shared.

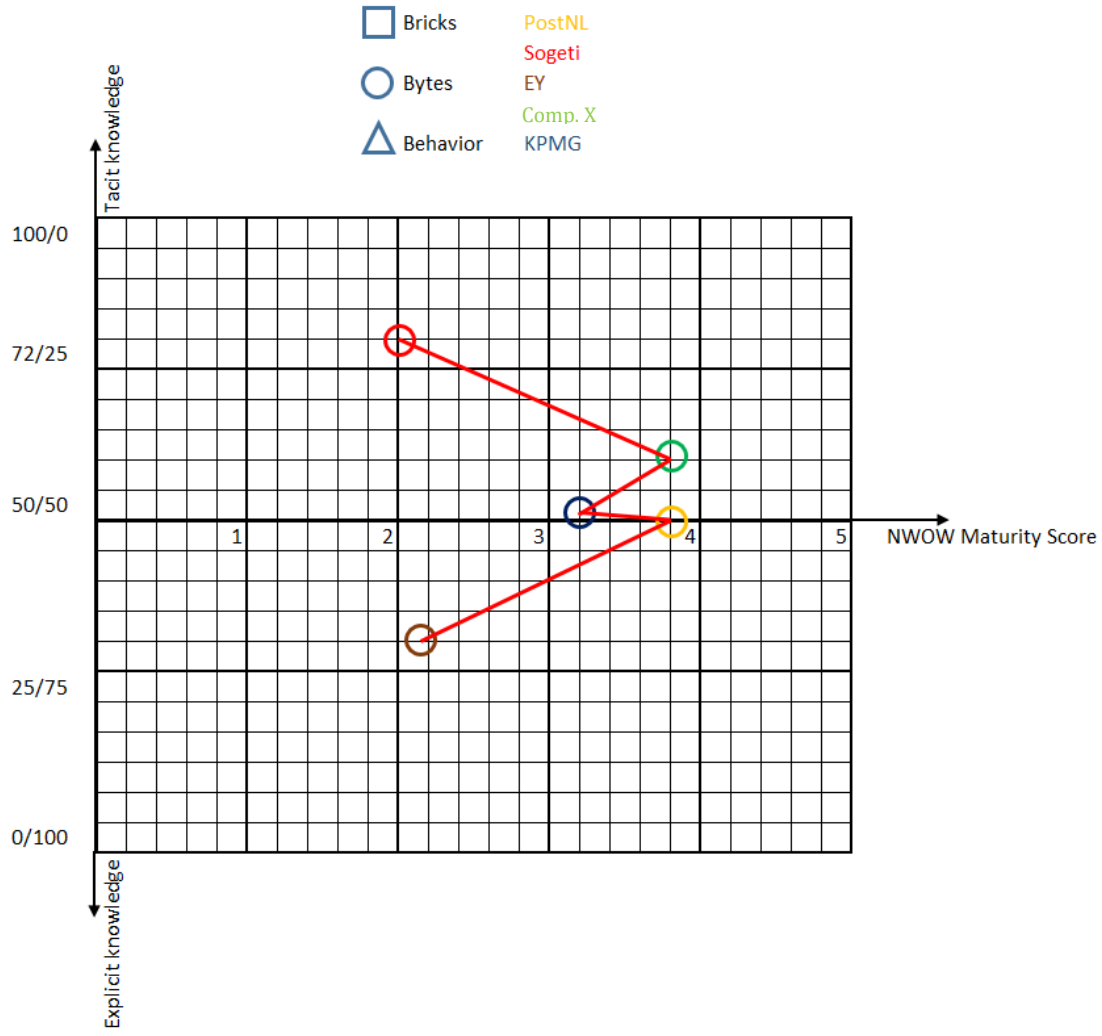

Figure 27: Bytes dimension versus knowledge types shared plot

Finally we have the Behavior dimension (Figure 28) which again shows a similar curve as the previous two dimensions. Once again with a small glitch that is caused by KPMG, but overall it shows a clear line. Here we can conclude that there is a clear interaction between NWOW maturity score in the Behavior dimension and the knowledge types that are shared.

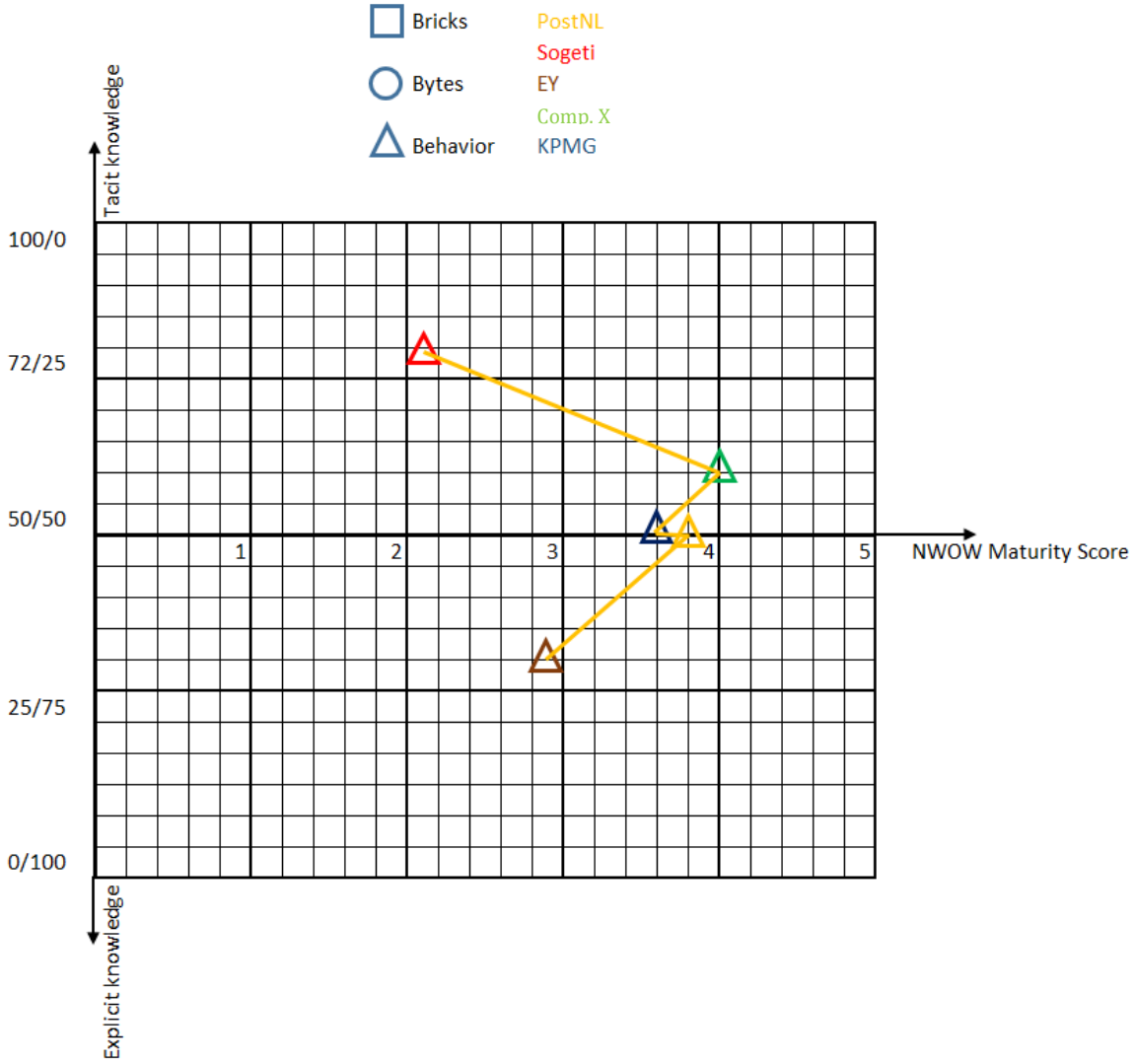

Figure 28: Behavior dimension versus knowledge types shared plot

7.3 KNOWLEDGE SHARER INFLUENCE ON KNOWLEDGE SHARING

When we compare knowledge sharer to the knowledge sharing data, we get the following table (Table 40), note that the data does not include an analysis with and without pragmatic data, because pragmatic knowledge is the same for every interviewee I have chosen not to include them in the final analysis.

Table 40: Knowledge types shared per knowledge sharer: Anchor, Connector, and Gatherer

	ANCHOR		CONNECTOR		GATHERER	
	Tacit	Explicit	Tacit	Explicit	Tacit	Explicit
DECLARATIVE	0,5	1,5	0	3	2	5
PROCEDURAL	0	2	2	1	3,5	3,5
CAUSAL	0	2	2	1	6,5	0,5
CONDITIONAL	0	2	2	1	4,5	2,5
RELATIONAL	1	1	1,5	1,5	4	3
PRAGMATIC	0	2	0	3	0	7
TOTAL - PRAGMATIC	1,5	8,5	7,5	7,5	20,5	14,5
PERCENTAGE	**15%**	**85%**	**50%**	**50%**	**59%**	**41%**

In this table there is a clear line, the more mobile you are in the work that you perform, the more you go from primarily explicit knowledge to more tacit knowledge (Figure 29). The last category of knowledge sharer type Navigator was not present as a type in the interviewees, therefor I do not have data on this. The expectation however is, that the focus there is even more on tacit knowledge, and I have indicated in the figure how this line would continue

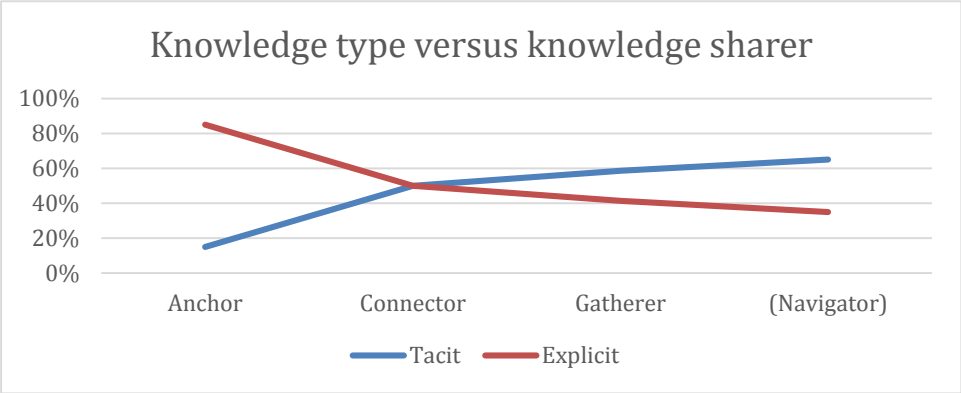

Figure 29: Tacit knowledge versus Explicit knowledge for different knowledge sharers, and an extrapolation for the Navigator knowledge sharer type

The explanation of this shift from mostly explicit to more tacit knowledge lies in the different types of work that are performed for each knowledge sharer. Where the anchors in this study were very reliant on explicit knowledge (market data and legislation), the connectors were less reliant on pure explicit knowledge due to management of employees and working on IT solutions for the own employees. Finally the Gatherers are people who are mostly located at clients, and who work on very diverse jobs, requiring more experience on different types of work, and therefor requiring more tacit knowledge. One

reason for this could also be that the more you are away from the office, the less reliant you become on explicit knowledge, but also the less available explicit knowledge becomes. Many forms of explicit knowledge are transferred at the office, during meetings or informal discussions. The less you are at the office and working more solo, the less you receive of this explicit knowledge.

Finally if you remember the knowledge sharer types per company (Table 41), we compare the average knowledge types shared combination for the different knowledge sharers per company, we get the following plot and table (Figure 30, Table 42):

Table 41: knowledge sharer types per company

	POSTNL	SOGETI			EY	COMP. X	KPMG
ANCHOR					2		
CONNECTOR	3						
GATHERER		2	1	3	3		

Figure 30: sharer type on NWOW Maturity versus tacit/explicit

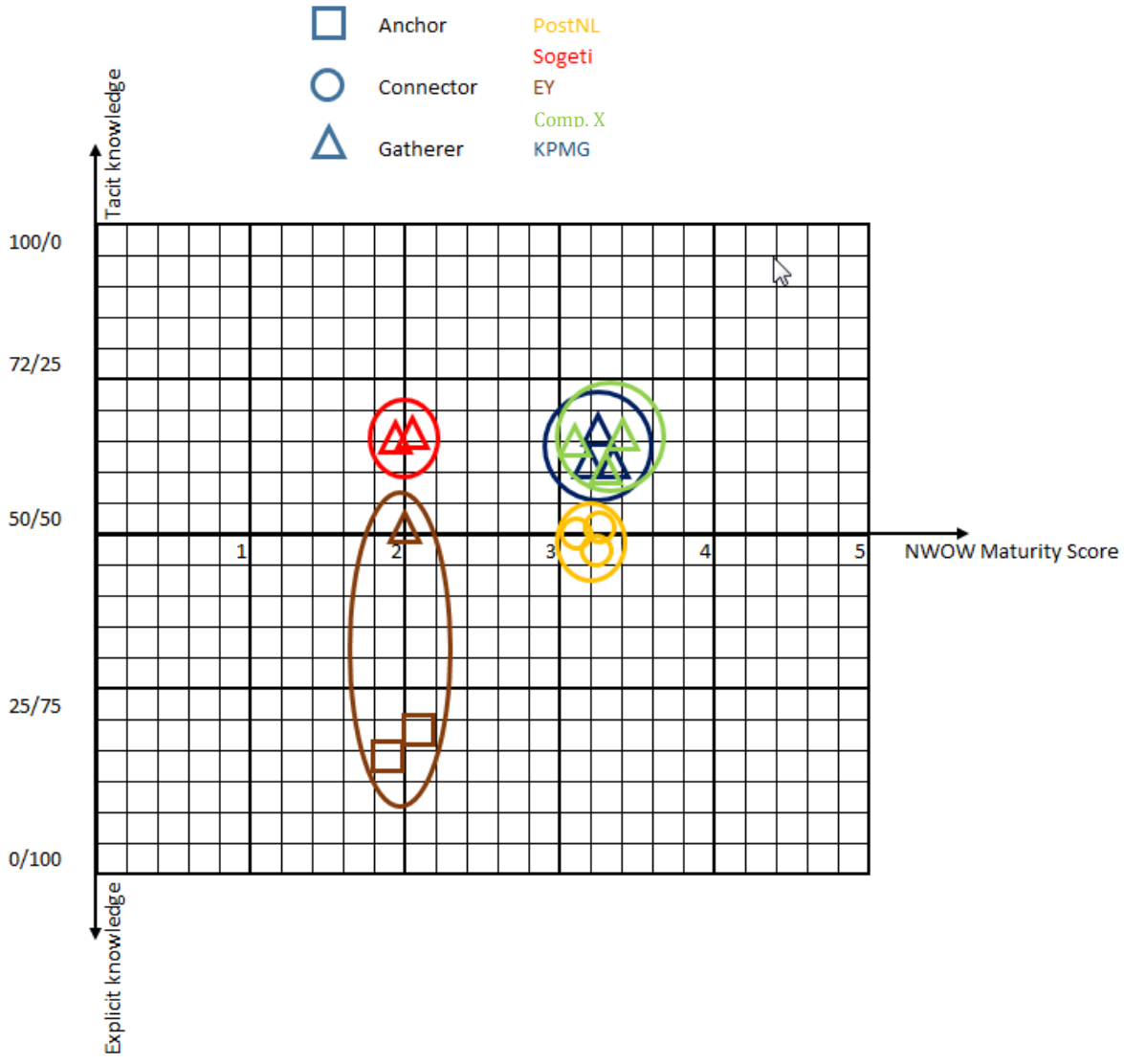

Table 42: Compare knowledge sharer to knowledge types shared

	POSTNL	SOGETI	EY	COMP. X	KPMG
E/T 1	50/50	41/59	85/15	41/59	41/59
E/T 2	50/50	41/59	85/15	41/59	41/59
E/T 3	50/50	x	41/59	41/59	41/59
AVERAGE	**50/50**	**41/59**	**70/33**	**41/59**	**41/59**
OVERALL	**50/50**	**25/75**	**70/30**	**37/63**	**47/53**
DIFFERENCE	none	**medium**	small	small	small

This indicates that overall there is a good match between the sharer types and the companies. Where EY is the only one that has a large difference between the individual sharers, the overall score perfectly matches with the overall score. The largest difference is that of Sogeti, the difference here is caused by a much lower NWOW maturity score than the other companies with gatherers.

7.4 GENERAL FINDINGS

There are also some general findings that I want to present, since they offer some insights into the different knowledge types, the overall NWOW maturity of companies and knowledge sharer types.

7.4.1 Tacit versus Explicit

First we can say something about the tacitness or explicitness of the 6 knowledge types that I used to identify knowledge (Alavi & Leidner, 2001). If we look at the totals (Table 43) we can see the differences in the level of tacit or explicit knowledge.

- **Declarative knowledge** is overly explicit, which can be explained because declarative is knowledge about things, for example the different parts of a bike, I can just look them up in a manual. However not everything is written down and some has to be achieved by experience, Take for example the knowledge about the market from the interview with KPMG, this is knowledge that was gained by operating in the market.
- **Procedural knowledge** is very balanced between tacit and explicit. I explain this by looking at the interviews. Many of the procedures that employees use to perform their work are written down in knowledge repositories like the global audit methodology database at EY. However every situation is different and needs to be adjusted to the requirements of that particular situation, for this tacit knowledge is required to adapt the explicit knowledge to the current circumstances.
- **Causal knowledge** is mostly tacit. During the interviews many of them said that there was never any rationale in the system on why to perform certain processes, but that they knew by doing and by discussing with colleagues why steps were required. However the 4 points in explicit are explainable mostly by the interviews with EY where they are very reliant on legislation which always has a rationale behind it documented.

- **Conditional knowledge** is slightly more focused on tacit than on explicit knowledge, when to perform certain steps is usually documented in knowledge repositories but is also in the heads of people.
- **Relational knowledge** is almost balanced between tacit and explicit knowledge with a slightly higher focus on tacit knowledge. Because most of the work is performed in differing situations, outcomes can always be different, therefor tacit knowledge is required to better foresee the results.
- During the interviews and research on this list of knowledge types, it became clear that **pragmatic knowledge** is formed on the basis of the 5 other knowledge types. It is an externalization of the tacit knowledge in people on how, why, when, and with what to perform you work, and in lesser fashion also 'knowledge about' that indicates the context for pragmatic knowledge.

Table 43: Tacit versus Explicit knowledge against the knowledge types by Alavi & Leidner (2001)

	TOTAL	
	Tacit	Explicit
DECLARATIVE	3,5	10,5
PROCEDURAL	7	7
CAUSAL	10	4
CONDITIONAL	8,5	5,5
RELATIONAL	8	6
PRAGMATIC	0	14

7.4.2 NWOW Maturity

Another analysis that can be made with the data is about the NWOW maturity of the companies that have been researched, concerning their current and future maturity score (Figure 31).

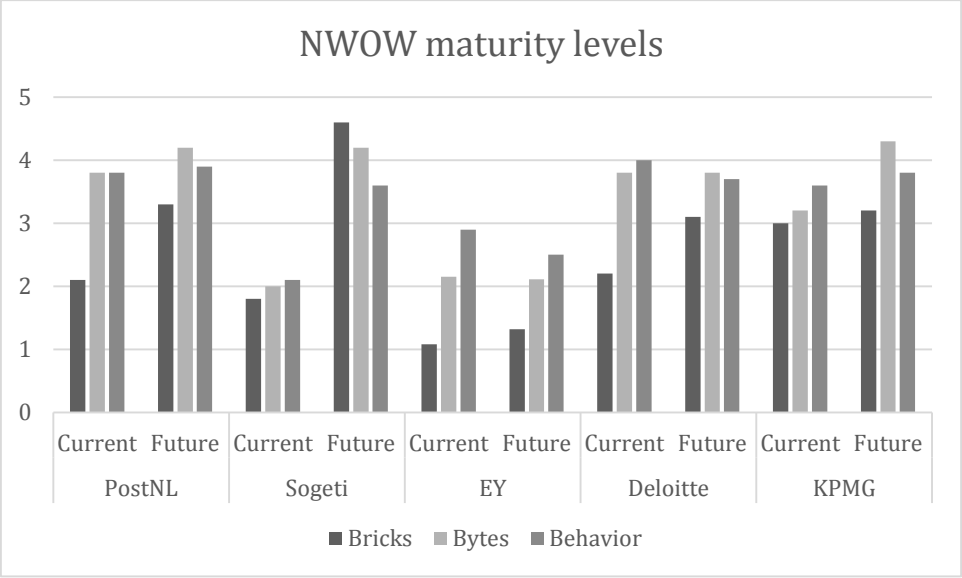

Figure 31: NWOW Maturity: current and future

Table 44 shows the combined maturity scores for the three dimensions, in this there is a ranking of implementation to be made that states that the least implemented dimension is Bricks, the second dimension is Bytes and the most implemented dimension is Behavior.

But Table 44 also shows the differences between the combined current and future maturity of Bricks, Bytes, and Behavior dimensions. Overall the current implementation of the Bricks dimension is significantly lower than that of the future implementation (66%).

Table 44: NWOW maturity overall: current and future. The difference indicates how much percent is needed to reach a future NWOW implementation score.

	CURRENT	FUTURE	DIFFERENCE
BRICKS	2,036	3,104	66%
BYTES	2,99	3,722	80%
BEHAVIOR	3,28	3,5	94%

In the Bytes dimension there is already a better balance between current and future with 80% of the future implementation maturity achieved. Finally in the Behavior dimension we see that 94% of the future maturity is achieved. This would mean that the behavior aspect is the best implemented dimension in companies, however this contradicts the experts view in paragraph 4.2 who says that Bricks and Bytes are the easy dimensions to implement since these can be bought, whereas the Behavior dimension is difficult to implement due to the change in culture that is required for this. We can make an assumption that companies currently do not really see

8 CONCLUSION & DISCUSSION

Most of the sub research questions have already been answered in the theoretical background section, I will therefore focus mostly on the conclusions I can make from the results and analysis in the previous two sections that answer the main research question:

'How does NWOW influence knowledge sharing among knowledge workers in knowledge intensive organisations?'

When we look at the interview data in combination with the NWOW monitor results, we clearly see a difference in knowledge types that are shared, I will discuss this for each of the three dimensions of NWOW.

In the **Bricks** dimension I compared three companies, EY (1,3), Comp. X (2,2), and KPMG (3) on their knowledge sharing types. What I found was that companies with a lower score have a higher degree of difference between tacit and explicit knowledge types. EY with the lowest score had a difference of 30%/70% for tacit/explicit. The work performed here is primarily done at the office where the office design isn't well implemented to suit the ABW principles (Koetsveld & Kamperman, 2011). The work is also based on explicit knowledge (market data, legislation). Comp. X on the other hand has the complete opposite, where there is no focus on explicit knowledge and employees are almost never at the office but always at the client side. Finally KPMG, which scores higher has a more balanced tacit/explicit knowledge ratio. Because the interviewees also have a management function, they are divided over the office and being at customers. This indicates that the Bricks dimension has a clear influence on the knowledge sharing practices but also the type of work that is performed has an influence.

In the **Bytes** dimension I compared Sogeti (2), KPMG (3,2), and PostNL (3,8) with each other. Here we see a similar result, the higher the maturity, the better the balance between tacit and explicit knowledge. Here we see that an important aspect is knowledge availability, the better the (explicit) knowledge availability, the better the balance is between tacit and explicit. Where Sogeti has very low knowledge availability combined with a low explicit score, PostNL has a very high knowledge availability combined with a very balanced explicit/tacit score.

Finally in the **Behavior** dimension I compared Sogeti (2,1), EY (2,9), and Comp. X (4) with each other. If we look at the overall scores, we see that there is a very small upwards curve in balance in tacit/explicit knowledge types. However when I looked at the different aspects of the Behavior dimension, there is no clear conclusion to be made. Due to this I cannot say if there is a big influence on knowledge sharing in the Behavior dimension.

These three dimensions cannot be fully seen as separate since there are interdependencies between the different dimensions. IT support for knowledge sharing applications is less required when everyone works at the same place and however well Bricks and Bytes are implemented, if someone gains no satisfaction of their work, the overall potential of NWOW is diminished. If we look at the overall maturity score of NWOW there is an influence.

If we look back at the plots in paragraph 7.2, we compared the three dimensions to their respective NWOW maturity scores. From those I created the following graph, showing quite clearly that the higher the NWOW maturity score is of the corresponding dimensions, the more balanced the knowledge becomes. Therefor I conclude that the

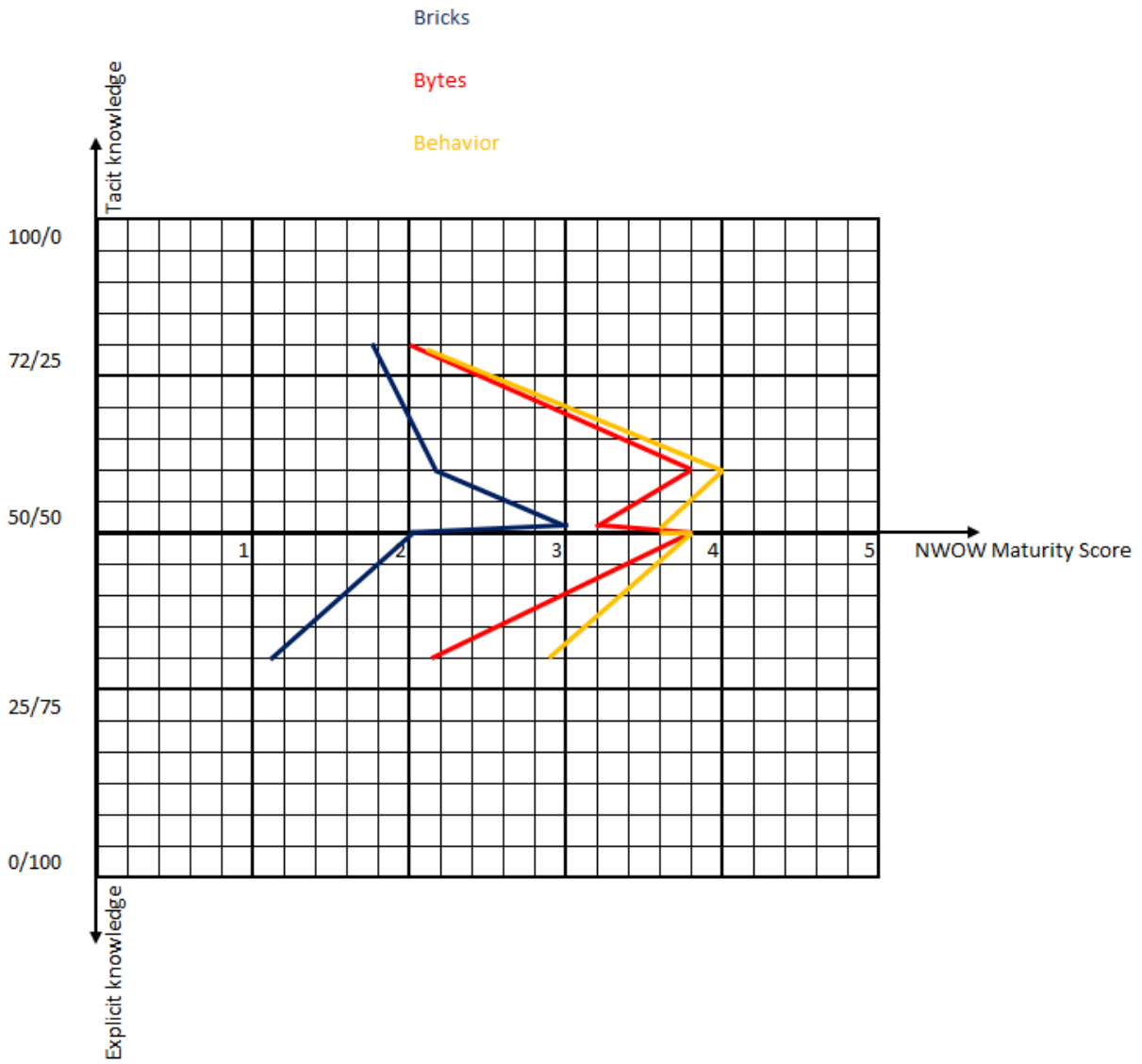

Figure 32: The three dimensions

NWOW maturity scores have an influence on the knowledge types that are shared. We can also give a conclusion based on the different dimensions itself, there seems to be an order of implementation in all cases where Bricks is the least implemented dimension, Bytes is in between and Behavior is the highest implemented dimension. This contradicts the statements made by Tim de Vos from Veldhoen+Company who said that Bricks and Bytes were the highest implemented dimensions due to the fact that you can purchase these, whereas the Behavior dimension needs a culture change which cannot be bought.

Another conclusion that can be made is the influence of the knowledge sharer types on the knowledge types that are shared. I noticed that the higher you are on the scale (Greene & Myerson, 2011), the more the focus becomes on tacit knowledge. Where the Anchors

are located at the same place at the office every day, working with mostly explicit knowledge, the Connector works at different locations at the office and at home and is more balanced in his/her use of tacit and explicit knowledge. Finally the Gatherer who works mostly outside the office and has less access to explicit knowledge is more focused on tacit knowledge.

If we look back at the graph I presented in paragraph 7.3, we saw that the knowledge sharer has a positive influence on the knowledge that is shared, the higher the mobility of the knowledge sharer the higher the focus is towards tacit knowledge types.

8.1 FACTORS OF INFLUENCE ON KNOWLEDGE SHARING

During this research I tried to prove that NWOW has an influence on the knowledge that is shared within companies, and partly I have succeeded, the Bricks and Bytes dimension appear to have a clear influence on what types of knowledge are shared. However after investigating the knowledge sharer type in comparison with the knowledge types that are shared, we also see a big influence. The question is now, which has a bigger influence, the knowledge sharer type, or the NWOW implementation scores?

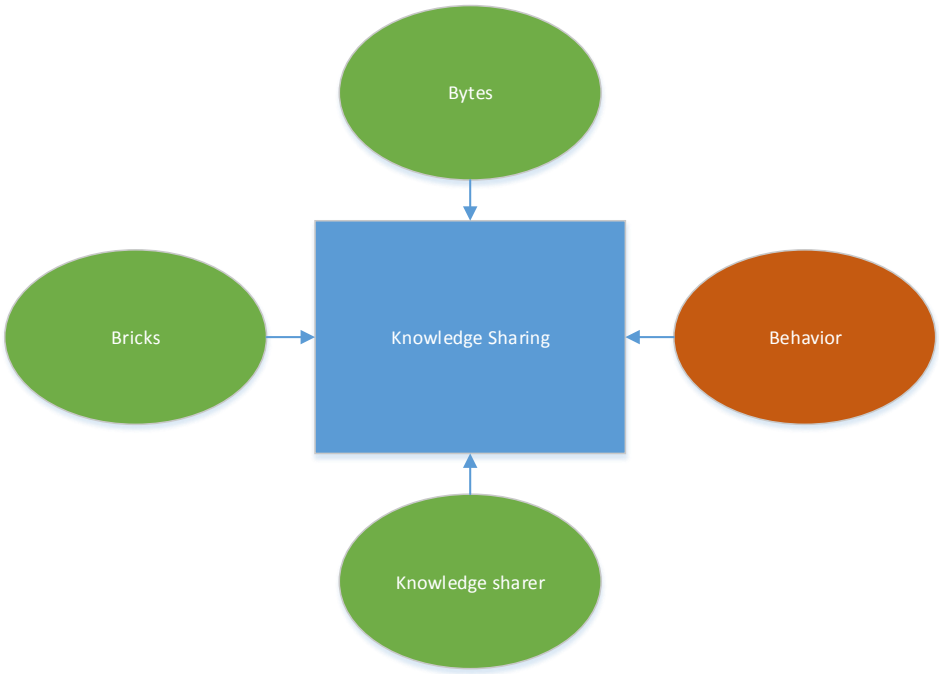

Figure 33: Factors of influence on Knowledge sharing

8.2 DISCUSSION

In this section I will discuss the conclusions and the strengths and weaknesses and the limitations of this thesis research.

This thesis research has several limitations, primarily based on the time constraint. To find and execute 6 case studies in the time provided for a thesis project were difficult, and appeared impossible since only 5 case studies were executed. I have sent over 20 requests

to companies but have either not gotten any response or the response that they do not have the time for it. In the end only the largest corporations were able to offer me some of their time for the interviews and the questionnaire, this leads to the question if this research is only interesting for larger corporations with a bigger knowledge management structure and possible larger problems in knowledge sharing areas. The initial thought was to interview architecture firms in order to keep the type of work as equal as possible, however even the one company that was a sure thing did not answer my emails, and therefore I conceded to use different types of companies and have the different work environments as a variable in my thesis. Luckily I found three of the big four in accounting willing to help me which made the type of work equal for these three. Sogeti also performs similar processes, meaning that 4 out of 5 companies perform somewhat equal work. The last company, PostNL performs significantly different work, being a support division of a large postal company. The question now is, can these results and conclusions be generalized to other companies with different size and from different sectors?

In order to gain a better view of the differences in knowledge types shared between different scores of NWOW maturity, more cases need to be performed, the current amount of 5, even though each contained three interviews does not give an overall picture of the current market, nor does it allow for a good enough comparison between the different NWOW maturity scores.

Another limitation of this research is the solidity of the NWOW assessment, which was only performed by one employee per company, and only by employees, not managers. This way it is impossible to give an average and better score per company. Because only one person per company completed the NWOW monitor, you get a subjective view, best seen by the results from Sogeti that show that the interviewee is currently not happy where he works and this effects the Behavior dimension tremendously.

The theoretical basis of this thesis report on NWOW and knowledge sharing is strong, however if we look at the crossover between these two domains, there is a clear lack of scientific literature, only 5 scientific papers were found and 21 master theses that touch the subject. I hope that in the future more research is done in the crossover between these two domains.

8.3 FUTURE WORK

For future work I would advise performing case studies to ascertain the top and bottom maturity scores and their knowledge types shared. Currently there is no baseline to work from, limiting the research. A company that should score highly in this matter is Microsoft, who partly invented the new work styles as described in this research paper.

For future investigations the interaction between knowledge sharers and knowledge types shared seems like an interesting field with the results that I present here. There seems to be a clear line in increasing tacitness, however in order to further validate this, more interviews need to be performed and in different sectors.

8.4 PRACTICAL IMPLICATIONS

This research showed that there are several factors of influence on knowledge sharing, first the dimensions Bricks and Bytes, here we see that a higher score leads to a better balance in the knowledge types in tacit and explicit knowledge. This balance in knowledge types is preferable because this means that there is a firm basis of explicit knowledge on which employees can rely at all times, but also a substantial amount of tacit knowledge to adapt this explicit knowledge to the right situation. Secondly there is the type of knowledge sharer that has an influence on knowledge sharing, where employees with low mobility have a higher focus on explicit knowledge, employees with a high mobility focus more on tacit knowledge, however still with a firm basis also in explicit knowledge.

My advice therefore for companies who wish to improve their knowledge sharing situation is to create a firm explicit knowledge basis, easily accessible by all employees, take for example the KPMG case where they have a center of excellence that is organized by dedicated employees. This knowledge repository contains all the explicit data that the employees require and they add to this during projects by using their tacit knowledge to adapt it to the specific circumstances.

If a well implemented knowledge repository with explicit knowledge is in place, you can start focusing more on tacit knowledge and sharing this between colleagues.

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10 APPENDIXES

For the complete NWOW monitor results, I have attached separate files to the paper version, since there was no way to convert them from Excel to Word in a decent way.

10.1 INTERVIEW GUIDE FOR THE CASE STUDIES

Wie ben je en wat doe je hier bij %naambedrijf?

Hoe ziet het bedrijf en deze afdeling eruit en wat doet deze afdeling? (structuur bedrijf)

Kort onderdeel over de KM situatie zoals die is bij het bedrijf: (KM Structure)

- Wat zijn de verschillende manieren waarop er bij jullie kennis wordt gedeeld? (de huidige KM infrastructuur)
- Waarom en waarvoor zijn de verschillende manieren?

Kort onderdeel over het type kennisdeler (Knowledge Worker)

- Waar werkt u allemaal?

Locatie	Werkt?
Workstation	
Interior	
Building	
Local area	
City	
Region	
Global	

Het hoofd onderdeel aangaande de types kennis die gedeeld worden. (Knowledge Sharing)

- Uitleg over de verschillende frameworks en hoe we die gaan bespreken.
- Voor elk KD type, kijken of ze dit soort kennis hebben, of ze dit delen, en hoe vaak ze dit delen, met behulp van een voorbeeld van hen. En waar ze deze kennis indelen in het tacit/explicit gebied.

	Mostly Tacit	50/50	Mostly Explicit
Declarative			
Procedural			
Causal			
Conditional			
Relational			
Pragmatic			

Declarative: Know-about, what can be applied to a problem?

Procedural: Know-how, how to apply a method to a problem

Causal: Know-why, Understand why this solves the problem

Conditional: Know-when, understand when to solve the problem

Relational: Know-with, understand how this solution affects other aspects

Pragmatic: Know-what, knowledge for an organisation (best practices, business frameworks, etc.)

10.2 INTERVIEW GUIDE FOR THE EXPERT INTERVIEW

- Hoe zien jullie kennisdeling binnen het nieuwe werken?
- Zijn er grote veranderingen vergeleken met traditionele manieren van werken?
- Jullie kijken vooral naar ABW en hoe de werkplekken ingericht kunnen worden, waar wordt de meeste kennis gedeeld binnen ABW? Is dit in de grote open ruimte, is dit vooral in vergaderzalen?
- De omgeving en de IT kunnen jullie regelen/kopen, hoe verander je de mensen? en dan specifiek, hoe zorg je dat ze kennis-delen belangrijk gaan vinden. (Bricks bytes and **Behavior)**
- Zie onderstaande figuur, waarin kennisdeling wordt ingedeeld in de aspecten tijd en plaats gebonden. Veel kenniswerkers werken op andere tijden en plaatsen, hoe zorg je dat kennis toch goed wordt overgedragen?

		Time	
		Same	**Different**
Place	**Same**	Face-to-Face	Ongoing tasks
	Different	Distributed interaction	Coordination

In de meer traditionele manieren van werken kon je even naar iemand toelopen of zat je tegenover iemand en kon je veel meer delen. Met het nieuwe werken zit je misschien niet meer op dezelfde plaats of tijd. Denk je dat prioriteiten gaan veranderen wat je wilt delen? En zo ja, hoe?

Het onderstaande diagram toont de verschillende soorten kennis en hoe de sharing practices worden genoemd. Welke vorm denk je dat voornamelijk wordt gebruikt binnen het nieuwe werken?
Hoe kan je binnen het nieuwe werken dit faciliteren? (IT, cursussen, etc?)

		Knowledge	
		Tacit	**Explicit**
Knowledge	**Tacit**	Socialization	Externalization/ Codification
	Explicit	Internalization	Combination/ Communication

10.3 NWOW MONITOR STATEMENTS

Stellingen bij Bricks

Flexibele werklocatie
Stelling
Ik mag zelf bepalen waar ik wil werken.
De organisatie vergoedt (e-werk) faciliteiten bij mij in de buurt (bijvoorbeeld third places, openbare flexkantoren).
Ik krijg (onkosten)vergoeding voor gebruik van het thuiskantoor.
Mijn organisatie is continu bezig met het verder verbeteren van de mogelijkheden tot flexibel werken op alle manieren die zich voordoen.
Werkplek-inrichting
Stelling
De werkplekken zijn zo gecreëerd dat ze inspirerend zijn.
De werkplekken zijn activiteit-gerelateerd ingericht (concentratie-, samenwerk- en ontmoetingsplekken).
De bezettingsgraad is goed (boven 70%); er is nauwelijks sprake van leegstand.
Doordat de werklocatie flexibel is, zijn er weinig of geen interne verhuizingen.
Op elk bureau is een beeldscherm aanwezig of ter beschikking om een laptop op aan te sluiten.
Het verbeteren van de werkplekinrichting staat voortdurend in de belangstelling van de organisatie.
Duurzaamheid & mobiliteit
Stelling
Het gebouw / de gebouwen zijn goed te bereiken (met openbaar vervoer en auto).
Het gebouw / de gebouwen hebben oplaadpunten voor elektrische voertuigen.
De tijd gespendeerd aan woon-werk verkeer is minimaal omdat ik zelf bepaal wanneer/hoe laat ik naar kantoor ga (bv. filemijding).
Het gebouw / de gebouwen zijn duurzaam ingericht (gericht op vermindering van energieverbruik en uitstoot van CO2).
Het beter omgaan met het milieu, duurzaam werken en de bereikbaarheid is continu een aandachtspunt van mijn organisatie.

Stellingen bij Bytes

Devices
Stelling
Ik kan voor mijn werk een device kiezen / gebruiken die mijn werkzaamheden het beste ondersteunt.
Ik kan en mag mijn eigen laptop, tablet of smartphone ook zakelijk gebruiken.
Er is IT ondersteuning voor elk device, verstrekt of zelf aangeschaft.
ICT behoeften zijn op mijn persoonlijke behoeften afgestemd.
De applicataties worden zoveel mogelijk aangepast op het flexibel kunnen werken op al mijn devices.
Mijn organisatie is voortdurend bezig met het flexibeler maken van haar hardwarebeleid en het toepassen van concepten zoals Bring Your Own Device.

Informatie beschikbaarheid
Stelling
De organisatie faciliteert me om altijd en overal op een veilige manier over mijn informatie/data te beschikken, zodat ik efficiënt en effectief kan werken.
Mijn bedrijf heeft een eigen (of gebruikt een) afgeschermd social platform waar ik informatie kan posten en zo met andere medewerkers kan delen.
Binnen mijn organisatie wordt zo weinig mogelijk papier gebruikt en wordt informatie digitaal vastgelegd, verspreid en gearchiveerd. (paperless office).
Informatie wordt binnen mijn organisatie openlijk gedeeld (tenzij dit schadelijk kan zijn voor de organisatie).
Mijn organisatie is steeds bezig met het makkelijker opslaan, vinden en bereiken van informatie.

Kennis beschikbaarheid
Stelling
Beschikbare kennis is vanaf elke plaats makkelijk te vinden en doorzoeken.
Mijn organisatie stimuleert het delen van kennis.
Ik ben bereid tot het delen van kennis en reageer actief op kennisvragen.
Kennis kan makkelijk opgeslagen worden (kennisdatabases/websites).
Collega's met specifieke kennis kan ik makkelijk vinden en zijn bereikbaar.
Kennis wordt binnen mijn organisatie openlijk gedeeld (tenzij dit schadelijk kan zijn voor de organisatie).
Mijn organisatie is steeds bezig met het makkelijker opslaan, vinden en bereiken van kennis.

Communicatie
Stelling
Er zijn afspraken gemaakt onder collega's over fysieke en virtuele aanwezigheid.
Mijn organisatie heeft een tool voor chat en video (bv. OCS, Lync, WebEx) waardoor ik makkelijk contact collega's kan opnemen.
Communicatie verloopt, met behulp van ICT, vlot en makkelijk met collega's.
Mijn bedrijf heeft een eigen (of gebruikt een) afgeschermd social platform waar ik collega's kan leren kennen en ervaringen met hun kan delen.
Mijn organisatie is continu bezig met oplossingen te zoeken om communicatie zo makkelijk mogelijk te laten verlopen.
Mijn organisatie heeft een platform waar ik virtueel kan samenwerken (in werkgroepen/projecten).
Samenwerken
Stelling
Ik kan real-time samenwerken aan documenten.
Voor het samenwerken in projecten met meerdere externe bedrijven kan een platform worden gebruikt.
Er is een goede planningstool aanwezig die duidelijk maakt wie, wat wanneer moet doen.
Ik kan de beschikbaarheid van agenda zien van collega's om makkelijk afspraken in te kunnen plannen.
Data kan tussen de verschillende geografisch verspreide locaties (in de wereld) worden gesynchroniseerd.
Het beter en makkelijker samenwerken is continu een aandachtspunt van mijn organisatie.

Stellingen bij Behavior

Resultaatgericht sturen
Stelling
Er is een duidelijke missie, visie en ambitie vastgesteld en deze heb ik tot mijn beschikking.
Op basis van de missie, visie en ambities worden doelen en resultaten vastgesteld waar naartoe gewerkt worden.
Het top management team van de organisatie staat open voor mijn initiatieven.
Het management is in staat om, ondanks dat ik overal en altijd kan werken, het overzicht te bewaren zodat er gewerkt wordt aan een totaalproduct i.p.v. losse onderdelen.
De manager beoordeelt me aan de hand van resultaat en niet aan de hand van aanwezigheid.
De manager faciliteert en coacht me waar mogelijk.
Mijn organisatie is continu bezig met meer op resultaat te sturen en heldere doelen te definieëren.
Resultaatgericht werken
Stelling
Ik maak afspraken over het resultaat van mijn werk.
Fysieke aanwezigheid op kantoor wordt door mijn organisatie niet gezien als een noodzaak voor het behalen van resultaten.

Ik ben ondernemend en zelfsturend.
Het management vervult een voorbeeldrol bij resultaatgericht en effectief samenwerken.
De arbeidsvoorwaarden zijn aangepast op resultaatgericht en plaats- en tijd onafhankelijk werken (bv beloning, werktijden, etc.).
Ik doe wat met de feedback die ik krijg en word door mijn organisatie gestimuleerd om feedback te geven.
Het verbeteren van het resultaatgericht en effectief werken heeft de voortdurende aandacht van het management.
Vertrouwen & autonomie
Stelling
Mijn organisatie stimuleert autonomie en verantwoordelijkheid.
Ik ben in staat om autonoom te werken, zelf beslissingen te nemen en eigen verantwoordelijkheid te dragen.
Mijn manager stuurt op zelf organiserende teams.
Mijn organisatie stimuleert openheid en transparantie in het dagelijks werk.
Er is een goede balans tussen wederzijds vertrouwen en controle tussen mijn manager en mij.
Het vergroten van vertrouwen en autonomie zijn een continu aandachtspunt van mijn organisatie.
Tevredenheid & voldoening
Stelling
Ik beveel mijn bedrijf aan bij anderen als werkgever.
Ik mag zelf werk en privé indelen en krijg de ruimte om mijn eigen werktijden te bepalen.
Mijn organisatie doet er alles aan om me optimale werkomstandigheden te bieden.
Ik haal voldoening uit het werk dat ik doe.
Ik krijg vanuit mijn organisatie waardering voor mijn behaalde resultaten.
Het continu verbeteren van de werkomstandigheden en welbevinden is heel belangrijk in mijn organisatie.
Cultuur & motivatie
Stelling
Ik ben gemotiveerd door de unieke bedrijfscultuur.
Ik ben betrokken bij de organisatie.
Ik ben gemotiveerd om me optimaal in te zetten voor de organisatie.
Ik kan me binnen de organisatie goed ontwikkelen.
Ik ben trots op mijn organisatie.
De bedrijfscultuur wordt overgebracht op nieuwe medewerkers.
Mijn bedrijf zet zich continu in om een innovatieve en inspirerende bedrijfscultuur neer te zetten.