

The new way of knowledge sharing

a thesis research about the effects of NWOW on knowledge sharing



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Abstract

In the past years, many articles have been written about NWOW, "the New Way of Working", in the Dutch business landscape. NWOW is based on several well-known underlying business concepts (e.g. teleworking and results driven management), which together can provide many benefits for employees and the knowledge intensive organization itself. At the same time, organizations have recognized knowledge as their most valuable and strategic resource in order to sustain competitive advantage. However, only little research has been devoted to the influences of NWOW on knowledge sharing.

This thesis research starts with clarifying what NWOW is, how it is defined, what the fundaments are and how it arose. After a literature review a working definition of NWOW has been proposed. Experts on the topic of NWOW and knowledge sharing have been interviewed to gain a thorough understanding of the main concepts, which resulted in five propositions and the discussion about a new generation of knowledge sharing. Three case studies have been conducted in order to measure general behavior towards knowledge retrieval and knowledge sharing at Centric B.V., Royal Dutch DSM N.V. and Enexis B.V., all of which are running pilot projects on NWOW.

The results of this qualitative research show that NWOW has been perceived as positive by all participating employees. NWOW participants share knowledge more virtually than not NWOW participants. More informal opportunities to share can be recognized among NWOW participants. Sensitive knowledge is shared more virtually by NWOW participants and sharing knowledge with a group shows a shift in choosing a wider variety of channels. Meetings between NWOW participants become shorter and more productive. However, the organization of meetings becomes more ad hoc. Furthermore, this research finds no differences in knowledge retrieval since the introduction of NWOW. Participants still rely the heaviest on personal networks when searching knowledge. ICT becomes even more a crucial service in an organization when implementing NWOW: more people are going to work time and location independent, relying heavier on knowledge sharing facilities, which makes maximum up-times of ever growing complex ICT systems, more important than ever.

Acknowledgements

Fully in line with the new way of working in organizations these days, this thesis research has been developed and executed according to the same principles:

- Working time and place independent;
- Working autonomously;
- Working result driven;
- Using web 2.0 tools;
- And last but not least, the author belongs to generation Y.

Nevertheless, I doubt the fact that there is a new way or a traditional way of doing a thesis research. The list above will probably sound very familiar to many students in their last phase of their studies. However, this thesis research of course did not arise on its own. In fact, working on a thesis research is just like working in an organization, collaborating with different people to accomplish a single goal.

"An organization exists when people interact with one another to perform essential functions that help attain goals." (Daft, 2007)

In reaching the goal of executing and writing this thesis research, I interacted with many people and would like to take this opportunity to thank them all. Let me start to thank the people who gave their mental support, not only during my thesis research but also in my choice to do this master study: my parents; John and Tiny Bellefroid-Denis, my girlfriend; Anouk Erens and her parents; Theo and Francine Erens-Tonnard, my former roommate; Matias Kruyen and many more family and friends. I am grateful for the people I often collaborated with and with whom I have experienced many amusing and stressful moments during my study: Ruud Kuipéri, Joris Witte, Koendert Marten Ekelschot, Coen Janssen and of course all my roommates at NKG70.

A special word of thanks goes to my supervisors: Remko Helms and Arjan de Kok for keeping this thesis research on track in a flexible way. To the case company champions: Sven Kort (DSM), Manon van Beek (Centric) and Esther Hehne (Enexis) and of course all participating employees. Furthermore, I would like to thank the experts who made time available in their busy schedules for this thesis research: Ruurd Baane, Dik Bijl, Marlous Agterberg and Bart van den Hooff.

A higher work enjoyment is one of the elements the new way of working concept tries to accomplish. This element certainly has been perceived as true by the author when writing this thesis research; this is another similarity with the new way of working concept.

Once more, for all support, time, help, explanation and patience I would like to thank you all.

Utrecht, December 2012

Bart Bellefroid

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List of Abbreviations and definitions

BU	Business Unit
CHR	Chief Human Resources
CIO	Chief Information Officer
CSR	Case Study Research
DICT	DSM ICT
DSO	Distribution System Operator
HCW	Het Centric Werken
HNW	Het Nieuwe Werken
HR	Human Resources
ICT	Information and Communication Technology
IM	Instant Message
IS	Information Systems
IT	Information Technology
ITS	Information Technology Services
ITSM	Information Technology Service Management
JSTOR	Journal Storage
KIN	Knowledge, Information and Networks
KIO	Knowledge Intensive Organization
MS	Microsoft
MSN	Microsoft Network
NWOW	New Way of Working
OCS	Office Communicator Server
OWC	Oracle Web Conferencing
Pn	Proposition <i>number</i>
RQ	Research Question
SRQ	Sub Research Question
UU	Utrecht University
VPN	Virtual Private Network
VU	Vrije Universiteit
WIFI	Wireless Fidelity

Chapter 1 - Introduction

This chapter introduces the problem statement and goal of this research, the research questions, challenges that need to be faced in answering the research questions and further contextual information about this research.

In recent years, many studies have been devoted on the topic of knowledge sharing in organizations and factors that are of influence (Klein, 2008). King (2006) argues that knowledge sharing is critical to organizations that wish to use their knowledge as an asset to achieve competitive advantage. However, only few studies have dealt with knowledge sharing within organizations that are implementing, or have implemented the New Way of Working (NWOW) concept. In an interview with Dik Bijl it was mentioned that NWOW is very popular in Dutch and Scandinavian organizations. In addition, many articles have been written the last decade about "Het Nieuwe Werken" (HNW), or NWOW as it will be called further on, in the Dutch business landscape. The New Way of Working is about the accumulation of diverse business insights, concepts and methods that are often already partially applied within organizations, but when applied together more than the sum of its parts, causing a diversity of benefits for organizations (Baane et al, 2010).

The difficulty with NWOW is that it is a vague, multi-interpretable container term for many people and there is not (yet) an unambiguous scientific definition for it (Stam, 2011; Heck et al., 2011; Berg, 2010). At the same time, many journalists have written about the term emphasizing their opinion on it, which makes it even more difficult to understand, resulting in another hyped management term.

Research performed by PwC (2011) mentioned that the decreasing interaction with colleagues could lead to a decrease of social cohesion, less knowledge sharing and a disrupted work / home balance. The focus of this study is limited to the factors that are of influence on knowledge sharing in organizations, which possibly alter when implementing NWOW.

NWOW is based on known concepts (e.g. teleworking, results driven management, telecommuting, flexible working) providing new approaches mainly on the management style of an organization (Bijl, 2009; Baane et al., 2010). In an attempt to simplify the concept and make it easier to understand, an implementation of NWOW can be distinguished in a combination of aspects in three dimensions: a physical dimension, a technological dimension and a personal dimension (Kok, n.d.). These are in line with Baane's bricks, bytes and behavior (Baane et al., 2010).

For a knowledge intensive organization (KIO), knowledge creation is the key factor to constant competitive advantage (Wegeman, 1997; Nonaka & Takeuchi, 1996). Many large KIOs in the Netherlands are implementing NWOW, mostly for real estate cost cutting and increased employee productivity reasons (Bijl, 2009).

However, only little research has been done about the effects of NWOW on knowledge sharing (PwC, 2011).

The goal of this research is to understand how knowledge sharing will be affected when implementing the NWOW concept in Dutch KIOs and how technology is involved in this.

1.1 Research questions

"What is the influence of the 'new way of working' concept on knowledge sharing in Dutch knowledge intensive organizations and how can this be best supported by ICT?"

- A. What is the NWOW concept and how does it compare to older similar concepts?
- B. What are the changes in knowledge sharing when the NWOW concept is introduced?
- C. How can knowledge sharing be supported by ICT?

1.2 Research challenges

For this research, a number of challenges need to be faced as a result of the chosen topic. First, NWOW is relatively new, only few scientific papers are written on this topic, although many quasi-scientific articles can be found about NWOW. Second, an overwhelming number of articles have been written about knowledge management and knowledge sharing. This makes it difficult to select useful papers and choose one approach to knowledge sharing that is generally accepted by researchers in the academic environment. Third, experts advocating NWOW and knowledge sharing are hard to find and if found, they are too busy with their organizational activities. Planning and a flexible attitude towards experts are therefore important. Fourth, case companies willing to participate in the research are hard to find as the Dutch business landscape is still facing the result of the financial crisis nowadays.

1.3 Social en scientific relevance

Since NWOW arose in 2005 and the concept became well known in the Dutch business landscape, many KIOs implemented NWOW mainly for cost cutting reasons and also for the benefit of personnel and more performance. Clarification about the effects on knowledge sharing is urgent as many organizations use their knowledge as an asset to achieve competitive advantage.

In this study the effect of NWOW implementations on knowledge sharing within Dutch KIOs has been investigated. Hopefully this will trigger other scientists to research and affirm the importance of knowledge sharing within KIOs and pay attention to knowledge sharing factors when altering an organizational style.

1.4 Document structure

This first chapter deals with the introduction of the concepts and problem statement of this research. Chapter 2 elaborates on the chosen research approach and design of this thesis and presents the research plan in order to answer the sub research questions and in the end the main research question. In chapter 3, the theoretical background provides a clear understanding of NWOW and knowledge sharing. Chapter 4 deals with the expert interviews of the research and chapter 5 with the elaborated case studies, followed by the analysis and findings in chapter 6. After that, chapter 7 provides a conclusion together with answers to the sub research questions, the discussion of the research, and finally several issues for future research are suggested.

Chapter 2 - Research approach

This chapter presents an overview of this thesis research by revealing the type of research, characteristics, design, used methods and research plan.

The choice for the type of research should be guided by state of prior theory and research according to Edmonson & McManus (2007), see Figure 1. Literature on NWOW can be considered between nascent and intermediate, while literature on NWOW with a focus on knowledge sharing is nascent. For this reason, this thesis research mainly contains qualitative data that will be collected and analyzed.

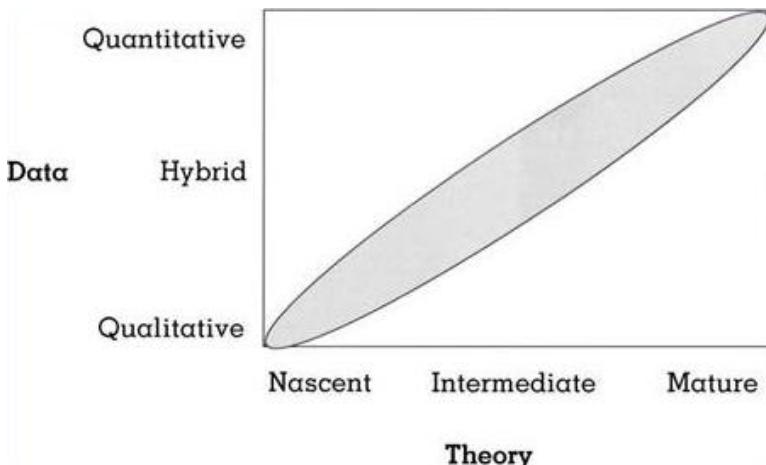


Figure 1. Method fit as a mean tendency (Edmondson & McManus, 2007)

Yin (2009) argues that exploratory research is usually applied in studies dealing with limited or non-existent knowledge, answering "what"-questions. Explanatory research however, deals with phenomena with already acquired knowledge, answering "how" and "why"-questions to acquire more in-depth knowledge. However, this research is based on both exploratory and explanatory types of research. On the one hand the study can be regarded as exploratory when investigating the main research question and sub research question A and B containing "what"-questions. And on the other hand sub research question C being a "how"-question. For this thesis research, a multiple-case (embedded) research design has been chosen. Reason for this was that a multiple-case study is more compelling than a single-case study what makes the overall study to be regarded as being more robust (Yin, 2009). Replication is important for multiple-case studies in order to get useful findings. Three different cases make this research a "literal replication" in which a case study protocol will be used at each case. Furthermore, the multiple case studies will be generalizable to theoretical propositions, not populations or universes (Yin, 2009). However, during this thesis research several propositions will be mentioned answering how knowledge sharing will change when implementing NWOW. These propositions can be corroborated or contradicted by other sources of evidence in this research. With data triangulation, the potential problems of construct validity can also be addressed because the multiple sources of evidence essentially provide multiple measures of the same phenomenon, see Figure 2 (Yin, 2009).

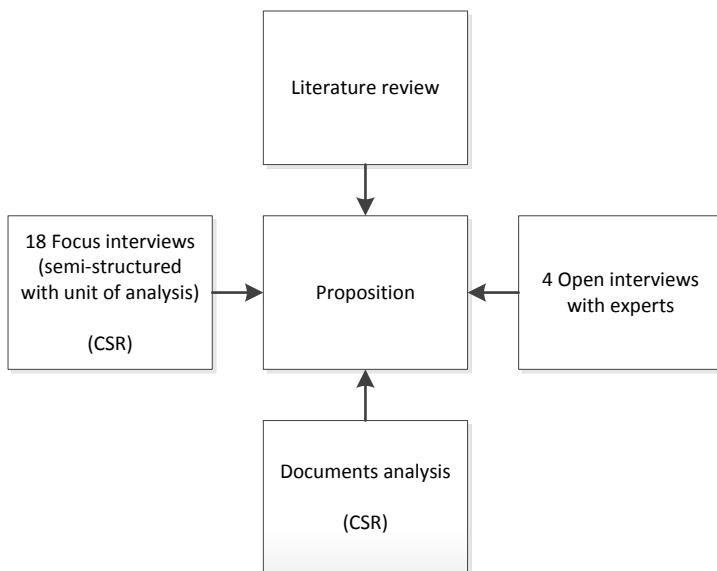


Figure 2. Data triangulation of this thesis research

According to Wieringa, Heerkens & Regnell (2009) empirical research investigates an observable phenomenon. They also claim that scientific evaluation papers evaluate existing problem situations or validate or refute proposed solutions by means of scientific research, ranging from formal, mathematical analysis to empirical research. NWOW can be considered an observable phenomenon although it has a different context within every implementation. NWOW is also investigated by multiple research domains and can be seen as a multi-disciplinary concept.

This thesis research focuses on the Information Systems (IS) domain, emphasizing the technological aspect. The scope of the research is limited to large Dutch for-profit organizations. The European Commission (2003) considers an organization having a minimum headcount of 250 as a large organization.

2.1 Research design

This section presents the research steps and the methods used to investigate the phenomenon in a proper way. In this research a literature review has been conducted, experts on the main topics have been interviewed and three case studies have been executed. Section 2.2 provides more insight in the overall research planning and how the answers to the sub research questions were found.

2.1.1 Literature review

In order to conduct a structured literature review, first a literature search strategy proposed by Duff (1996) and a literature review technique proposed by Webster & Watson (2002) have been used.

Literature Search Strategy

To prevent browsing and "snowballing" (locating a relevant source and working back from its references) during a literature review (Duff, 1996), a model of

systematic literature search has been applied as shown in Figure 3. The library-based model operates at a higher level of abstraction and is designed to be applicable for information skills teaching programs. The model centers on a flow chart of stages in a typical literature search (Duff, 1996).

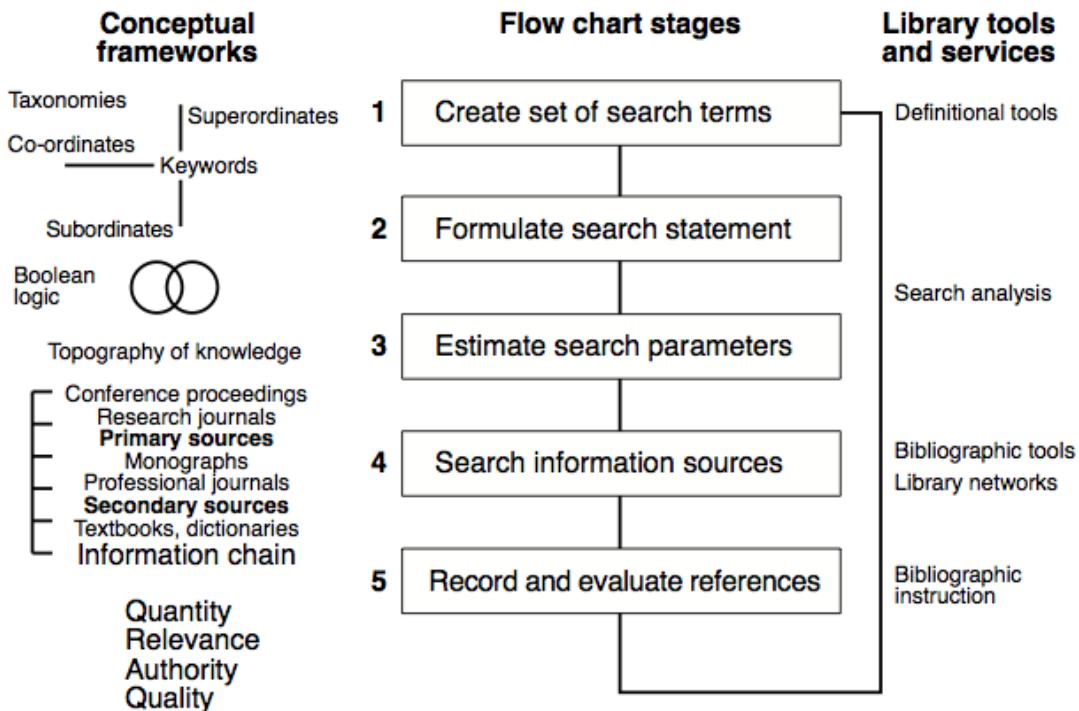


Figure 3. Model of library-based literature search (Duff, 1996)

Creating a set of search terms

The starting stage of the search strategy is to create a set of search terms to find relevant literature in the field of study. As many publications on the topic were in Dutch language, terms were used interchangeably. Keywords were chosen based on relevance:

Knowledge sharing, new way of working, het nieuwe werken, alternative way of working, nwow, nww, hnw, teleworking, telecommuting, virtual working, virtual teams.

Formulate search statement

Formulating the terms in an appropriate set of terms to incorporate the topic is rendered in:

"Knowledge sharing" AND ("new way of working" OR "nww" OR "nwow" OR "het nieuwe werken")

Estimate search parameters

Four parameters are germane to most searches, being: spatial parameters, temporal parameters, disciplinary parameters and formal parameters.

During the literature search no spatial parameters are used and as the concept is relatively new, temporal parameters are also not used. Furthermore, no disciplinary search parameters are used in order to find as much information about the concepts as possible. Formal parameters were also not used because several researches have been done as a thesis research, which are not published in scientific journals, but could still be relevant for this study.

Search information sources

Sources that have been consulted during the literature review are:

- Omega (UU library);
- Google Scholar;
- IEEEXplore;
- ScienceDirect;
- JSTOR;
- SpringerLink.

Record & evaluate references

The chosen approach for this literature review is concept-centric, which was focused on the concept instead of the author of a publication. Duff (1996) mentions that critical thinking must be applied in order to discriminate between references. QRIQ (Kent et al., 1978) is a useful tool to accomplish this:

- *Quantity*: Quantity is not playing a crucial role in this investigation as the literature research will give a first insight into the concept. With a minimum of ten references per concept a solid theoretical foundation can be made.
- *Relevance*: Relevance is of importance because of the novelty of the NWOW concept. The intellectual level of the references is more important for the explanation of knowledge sharing than NWOW, because of the abundant availability of knowledge sharing literature.
- *Authority*: The qualification of the author is important, however only little information is available on NWOW, so this will not be a crucial selection factor and documents like thesis researches will be used too in this literature review. Furthermore, NWOW has been applied most in the Netherlands and Scandinavian countries, so this can be a factor of influence when searching the literature.
- *Quality*: this research tries to refer to primary sources as much as possible, but this does not mean that secondary sources will be omitted.

Most of the literature on NWOW is available in the Dutch language. This can be drawn back to the fact that the Netherlands is one of the first countries where the NWOW concept really became popular. In the Netherlands the term is called "HNW" (Het Nieuwe Werken). As the NWOW concept is an emerging topic it was inevitable to search for both scientific and non-scientific publications. To identify the relevant literature, major contributions are likely to be found in the leading journals. It makes sense, therefore, to start with them when reviewing literature (Webster & Watson, 2002). Previous authors also mention that a complete

review covers relevant literature on the topic and is not confined to one research method, one set of journals, or one geographic region.

Mendely reference manager has been used to keep overview in the research and keep all literature together by concept. Notes by reading the literature will also be stored in this tool.

2.1.2 Expert interviews

In this research four experts were interviewed to enrich the theory on the main subjects. The expert interviews were held both in a semi-structured way in a face-to-face setting whereby the interviewer had a priori developed an open-ended interview questionnaire. These questions were, in the version of the interviewer, divided in sections correlating to the research questions as formulated in the first chapter. Although the interview questions were preparatory developed, flexibility during the interview was important, in order to probe for details or discuss issues to get a deeper understanding of the participants' line of thought.

Two experts on the topic of NWOW were interviewed, being Dik Bijl and Ruurd Baane. Both are authors of business literature about NWOW. Furthermore, two experts on the topic of knowledge management and communications were interviewed, being Prof. Bart van den Hooff and Marlous Agterberg (PhD). Both active for the Vrije Universiteit (VU) in Amsterdam.

For the analysis of the interviews open coding has been used by the researcher with NVivo 9 software to analyze the data. However, the results section of this thesis will reflect on this.

2.1.3 Case study research

For this research, case studies have been executed at three large Dutch for-profit organizations, which are occupied with a transformation to NWOW. In this way a proper comparison can be made between employees working according to NWOW and employees that are working in the traditional way. The case companies were only selected for this research when they have NWOW partially implemented.

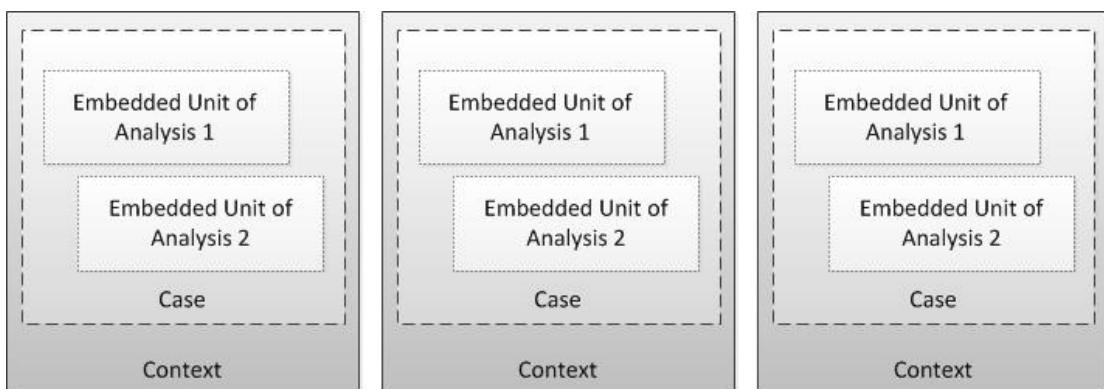


Figure 4. Multiple-case design containing multiple units of analysis.

The target of this research was to find differences in knowledge sharing between employees that use NWOW (Embedded Unit of Analysis 1) and employees that

do not use NWOW (Embedded Unit of Analysis 2) within an organization, as depicted in Figure 4. Differences may be found within the two groups in the same case or between the two groups in a cross-case comparison. The way NWOW is actually implemented within a case organization may vary, emphasizing different elements of NWOW than others. This is considered to be context and will be investigated using a document study per case in advance.

Before executing the multiple-case study research, a case study protocol has been created, see Appendix A. The role of the case study protocol was two-folded; first it guided the case study researcher, who had to follow the same procedure for every single case. So, corresponding findings within, and cross-case, could be used as a robust result. Second, by using a case study protocol the study is more reliable (Yin, 2009). In order to produce a high-quality case study research, the construct validity of the case study protocol will be checked before execution by the research supervisor and by the case company contact.

The internal validity is important for this qualitative research in order to provide a clear chain of evidence. So, a certain set of conditions may be observed, which demonstrates a clear cause of an observed effect without finding a "spurious relationship" (Yin, 2009). In the case study this means that the interviews contained the same set of questions for the two units of analysis. The group of employees using NWOW will have some additional questions in the interview, as they are only applicable to them.

To meet external validity requirements in this research, the researcher has chosen to use three case organizations instead of one. In this way, the cross-case results may give a rich image of NWOW in large Dutch for-profit organizations. This research is a preliminary step finding effects of NWOW and gives focus to further quantitative research on this topic.

Per case company six people have been interviewed, see Figure 5, resulting in a total of eighteen interviews. The document analysis will be based on documentation provided by the case company about the NWOW concept as implemented in their organization.

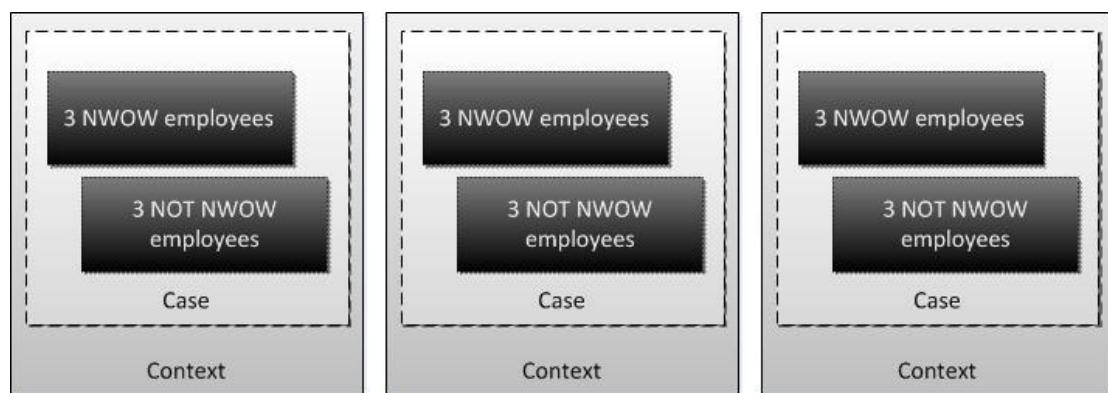


Figure 5. Multiple-case design, 3 cases with 18 participants in total

The results of the data collection have been written per case individually and cross-case in this document. Every case company received a case study report

focused on knowledge sharing. Cross-case conclusions however will be made in this thesis research only.

Document analysis

In the first face-to-face contact, the research has been explained in detail to the case company contact. During this preliminary interview it had to be explained that a document analysis will be executed and documents involved by the implementation were needed. The documents (most of time advices or project initiation documents) have been e-mailed or printed to analyze for the research. If it was only possible to execute a document analysis on site to obey security rules of an organization, an appointment had to be made to execute this analysis on site.

The document analysis provides a company briefing elaborating on the core business of the company. Questions that needed to be answered were prepared before the documents were handed over. The questions can be found in the case study protocol in the Appendix A (in Dutch).

Interviews

Semi-structured interviews were executed with 6 employees of each case company. According to Myers & Newman (2007) this means an interview having an incomplete script. Thus, the researcher had prepared some questions beforehand, but left space for improvisation. For the research, it was important that the participants had a comparable knowledge working function (e.g. IT consultant, finance, secretary, etc.) within the organization, to measure employees having similar IT skills.

The interview itself consisted of two parts: a question part and a scenario part. All questions were the same for both groups (units of analysis). However, the NWOW group interview had some additional questions. The semi-structured interviews were in the Dutch language, for its ease of understanding by the Dutch participants. The interview took about 45 minutes, where 60 minutes were scheduled, most of them in a face-to-face setting where the researcher traveled to the remote site. Some interviews were executed by phone (or Skype) when participants preferred this. When an interview took place by phone the participant received the questions of the interview one hour before the actual interview took place, in this way legacy in connection would cause less problems during the interview.

The six participants have been chosen by the case company contact, knowing which people work according to NWOW and working in a traditional way. Planning of the interviews has been decided in consultation with the participant and the researcher. All interviews have been recorded (after accordance) and can be used as reference. A universal version of the interview can be found in the case study protocol in Appendix A, which means that the specific company dialect (e.g. mentioning "X-werken" instead of NWOW) has not been taken into account. Of course, this has been done during the interviews. Furthermore, in the interview the researcher has chosen to use the he-perspective to improve the readability of the interview.

2.2 Research plan

In order to answer the posed research question, the sub questions have to be answered first. The table below will explain how the sub questions will be answered.

Research question		Approach
What is the influence of the 'new way of working' concept on knowledge sharing in Dutch knowledge intensive organizations and how can this be best supported by ICT?		Qualitative, exploratory and explanatory
Sub research question		Methods
A. What is the NWOW concept and how does it compare to older similar concepts?		Literature review Expert interviews
B. What are the changes in knowledge sharing when the NWOW concept is introduced?		Literature review Expert interviews Case study research
C. How can knowledge sharing be supported by ICT?		Literature review Expert interviews Case study research

Table 1. Research questions related to methods

The research model depicted in Figure 6 explains the development of the research and is based on the research model method as mentioned by Verschuren and Doorewaard (2007). Research objects are represented as rectangles. The model is divided over 4 phases to structure and gives an overview of the research project.

Phase (a) The literature review has been conducted on the topic of NWOW and on the topic of knowledge sharing with a focus on communication technologies. Two expert interviews have been held to evaluate the literature, resulting in a theoretical foundation about NWOW and two expert interviews have been held to evaluate the literature about knowledge sharing and communication technologies, resulting in a theoretical foundation about knowledge sharing and communication technologies.

Phase (b) The results of the previous phase were fundamental for the gathering of empirical data at three case companies during the multiple case studies.

Phase (c) A working definition of NWOW has been proposed. Together with the empirical results of applied media, as outcome of the evaluation interviews, these deliverables will contain an understanding of knowledge sharing in organizations implementing NWOW.

Phase (d) The result of this thesis research contains an understanding of the effects of NWOW on knowledge sharing for large KIO's in the Netherlands.

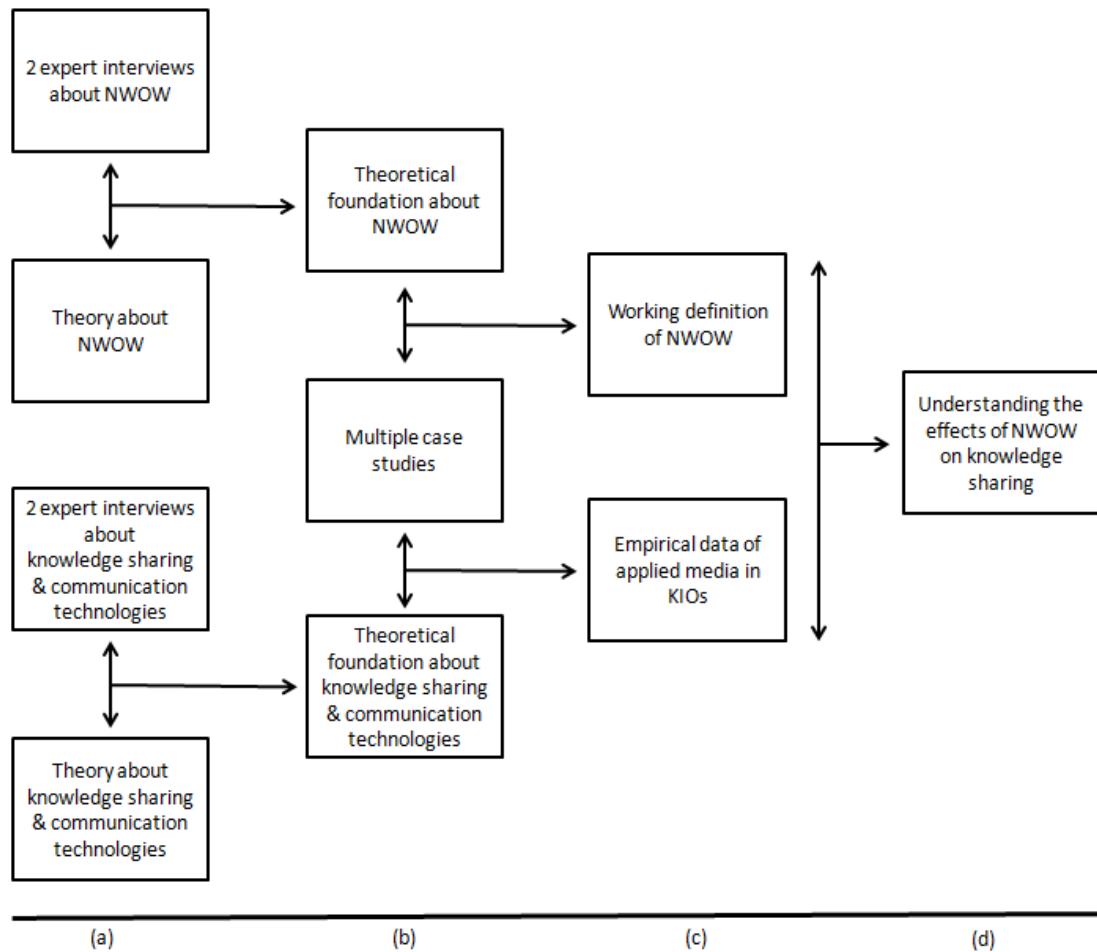


Figure 6. Research model (Verschuren & Doorewaard, 2007)

Chapter 3 - Theoretical background

The main goal of this chapter is to get a thorough understanding of NWOW and knowledge sharing. An appropriate approach of each of the topics will be chosen to elaborate further on in this research. This section will also contribute to answering sub research question A and B.

3.1 NWOW

This section elaborates on what NWOW is, how it is defined and how it arose and elaborates on the main approaches that appear in the literature.

3.1.1 Defining NWOW

Bødker & Christiansen (2002) coined the term "New Ways of Working" already in 2002 defining "New work" 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) defines NWOW as "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." Baane et al. (2010) argues that "NWow is an umbrella term, which organizations variably use to state their social innovation initiatives. A term that carries a certain degree of superficiality with it, often to let the organizational image look modern and progressive in communication to its customers and the labor market. Observing four work principles: 1. Time and location free work, 2. Steering workers towards achieving results, 3. Free access to and use of knowledge, experience and ideas, 4. Flexible work relations." According to Pous & Wielen (2010) there is no single definition for NWOW, but is "in many regards, the answer of rigid bureaucratic principles that dominated the working human a long time. Time and place independent working gives organizations in current times many benefits and make organizations more efficient and effective. Besides this, there are many individual advantages for all involved parties." TNO (2011) defines NWOW as follows: "Multiple measures aimed at freedom of choice for employees. Working anytime, anywhere. Steering employees on the basis of mutual trust, providing all required facilities." And Kok (n.d.) defines NWOW as "a vision for the organization of work and the work environment in such a way that the capabilities of employees are optimally utilized and developed. Key elements in this vision are freedom and trust to be able to work anyplace and anywhere, a result oriented way of working, and activity-based workplaces and office design".

In order to create an overview of the NWOW definitions and mentioned subjects above, Table 2 has been composed. The table shows the subjects mentioned in the definition of NWOW per author.

Mentioned subjects (in definition)	Kok (n.d.)	Bijl (2009)	TNO (2011)	Baane et al. (2010)	Pous & Wielen (2010)	Bødker & Christiansen (2002)
Time and location independent working	X	X	X	X	X	
Freedom of choice for employees	X	X	X			
More efficient working		X			X	
More effective working		X			X	
Flexible work relations		X		X		
NWOW as a vision	X	X				
Steering towards achieving results	X			X		
Steering on the basis of mutual trust	X		X			
New office designs (facilitating creativity, knowledge sharing and communication)	X					X
Optimal utilization and development of employees' capabilities	X					
More pleasurable working		X				
Providing all required facilities			X			
Free access to and use of knowledge				X		
State social innovation initiatives				X		
Modern organization image (to customers and labor market)				X		
Mobile, networked technology					X	
Project-managed organization						X

Table 2. Subjects mentioned in definition NWOW

Some definitions are high-level while others are more concrete. It is interesting to see the differences among the definitions of NWOW. However, the table shows that *time and location independent working* is mentioned by five out of six authors. Three authors mention *Freedom of choice for employees* as a part of NWOW. NWOW is mentioned twice as a way to work *more efficient*, to work *more effective*, *steering towards achieving results* and *on the basis of mutual trust*, with *flexible work relations*. Furthermore, it has been mentioned two times as a *vision* and it in relation with *new office designs*.

For this thesis research a working definition will be proposed by the author at the end of this chapter.

3.1.2 The origins of NWOW

Nilles (1975) was the first person who coined the term "the new work mode" and "telecommuting" which later on became "teleworking". Nilles focused on decentralization of organizations as a possible solution to the problems of the previous century, namely the increase of traffic problems and the scarce of oil and energy during the OPEC crisis. In 1986 Hughson & Goodman (1986) already mentioned that telecommuting technology was currently available and through telecommuting, employees who use computers at work can now do their jobs from home on a personal computer. In this way it provided a possibility to keep employees that could not come to work full-time. Telecommuting had no effect on the operating costs, but did show an increase in user productivity, quality of output and morale (Hughson & Goodman, 1986). The term telecommuting never became popular in Europe, here teleworking has been used more often meaning the same thing (Pous & Wielen ,2010). According to Bailey & Kurland (2002) teleworking was first applied in organizations as a strategy to decrease real estate costs, respond to employee's needs for a healthy work-family balance, and to aid compliance with the American Disabilities Act of 1990. It was also promoted as a way to reduce air pollution and traffic congestion.

Teleworking was defined as working outside the conventional workplace and communicating with it by ways of telecommunications or computer-based technology (Nilles, 1994; Olson & Primp, 1984), telework constitutes an early form of virtual work (Bailey & Kurland, 2002). According to Ashford et al. (2007) it is information technology which facilitates employees in this, being partially virtual, i.e. checking e-mail from home, collaborating with others virtually and by being often just a keystroke away from work at any hour of the day.

Since 2005 when Bill Gates wrote a white paper called "The New World of Work" (which received a lot of interest in the Dutch business landscape), NWOW became a hot topic. Gates (2005) revealed his vision about unified communications and new worlds of working, after that diverse authors in the business landscape (Bijl, 2007; Bijl, 2009; Baane et al., 2010; De Pous et al. 2010; Verbruggen et al., 2010) shared equal thoughts and elaborated on the NWOW concept.

The business interest and number of authors in NWOW in North-West Europe countries (e.g. Denmark, the Netherlands) is remarkable, according to Kok (n.d.). This is due to the Dutch culture, which is one of dialogue and consensus, personal responsibility, mutual respect and entrepreneurship. Other reasons according to Bijl (2009) can be found in the ideal climate in cultural dimensions of Hofstede et al. (2010). Bijl (2009) also mentions the fact that more than 90% of the households have a computer with 80% having a broadband connection to the internet.

3.1.3 Classify NWOW

Several authors claim that NWOW can be classified using a number of dimensions, on which organizations that want to implement it need to focus.

3 Dimensions: Baane et al. (2010) sets apart three dimensions, being bricks, bytes and behavior, in line with this thought Kok (n.d.) mentions a physical, technical and a personal dimension. This approach is also more or less in line with the approach of Pous et al. (2010) which states that NWOW concentrates itself on three previous divided domains, namely: physical domain, information domain and social domain.

4 Dimensions: Bijl (2009) classifies four dimensions, being ICT, physical work environment, organization and culture (personal mentality). It is expected that Bijl separates the personal (or behavior) dimension in two sub sections, being the organization and personal mentality. Veldhoen (2005) subdivides NWOW in the following aspects: a virtual work environment, a physical work environment, a mental work environment and a social work environment.

For this research, the dimensions of Kok (n.d.) are used, because of its consensus over multiple authors, its simplicity and ease of understanding. However, when an organization decides to implement NWOW, it is important to give attention to all of these three dimensions. Because when applied together, the sum will be greater than its individual parts (Baane et al. 2010; Bijl, 2009; Peters et al. 2011).

3.1.4 Underlying concepts

Concepts and ideas used within NWOW are not new (Baane et al. 2010; Verbruggen-Letty et al. 2010), three decades ago, *self-steering, coaching* and *to let loose* were already mentioned in the management literature and are now drivers behind NWOW. NWOW is based on known concepts providing new approaches mainly on management styles of organizations (Peters ,2011; Baane et al., 2010). Several authors on the topic of NWOW acknowledge that the concept is not new and more an umbrella term based on many others concepts (Baane et al. 2010; Bijl, 2009). To give an indication about concepts that are mentioned when talking about NWOW, a code tree has been created using publications of (Bødker & Christiansen, 2002; Bijl, 2009; Baane et al., 2010; De Pous et al. 2010; Verbruggen et al., 2010; Peters et al., 2011; Kok, 2012; PwC, 2012), that are trying to explain NWOW and refer to other concepts.

The code tree in Figure 7 has been composed by Nvivo9 to show the underlying concepts of NWOW. The figure exists out of three columns: *concept name* (e.g. teleworking), *the number of sources* (e.g. 4) and *the number of references* (e.g 11).

Underlying concepts	4	5
Generation Y	4	4
Teleworking +	4	11
Empowerment	4	14
Steering on output +	4	6
Self steering autonomy +	3	3
WEB2.0	2	2
Social Innovation	2	3
Flexible contract	2	3
Office innovation	2	4
Knowledge management	2	3
Teamwork	2	5
Coaching management +	2	4
Network organization	1	1
Business process management	1	3

Figure 7. Underlying concepts of NWOW based on literature

The code tree is sorted on number of sources, which shows how many different authors mention a certain concept when explaining NWOW. A "+"-character after a concept name indicates a positive scientific effect on work related flow according to Peters et al. (2011).

Figure 7 shows that NWOW relies the heaviest on *empowerment*, *teleworking* and *generation Y* as underlying concepts. The following proposition, based on the previous, will be used during the research:

P1: NWOW relies the heaviest on time and place independent working, more empowerment (autonomy & steering on output) for employees and the preparation for generation Y in terms of technology.

Below, this research examines the most mentioned concepts of Figure 7.

Empowerment

According to Peters et al. (2011) definitions of empowerment emphasize control and involvement. In essence, the empowerment-concept implicates a shift of external control of an employer to an employee in directions of self-management whereas control will be generated by the employee internally. The responsibility for executing a job will be more delegated towards an employee who will be judged on his performance (Bowen & Lawler, 1995).

Kok (n.d.) states that the autonomy of employees, delegation of responsibility and result-based work agreements (together mentioned as empowerment) are the most important aspects of the NWOW concept. Freedom and mutual trust form the basis for the new work relation. According to Bijl (2009) researchers have been investigating the topic of empowerment for 20 years now.

The following concepts can be considered a subpart of empowerment:

- *Self-steering* and *autonomy*; mentioned by Baane et al. (2010), Bijl (2009) and Peters et al. (2011) as a sub part of empowerment. Since the eighties

there have been executed studies on self-steering teams (Baane et al., 2010);

- *Results driven management or steering on output*; mentioned by Baane et al. (2010), Bijl (2009), Kok (n.d.), PwC (2012) as a sub part of empowerment but very important within the NWOW concept. Baane et al. (2010) states that this concept exists for 30 years now. Schaffer & Thomson (1992) mentioned that the management should review and evaluate progress on the current array of result-focused progress.

Teleworking

One of the most famous concepts when referring to NWOW is place and time independent working or teleworking, literal "remote working". Telework is defined as: "Any form of substitution of information technologies (such as telecommunications and computers) for work-related travel; moving the work to the workers instead of moving the workers to work" (Nilles, 1998). Two dimensions of NWOW are of importance in here, namely the technical dimension (preparing the infrastructure and providing the teleworker with the right equipment) and personal (settle guidelines). Telework has a positive effect on the work related flow (Peters et al. 2011).

Generation Y or Net generation

Preparing for new entrants in the labor market seems to be an important aspect of NWOW. Although generation Y is not really a concept NWOW itself is based on, it has been mentioned four times in four different sources in Figure 7. Generation Y (or the Net generation) is always mentioned together with technology and indicating that this generation has been grown up with technology. According to Bontekoning (2007) generation Y, born between 1985 and 2000, are people who are accustomed to network with other people of all ages out of different cultures. They think knowledge is important but also perishable. Eager to get results directly and get satisfaction with the things they do. Thinking beyond borders and respecting people who don't. They prefer to multitask and know a lot about interactive media. Furthermore, this Net generation entering the work force currently demands more flexibility, integrity and customized jobs from their employer (Tapscott, 2009).

More underlying concepts

Other concepts that can exist separately of NWOW are listed below. The concepts will only be treated cursorily.

- *Web 2.0*; Frissen (2008) defines web 2.0 as a development of platforms on the internet where users can organize, collaborate, maintain friendships, share, exchange, trade and create, being openly accessible, decentral organized, making an active input of users possible and everything on those platforms can be maximum exploited." Web 2.0 provides everyone on the internet real-time access to a treasure of information, ideas and opinions (Baane et al., 2010);
- *Social innovation or smart working*; can be considered as making changes in the way of managing is done, internally on communication, in areas of HRM, in internal work and task dividing, in the physical work

- environment, in areas of working hours and in collaboration between knowledge institutions (Baane et al., 2010);
- *Flexible contract*; a more "grown-up" way of a working relation, where the employer and employee agree upon co-operation (Baane et al., 2010, Volberda, 1999);
 - *Office innovation* or *Task based workplace*; another concept that has been researched for many years, creating an environment aimed at flexible and activity-related workplaces (Bijl, 2009);
 - *Knowledge management*; since paper is not the primary way of storing information and knowledge with ICT systems as a successor (Bijl, 2009). According to Dalkir (2005) Knowledge management means "treating the knowledge component of business activities as an explicit concern of business reflected in strategy, policy, and practice at all levels of the organization; and, making a direct connection between an organization's intellectual assets, both explicit and tacit, and positive business results";
 - *Teamwork* or *team cohesion*; a well-known concept based on trust for interpersonal relations to collaborate (Bijl, 2009);
 - *Coaching management*; associated with a research of Bass (1985) comparing the traditional 'transactional' vs. the new 'transformational' leadership style. The latter emphasizes coaching, creativity, trust and personal attention for employees (Peters et al., 2011);
 - *Network organization*; collaborating over the border of organizations with other institutions, mentioned by Bijl (2009);
 - *Business process management*; mentioned by Bijl (2009), being methods, techniques, and tools to support the design, enactment, management, and analysis of operational business processes (Aalst, Hofstede & Weske, 2003).

3.1.5 Benefits of NWOW

Research of PwC (2011) showed that the implementations of the NWOW concept in organizations entail many positive macro effects, quantifying:

- Increased effective time of employees;
- Increased productivity;
- Increase of entrants in labor market;
- Decreased commuter traffic;
- Decreased CO2-emissions;
- Decreased (deadly) traffic accidents.

Peters et al. (2011) did research on the perceived work-related 'flow' (work enjoyment) when using NWOW:

- Increased work-related 'flow' by receiving more empowerment;
- Increased work-related 'flow' when the possibility to work time and place independently;
- Increased work-related 'flow' when coaching leadership is applied and an employee experiences more support from his or her manager;
- Increased work-related 'flow' when a strong social cohesion exists between colleagues and helping behavior is around.

Baane et al. (2010) uses numerator-effects mentioning a possible increase of yield by higher satisfaction and concerned employees, product improvement, improved collaboration, better use of knowledge (strengthen innovation power), attractive company image, higher customer satisfaction and increased corporate social responsibility. Furthermore, he mentions denominator-effects: a possible decrease of costs, by saving money on real estate and facilities costs, saving money on travel and accommodation costs, saving money by better planning of employees, saving money on IT costs, saving money on sickness absence and saving money on undesirable job hopping. Verbruggen et al. (2010) mentioned an increase in productivity with 15% and an increase of the company pride, company name and reputation.

3.1.6 Drawbacks of NWOW

Research of PwC (2012) notes young professionals are often dependent on the knowledge and advice of experienced employees, and appreciate the fact when they can find them at the same fixed location. Furthermore, it mentions the 'telecommuting paradox' where flexibility, productivity and a good work/life balance are perceived as positive, while professional and social cohesion are perceived negative. Reason for this is the decrease in direct communication between employee, colleagues and manager (Gajendran & Harrison 2007). The loss of structure, a static workplace, being short on self-steering capacity and management style, are mentioned as obstacles when implementing NWOW (Heck et al, 2011). Bailey & Kurland (2002) discuss the increased productivity of teleworking, as often mentioned by others. Stating that employees who report an increase in productivity also report more worked hours. This means that these employees are more productive because of the extra hours they make and not because they work more effective. In answering the question "why do people telework?", Bailey & Kurland (2002) suggest that the primary motivation may be the avoidance of interruptions.

3.1.7 Working definition: NWOW

Based on the diverse elements of the definitions in the beginning of this section, drawn into Table 2, combined with the remainder of the literature review, the following working definition has been proposed:

"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."

This definition is a combination of previously mentioned definitions, trying to explain the concept in a concrete and comprehensive way. The working definition is mainly based on elements of Table 2:

- NWOW as a vision;
- More efficient working;
- More effective working;
- Time and location independent working;

- Steering towards achieving results;
- Flexible work relations;
- Freedom of choice for employees;
- Providing all required facilities;
- Optimal utilization and development of employees' capabilities;
- More pleasurable working (work-related flow).

The term empowerment has been excluded from the definition on purpose because it is multi-interpretable and described differently in the literature (Peters et al., 2011). By mentioning *freedom* (meaning autonomy) and *steering on results* the definition tries to refer to empowerment in a way.

3.2 Knowledge sharing

This section will elaborate on the main approaches to knowledge sharing, knowledge work and knowledge workers, later on a bridge will be made to IT and the choice of channels, but first we have to explain what knowledge is.

3.2.1 Defining knowledge

In the publication "Dare to Share" Soukijad (2005) explains: "100 degree Celsius" is data, "the temperature of this water is 100 degree Celsius" is information and "knowing that it hurts when putting your hand in water of 100 degree Celsius" is knowledge. Davenport and Prusak (1998) defined knowledge as "*a fluid mix of framed experience, values, contextual information, and expert insights that provides a framework for evaluating and incorporating new experiences and information. It originates in and is applied in the minds of knowers.*" Related to an organization, Nonaka and Takeuchi (1994) argued that knowledge is "*a justified true belief that increases an entity's capacity for effective action.*"

According to Borgatti & Cross (2003), types of knowledge can be identified by "know what", knowledge about content, "know how", knowledge about processes and "know who", knowledge about your network including yourself to reach a goal (Soukijad, 2005). Another distinction can be made between explicit and tacit knowledge (Nonaka & Takeuchi, 1995). Explicit knowledge, being encodable and expressible, is in principle straightforward to share, while tacit knowledge is not. Tacit knowledge cannot be shared, but must be developed within the individual. Someone cannot explain how to ride a bike, he can provide conditions in which they can develop this know-how themselves (Klein, 2008).

Several authors (Nonaka, 1994; Brown & Duguid, 2001; Grover & Davenport, 2001) claim that knowledge originates in human minds, is highly context-specific and is created dynamically in the social interactions and networks between people. Knowledge has been recognized as the most important resource of organizations (Grant, 1996; Davenport & Prusak, 1998).

According to Ipe (2003) knowledge exists at multiple levels within organizations. De Long & Fahey (2000) divided it into three levels, being: individual, group, and organizational.

3.2.2 Defining knowledge sharing

Knowledge sharing is defined by Ipe (2003) as follows: "*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.*" King (2006) defines it as "*the exchange of knowledge between and among individuals, and within and among teams, organizational units, and organizations.*" According to Bosua & Scheepers (2007) knowledge sharing is "*a dual process of enquiring and contributing through activities such as learning-by-observation, listening and asking, sharing ideas, giving advice, recognizing cues, and adopting patterns of behavior.*" For this research the latter definition will be used to refer to knowledge sharing.

A common misunderstanding in literature about knowledge sharing and knowledge management is the difference between knowledge sharing and knowledge transfer. The difference can be declared as follows: "*transfer implies focus, a clear objective, and unidirectionality, while knowledge may be shared in unintended ways multiple-directionally without a specific objective*" (King, 2006). Ipe (2003) makes a distinction between knowledge sharing between individuals and the concept of knowledge transfer used predominantly to describe the movement of knowledge between larger entities within organizations, such as between departments or divisions and between organizations themselves.

Ipe (2003) urges that understanding of the process of knowledge sharing between individuals is one step toward a better understanding of knowledge sharing as a whole in organizations. Argote, McEvily & Reagans (2003) mentioned four factors that influence knowledge sharing, being ability, motivation, and opportunity. However, Ipe (2003) mentioned a different set of four major factors that influence knowledge sharing between individuals in organizations. These factors are:

- *The nature of knowledge;* knowledge can exist in tacit or explicit form, and has a value attributed to it, this value has a significant impact on how and whether individuals share it;
- *Motivation to share;* motivational factors can be divided into internal and external factors;
 - *Internal factors;* include perceived power attached to knowledge and the reciprocity that results from sharing;
 - *External factors;* include relationship with the recipient and rewards for sharing;
- *Opportunities to share;* can be both formal and informal in nature;
 - *Formal opportunities;* include training programs, structured work teams, and technology-based systems that facilitate the sharing of knowledge;
 - *Informal opportunities;* include personal relationships and social networks that facilitate learning and the sharing of knowledge;

- *The culture of the work environment*; the factors described above are important to understand the manner in which knowledge is shared between individuals and all of these factors are influenced by the culture of the work environment.

The framework that Ipe (2003) uses to explain how the factors mentioned above are related to each other can be found in Figure 8.

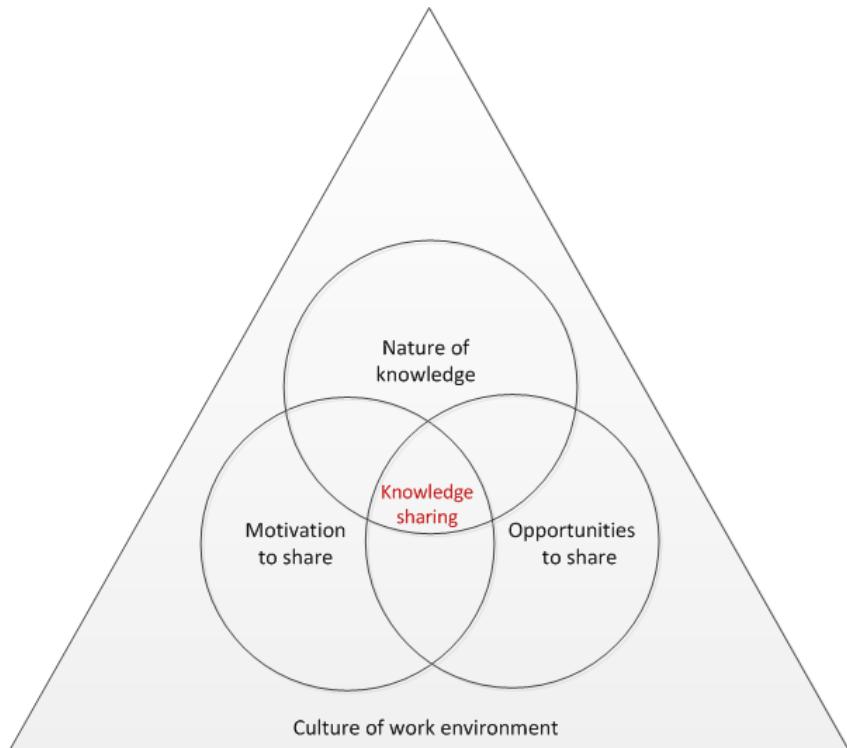


Figure 8. Factors influencing knowledge sharing (Ipe, 2003)

Ipe (2003) found that more knowledge is shared informally than through formal channels, and much of the process is dependent on the culture of the work environment. De Long and Fahey (2000) argue that the impact of culture on the context for social interaction can be assessed along three dimensions:

- Vertical interactions (interactions with senior management);
- Horizontal interactions (interactions with individuals at the same level in the organization);
- Special behaviors that promote knowledge sharing and use (sharing, teaching, and dealing with mistakes).

3.2.3 Knowledge work & knowledge workers

Pyöriä (2005) mentioned that the definition of knowledge work by Reich (1991) has been used as an important fundament to other authors, stating "*Knowledge work refers strictly to expert labor whose resources are pooled from increasingly international external labor markets and whose competitive edge lies in solving, identifying and brokering new problems. The category of symbolic analysts includes such professionals as lawyers, investment bankers, management consultants, research scientists, and so forth.*" According to the research of Pyöriä

(2005) knowledge work nowadays, can be explained as follows: "*The most important criteria for knowledge work, as they emerge from recent studies, are centered on the symbolic content of task structures that, according to the authors cited above, allow for creative application, manipulation or extension of knowledge in organizationally contingent settings.*"

The first identified knowledge workers were doctors, lawyers, scientists and academics. Drucker extended the term later to include "knowledge technologists". Computer technicians, lab analysts, paralegals and software designers, people whose work requires formal knowledge yet still contains elements of process work. Knowledge technologists are now among the fastest growing class of workers (Drucker, 1999).

According to Greene & Myerson (2011) we can distinguish 4 different types of knowledge workers:

- *Anchor*; consistent presence in the office, the *Anchor* is the person that others go to in order to get information, hence they have a vital role in knowledge sharing within an organization;
- *Connector*; depends on interaction with people from different departments and across different sections of the organization, but these interactions remain focused internally within the office building;
- *Gatherer*; communicates continually on the move through mobile and wireless technologies. As a resource, the office is important as a place where they can distill, process and review information on their own or face-to-face with relevant colleagues;
- *Navigator*; rarely in the office at all, the *Navigator* works for the organization at arm's length. E.g. a contractor who is employed on a project basis, the nomad salesman who attends the office a few times a month, and the consultant who arrives for a meeting and needs access to a space where they can sit down and use their laptop.

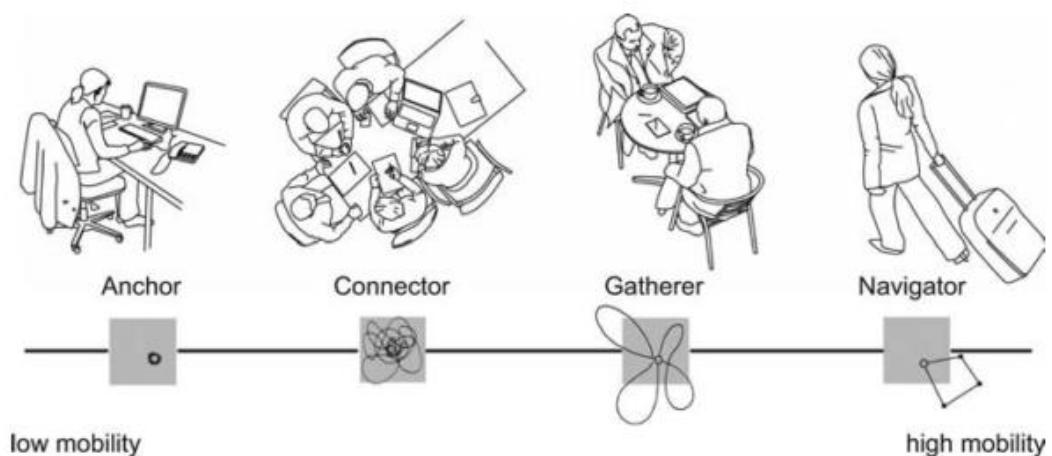


Figure 9. Four types of knowledge workers (Green & Myerson, 2011)

Based on the knowledge worker types above, it is most likely that:

P2: the higher the mobility of the knowledge worker, the more this person will share knowledge through virtual communication channels.

3.2.4 Knowledge sharing related to ICT

Knowledge sharing is critical to organizations that wish to use their knowledge as an asset to achieve competitive advantage. Knowledge management systems can be the primary enablers of knowledge sharing in an organization (King, 2006). Two main strategies in knowledge management are available in literature, on the one hand codification, which is focused on codifying, storing and disseminating knowledge in the organization (Huysman & Wit, 2004). And on the other hand, socialization (sometimes referred to as personalization), which indicates that assets of an organization are often of a tacit nature and are embodied in employees, by ways of experiences, skills and attitudes (Polanyi, 1967; Hansen et al., 1999).

Huysman & Wit (2004) argue that the most important obstacle to managing knowledge is management itself. "The role of managers in the next generation of knowledge management will be much more on the periphery, providing opportunities for people to exchange knowledge. What first needs to be addressed is how to stimulate a need to share knowledge among a group of people. It is only when this need exists that physical or electronic spaces are likely to be used for knowledge-sharing purposes."

3.2.5 Channel choice when sharing knowledge

Although researchers and practitioners understand the benefits of, and implementation strategies for, knowledge management initiatives, the factors contributing to positive attitudes and knowledge sharing behaviors, it is not clear what conditions lead an employee to use the phone instead of the intranet to share knowledge (Snyder & Lee-Partridge, 2009).

The beginning of this chapter explained that NWOW could cause a change in the collaboration between employees. On the one hand by working more time and location independent and on the other hand do employees work more often with "new" web 2.0 tools, carrying a more social element with it. It is of interest of this research to understand how NWOW employees cope with these new possibilities. The following proposition derives:

P3: Employees using NWOW make an increased use of web 2.0 tools (containing social elements) to collaborate with each other.

Snyder & Lee-Partridge (2009) claim that employees have a wide array of information and communication technologies from which to choose, but they may not make rational choices when determining what channel to use for sharing knowledge. One way to encounter the choice of a channel is to use the media richness theory of Daft & Lengel (1984). This theory describes organizational communication channels, possessing a set of objective characters that determine each channel its capacity to carry rich information. According to this theory, messages should be communicated on channels with sufficient and

appropriate media richness capacities. Messages communicated on channels that are inappropriate to the equivocally of a situation and richness of the information sought to be transmitted may be misinterpreted by recipients or may be otherwise ineffective with regard to their intended purpose (Carlson & Zmund, 1999).

Although prior studies have treated media richness perceptions as fixed for a given individual, according to channel expansion theory, this may not be the case. The channel expansion theory identifies certain experiences as important in shaping how an individual develops richness perceptions for a given channel (Carlson & Zmund, 1999).

Four experiences are identified as being particularly relevant:

- experience with the channel;
- experience with the messaging topic;
- experience with the organization context;
- experience with communication co-participants.

In addition Orlikowski (1992) notes that research has confirmed the notion that technologies are not deterministic, but rather that employee selection and use of technologies emerge from situated practices.

3.2.6 Model development

In an attempt to get to an answer to sub research question B of this research, the following model has been developed, see Figure 10. The model shows the influencing factors of channel choice. In an attempt to analyze if NWOW has an effect on the channel choice by individuals to share knowledge, patterns will be searched in knowledge sharing factors or in entity level that lead to a specific channel choice to share knowledge.

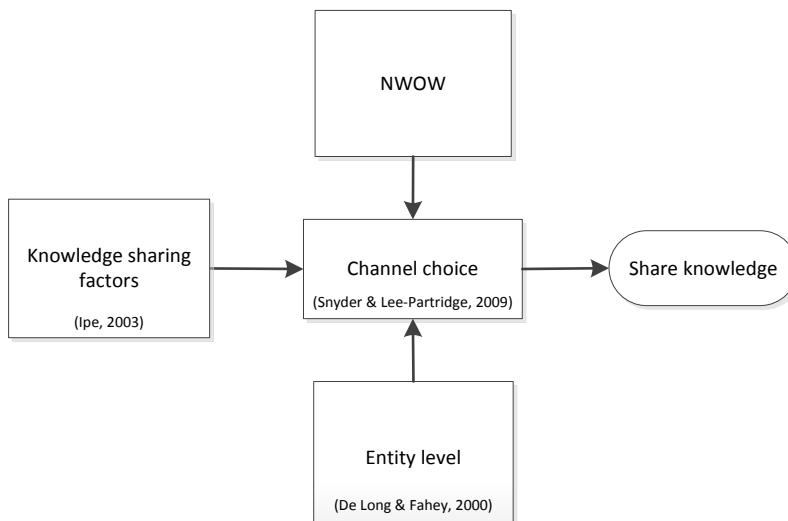


Figure 10. Influencing factors in channel choice when sharing knowledge

3.2.7 Theory on scenario development

Scenarios have been chosen as a research instrument to make it more concrete for participants to answer the interview questions. Huss (1988) stated that "a

scenario is a narrative description of a consistent set of factors which define in a probabilistic sense alternative sets of future business conditions."

The list of scenarios, see Appendix A, is developed based on the theory of Snyder & Lee-Partridge (2009) who noted: "The present study is a preliminary attempt at searching for answers to the important questions we have raised here. We seek to understand the decisions employees make in using technologies for knowledge sharing. We ask the following questions:

1. To what information and communication technologies do employees have access for sharing knowledge?
2. What information and communication technologies do employees use when sharing knowledge?
3. What factors influence the choice of information and communication technologies when sharing knowledge?"

Snyder & Lee-Partridge (2009) distinguished 4 different types of knowledge sharing, being:

- Sharing general organizational information;
- Sharing sensitive organizational information;
- Sharing general project information;
- Sharing sensitive project information.

Snyder & Lee-Partridge their types of knowledge sharing are approached from the knowledge sharing transmitter. In the discussion section, Snyder & Lee-Partridge (2009) argue: "Next, we would like to gather additional qualitative data through in-depth interviews. For example, we can ask employees to describe specific, yet typical organizational knowledge sharing practices. We can also use interviews to look more closely at the nature of the information employees share, rather than the vague categories of general and sensitive information."

To enrich the theory of Snyder & Lee-Partridge (2009), see the yellow variables in Figure 11. Scenario development modelFigure 11 below, the knowledge sharing factors as mentioned by Ipe (2003), see the orange variables in this figure, have been added to the list of knowledge types of Snyder & Lee-Partridge (2009) above. This approach has the ability to make these 'vague terms' more specific. Furthermore, the entity levels *organization*, *group* and *individual* as mentioned by De Long & Fahey (2000) have been used instead of the initial used *organization* and *project* in order to make the list of different types of knowledge sharing more complete.

Ipe (2003) mentioned the following factors that influence knowledge sharing:

- Nature of knowledge:
 - *Value attributed to knowledge*, general or sensitive;
- Motivation to share:
 - *Internal factor*, familiar or unfamiliar (assuming that an employee doesn't know the reciprocity of its unfamiliar colleague);
 - *External factor*, superior or equality (relation with colleague);
- Opportunity to share:
 - *Formal* and *Informal* are both possible dependent on the organizations possibilities. (document analysis and first interview questions answers the available opportunities to share);
- Entity level (organization, group or individual).

When combining these factors to create a list of potential knowledge sharing scenarios, initially 24 scenarios arose:

- Nature of knowledge (general or sensitive);
- Internal motivation to share (familiar or unfamiliar);
- External motivation to share (equal or superior);
- Entity level (organization, group, individual).

This list of 24 scenarios ($2 \times 2 \times 2 \times 3 = 24$) has been mitigated in this research to 12 scenarios. The reason for this was to create scenarios that can arise in real-life. Internal and external motivation to share are only applicable to individuals and not to a group or organization (as an example, a participant would not understand how to share *sensitive* knowledge with an *unfamiliar* and *superior organization*).

The entity *group* and *organization* will only be mentioned in a *general* and *sensitive* knowledge sharing scenario ($2 \times 2 = 4$ scenarios, see yellow variables in Figure 11). The *individual* entity has been used to draw scenarios with different *internal* and *external motivation to share* factors ($1 \times 2 \times 2 = 4$ scenarios, see orange variables in Figure 11) combined with the *nature of knowledge* factor making it $1 \times 2 \times 2 \times 2 = 8$ different scenarios. This makes a total of twelve scenarios when the previous 8 scenarios are added by the 4 earlier mentioned scenarios.

The model in Figure 11 combines the diverse factors with variables in a model to gain understanding. A large version can be found in Appendix B.

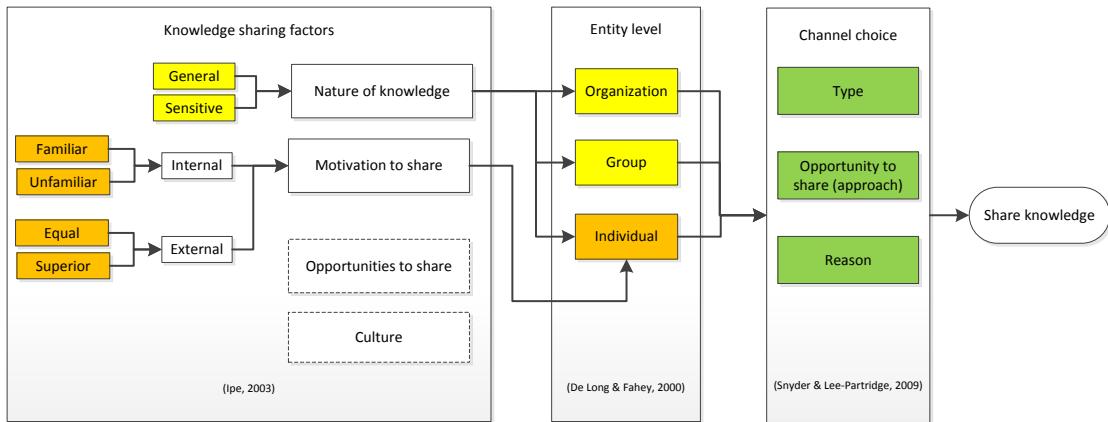


Figure 11. Scenario development model

In total 12 scenarios are invented by the researcher and checked by the diverse case company contacts. Every scenario, in the second part of the case study research interviews, has a different set of variables within the knowledge sharing factors:

1. *General* knowledge for whole *organization*;
2. *Sensitive* knowledge for whole *organization*;
3. *General* knowledge for project *team*;
4. *Sensitive* knowledge for project *team*;
5. *General* knowledge for a *superior* colleague you know (i.e. team leader, project leader);
6. *Sensitive* knowledge for a *superior* colleague you know (i.e. team leader, project leader);
7. *General* knowledge for a *superior* colleague you don't know (i.e. Chief corporate HR, Member of the Board);
8. *Sensitive* knowledge for a *superior* colleague you don't know (i.e. Chief corporate HR, Member of the Board);
9. *General* knowledge for an *equal* colleague you know (i.e. project or team member);
10. *Sensitive* knowledge for an *equal* colleague you know (i.e. project or team member);
11. *General* knowledge for an *equal* colleague you don't know (i.e. project member with same role as your but of a different project);
12. *Sensitive* knowledge for an *equal* colleague you don't know (i.e. project member with same role as your but of a different project).

As an example, participants are asked the following in scenario 6: "Imagine you find out that project articles have been stolen out of a stockroom and only you and your project members have access to it. How would you share this knowledge with your project leader?" This scenario contains a *sensitive* value (nature of knowledge), shared with an *individual* (entity level), who is *familiar* (internal factor) and *superior* to you (external factor).

Assumptions that are made in order to come up with the detailed scenarios are:

- A team leader or project leader is a superior colleague you know;
- A member of the board of directors or the Chief Human Resources are superior colleagues you don't know personally;
- You know your colleagues, that work on the same project as you, personally;
- An employee doesn't know all employees of other projects within the organization.

3.2.8 Channel choice

Participants of the case study research will answer the scenarios, choosing a certain channel, in their own professional vocabulary. After this answer the researcher will put many more questions in order to get a clear answer on "what", "how" and "why" participants use a certain channel to share knowledge.

The green rectangles in Figure 11 represent the construct of the answer that can be chosen by the participants per scenario. Every scenario will be answered with a type of channel choice:

- Face-to-face physical (only);
- Face-to-face virtual unless;
- Call;
- Mail;
- Chat;
- Document sharing system;
- Message on intranet.

The list of channel choice types above has been developed based on the answers during the interviews, in this way a complete overview of channel choice types to share knowledge could be created. However, some remarks need to be made on the previous list. Meeting *Face-to-face* is not self-evident physical anymore, since virtual possibilities arose to meet each other using videoconferencing tools. However, participants answered many scenarios with "videoconference but when we are both in the same building we will meet physical of course". The *face-to-face virtual unless* type has been used as answer when participants think that a videoconference is equal to a face-to-face meeting (physically) to share the knowledge of the scenario. *Call* has been added to the list of channel choice types instead of telephone, because nowadays people can call with a variety of devices (e.g. telephones, cell phones, notebooks or tablets). Other channel choice types speak for themselves.

The opportunity to share of a chosen channel can be formal or informal; this has been assessed based on how the channel has been used. Is it used according to the organizational structures (from manager to manager), which makes it formal or directly? The tone a participant uses in his communication can be of importance, but also the message that actually has been sent can be of importance to assess if a participant uses an informal or formal opportunity to

share. For example, when a participant chooses to call a person in a scenario to make an appointment to share the knowledge it is a formal opportunity to share, because of the formal way the participants approaches the scenario to share the knowledge.

Finally, the reason of why the participant chooses a certain channel has been asked: resulting in a list of thirteen different reasons to share knowledge. An overview of all reasons is shown in Table 13.

Chapter 4 - Expert visions

This chapter describes the first data collected for this research. Starting with the vision of four experts on the topic of NWOW and knowledge sharing. This is the result of four open-ended interviews.

4.1 NWOW experts

Ruurd Baane, co-author of "The New World of Work unraveled - Bricks, Bytes & Behavior" of Baane et al. (2010), and Dik Bijl, author of "Journey towards the New Way of Working" of Bijl (2011; 2009; 2007), have been interviewed as experts about NWOW. Both experts wrote popular publications about NWOW in the Netherlands and are therefore considered experts in the field. Below a subdivision in sections has been made on the elaborated topics.

4.1.1 NWOW and its underlying concepts

An organization that has implemented NWOW has the following four work principles:

- Time and place independent working;
- Results driven management;
- Free access to knowledge, experience and ideas, both externally and internally;
- Flexible conditions of employment.

According to Ruurd Baane these principles are the most important when implementing NWOW. "Problem is that these principles are often treated isolated." Baane mentioned the following underlying concepts of NWOW: "*teleworking, activity related working, results driven management, performance management, coached leadership and integral management.*" Employee 2.0 was also mentioned but is not a real concept but more an indication of a generation.

These underlying concepts cannot be solely classified by bricks, bytes and behavior, as they have common grounds. "Bricks and bytes components are the easiest to implement, these components can be acquired by an organization. The behavior component is harder, and is therefore more dominant. When only the bricks and bytes are implemented and behavior is not, NWOW has its limitations. All these concepts rely on more autonomy for the employee, more freedom and flexibility in condition of employment, and benefit budgeting. When only one of the aforementioned concepts is implemented, a suboptimal result occurs because all concepts share this common ground. The power of NWOW is in the combined implementation of all these concepts."

Bijl sees his definition of NWOW more as a goal and not as a real scientific definition. Therefore, he does not see the importance of a scientific definition for NWOW. Nevertheless, scientific definitions are needed to prevent standard mistakes and misunderstandings. According to Bijl, "NWOW is about achievement and work enjoyment and is more like an organization philosophy where organizations manage on the basis of some ground components." He added "NWOW is an integral and holistic approximation of the organization, where different departments and teams have to work together. But NWOW is not

only about more freedom, when an employer desires a lot of structure and planning in his work, NWOW should provide this as well."

Bijl refers to four components of NWOW: ICT, physical workspace, management and work culture. He does not support Veldhoen's ideas, being: virtual, physical, mental, and social environment completely, Bijl said: "Veldhoen is sometimes being too extreme in his theories. NWOW is a combination of diverse older concepts, which have to be implemented together to reach the full potential. This is why completed studies about these older concepts can be used to implement NWOW. However, these studies should be placed in the right context."

4.1.2 The driver behind NWOW

Teleworking was known long before NWOW became popular. But does this mean that teleworking has been a primary driver behind NWOW? According to Baane this has not been the case, it was mentioned that many large KIOs in the Netherlands are implementing NWOW "mostly for real estate cost cutting, efficiency, and to be an attractive employer for new entrants to the labor market. In addition, teleworking is an important boundary condition, but for none of the organizations telework was the primary driver to start with NWOW". Furthermore, he said: "It can be explained as a concurrence of digitalization, globalization, individualization, the aging of employees and the decrease of young employees." Some organizations, mentioned in Baane's publication, did already have a teleworking strategy, which helped of course to start a NWOW implementation.

4.1.3 Working location independent

The office is, and will remain to be, important for employees as a place where they can meet each other. Bijl commented: "Those employees who work best in their office, should not be forced to work from a distance." It is found important that organizations predefine the group size of a virtual and real team. Bijl said: "At Microsoft for example, the group size is predefined, this is determined by function and type of work. When there is too much freedom, some employees will feel lost and they lose connection with the organization. On the other hand, other employees appreciate a larger degree of freedom. Therefore, it is important that teams discuss these issues at team level." Furthermore, Bijl added: "when forming a team, it is best to work for approximately two months in close proximity to get to know each other and only start working from a distance after this period."

Baane complemented this: "Still it keeps important to catch up with team members face-to-face regularly, most likely in the office. Often, social media has been mentioned as a solution to keep in touch but this cannot completely replace face-to-face contact. Although social media has become an acceptable communication platform, not everyone likes to work with them. Social media can be compared to eating fast-food, you cannot live only on fast-food, you need vegetables too. Social media can provide to a certain extent, but it is too volatile to replace face to face contact completely."

4.1.4 Intuitive knowledge sharing

Downsides of NWOW mentioned by the interviewees are: employees who will identify themselves less with their organization, a decrease in social contact with peers and a disruptive private / work balance, which could lead to employees who work too much. Baane noted that knowledge sharing is mentioned as a solution by organizations to prevent some of these downsides from occurring. NWOW should contribute to knowledge sharing. He said: "IT can facilitate knowledge sharing in forms of share points and knowledge management systems. However, in the work field it can be seen that is hard to implement these systems in an effective way. To make knowledge sharing work effectively, a mental aspect should be changed to make sure employees have the volition and discipline to actually share knowledge. Philips for example uses the 'share unless' principle. Share everything except when there is a good reason not to share. Often there are practical issues, employees who do not know how to share knowledge for example. Therefore, knowledge sharing systems should be very intuitive and easy to understand. Recently, organizations started experimenting with Facebook-like environments, where employees can form a group or community in a very intuitive way. It is hoped that employees react in the same intuitive way towards these systems as towards Facebook as they do in their spare time."

4.1.5 Knowledge in generation Y

Generation Y develops new strategies for searching and combining knowledge. According to Baane, employees are becoming more and more knowledge collectors instead of owners. He commented: "They are getting better at collecting and searching for knowledge instead of knowing. At the same time, the need for expertise stays and remains important. At the moment knowledge sharing systems function well, but will not replace expertise and craftsmanship. In the way of gathering knowledge, makes generation Y more of a knowledge broker than someone who has actual expertise." Baane thinks this is why generation Y sometimes fails in being a good professional.

4.2 Knowledge sharing experts

Prof. dr. Bart van den Hooff, Professor of organizational communication and information Systems at VU University Amsterdam and member of Knowledge, Information and Networks (KIN) research group and his colleague Marlous Agterberg, MSc assistant professor at VU University Amsterdam and also member of KIN research group, have been interviewed as experts on the topic of knowledge sharing. Both were familiar with the NWOW concept. Below a subdivision in sections has been made on the elaborated topics.

4.2.1 A first generation knowledge sharing

The most important driver behind knowledge sharing is to keep knowledge in the organization. Especially in case of aging people, outsourcing, geographic dispersion and reorganizations it is important to keep knowledge available and usable. Both experts agree about the most traditional way of knowledge sharing in big organizations, being the concept of codification. Van den Hooff mentioned: "The knowledge an employee has about a subject, is stored in a database, so other employees can use this knowledge in future projects. This way of knowledge sharing can easily be supported by ICT." Marlous added:

"Traditionally, knowledge has been treated as an object. This knowledge sharing approach can be referred to the codification component of knowledge management strategies as proposed later on by Hansen et al. (1999)."

4.2.2 A second generation knowledge sharing

The second-generation knowledge management approach focuses more on the social component of knowledge sharing. "This social component is about the way people co-operate and communicate to share their knowledge. Mentoring and coaching is used as a way to let juniors and seniors work together, this can be used in the most formal way, through knowledge sharing systems, but can also be accomplished by brainstorm sessions, lunches or other informal face-to-face meetings" according to Agterberg. In the light of the Hansen's model (Hansen et al., 1999) this personalization approach is getting more important. Van den Hooff added: "but this does not mean that codification is less important. Nowadays, knowledge can easily be stored and mapped, by means of expertise finding systems, but the actual transfer of knowledge is mostly done in face-to-face settings." Van den Hooff added: "Both codification and personalization are used in large organizations, the 80/20 story of Hansen et al. (1999) is not correct. This depends on what project and on the level of expertise of the employees what strategy may be used." Codification is mostly used as a starting point, where new employees can find out what employees know and what knowledge is available. Personalization is used to see the application of the available knowledge.

4.2.3 New way of knowledge sharing - a third generation

Agterberg comments: "A third generation of knowledge sharing can be recently seen. Employees are discovering different ways to get in touch with experts on a subject. Discussion forums are an example of this approach. Employees are looking for knowledge outside the organization and are less dependent on the knowledge that is available within their organization." Van den Hooff mentioned: "The growing importance of social media and the shift towards a more bottom-up character of knowledge sharing. I expect that people will meet less face-to-face physically and more virtually."

4.2.4 Tools for new ways of knowledge sharing

Van den Hooff argued: "The problem of a decrease in physical contact existed long before NWOW became popular. In large international organizations, distance between employees had to be bridged already for a long time. However, social media are becoming more important when there is less physical contact between employees. These social media are mostly bottom-up and contain user generated content. In this way, employees can easily keep track of proceedings of fellow employees. In social networks, co-operation and interaction is supported, in contrast with more traditional knowledge sharing systems. Due to the progressive use of web 2.0 applications, contact between employees is often been facilitated too."

According to van den Hooff, employees are easier to find and contact can quickly be made. As a result, self-organizing networks within companies arise. These networks facilitate knowledge sharing, but they make a knowledge sharing network very fluid as networks arise and disappear continually. In addition he said: "A hardware component that facilitates communication is the use of tablets

and other mobile devices, which can facilitate knowledge sharing as it is easier to access knowledge via mobile devices. However, this does not mean that more knowledge is actually shared."

Van den Hooff also mentioned that organizations started with social media as an application to communicate with external customers; think of a Facebook-page and a web customer service via Twitter. Although recently internal use of social media can be seen, internal communities are made, with Yammer for example. These communities are progressively used for knowledge sharing. A positive side of social media is that most private conversation is visible (and searchable) for public too. Another positive side of social media is that the process of knowledge sharing develops during work, and is not seen as a separate job. Furthermore he added: "Whether knowledge sharing through social media is successful or not remains a question to be answered. A lot of data is generated when all interaction in social media systems is stored. The question remains if these data are usable. For example, when searching for information about a project, a lot of data needs to be searched to find the right information, because most of the time contextual information is missing. Smart search engines have to be invented to make databases easy searchable. Nevertheless, this bulk of information can be used to localize expertise."

4.2.5 Knowledge sharing and NWOW

NWOW means often more freedom, flexibility and autonomy in the way of working. There are positive and negative aspects about more autonomy when applying NWOW. Employees identify themselves less with the organization because they perceive themselves as an individual instead of a part of the whole. Resulting in employees who see their co-workers not as partners but as competitors and knowledge can be withheld instead of shared. However, the primary effect of this individualistic management is positive. When employees get more responsibility, they feel more responsible for the work they produce and they may work harder to obtain the desired goal, according to van den Hooff. He added: "Employees feel more affiliated with equal co-workers and with their job. For example, a java programmer will feel more like a java programmer than part of the organization. When employees create a community of practice, an opportunity to learn is created and employees get better at their job." This of course is positive for the organization.

Results driven management and more empowerment can be seen as the most important influencers of knowledge sharing according to both experts. These variables ensure that employees work together more, to optimize the results. As a consequence of this, more knowledge is shared when proper facilitators to share knowledge are in place. Location and time independence are important variables that influence knowledge sharing. According to the experts, both positive and negative consequences about location and time independence can be noted. Agterberg mentioned: "A negative consequence is the fact that there is less face-to-face contact between employees. But on the other hand, these variables facilitate creativity, because employees can work where and when they feel they are the most productive and creative. Another positive aspect about location independence is the fact that employees can go to a seats2meet workplace,

where they can brainstorm with other employees. Time independence could result in more contact between employees, because they work in evenings and weekends which results in more opportunities to share knowledge. ICT has an important role in facilitating this."

4.2.6 Factors influencing knowledge sharing versus NWOW

Factors that may change when applying NWOW based on Ipe's (2003) knowledge sharing framework, are discussed. According to van den Hooff, the *nature of knowledge* does not change due to NWOW; most knowledge is tacit while explicit knowledge is a facilitating factor. It does not make a difference if this knowledge is transferred through the old way of working (often physically) or the new way of working (more virtually).

The *opportunity to share* will be influenced by NWOW. Van den Hooff stated that: "Because people will meet each other less face-to-face. This is an important obstacle to overcome. ICT can play an important role in the facilitation of opportunities to share, by making visible what employees are doing and when employees are working on a specific project, opportunities to share can be created. In this way, there are more opportunities to work together with employees you did not know before, and more diverse groups are formed."

The *motivation to share* knowledge stays very personal. Van den Hooff mentioned: "some employees are demotivated by NWOW, because they want their own workplace, clarity about their work and the time they work. Other employees are very motivated due to the fact that they can work when and where they want."

The *culture* of work will become more informal and open due to NWOW, according to the experts. "Boundaries fade away and employees have more contact through social media. However, the culture of work should be ready for NWOW when it gets implemented, old formalistic cultures probably would not adopt NWOW early" mentioned van den Hooff.

4.2.7 Improving knowledge sharing

The main issue with knowledge sharing, as said by van den Hooff, is that employees should not see it as a separate job, so it has to be more implemented in their daily work. "It should be stressed that employees cannot do their jobs in the most optimal way if they do not share knowledge at the same time. For an organization it remains important to facilitate the sharing of knowledge by providing the opportunity to work together. ICT plays an important role in facilitating this. Furthermore, it does not work to reward employees when they share knowledge because this results in seeing knowledge sharing as a separate part of the job. This way of rewarding results is an extrinsic motivation to share knowledge, while intrinsic motivation is the ideal goal. It could work when, for example in a forum, employees get rated on their level of most useful information shared. In this way, employees get rated on their expertise instead of on the quantity of knowledge."

The following propositions can be drawn, that are also interesting for this research, based on the input of both experts:

P4: Employees using NWOW meet less physically and more virtually when sharing knowledge.

P5: Employees using NWOW use more informal opportunities to share knowledge.

Chapter 5 - Case studies

This chapter elaborates on the conducted case studies in this thesis research. Firstly, the case study participants will be discussed. Secondly, the way how the case study research has been executed (i.e. by using a case study protocol) will be discussed. After this, three individual sections will elaborate on the results per case.

Every case starts with general information about the case companies, gathered in the document analysis. Then, the first part of the case study interviews will be presented, being general open-ended questions about knowledge sharing and NWOW. Finally, the second part of the case study interviews, being semi-structured questions about knowledge sharing scenarios as mentioned in Section 3.2.7 Theory on scenario development.

5.1 Case study participants

The case study research has been executed over three case companies being Centric B.V., Royal Dutch DSM N.V. and Enexis B.V. All companies can be considered "large" according to the European Commission (2003). There is a high variety between the case companies as they are all active in different sectors. This makes cross-case results between both units of analysis more interesting, as they become applicable to a wide range of companies in the Netherlands in different sectors.

In total, 18 people have participated in this case study research. Per case company 6 participants have been interviewed, 3 employees of the NWOW pilot and 3 employees outside the NWOW pilot, see Figure 12 for a comprehensive overview.



Figure 12. Case company overview

Table 3 below shows a list of the two groups of interest: group 1, being the NWOW unit of analysis, and group 2, being the NOT NWOW unit of analysis. Details about the participants such as function, experience and nationality were retrieved during the interview as well.

Unit of Analysis	Knowledge worker type	Function	Experience	Organization	Gender
NWOW	Gatherer	Project Manager	11	Enexis	male
NWOW	Anchor	Contract Engineer	14	Enexis	male
NWOW	Gatherer	Business Information Manager	3	Enexis	male
NWOW	Gatherer	Implementation Consultant	4	Centric	male
NWOW	Gatherer	Implementation Consultant	2	Centric	male
NWOW	Connector	Functional Application Manager	13	Centric	male
NWOW	Anchor	ICT Security Officer	4	DSM	male
NWOW	Connector	ICT Solution Architect	10	DSM	male
NWOW	Connector	ICT Innovation Consultant	3	DSM	male

Table 3. List of participants group 1: NWOW

Unit of Analysis	Knowledge worker type	Function	Experience	Organization	Gender
Not NWOW	Anchor	Engineer	2	Enexis	male
Not NWOW	Gatherer	Team Manager	6	Enexis	male
Not NWOW	Gatherer	Team Manager	11	Enexis	male
Not NWOW	Anchor	Programmer	20	Centric	male
Not NWOW	Anchor	Programmer	25	Centric	male
Not NWOW	Gatherer	Implementation Consultant	2	Centric	male
Not NWOW	Connector	Manager Service Lab	6	DSM	female
Not NWOW	Connector	HR Manager	10	DSM	female
Not NWOW	Navigator	Manager Public Affairs	22	DSM	female

Table 4. List of participants group 2: NOT NWOW

Note that every case company has a different set of knowledge working types of the participants. A reason for this difference can possibly be found in the fact that all companies are active in a different sector, based on a different core business. Unfortunately, only one navigator has been interviewed, being a NOT NWOW participant. The high mobility of this role would make this knowledge worker type very suitable for NWOW, however only a NOT NWOW participant has been interviewed with this role.

The determination of the type of knowledge worker has been derived from the function of the participant. Based on the theory of Greene & Myerson (2011) the researcher has judged the type of knowledge worker as follows:

Function	Works	Knowledge worker type
Business Information Manager	Nationally	Gatherer
Contract Engineer	Highly local	Anchor
Engineer	Highly local	Anchor
Functional Application Manager	Flexible local	Connector
HR Manager	Flexible local	Connector
ICT Innovation Consultant	Flexible local	Connector
ICT Security Officer	Highly local	Anchor
ICT Solution Architect	Flexible local	Connector
Implementation Consultant	Nationally	Gatherer
Manager Public Affairs	Internationally	Navigator
Manager Service Lab	Flexible local	Connector
Programmer	Highly local	Anchor
Project Manager	Nationally	Gatherer
Team Manager	Nationally	Gatherer

Table 5. Knowledge type determination

Figure 13 shows how the knowledge worker type relates to both units of analysis (NWOW and not NWOW).

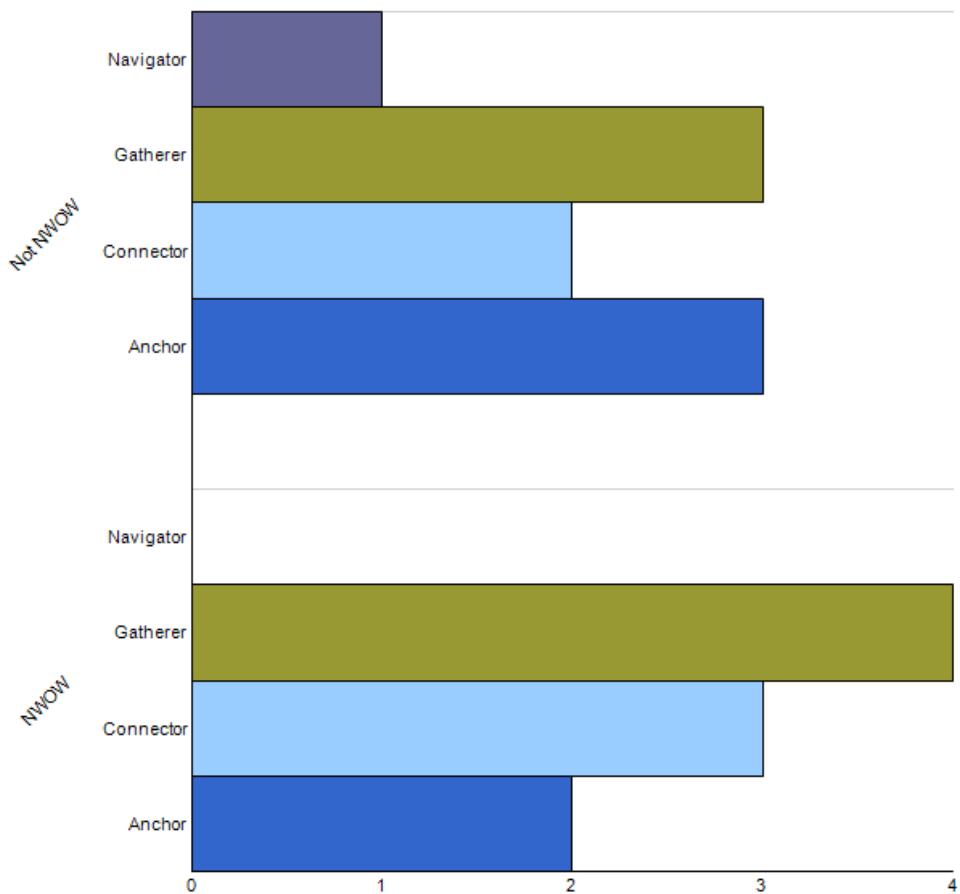


Figure 13. Knowledge worker type divided in both units of analysis (N=18)

The horizontal axis presents the number of participants. For this research it would be most ideal to have equal values per knowledge worker type in both units of analysis.

5.2 Case study protocol

In order to execute the case study research, the same procedure has been followed every single time to make the study more reliable. To accomplish this, a case study protocol has been developed, see Appendix A. In every case, a preliminary interview has been conducted with the case company contact, to gain general information, implementation process information and to explain the research in more detail. Notations have been made by the researcher and were used in the document analysis. These conversations were not recorded. After the preliminary interviews project, implementation, and advisory documents were acquired for the document analysis.

The main topic of the document analysis was to gather knowledge about the case company, the responsible department for the implementation and what changes had been made on organizational, technical and physical level. In the document

analysis the dialect name for NWOW of the case company has been used instead of NWOW. The document analysis begins with a company briefing elaborating on the core business of the company; this information can easily be found on the internet.

The first part of every case study interview dealt with the orientation about the case company's knowledge sharing context, the way NWOW has been implemented and how it is perceived by the participants. Every case will go into the status quo of NWOW, what is accomplished and what is not according to participants. Perceived changes in the organization, technology and physical environment will be briefly commented. Collaboration facilities, knowledge retrieval and knowledge sharing culture will elaborate on how knowledge sharing is organized within the case company.

The second part of every case study interview consisted of a semi-structured section which dealt with which channel choice participants would make when they had to share knowledge in a specific scenario. Section 3.2.7 Theory on scenario development, provides more information about how these scenarios have been developed. The channel choice answers were then put into a contingency table, together with the main reason mentioned for the choice, per unit of analysis. Based on the given answer, the researcher has determined the "opportunity to share" and added this before the channel type in the contingency tables. A list of answers to the channel choice type has been created, along the interviews. When a not formerly mentioned type or reason was given, it has been added to the list. The numbers in the contingency tables indicate how many times a certain reason has been mentioned as the main reason to choose a certain channel. Section 3.2.8 Channel choice, provides more information about the list of answers that has been developed. Next, a short analysis per company has been done.

Section 6.2 Cross-case results, provides more information about cross-case analysis between NWOW and Not NWOW.

5.3 Case 1: Centric B.V.

Centric B.V. has a headcount of 15,500 employees worldwide dispersed over more than 10 countries and four main businesses, being Centric IT Solutions (ITS), Oranjewoud advice and engineering services, Finace financial services and since 2010 Strukton infrastructure services.

Centric ITS introduced NWOW within their organization calling it HCW (in Dutch: "Het Centric Werken", the Centric Way Of Working), reason for this different naming is because the organizations argues they partially integrate the NWOW concept using only the elements that are beneficial for them. Reasons for Centric to initiate the HCW project were to make knowledge and competences of employees better findable, decrease housing costs, be attractive to the new generation on the labor market, be corporately social responsible and gain commercial benefit by implementing NWOW in other companies. As a consulting ITS organization, Centric was already familiar with teleworking and result driven management but only on a departmental level instead of an individual level. Furthermore, many applications to work remotely were already in place and available before the HCW project started.

In 2010 the R&D department started a study on the topic of NWOW for Centric ITS resulting in an implementation advice and later on in the composition of a steering and project group. After the preparation period in 2011, Centric started to introduce HCW on an evolutional basis. Most efforts in implementing HCW will be done by the own organization as all knowledge and facilities are in place, dividing the aspects of a HCW implementation over three departments: facility management, intern automation and human resource management. Around 300 people are involved in the HCW pilot project right now.

HCW is built around the three pillars: "People, Technique & IT and Workplace" derived from "Bricks, Bytes and Behavior" of Baane et al. (2010). Organizational changes that have been proposed in order to flourish HCW are changes in the organizational policy (result driven management instead of attendance, flexible working hours, open agendas, one mandatory contact day for groups, introduction program for new employees, no time registration, expanded opening hours, stimulate blogging and paperless working), training programs were set up (to work remotely, work result driven, approach colleagues remotely, etc.) and facilities for teleworking from the home (teleworking contract, office chair, office desk, compensation for broadband connection).

Changes that have to be made from a technical perspective are an expansion of the wireless- and underlying infrastructure at other Centric B.V. establishments like Oranjewoud and Finace. So that Centric ITS employees can use all (virtual) facilities at those locations and vice versa. Furthermore, employees may choose a notebook and smart phone they like (with remote collaboration functionality) obeying the required security rules. Software that is available within Centric ITS to all employees, which can be beneficial when applying HCW are: MS Office Communicator Server, MSN (instant messaging), Yammer, MS Sharepoint, MySite and MS Lync. The latter is another software pilot within Centric ITS outside of the HCW project. Furthermore, follow-me printers can be used to print at the

location an employee is situated. Changes in the physical workplace will be made by introducing activity-based office rooms, using lockers, adding coffee corners and set adjustable chairs / desks with peripheral equipment (monitor, keyboard and mouse).

5.3.1 Interview part 1 - NWOW status quo

In the latter paragraph, a promising NWOW environment has been drafted. However, the implementation of NWOW although evolutionary, was not recognized as a solely project by the participants. According to the preliminary interview with the company contact, the project gained less attention at the moment due to the financial crisis.

The NWOW group at Centric was positive about HCW, many mentioned: "we already worked quite flexible and time and place independent as we are consultants, it has many advantages, but there are some disadvantages like the possibility to meet with colleagues, which is sometime more difficult." Another participant said: "Now, it is more dependent on the type of manager you have whether you can work flexible, some managers steer on hours while other managers steer on output."

Organizational changes

The participants mentioned that they didn't receive instructions or trainings about HCW. They also did not recognize a change in culture within the organization. However, they did recognize a more effective use of MS Sharepoint within the organization. Formal opportunities to share are mentioned by all participants, being monthly organized knowledge sessions that take place about actual topics in the sector.

Collaboration facilities

Collaboration software that has been used by the NWOW group are: MS Sharepoint (document sharing), Outlook (e-mail client and agenda), Service desk (communication tool to collaborate with customer and with other colleagues), Oracle Web Conferencing (videoconferencing tool). One said: "We don't use OWC a lot." Yammer is also in place but only used by a small group of developers within the company. According to one NWOW participant: "Someone can use Yammer 100% work related or 50% work related, the problem is that within Centric it is a 100% work related what loses the Facebook-like feeling. And people use a medium, they got used to, when posting on Yammer, I receive answer by e-mail." This NWOW participant expected Yammer to be more social. Furthermore, MS Sharepoint is used for storing documents but not as a communication platform. Reason for that is that it does not work in an ad hoc way like e-mail or phone.

NWOW participants are all positive about activity-based rooms. As an example one participant complained that some silence-rooms were changed back for other purpose due to scarcity of space. "Unfortunately, there are only few silence-rooms now and they are always occupied", he said. This indicates the appreciation of these activity-based rooms.

Knowledge retrieval

All participants agreed upon the fact that they can find colleagues based on their expertise. By default employees call colleagues within their direct professional network, otherwise they call a manager or someone else who know many more people in the organization. A knowledge matrix is mentioned several times, this is a product-centric list of which person is responsible for a certain subject about an in-house developed product or module.

Knowledge sharing culture

The knowledge sharing culture within Centric is perceived the same for both groups, an open knowledge sharing culture, when you have a problem you just have to ask. One of the NWOW participants said: "Centric has an open atmosphere in helping each other, although it can be a hurdle to call a quite unknown person." Mistakes can be made and are treated professionally to prevent from happening next time. The culture within Centric has not changed since the introduction of HCW according to the participants.

5.3.2 Interview part 2 - Channel choice

The table below shows how NWOW participants at Centric share their knowledge in the diverse knowledge sharing scenarios as explained in section 3.2.7 Theory on scenario development. The table is based on 12 knowledge sharing scenarios showing the opportunity to share the knowledge and channel type versus the reasons employees mention to choose for this particular channel. The highlighted cells will be elaborated below.

Mentioned reasons	Opportunity to share - channel							Total
	Formal - Call	Formal - Face-to-face physical	Formal - Mail	Informal - Call	Informal - Chat	Informal - Face-to-face physical	Informal - Face-to-face virtual unless	
assurance that receiver reads or gets message				2				2
best way to forward task				3				5
doesn't disturb receiver			1					1
easy to use			1	1	1			3
file building		4						4
it is fast	1		1	1				3
most confidential way		2		1	1			4

most personal				1	3	1		5
possibility to react directly	1		1		1			3
smallest chance of misinterpretation						1		1
without obligation, initiative for the receiver				1		4		5
Total	1	3	7	10	2	5	2	36

Table 6. Contingency table Centric NWOW

Table 6 above shows that the participants often use informal opportunities to share; choosing *informal - call* the most with divergent reasons. It is remarkably how often e-mail has been chosen with means to archive the sharing of knowledge in a formal approach and how often *mail* is used to leave further initiative at sides of the receiver. Furthermore, sharing knowledge *face-to-face physically* is still mentioned as the most personal way.

Mentioned reasons	Opportunity to share - channel					
	Formal - Face-to-face physical	Formal - Mail	Informal - Call	Informal - Face-to-face physical	Informal - Mail	Total
assurance that receiver reads or gets message				1		1
best way to forward task	1		1	4	1	7
easy to use				1	3	4
file building		1				1
it is fast				3		3
most confidential way	1			1		2
most personal	2		6			8
no other possibilities in place					2	2
possibility to react directly			2	2		4
too sensitive for other channels			1			1
without obligation, initiative for the receiver		2			1	3
Total	4	3	4	18	7	36

Table 7. Contingency table Centric Not NWOW

The Not NWOW participants choose *face-to-face physical* by far the most in ways to share knowledge in an informal way. Reason for this remarkably number of 18 *informal - face-to-face physical* answers can possibly be found in the fact that 2 of the 3 participants have an *anchor* type of knowledge worker. They often answered: "In that case, I would just walk to him directly to tell him." However, they considered the reason to walk directly, by choosing different reasons, *most personal*, *most confident* and *best way to forward task* (as these anchors have a direct manager in the same building).

5.4 Case 2: Royal Dutch DSM N.V.

Organizational context: Royal DSM N.V. (DSM) is a global science-based company active in health, nutrition and materials. Worldwide, DSM employs 22,000 people dispersed over 200 locations in five different continents.

At DSM the NWOW concept (calling it "nWOW") has been introduced by human resources in order to encourage entrepreneurship and collaboration within the organization (obtaining better organizational wide knowledge sharing), which according to DSM finally will result in "better business." DSM describes the principles for nWOW as follows:

- One world of business: simplify working together;
- Always on: improve business insights;
- Workforce evolution: attract and retain employees;
- Transparent organization: streamline business process management & content management.

The NWOW concept is also in accordance with the corporate strategy of DSM stating: "*Sustainability is the byword for our business. That means creating sustainable shared value for all our stakeholders based on innovations that benefit People, Planet and Profit.*" In this strategy piece, the part about people was important to initiate a study on the NWOW concept in 2009. Later on, this became a pilot project for DICT, actuated by CIO Aloys Kregting with project members of human resources, workplace, training, and nWOW champions. Globalization, future footprint, sustainability, attractiveness to new entrants in the labor market, lower real estate costs and more efficiently use of facilities were other reasons for DSM to start the project.

During the pilot project, information sessions were held for the involved employees informing them about the organizational change. A project plan had been made to scope the project and arrange the communication about and inside the project. A workgroup, a sounding board and a review team had been composed in order to lead the project. The project communication was done very openly using the intranet where employees could find information about the projects' frequently asked questions and answers, notes of sounding board meetings and more. Enthusiast employees shared experiences to make others attracted to nWOW as well. Furthermore, several conditions were devised, containing rules of engagement: no forced home working; coaching of employees to the desired behavior; appreciating early adopters and no exceptions for anybody, neither for authorities. Using this approach, the project team was from a human resources point of view occupied with training, instructions about the change in behavior, consequences for labor regulations, supporting management and evaluating the work-life balance of employees. The first step taken within DSM was to go from the as-is situation, being an "open office" where employees already have been encouraged to work remotely and flexible within the office building, but steering was still based on presence, to go to nWOW. DSM tries to fully adopt the NWOW concept (as long as appropriate for the organization) having activity-based office rooms and steering employees on their results. Changes concerning technology were the responsibility of the intern IT

organization. Most changes have been made in the hardware infrastructure, expanding the wireless environment for the expected growth of mobile devices. Employees were equipped with so called "toolkits" containing a laptop, laptop stand, mouse, keyboard, smart phone and trolley. Also many meeting rooms were provided with videoconferencing equipment to encourage remote meetings.

Regarding software, DSM is continuously improving its unified communications within the IT environment in order to create an atmosphere where collaboration in virtual teams is stimulated and works as easy as possible. Another reason for DSM to adopt new software products early on is to be a challenging employer to new entrants in the labor market. Hence, changes in software for the nWOW project at DSM embraced only the transition of MS Office Communicator Server (OCS) and MS Live Meeting to its successor MS Lync started in spring 2012. Other tools in the application portfolio of DSM introduced outside the nWOW project were, push mail, instant messaging and presence via OCS, employee information (using MySite) and virtual workspace via MS sharepoint. Software like Yammer, Netpresenter, Webex and Tandberg collaboration software were already in place. Although, it is mentioned that the full potential of these tools are utilized when practicing nWOW. The introduction of Lync will be a leap forward for telephony and the single point of contact per employee. During the initiation of nWOW, consultants of Microsoft concluded that only telephony was a point of interest to extend the software portfolio for nWOW users with.

In an attempt to shape the organizational culture, DSM started the "One DSM Culture Agenda." With this program DSM tries to create understanding for employees from different cultures and to encourage collaboration over the diverse business units. Within the vision of this program, accountability for performance and nWOW are also a subsequent.

When looking into organizational knowledge sharing and get a grasp of the recurrent activities and meetings that take place within DSM, the following is in place:

- A yearly top management conference, where 350 of the top managers of DSM join a conference (last year online);
- A quarterly town hall meeting is organized for business units (500 people at DICT business unit);
- A bi-monthly department meeting;
- And meetings on team level that are arranged bi-weekly or more.

The pilot project ended in quarter 2 of 2012. Early results about the nWOW project are positive. Resulting in a better work-life balance, employees working inside and outside the office building, less commuter traffic, the office is now perceived "more fun", decrease of formal meetings and an increase of individual performance. Negative sides of the changes are employee experiences such as a decreased team spirit and diminished social contact with colleagues and managers. Of course, an organization cannot be changed easily and possibly needs repeated trainings or instructions about desired behavior and in the use of

technology to get employees in a state that they think it is normal and reap the full benefits of the NWOW concept.

5.4.1 Interview part 1 - NWOW status quo

As the previous section already mentioned, NWOW has been perceived as positive and "more fun" by the pilot group, resulting in an implementation project for NWOW at more departments in the organization. All participants at DSM perceived NWOW as a positive development. One participant mentioned: "we see NWOW as a way to give a positive push on culture change at DSM."

Organizational changes

To make people acquainted with NWOW, DSM organized the following: walking-in sessions, newsletters with instructions via mail, online training sessions, knowledge sessions devoted to NWOW, flyers with do's and don'ts and team sessions to tune with colleagues about topics like availability. Guidelines for NWOW were given by the organization to the employees and agreements are arranged with the competence managers.

Formal opportunities to share knowledge at DSM embraced newsletters, colloquia, department meetings, business unit meetings, team-level meetings, center meetings, project meetings and ad hoc meetings. Employees of the NWOW group were asked what changed since the introduction of NWOW concerning facilities to share knowledge. They mentioned: "we now have offline as well as online knowledge sessions, it has become normal that people join an offline meeting using videoconference and of course the changes in technology." Furthermore, the NWOW participants are positive about videoconferencing, resulting in more ad hoc meetings of a shorter time take place resulting in more effective meetings.

Employees using NWOW were asked how the organizational culture has changed since NWOW when focusing on knowledge sharing. All participants were positive, reacting like "it's now normal that you're sitting next to people you don't know" and "the character of the organizational culture is becoming more informal which encourages knowledge sharing." Although one employee also mentioned: "static workplaces caused a lot of local knowledge sharing while dynamic workplaces cause more cross-functional knowledge sharing."

Collaboration facilities

In answering the question which technology / software is in place to collaborate with colleagues, the following software was mentioned by traditional workers: Outlook (used for mailing and planning), DSM store (used for document storing), Office Communicator Server, or Lync (used to chat), Training compass (used as e-learning tool), WebEx (used for videoconferencing), Live meeting (used for videoconferencing), Intranet (used for news), E-lab notebook (used to store lab notes), Paper store (used for scientific papers storage). The latter two of the previous mentioned software packages are competence dependent collaboration tools.

NWOW employees mentioned the same tools as above but added:

Office Communicator Server or Lync (used to chat, call and videoconference), Live meeting, used for videoconference and remote desktop, Sharepoint Team Sites (to store team documents), Sharepoint Blogging (to blog), Sharepoint Questionnaire (to create questionnaires), Sharepoint My Sites (used to store information about individuals), VPN portal (used to safely work from unsecure workplaces), Yammer (used as an organization wide social media platform) and Remedy (ITSM service management software).

According to all participants they would share their knowledge face-to-face, whereby the coffee corner was explicitly mentioned. Furthermore, they call through Lync or by phone, use videoconferences, mail, chat or use Sharepoint to sharing knowledge. The previous mentioned tools show some differences between traditional and NWOW employees; the most obvious of which is that NWOW participants mention Sharepoint while none of the traditional working participants mentioned it. Second, NWOW participants mentioned Lync many times for different activities while traditional working participants mainly use it to chat. One of the NWOW participants said: "Many tooling was already in place but it comes together as a concept when using NWOW."

Of course the tools mentioned before only show a picture at a given moment in time, and participants can answer the questions differently today. However, the lists above do give an indication about the first tools that popup in the participants' heads, and it can be assumed they use it on a regular basis. One of the participants said "Lync became indispensable since the application of NWOW." Reason for this is that this software combines many features to communicate with colleagues and functions as a starting point for communication.

NWOW employees also consider Sharepoint as useful software: "It helps to keep documents in a central place, using version management and is easier for managing action points for the team. A nice overview of who has done what in the project becomes available" and "Sharepoint makes version management easier thanks to the use of linking to the source document."

Yammer as an organizational wide social platform has not been adopted by the employees, a reason for this can be found in its quiet introduction in the organization. According to one of the employees: "I would rather use Yammer if it is possible to exchange information with the team, now it is implemented too broad and it contains too much irrelevant information. The team I work in is small so face-to-face contact is still easier." Furthermore, another employee mentioned: "A social platform is crucial for a successful implementation of NWOW and has the ability to avoid the referring-to-colleague culture, which can be time saving."

When asking employees how they think the redesign of the office to activity-based rooms has influenced knowledge sharing, they overall answered positive. "Flexible desks cause people to make contact with unknown employees more quickly." The use of cockpits and small meeting rooms with communication equipment is found very convenient to work at and collaborate in for a short

time, alone or in a small group. Meeting rooms possessing a smart board and teleconference tools are also being found very convenient. Although a remark has been made about the instruction of the devices, "these can be made more easily to understand, in a way that non-technical users can easily use them." Only one participant thought that the redesign would not increase knowledge sharing, however he said "it certainly would increase the comfort for the employees."

Knowledge retrieval

When asking the participants whether they can find colleagues easily, based on their skills and expertise, most answered, "yes, I know a lot of people in the company and if I do not know I ask someone with a larger relational network who can put me through." However, when this is not the case some employees are going to search the intranet for people profiles or even the internet. One participant said "A problem with searching profiles is that only few have filled them in and when filled in, it is a problem to keep it up to date."

Knowledge sharing culture

According to all participants the knowledge sharing culture within DSM tends to be dispersed over many different silos. Although one participant said "DSM has started diverse initiatives to look across different silos." Furthermore, DSM has an open culture and allows making mistakes and learning from them, a nice example can be found within DICT where mistakes can be send in to the fabulous failures list. The most fabulous failure will be awarded an iPad. An NWOW participant mentioned that employees of DSM global in general keep knowledge for themselves (thinking knowledge is power). But he also mentioned: "The knowledge sharing culture within DICT is increasing, in contrast with DSM global." Another participant said, "It is a confidential culture but it is becoming more commercial. For this it is important that responsibilities between departments become clear." Additionally, it is in the culture of DSM to help each other when it is asked, without a lot of forwarding.

5.4.2 Interview part 2 - Channel choice

Table 8 shows how NWOW participants at DSM share their knowledge in the diverse knowledge sharing scenarios as explained in section 3.2.7 Theory on scenario development. The table is based on 12 knowledge sharing scenarios showing the opportunity to share the knowledge and channel type versus the reasons employees mention to choose for this particular channel. The highlighted cells will be elaborated below.

Mentioned reasons		Formal - Chat	Formal - Face-to-face physical	Formal - Face-to-face virtual unless	Formal - Mail	Informal - Call	Informal - Chat	Informal - Document sharing system	Informal - Face-to-face physical	Informal - Face-to-face virtual unless	Informal - Mail	Total
best way to forward task			1	2			1	1				5
doesn't disturb receiver	1			1						1	3	
easy to use			1							1		2
file building										1	1	
it is fast			1		1	3		2				7
most confidential way									1			1
most personal	1	1						1	2			5
no other possibilities in place				1						1	2	
possibility to react directly								2				2
smallest chance of misinterpretation			1					2				3
without obligation, initiative for the receiver		1	1							3	5	
Total		1	1	6	5	1	3	1	9	3	6	36

Table 8. Contingency table DSM NWOW

Table 8 shows that most opportunities to share are informal and divided over all possible channels. It is remarkable that *chat* has been chosen three times because of its fast way of communication. *Face-to-face physical* remains the most chosen channel in this group. However, it has not been chosen often as a way to communicate most personal, but the possibility to react directly, smallest chance on misinterpretation and its speed seem to be more important reasons.

Mentioned reasons	Formal - Call	Formal - Face-to-face physical	Formal - Mail	Informal - Call	Informal - Face-to-face physical	Informal - Face-to-face virtual unless	Informal - Mail	Total
assurance that receiver reads or gets message			1				1	2
best way to forward task	1	2	2					5
easy to use	1		1					2
it is fast	1	2		2	1			6
most confidential way		3				1		4
most personal		1			3	1		5
no other possibilities in place			1					1
possibility to react directly	2	1						3
smallest chance of misinterpretation		2			2			4
without obligation, initiative for the receiver			2				2	4
Total	5	11	6	3	7	1	3	36

Table 9. Contingency table DSM Not NWOW

In Table 9 it can be seen that 22 out of 36 times, employees have chosen for a formal opportunity to share. Hereby *face-to-face physical* is the most used channel, with the reason that it is the most confidential way. It seems that *calling* and *face-to-face physical* meeting, whether formal or informal, seem to be the fastest ways to communicate for this group. *Mail* is the ideal channel to share knowledge without obligation and interruption for this group.

5.5 Case 3: Enexis B.V.

Enexis Holding B.V. is a Dutch DSO. A DSO is a distribution system operator, which means a natural or legal person responsible for operating, ensuring the maintenance of and, if necessary, developing the distribution system in a given area and, where applicable, its interconnections with other systems and for ensuring the long term ability of the system to meet reasonable demands for the distribution of electricity or gas (Freie Universität Berlin, 2007). Enexis employs 4300 people dispersed over 22 locations in the Netherlands.

At Enexis, the NWOW concept (called “X-werken”) has been introduced by human resources in order to work more flexible within time and space by using information and communication technology. Key points for Enexis to start the NWOW project are:

- Be an attractive employer to new entrants in the labor market (generation Y) and preserve current employees;
- A new work basis demanding a change in behavior for employees and managers based on more autonomy for employees;
- Obliging strategic goals by keeping public services central and care for affordable services to customers. Customer satisfaction needs to increase while lowering corporate costs.

Human resources started the NWOW project in an attempt to attract new talented employees for Enexis; mainly caused by the fact that 700 employees will retire within 5 years and new talent is needed. By the beginning of 2011 four pilot groups have been assigned to start with NWOW. The four pilot groups were based on employees with different functions (e.g. operational and administrative), people who were enthusiastic in advance and obliging employees whose office was going to be moved. The pilot groups have filled in a questionnaire in order to draw a baseline for the measurements of the project. After a pilot period of 7 months another questionnaire has been filled in to evaluate the results of the pilot project. The results showed a positive contribution to the overall employee satisfaction after the implementation of the NWOW concept.

Trainings and workshops have been given to managers and employees using 7 modules whereof 3 were mandatory, being: “korte vragen, snelle antwoorden”, “ik en mijn werkplek” and “werk en privé balans.” These trainings and workshops were led by human resources and the external consultancy company Work21. Enexis used the trainer-to-trainer principle to pass the knowledge from the trained managers to their team members. Next, managers received a letter with approximately 20 statements like “I am awake after a party and didn’t drink alcohol; I may work a few hours until I am tired.” These statements will be discussed on team-level to get every member of the team at the same NWOW-level agreeing with the norms of the team.

Technical changes that have been applied during the pilot project are the extension of the IT infrastructure by adding WIFI appliances on diverse locations. Together with the start of the pilot project the IT department has opted (outside

the scope of the NWOW project) to renew the whole IT infrastructure to be prepared for new technology and heavier bandwidth use.

Furthermore, pilot users received the so called "PSO" (default personal equipment) kit. This PSO kit included a laptop, bag, laptop stand, mouse, keyboard, headset, webcam and cat 5 cable. No real software changes are made during the pilot because Enexis already was implementing Microsoft Windows 7 together with Microsoft Lync in another project. Enexis uses Microsoft Sharepoint and MOVI to initiate videoconferencing. Employees in the pilot groups have actually been trained to use Microsoft's Lync and Sharepoint and probably are using it more effective than employees outside the pilot.

Physical changes have been made by giving employees the flexibility to work from their homes. In module "ik en mijn werkplek" employees learned what factors matter when choosing a workplace. Enexis is starting with the design of a new office building which embraces many facets of NWOW such as activity-based rooms, for now many traditional "cell offices" are used flexible. New buildings are also more often located near stations to motivate employees to travel by public transport. Also desk cleaning days are organized in order to use the offices more flexible again; this is also an announcement for many employees that changes are coming in the traditional way of working.

Enexis uses MS Sharepoint, Team Sites and asked employees to update their profiles so they can be found by expertise and skills. Knowledge sharing is done using software like MS Sharepoint, wikis and intranet. Formal meetings are mostly arranged in a physical setting, with a growing number of virtual attendants. When new things happen which are important for the whole organization, theme gatherings are arranged. The coffee corners still act as a place for the sharing of informal knowledge.

5.5.1 Interview part 1 - NWOW status quo

The NWOW pilot project at Enexis was in its final phase when the interviews were executed. An NWOW implementation project for other departments was already started. All participants of Enexis think NWOW is a positive improvement of the way people do their work. Some mention: "meeting colleagues can be done more virtually, but it stays important to see colleagues physically and look each other in the eyes. A well balanced approach on this is very important." In addition one participant said "A time ago, people perceived it as annoying when I was sending a mail on Sunday, but now it is normal when you work different times than others."

The changes for the NWOW employees are found positive, mentioning "the possibility to be flexible and combine work and private time is very nice for me, now I can spend more time with my children during the day and work when they sleep" and "In the beginning you had to get used to the fact that there is no static office workplace anymore, and you choose your location based on the activities and demands you have that day." Some NWOW participants were already used to work result driven. "As a manager in my previous position, I was used to work

based on the result that needed to be achieved and not only running the 40 hours, so in that case I already used NWOW."

Organizational changes

In order to instruct NWOW within Enexis, seven modules have been developed whereof three modules are compulsory to follow by all participating team managers. It is the aim of the program that the managers pass on the learning modules to their team. A reaction about the instructions was: "very helpful to see how body attitude, setting of chairs and desk are important for your health. It was also stressed that all facilities are in attendance at the office but you need to pay extra attention to them when working somewhere else, for example at home."

At Enexis, the following formal opportunities to share knowledge were mentioned by a not NWOW participant: a monthly team meeting, a monthly department meeting, a bimonthly engineers meeting (dependent on position), unregularly competence meetings and a yearly region gathering. A NWOW participant said "suggestions about how often people should meet are available, but it is the choice of the team manager to actually make 'hard' rules for this." It is interesting to see the difference in answers of both groups.

An increase use of Lync is recognized by the NWOW group, one said: "Sometimes meetings are arranged between different office locations using Lync. An agreement that we have made with the team members was about the presenter status, when you are in available status, an answer is expected." Again, Lync has been mentioned as a tool for short answers and ad hoc meetings. More short meetings are existing because of the ease of inviting people to a group chat or video conference. Also Sharepoint became more important for working with central documents. A rule one of the managers made was: "when a document is not on Sharepoint, the document doesn't exists." Also the character of knowledge sharing has been discussed by one of the participants "when I was young, knowledge followed a top-down way through the organization; nowadays it are the engineers who have the knowledge. For this reason, central knowledge storing is very important these days."

Collaboration facilities

In answering the question which technology / software is in place to collaborate with colleagues, the following software was mentioned by traditional workers: Lync (for chat, call, videoconference, remote desktop), Outlook (for mail, agenda), Sharepoint (document storing), Intranet (for news), Digital project directory (project archive tool).

NWOW employees mentioned the same tools as above but added: intranet (for news, blogs, personal profile), wikis (for process knowledge), Yammer (social platform) and Projectplace (project collaboration tool). One of the comments on Yammer was: "We have Yammer in place and it was used by many people until the upgrade of Sharepoint, which is now much more social and took over much of Yammer's functionality."

It is clear that working time and location independent makes employees more dependent on ICT and the infrastructure. One participant said: "Unfortunately, the videoconferencing tool in Lync is not often used from the home because problems occur due to bad or narrow bandwidth connections to the homes of people." Another hurdle recognized by one of the participants was, "often a one-on-one videoconference works, but when doing a videoconference with a group is much harder, especially when people react impulsively and take answering space of others. So, this way of working demands discipline of people."

The participants prefer to share knowledge face-to-face (coffee corner is mentioned again); this stays very important. Lync however is mentioned often, but more as an informal tool. E-mail and intranet are mentioned of course, and furthermore Projectplace is mentioned and Digital project directory is mentioned as well.

When asking employees how they think the redesign of the office to activity-based rooms has influenced knowledge sharing they answered all positive. One of the participants said "I think the room is quite determinative for the result you want to achieve. Based on the activity you want to execute, the room should facilitate this. A brainstorm room should have crutches so people have to sit straight and participate actively for example."

Knowledge retrieval

When asking the participants whether they can find colleagues easily, based on their skills and expertise most answered "yes" referring to their personal network of colleagues, or the network of a colleague, or searching for profiles on the intranet. But it is mentioned that "still many people haven't filled in their profile page, so I would not use it." Another participant said "a lot can be found using the structure of Sharepoint and using the contact person of a department you expect to find your answer."

Knowledge sharing culture

The knowledge sharing culture at Enexis is an open and helping one and has been called "a kind of family" by one of the participants. Still many employees stress the fact that too many knowledge silos are in place and still too many people think that knowledge is power. When asking why employees still think this way one participant mentioned "it is a different generation and partly the function you have, some managers keep knowledge to preserve their positions in the organization." Furthermore, it is allowed to make mistakes and learn from them.

Since NWOW had its introduction the culture changes, employees mention "employees are getting a more general picture of the whole organization. Of course every merger is a step into a changing culture" and "It is becoming more flexible and transparent."

5.5.2 Interview part 2 - Channel choice

Table 8 below shows how NWOW participants at Enexis share their knowledge in the diverse knowledge sharing scenarios as explained in section 3.2.7 Theory

on scenario development. The table is based on 12 knowledge sharing scenarios showing the opportunity to share the knowledge and channel type versus the reasons employees mention to choose for this particular channel. The highlighted cells will be elaborated below.

Enexis - NWOW (N=3)		Opportunity to share - channel										
Mentioned reasons		Formal - Call	Formal - Document sharing system	Formal - Mail	Formal - Message on intranet	Informal - Call	Informal - Chat	Informal - Document sharing system	Informal - Face-to-face physical	Informal - Face-to-face virtual unless	Informal - Mail	Total
assurance that receiver reads or gets message			1	2					1		1	5
best way to forward task	2								1	2	5	
doesn't disturb receiver	1	2									3	
easy to use									1		1	
file building			1								1	
it is fast		1								2	3	
most confidential way								1	1	1	2	
most personal					1		2	2	2	2	5	
possibility to react directly	2			2					2	1	7	
without obligation, initiative for the receiver			1	1	1	1					4	
Total		5	1	5	2	4	1	1	5	6	6	36

Table 10. Contingency table Enexis NWOW

Table 10 reveals that employees choose more informal than formal opportunities to share. The table shows a rather dispersed way of choosing. It is interesting to see that *formal - message on intranet* has been chosen twice to be assured that the message has been read. This is probably because Enexis has a well-read news page, which all employees consequently read. *Informal - face-to-face virtual unless* has been chosen the most often, together with *informal - mail*. However, it is interesting to see that the reasons "most personal" and "possibility to react directly" are chosen for *informal - face-to-face virtual unless*, which indicates that face-to-face meetings also virtually are perceived personal and a way to answer directly.

Enexis - Not NWOW (N=3)		Opportunity to share - channel						
Mentioned reasons		Formal - Call	Formal - Face-to-face physical	Formal - Mail	Informal - Call	Informal - Face-to-face physical	Informal - Mail	Total
assurance that receiver reads or gets message				1				1
best way to forward task			3		1	1	5	
doesn't disturb receiver						1	1	
file building			1					1
it is fast	1				1			2
most confidential way		1						1
most personal	1	2			6			9
possibility to react directly	1	3			7		11	
smallest chance of misinterpretation					1			1
without obligation, initiative for the receiver			3			1		4
Total		3	6	7	1	16	3	36

Table 11. Contingency table Enexis Not NWOW

It can be recognized in Table 11 that the "possibility to react directly" is very important, as it has been chosen 10 times as the main reason for the choice of *face-to-face physical* (whether formal or informal). It is also still important as a personal way to share knowledge. *Mail* is a very popular choice to share knowledge without obligation for the receiver and leave the initiative of further interaction at the side of the receiver.

Chapter 6 - Findings & data analysis

This chapter elaborates on the propositions that are derived during this research and deals with the cross-case results based on the three case studies of the previous chapter.

6.1 Derived propositions

During the literature review and the expert interviews, several propositions have been constructed. This section aims to find evidence for the proposed proposition in other sources than the one it initially arose in. The table below shows a recapitulation of all proposed propositions.

#	Proposition	Derived from	Used for SRQ	Result
1	NWOW relies the heaviest on time and place independent working, more empowerment (autonomy & steering on output), preparation for generation Y (in terms of technology)	Literature	A	undecided
2	The higher the mobility of the knowledge worker, the more this person will share knowledge through virtual communication channels.	Literature	B & C	undecided
3	Employees using NWOW make an increased use of web 2.0 tools (containing social elements) to collaborate with each other.	Literature	B & C	accepted
4	Employees using NWOW meet less physically and more virtually when sharing knowledge.	Expert interviews	B & C	accepted
5	Employees using NWOW use more informal opportunities to share knowledge.	Expert interviews	B	undecided

Table 12. Overview propositions

Proposition 1: *NWOW relies the heaviest on time and place independent working, more empowerment (autonomy & steering on output), preparation for generation Y (in terms of technology).* This proposition has been corroborated in the expert interviews by both NWOW and Knowledge sharing experts. Furthermore, many case study participants consider NWOW as working from the home or teleworking. However, it is difficult to verify this proposition based on the previous mentioned chain of evidence and will therefore be considered as undecided for this thesis research.

Proposition 2: *The higher the mobility of the knowledge worker, the more this person will share knowledge through virtual communication channels.* This proposition derived in the knowledge sharing literature and has been verified by the expert interviews, stating: "social media are becoming more important when there is less physical contact between employees." Further evidence to support

this proposition were the scenarios asked during the case study research, resulting in the following graph in Figure 14 below.

We can see a decreasing trend in *face-to-face physical* when the mobility of the participants gets higher. *Calling* (whether by phone or notebook) is increasing when the mobility gets higher, although the *anchors* make a little more use of their phones than the *connectors*. Videoconferences (*face-to-face virtual unless*) are dependent on the presence of these techniques in the different case companies, which possibly is the reason for this result. *Mail* shows an increasing trend, it only stagnates at the *navigator* which can be caused by the number of participants in this role. The *document sharing system* and *message on intranet* are only mentioned by some *anchors* who have had trainings within the context of NWOW.

It is important to understand that the graph is based on all 12 scenarios of 18 participants of which only 1 is a *navigator*. These results would be more reliable when having the same amount of knowledge workers for every type. However, the graph can give a useful indication.

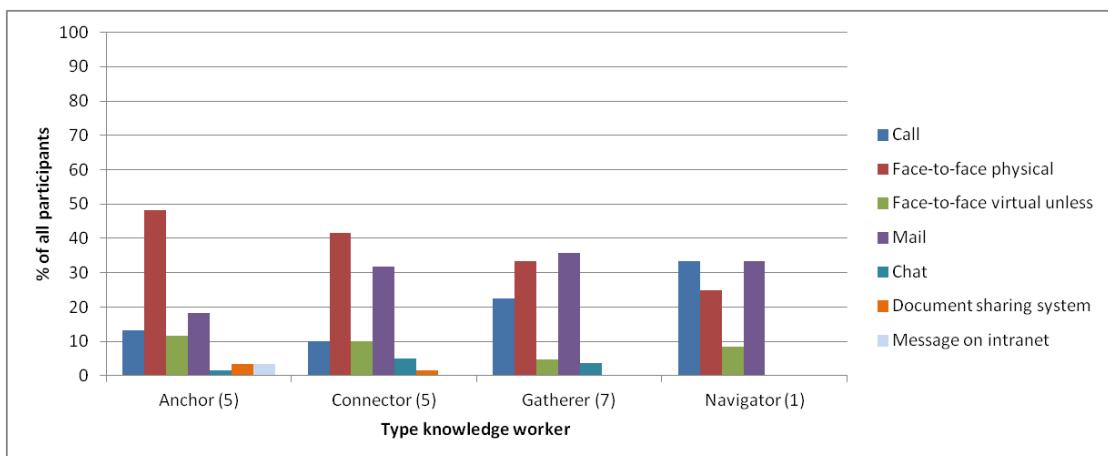


Figure 14. Knowledge worker type vs. channel - All (N=18)

In order to find further evidence for proposition 2, the researcher made use of a rival theory, stating: The higher the mobility of the knowledge worker, the less this person will share knowledge through physical communication channels, which is true when observing the diagram in Figure 14. However, when we divide the diagram by unit of analysis (see Figure 15 and Figure 16) it can be recognized that NWOW participants choose a wider range of channel types.

The diagram in Figure 15 does not support proposition 2 because the *anchors* are choosing more virtual channel types than connectors. A reason for this effect may be caused by the fact that the NWOW *anchors* are employees of DSM and Enexis, which both are organizations in the evaluation phase of the NWOW pilot and are already very familiar with the new behavior and available techniques.

Figure 16 shows evidence supporting proposition 2 by the Not NWOW participants. A decreasing trend for the choice of *face-to-face physical* channel type can be seen, together with an increasing choice for virtual channels (counting all other channel types except *face-to-face physical*).

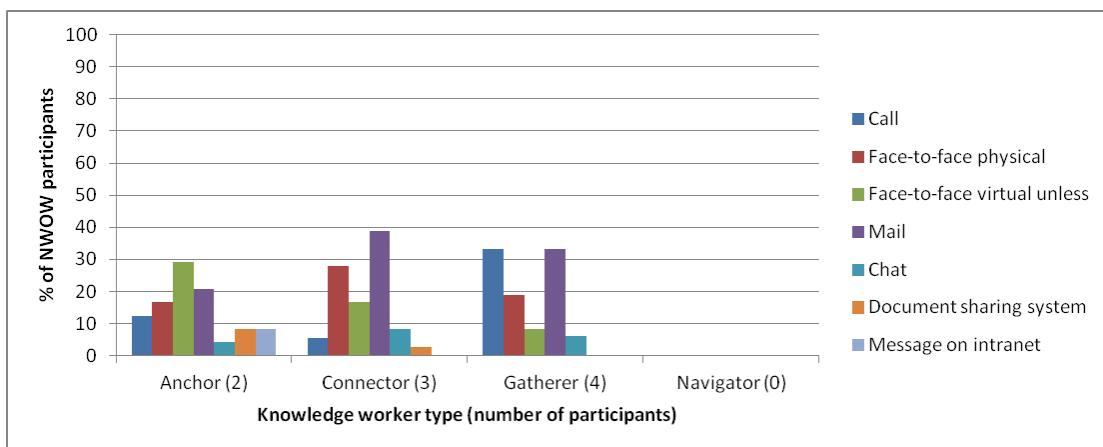


Figure 15. Knowledge worker type vs. channel - NWOW (N=9)

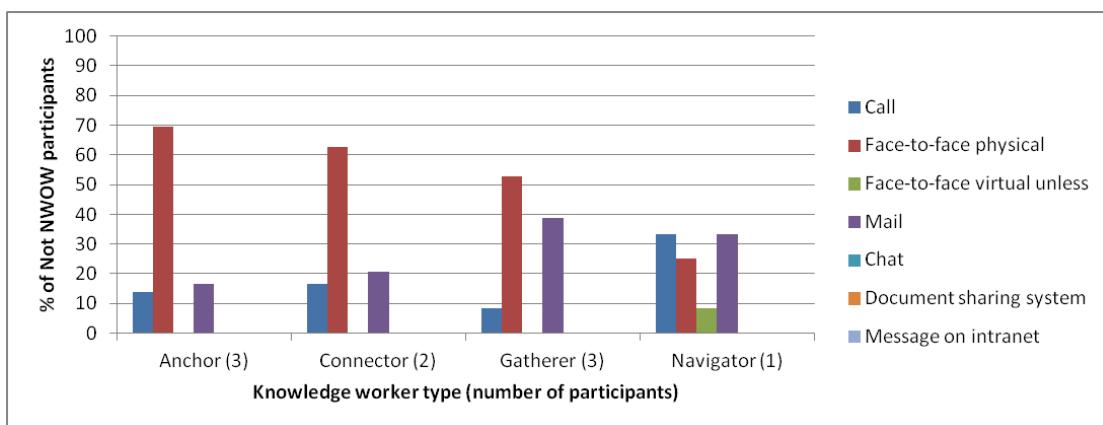


Figure 16. Knowledge worker type vs. channel - Not NWOW (N=9)

This results in a second undecided proposition for this research. Quantitative research on this topic will be needed to draw strong conclusions for this proposition.

Proposition 3: Employees using NWOW make an increased use of web 2.0 tools (containing social elements) to collaborate with each other. This proposition has been derived from the expert interviews. Supporting evidence for this proposition can be found in the second part of the case study interviews. The channel choice scenarios also dealt with sharing knowledge (general and sensitive) in a project group. Only 2 of the 12 scenarios drew a scenario containing a "group" as entity to share knowledge with (and collaborate). Figure 17 below shows what channel type all 18 participants have chosen to share knowledge with a group.

Face-to-face virtual unless, document sharing system and chat can be considered as web 2.0 tools, containing social elements. A clear shift can be noticed between the NWOW group and the Not NWOW group when considering the channel choice.

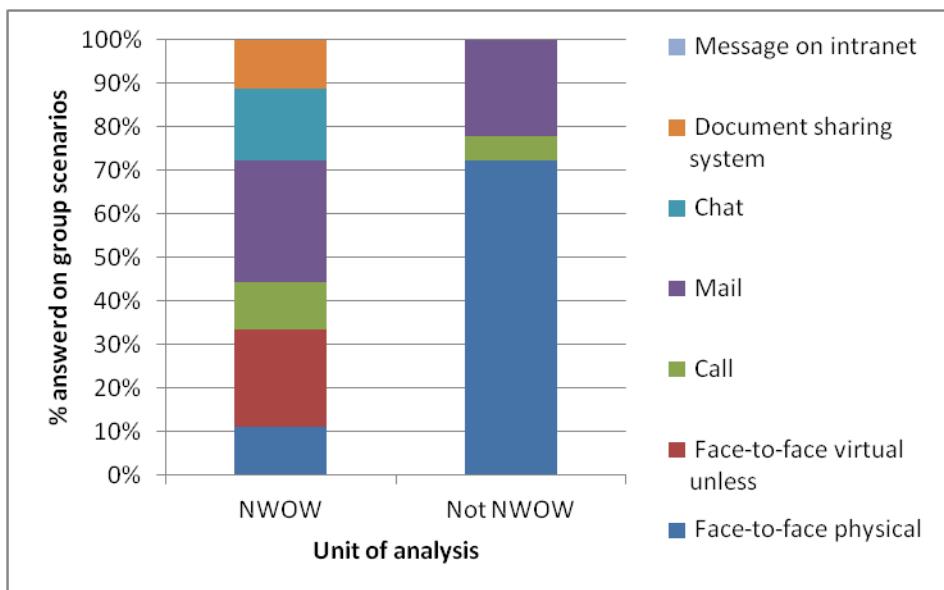


Figure 17. Results on knowledge sharing with group scenario (N=18)

The graph above supports the third proposition; however it is hard to draw conclusions on this by qualitative research. For this research the proposition remains true, but of course it needs to be verified by others.

Proposition 4: *Employees using NWOW meet less physically and more virtually when sharing knowledge.* The proposition has been derived from the expert interviews. In search for supporting evidence for this proposition we can refer to the diagrams in Figure 15 and Figure 16 showing a decrease in *face-to-face physical* channel choice. In addition Figure 17 also shows a decrease in *face-to-face physical* as a channel choice type for the NWOW group. However, the latter was only based on two scenarios.

In an attempt to find more evidence supporting proposition 4, the diagram in Figure 18 has been created. The diagram shows reasons that employees mentioned when choosing *face-to-face physical* (only) and *face-to-face virtual unless*. The reasons mentioned give an indication of why a certain channel type is chosen by the participants. Difference between NWOW and Not NWOW groups can reveal a new behavior towards a certain channel type.

A clear change can be recognized by the reason "most personal", where NWOW participants chose for a virtual way to share knowledge more easily. Many Not NWOW participants had access to videoconference options but chose explicitly for *face-to-face physical* only because it was "most personal" to share knowledge in that scenario.

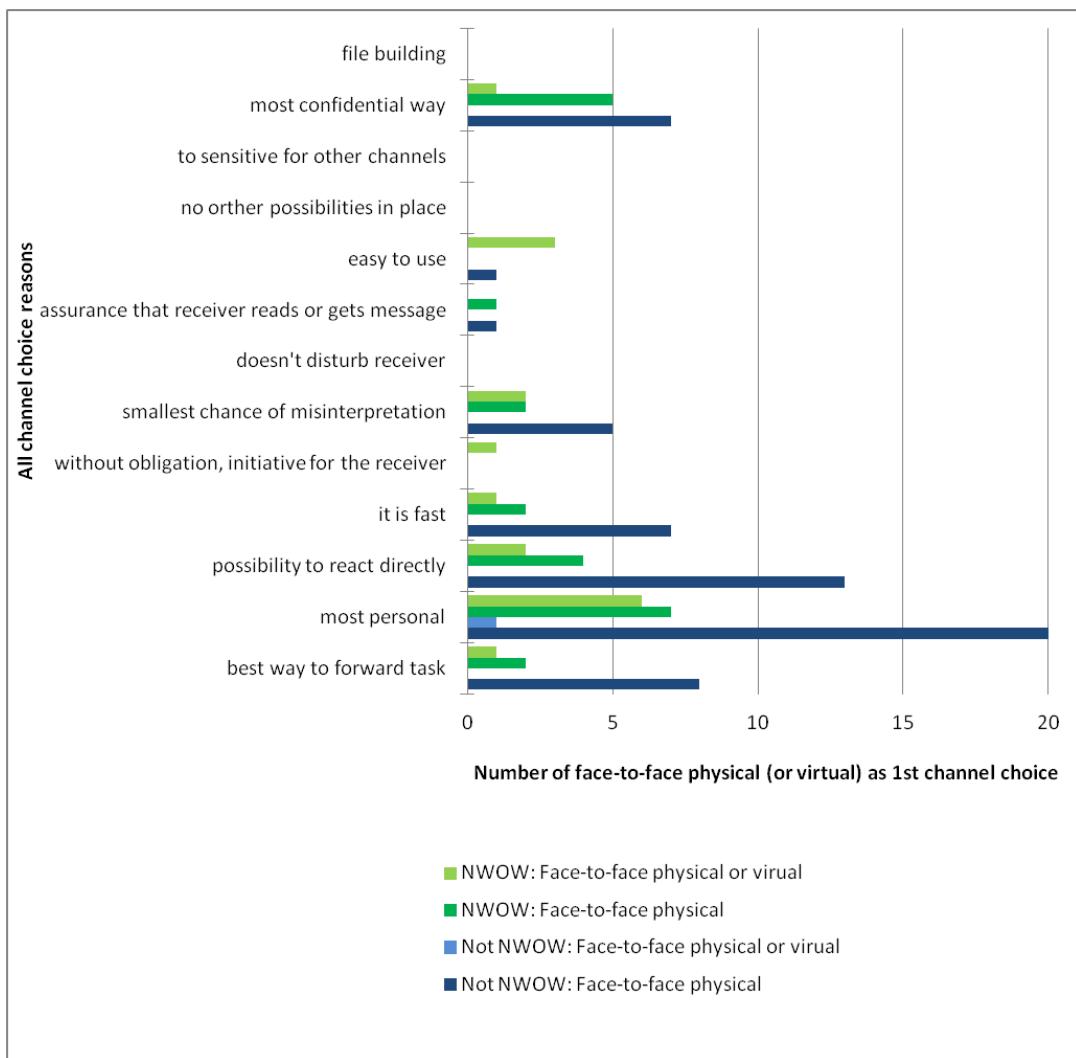


Figure 18. Reasons why employees choose face-to-face (N=18)

The graph above shows us that the *face-to-face physical* has been chosen most often in both groups, with the reason that it is the most personal way. However when looking at the NWOW group, we see that those employees don't solely rely on the physical aspect. Of course, when employees are in the same building they will directly approach one another, however many NWOW are fine by using a video collaboration tool as a personal solution for face-to-face contact.

Another interesting reason is *it is fast*, as this is true as long everyone is in the same location, NWOW doesn't choose physical face-to-face contact anymore because it is the fastest way. This results in the acceptation of proposition 4 in this thesis research.

Proposition 5: *Employees using NWOW use more informal opportunities to share knowledge.* This proposition has been derived from the expert interviews. Evidence supporting this proposition can be found in the case study research. The graph in Figure 19 shows the opportunity to share knowledge divided over both groups, NWOW and not NWOW.

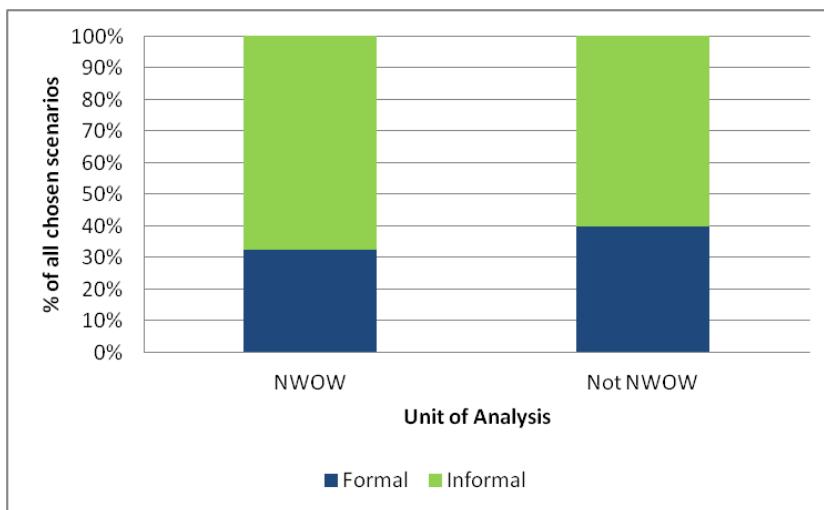


Figure 19. Difference in opportunity to share (N=18)

The graph shows only little difference between both groups. A Pearson Chi-square test has been executed using SPSS 20, showing no significant result ($p = 0.262$ with significance level of 0.05) when all participating case companies were used. However, when we only use the organizations that are in an evaluating phase of the NWOW pilot (DSM and Enexis), we find a significant result of $p = 0.044$ (with significance level of 0.05). This means that Centric, as an NWOW pilot organization in its early implementation phase, can be considered an outlier for this proposition.

In Figure 20 the diagram is detailed per case. This figure shows that in all three cases the NWOW groups have less formal and more informal knowledge sharing. For the Not NWOW of DSM and Enexis knowledge sharing has been done more formal and less informal than in the NWOW groups. Centric is an outlier here because there is less formal and more informal knowledge sharing occurs than in the NWOW group. The reason for this is that in this case company the Not NWOW workers are able to easily and quickly access their manager in an informal way when they need knowledge on a topic, and therefore always use an informal knowledge sharing channel.

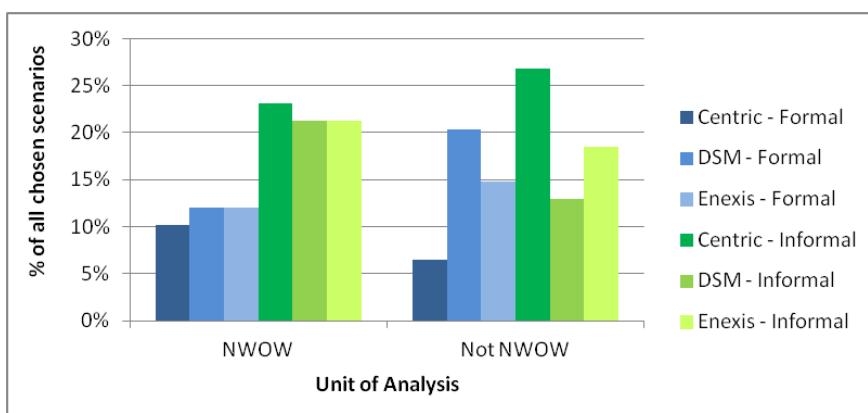


Figure 20. Difference in opportunity to share - allocated over cases (N=18)

For this research proposition 5 remains undecided, although future research may prove this proposition to be true.

6.2 Cross-case results

This section presents the cross-case results among the differences between NWOW and Not NWOW workers, combining the data of the three cases. First, some general findings will be presented. Further, the retrieval of knowledge and sharing of knowledge are subjects of dispute. And at the end of this chapter, the research returns to the influencing knowledge sharing factors that are possibly affected by NWOW.

6.2.1 General findings

At first, it is interesting to see that all 18 case study participants were positive about NWOW as a concept, even the participants outside the pilot groups. The redesign of a static office building structure to flexible desks and activity-based work spaces is perceived beneficial to knowledge sharing between individuals. Small meeting rooms are found convenient to collaborate and cockpits handy to concentrate or collaborate between two individuals.

A shift can be recognized among NWOW participants as they work more virtual; however, they all agree that face-to-face contact stays very important. Within DSM and Enexis there is also a trend recognizable that meetings are arranged more ad hoc and are of shorter duration, which results in more productive and effective meetings according to these NWOW participants. One NWOW participant mentioned: "With the new techniques, people can reach each other more easily by which more effective and shorter meetings arise." This has also its downsides of course, because organizations are more dependent on ICT. One of the participants said "When you want people to work from their homes, tools like live meeting are unavoidable in order to successfully apply NWOW."

NWOW participants also choose more often for an informal way to share their knowledge than traditional workers do. This may directly result in more and richer knowledge sharing. NWOW has positive effects on the knowledge sharing culture of DSM and Enexis. Centric employees did not recognize any changes yet, but this can be the case because the implementation of NWOW at Centric is in an early stage while the others are in an evaluation phase.

6.2.2 Knowledge retrieval

Employees still heavily rely on their personal networks, whether they are in the NWOW group or not. When expertise needs to be found, they first check direct colleagues. When a solution is not given, they will ask a "hub" in their personal network. After this step, they may use an IT system to find someone. Informal connections allow people to benefit from knowledge accumulated by close contacts and associates (Hansen, 1999; McEvily and Zaheer, 1999; Reagans and Zuckerman, 2001; Uzzi and Lancaster, 2003).

6.2.3 Knowledge sharing

To find an answer about the way knowledge is shared in an organization, the following question has been asked to the NWOW participants in the case study interview: "*What facilities or rules in the area of knowledge sharing are changed since the implementation of NWOW? (think about software / meetings / etc.)*". For Not NWOW participants it was formulated as "*What facilities or rules in the area of knowledge sharing are available in your organization? (think about software /*

*meetings / etc.)". Many participants came up with long answers to this question. In addition, another question was asked about collaboration facilities "What software do you use to collaborate with your colleagues? And how is knowledge shared?" Of course it was the role of the researcher to ask more questions and find out what the participants meant with their answers to the questions and how they collaborate with others. All answers to the previously mentioned questions have been gathered and drawn into a table to get an overview of the application portfolio to collaborate and share knowledge of every organization (see Appendix C). Some collaboration facilities like Tandberg-Cisco (videoconferencing device) exist of hardware and software; these facilities were also added to the list. Furthermore, a few applications are named twice in the table; this is because these were used differently by participants (e.g. MS Sharepoint can be used as *document storing and sharing platform* or as *document storing and sharing, communication and social platform*).*

At Centric, 7 different applications to collaborate were mentioned by all 6 participants. The participants of DSM distinguished 15 applications and at Enexis the participants named 10 applications to collaborate with.

In the literature review, the knowledge management strategy of Hansen et al. (1999) has been mentioned. This strategy makes a distinction between codification and personalization of the knowledge management approach of an organization and its assets. This can also be recognized by collaboration software; codification software is more about storing knowledge and personalization software tries to facilitate social interaction. In addition to this theory, the knowledge sharing experts in this research mentioned a new, more social variant, between codification and personalization. Other researchers referring to this new stream of software name web 2.0 tools and speak of it as "a set of economic, social and technology trends that collectively form the basis for the next generation of the internet" (Musser & O'Reilly, 2006; Bebensee, Helms & Spruit, 2011). For this research we will stick to the term "hybrid" which can indicate the difference between the collaboration applications without spending too much effort on discussing whether or not an application is a web 2.0 tool. Figure 21 shows a separation of the mentioned collaboration applications between both units of analysis by the strategy of the applications as assessed by the researcher.

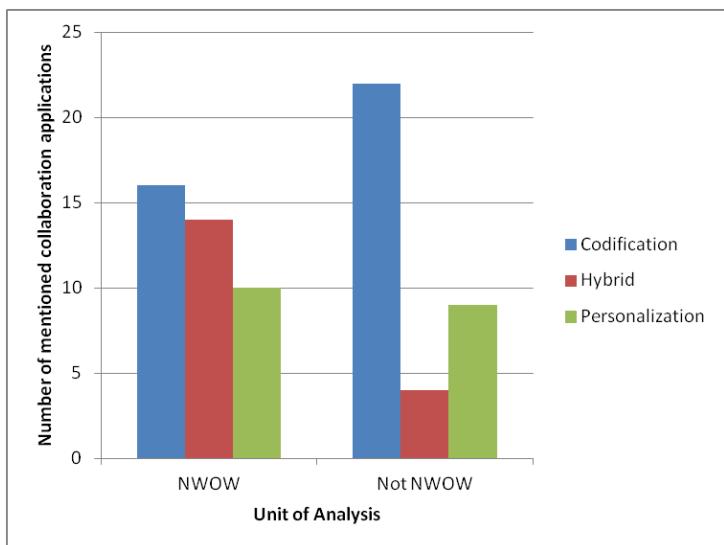


Figure 21. Type of collaboration applications - cross-case

The diagram in Figure 21 shows that NWOW participants mentioned more collaboration applications with a hybrid and personalization strategy. Figure 22 shows the individual cases. It is remarkable that participants of Centric mentioned almost only codification collaboration applications, while participants of DSM and Enexis mentioned more applications of hybrid and personalization strategy.

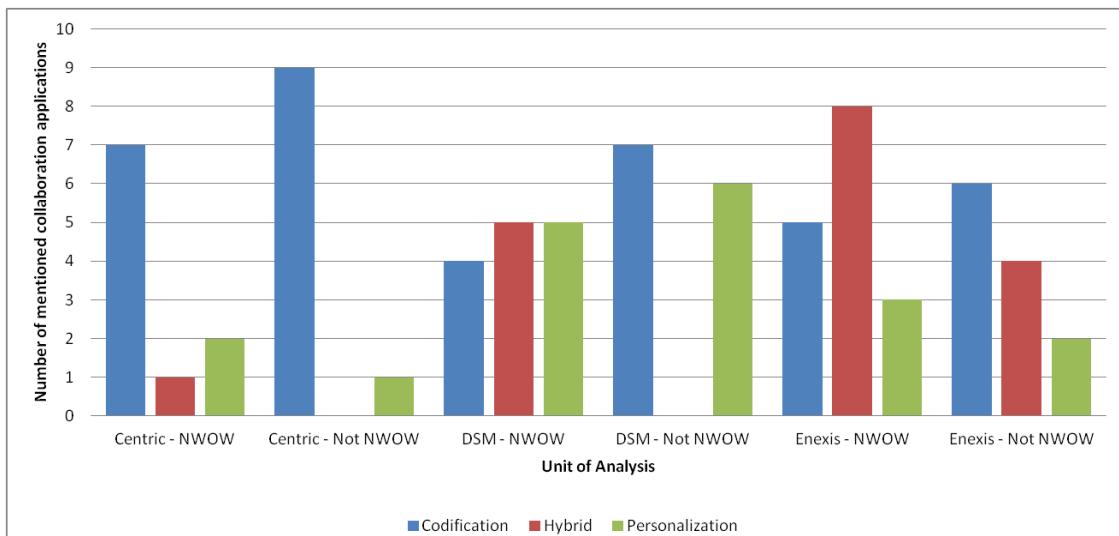


Figure 22. Type of collaboration applications - individual cases

Some patterns that can be recognized in the figure above are that Not NWOW participants mention more codification applications and less hybrid applications, and that NWOW participants make more use of hybrid applications, especially in the case of Enexis where both groups have access to the same set of tools. It would be logically when personalization applications would be used more by the NWOW participants, however hybrid application are possibly substitutes for personalization applications.

The three collaboration applications mentioned most often by all NWOW participants were MS Sharepoint, MS Outlook and MS Lync. The list below will explain more about these collaboration applications:

- *MS Sharepoint*, a document sharing and collaboration platform that has been mentioned for the storing and sharing of documents by all participants, being the codification purpose. However, NWOW participants mainly added that they use it as communication and social tool, which makes it a hybrid application. NWOW participants commented they use it to find colleagues and start chatting, to follow others and some use it to blog. A reason for these different uses may be the better implementation of the tool and training of employees within the pilot. Participants of the NWOW group also mentioned to use the latest version of MS Sharepoint as a substitute for Yammer;
- *MS Outlook*, a personal information manager, being a codification application, has been mentioned by almost all participants for its email and agenda function;
- *MS Lync / OCS*, an instant messaging platform, which is the biggest difference in technical change according many NWOW participants. This personalization application is mentioned as "the glue" for all collaboration with colleagues. Lync is the name of the successor of OCS (Office Communicator Server), integrating functions of Netmeeting like calling and videoconferencing. NWOW participants mentioned the use of the remote desktop function, which seems convenient when explaining things from another location. At DSM the application has been introduced to work seamlessly with mobile devices, receiving chat messages and (video) calls on your mobile and desktop at the same time.

It is remarkable that the three most mentioned applications are made by the same software corporation. Although Microsoft is known for its wide application of business software, competitors like IBM, Google and Oracle do offer quite similar applications. Looking closer to "the main use" of the collaboration applications in the table in Appendix C, we see that *storing & sharing documents*, *email & agenda*, and *chat* were mentioned the most.

6.2.4 Knowledge sharing channel choice

Table 13 has been created to get an overview of all three case companies and how NWOW and Not NWOW groups relate to each other. The grey parts represent a total number of the same chosen channel. Notice that several empty columns were left out to save space. The opportunity to share has been mentioned in the table before the first channel choice. The yellow markers were used to emphasize interesting patterns.

Formal - call has been chosen quite equally by both groups but with different reasons, mostly for the possibility to *react directly* or for its *speed*. Furthermore, it becomes clear that *formal - face-to-face physical* has been chosen much less by NWOW participants than by Not NWOW participants. Most Not NWOW participants indicated *confidentiality*, *most personal* and the *possibility to react directly* as reason. A clear shift by the NWOW participants can be recognized by

the *most personal* reason, where *informal - face-to-face virtual unless* has been chosen many times instead of the physical choice. *Ease of use* and the *possibility to react directly* are mentioned by *face-to-face virtual unless* as important factors. *Informal - face-to-face virtual unless* has become a clear alternative to the *informal - face-to-face physical* choice. Keeping in mind the poor performance of videoconferencing tools at the moment of research, as mentioned by participants of Centric and Enexis, the shift to *face-to-face virtual unless* would be more clear when people could rely on the infrastructure.

The orange squares in Table 13 show the most often mentioned reasons when sharing knowledge, chosen by both groups, starting with most important reason why people choose a certain channel, because it was:

1. Most personal;
2. Best way to forward task;
3. Has the possibility to react directly;
4. Without obligation, initiative for the receiver;
5. It is fast.

Most personal is a logical outcome as most often mentioned reason. Employees were used to work face-to-face and catch-up with each other every time they collaborate and shared knowledge with each other. *Best way to forward task* is chosen often to send a message according to the organizational structure of the company "forwarding" the task and responsibility. The reason *has the possibility to react directly* has been chosen much more often by the Not NWOW group. This may relate to the fact that NWOW participants are used to work time and place independent and do not demand to give a reaction directly in every scenario.

Another interesting reason is *without obligation, and leave the initiative at the receiver*, often in combination with the *mail* channel. In the scenario with internal motivation to share - unfamiliar and external motivation to share - in total 9 participants chose *mail* with this reason. *File building* has been chosen mostly as a reason for NWOW employees to share knowledge by *mail*. And when digging deeper in the scenarios it can be seen that this reason is chosen in sensitive - nature of knowledge scenarios.

The fastest way to communicate according to the NWOW participants is *chat*. According to Not NWOW participants it is *face-to-face physical*, followed by *call*. Again, we see a shift in reasons to choose a certain channel, in line with the theory and available collaboration applications. All case companies have a way to use instant messaging, which becomes convenient when working more flexible.

Notice that section 6.2.3 Knowledge sharing, shows that MS Sharepoint, a *document sharing system* has been chosen most often when asking how participants collaborate with others. However, *Document sharing system* has only mentioned three times as a channel choice. The kind of scenarios created by the researcher can be the reason why this channel had been chosen only few times, as the factor "time" had a role in many scenarios automatically, while *document sharing systems* store documents and doesn't directly need to trigger the receiver.

Table 13. Overview of opportunity to share and channel choice (N=18)

6.2.5 Influencing factors in knowledge sharing

In Section 3.2.7 Theory on scenario development, the knowledge sharing factors according to Ipe (2003) and entity levels of De Long & Fahey (2000) were added to the theory of Snyder & Lee-Partridge (2009). This theory used the knowledge sharing factors *nature of knowledge* (general and sensitive) and *entity level* (organization and group) as it has been referred to in this thesis research.

Table 14 shows the channel choice when sharing knowledge according to the research of Snyder & Lee-Partridge (2009). In their research they asked 76 participants to identify the technologies used to share information about each of the following: general organizational information, sensitive organizational information, general project information, sensitive project information and information about which they are an expert. So, participants could choose multiple channels. However, the research asked to share organizational knowledge without explaining with whom (an individual or whole organization), for this thesis research it has been assumed that the knowledge transmitter needs to share the knowledge with that entity. So, organizational knowledge needs to be shared with the organization as a whole, all colleagues need to receive the knowledge.

Sharing organizational knowledge		
	General information	Sensitive information
Face-to-Face	63	69
Email	74	32
Phone	41	29
Instant Messaging	22	3
Sharing project knowledge		
	General information	Sensitive information
Face-to-Face	65	69
Email	71	40
Phone	50	27
Instant Messaging	20	8
Virtual workspaces	18	6
Videoconferencing	17	3

Table 14. Channel choice when sharing knowledge (Snyder & Lee-Partridge, 2009)

Note that virtual workspaces and videoconferencing were not mentioned in sharing organizational knowledge. It is not clear why these channels weren't chosen to share organizational knowledge. General information for the organization is shared most by *email*, this is the same for project knowledge. However, sensitive information is shared mostly *face-to-face*. A difference in the choice for *email* can be recognized between general and sensitive organizational and project knowledge. The choice for *email* decreased with more than 50% between general and sensitive. A similar pattern has been found in this thesis research among all participants in the two scenarios with the organization entity level. The group entity level did not respond equally. *Email* seems to be a less appropriate means to share organizational knowledge. Another similarity can be found in the choice to share knowledge *face-to-face* most often, when knowledge is sensitive. *Email* is the standard channel to share general organizational and

project knowledge according to Table 14. This corresponds with the organization entity scenarios in this thesis research.

In section 3.2.2 Defining knowledge sharing, the knowledge sharing factors according to Ipe (2003) have been explained. Findings on these knowledge sharing factors have been listed below.

Nature of knowledge

It varies per individual what is meant with general or sensitive knowledge. If a participant did react differently than expected on the type of scenario (recognized by non-verbal expressions), the researcher explained what the scenario had to represent (e.g. you need to share sensitive knowledge with your project team).

Figure 23 is based on 6 scenarios with a general nature of knowledge. Notice that NWOW participants choose a wider range of channels, however *informal* and *formal - face-to-face physical* are clearly replaced for more *face-to-face virtual unless*. Also *chat* and *informal - mail* become more important for NWOW participant.

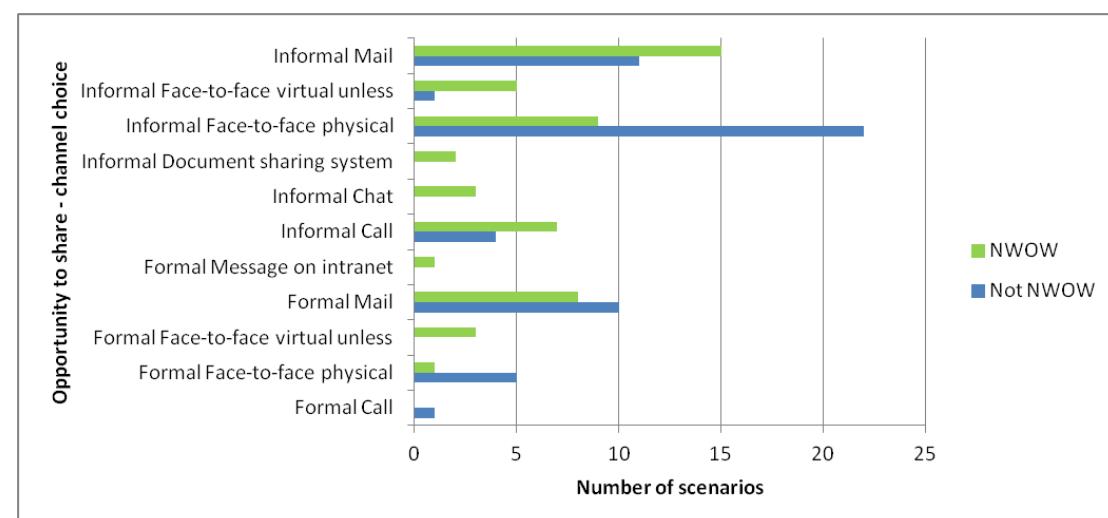


Figure 23. General nature of knowledge scenarios (N=18)

Figure 24 is based on 6 scenarios with a general nature of knowledge. Again, the NWOW participants choose a wider range of channels with a decrease of the *informal* and *formal - face-to-face physical* choice.

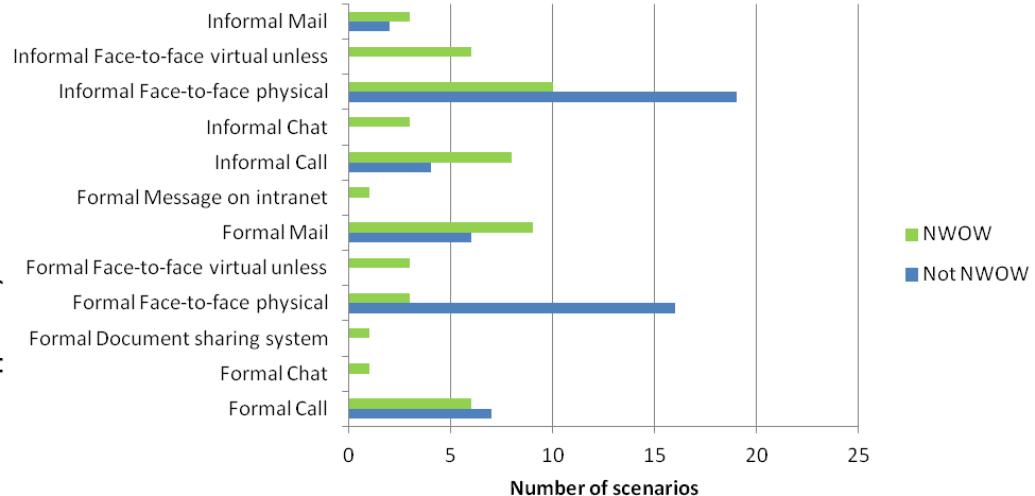


Figure 24. Sensitive nature of knowledge scenarios (N=18)

NWOW is of influence on the nature of knowledge. This has been concluded because both figures Figure 23 and Figure 24 show the same trend of a decreasing *face-to-face physical* knowledge sharing.

Internal - motivations to share

The factor internal motivation to share was used in 8 of the 12 scenarios, where 4 scenarios asked to share knowledge with a familiar person. Figure 25 shows that NWOW participants only shift from *face-to-face physical* to *face-to-face virtual unless*.

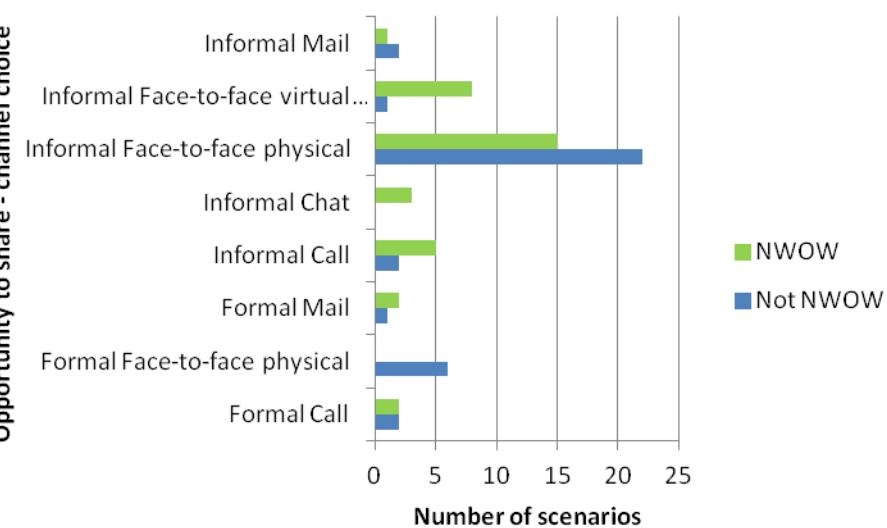


Figure 25. Familiar internal motivation to share (N=18)

Four of the 12 knowledge sharing scenarios in Figure 26 used an unfamiliar person to share knowledge with, someone you don't know. Little difference can be found in the opportunity to share, which is more *informal*.

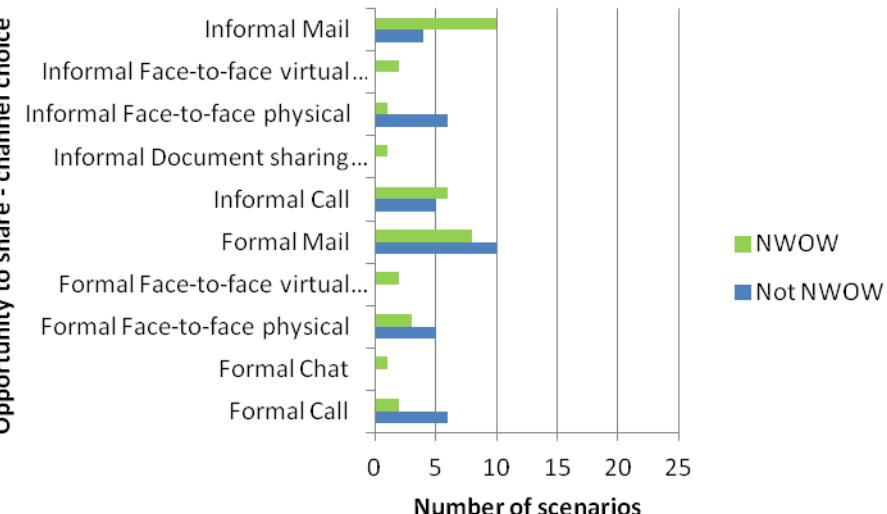


Figure 26. Unfamiliar internal motivation to share (N=18)

The question whether NWOW influences internal motivation to share knowledge, has been answered with "no". Only a small difference can be found in this factor which may be coincidence.

External - motivations to share

The factor external motivation to share was used in 8 of the 12 scenarios, where 4 scenarios contained sharing knowledge with a colleague equal to the participant in the organizational structure. Figure 27 shows some small differences between both groups, *face-to-face physical* decreased where *face-to-face virtual unless* increased a little. NWOW participants choose more different *informal* channels to share knowledge.

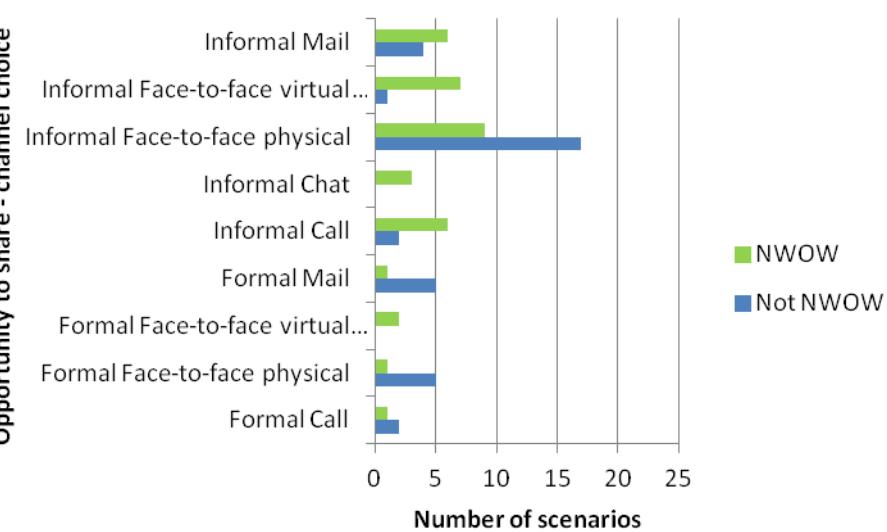


Figure 27. Equal external motivation to share (N=18)

Four of the 12 knowledge sharing scenarios in Figure 28 used a superior person to share knowledge with. Again, little differences can be recognized in the wider use of tools.

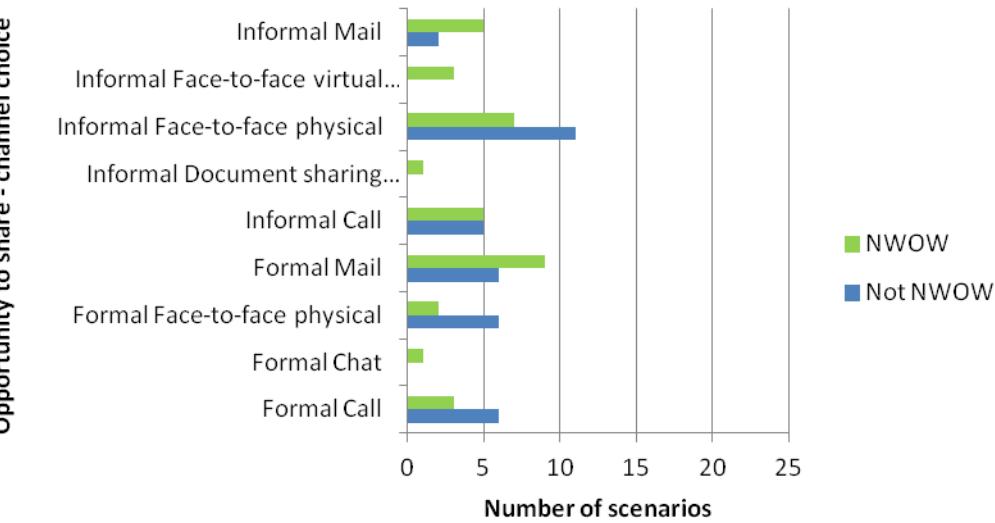


Figure 28. Superior external motivation to share (N=18)

The question whether NWOW influences external motivation to share knowledge, has been answered with "no". The differences are too small to draw real conclusions upon.

Entity level

The last factor that has been changed was the entity factor. Two of the 12 scenarios asked to share knowledge with the whole organization. Figure 29 shows the use of new channels like *message on intranet* to share knowledge. *Informal face-to-face physical* represents the participants that first talk to colleagues around to share the knowledge.

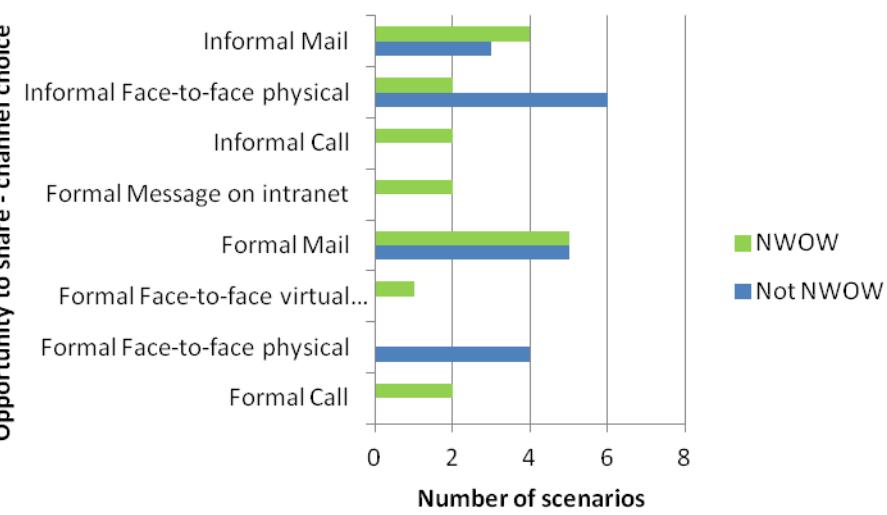


Figure 29. Organization entity level (N=18)

Figure 30 shows a clear difference between NWOW and Not NWOW, in the choices for more different channels than the reliance on *face-to-face physical*. *Document sharing systems* are used for these two group scenarios.

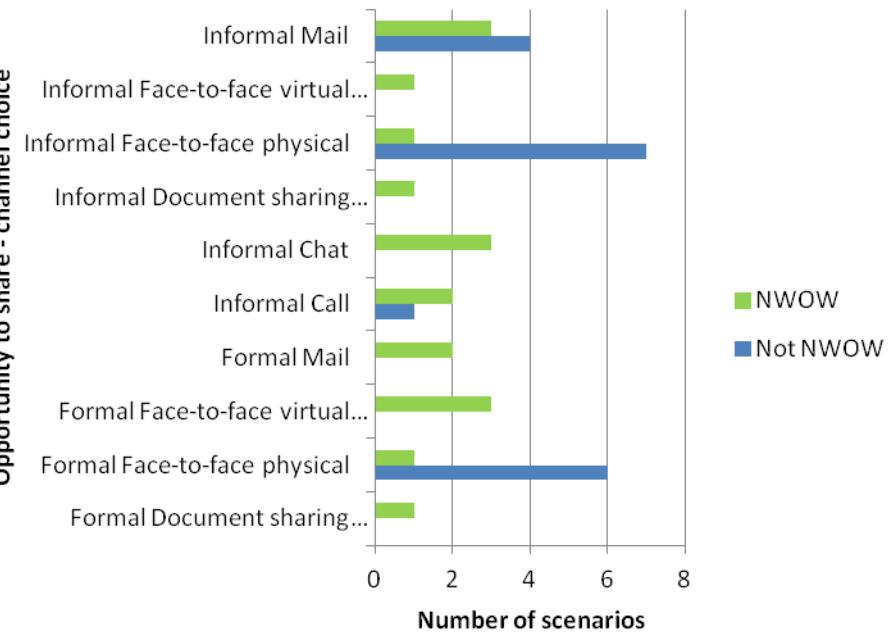


Figure 30. Group entity level (N=18)

Figure 31 shows only individual scenarios, being eight of the 12 scenarios. The shift of *face-to-face physical* to *face-to-face virtual unless* can be recognized again. NWOW participants use more informal ways to share knowledge; *mail* and *chat* are example of this.

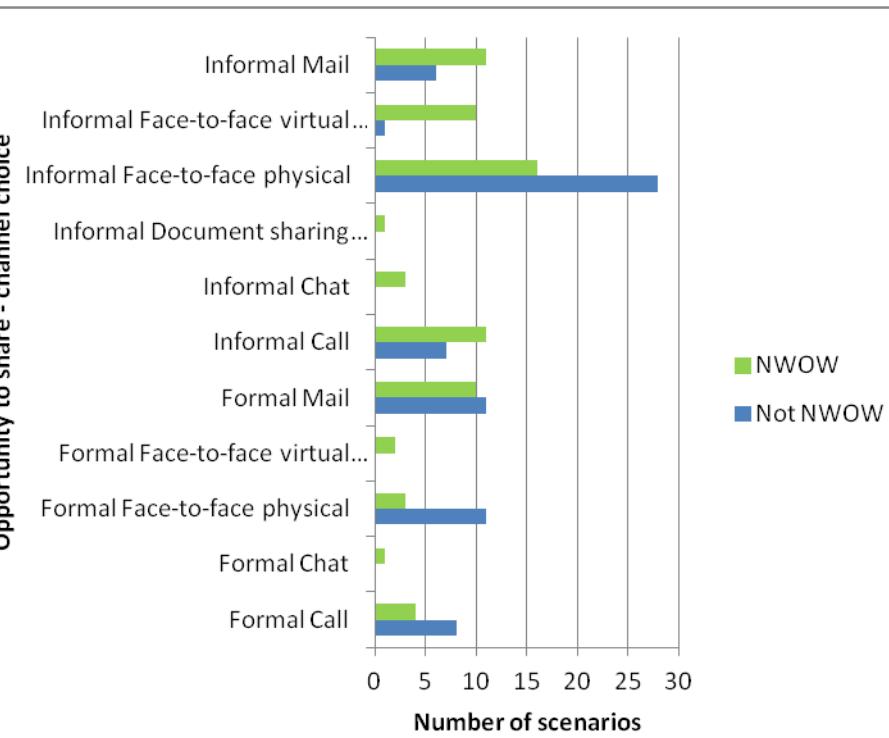


Figure 31. Individual entity level (N=18)

For the question whether NWOW influences knowledge sharing, support for the entity group level has been found. On organizational and individual level, smaller differences were found.

Opportunity to share

Note that the opportunity to share has been used several times above to indicate whether participants use an informal way or formal way to share their knowledge. Section 3.2.8 Channel choice, described the differences and Figure 19 showed the differences in opportunity to share among both units of analysis. When we combine this with the knowledge worker types of Greene & Myerson (2011) the following diagram exists, see Figure 32.

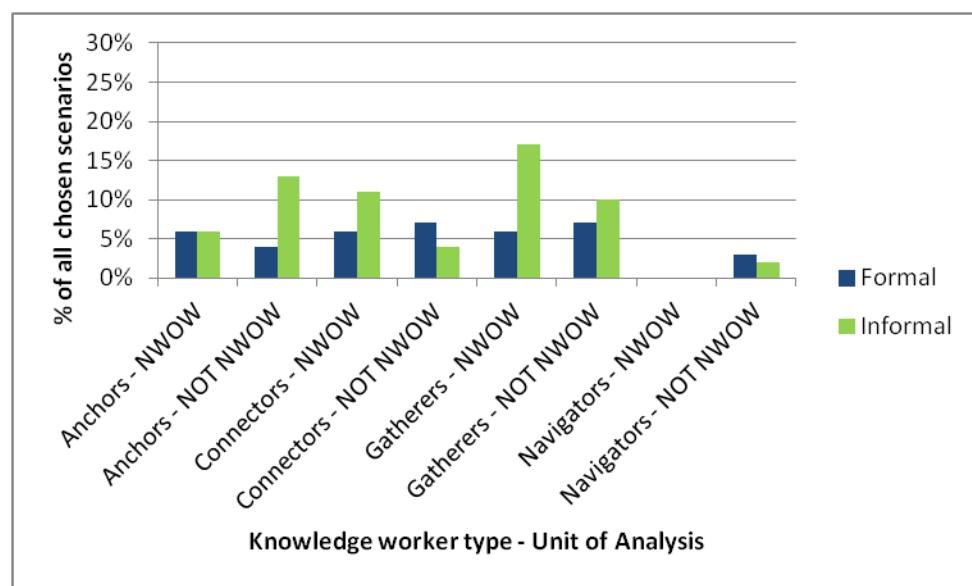


Figure 32. Opportunity to share divided by knowledge worker type (N=18)

The diagram shows that NWOW *connectors* and *gatherers* share knowledge more in an informal way. However, the *anchors* show an opposite result. Not NWOW *anchors* share knowledge more informally. A reason for this effect can be found in the fact that *anchors*, whether NWOW or Not NWOW, have the possibility to share knowledge with colleagues or a manager around, as they are in the same office sitting nearby each other.

Chapter 7 - Conclusions & discussion

The aim of this thesis research was to understand "*What is the influence of the 'new way of working' concept on knowledge sharing in Dutch knowledge intensive organizations and how can this be best supported by ICT?*" as very much attention is given to NWOW in the Dutch business landscape these days. This thesis research shows many positive effects of NWOW regarding knowledge sharing.

NWOW is perceived positive by all participants in this research; all participants understand the logical step and benefits that NWOW can provide when implemented well. Activity-based offices are also positively judged, providing better situational work environments.

This thesis research found that NWOW participants share knowledge more virtually than Not NWOW participants. The knowledge sharing factor "nature of knowledge" showed a decrease in the demand to share sensitive knowledge face-to-face physical only. Furthermore, NWOW influences the sharing of knowledge with a group of people as a wide range of communication channels has been chosen. More informal opportunities to share can be recognized among the NWOW participants. Meetings between NWOW employees become shorter and more effective as mentioned by few case study participants. They also noticed that the organization of meetings becomes more ad hoc. Furthermore, all participants rely the heaviest on personal networks when searching for knowledge. As for the rest, ICT becomes even more a crucial service in an organization when implementing NWOW.

The remainder of this chapter answers the sub research questions, which together give an answer to the main research question accompanied with the discussion of this research.

7.1 Answering SRQ A

"What is the NWOW concept and how does it compare to older similar concepts?"

After the literature review, an easy to understand, concrete working definition has been formulated, embracing all important aspects of NWOW:

"NWOW is a vision that intends 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."

Based on literature and expert interviews this research came up with the following proposition:

- *P1: NWOW relies the heaviest on time and place independent working, more empowerment (autonomy & steering on output) for employees and the preparation for generation Y in terms of technology.*

Time and place independent working can be seen as teleworking. Although in the past teleworking often referred to "working from the home", NWOW is slightly different as third party locations are mentioned more often. Self-steering teams and the steering on results are also well-known concepts in business for 30 years now (Baane et al., 2010). However, the preparing for generation Y sounds new, but the implementation of new technology in organizations is a continuing process. This proposition is invigorated by the NWOW and knowledge sharing experts, when the following underlying concepts of NWOW were mentioned: *teleworking*, activity related working, *results driven management*, performance management, coached leadership and integral management and *employee 2.0* (equal to generation Y).

7.2 Answering SRQ B

"What are the changes in knowledge sharing when the NWOW concept is introduced?"

We can recognize a shift in the use of tools. More face-to-face contact can be done virtual instead of physical, while still perceiving it personal. Mail remains important as a communication channel, pursued by the use of chat.

The use of scenarios, based on Snyder & Lee-Partridge (2009) expanded with knowledge sharing factors of Ipe (2003) revealed a thorough view in how people choose their communication channel and why. Table 13 provides a clear overview, which supports evidence in answering this research question.

A knowledge sharing factor that is influenced by NWOW is "nature of knowledge", which showed a decrease in the demand to share sensitive knowledge face-to-face physical only. The "entity level" with whom participants share knowledge also shows an influence of NWOW on the sharing of knowledge. When sharing knowledge with a group of people a wider range of communication channels has been chosen, that are more hybrid. "Motivation to share" seems not to be influenced by NWOW. The "Opportunity to share" did show significant results among the NWOW pilots that were in a later phase of implementation, by choosing more informal ways to share knowledge.

Furthermore, propositions were used in this research to answer this sub research question. When statements or comments were made about NWOW concerning knowledge sharing, a proposition had been made to collect more evidence for it in this research. The propositions that have been brought up in this research are:

- *P2: The higher the mobility of the knowledge worker, the more this person will share knowledge through virtual communication channels;*
- *P3: Employees using NWOW make an increased use of web 2.0 tools (containing social elements) to collaborate with each other;*
- *P4: Employees using NWOW meet less physically and more virtually when sharing knowledge;*
- *P5: Employees using NWOW use more informal opportunities to share knowledge.*

A new, third generation, in knowledge sharing has been recognized by the knowledge sharing experts. This shift in knowledge sharing embraces several similarities with elements motioned in NWOW. More knowledge sharing activities take place virtually and outside the organization. Furthermore it becomes more bottom-up in character.

7.3 Answering SRQ C

"How can knowledge sharing be supported by ICT?"

Collaboration applications were used mainly for storing & sharing documents, email & agenda functions, and to chat with colleagues. A wide variety of applications was available at the case companies; see Appendix C. The three most often mentioned collaboration applications by the NWOW participants were MS Sharepoint, MS Outlook and MS Lync. Last mentioned is a personalization application and can be seen as "the glue" for all collaboration with colleagues according to the participants. It is remarkable that the three most mentioned applications are made by the same software corporation. Although Microsoft is known for its wide application of business software, competitors like IBM, Google and Oracle do offer quite similar applications.

Not NWOW participants rely more heavily on codification applications, while NWOW participants make more use of hybrid applications. During the expert interviews one expert argued "many things for codification are already in place, but tools need to be more intuitive, so employees should not see it as a separate job to share knowledge, it has to be more implemented in their daily work."

ICT becomes even more a crucial service in an organization when more people are going to work time and location independent, relying heavier on codified knowledge and personalization software to "stay in touch" with colleagues, facilitated by ICT systems. Maximum up-times for these systems become more important than ever.

The answer to this sub research question can be supported with evidence using the following propositions:

- *P2: The higher the mobility of the knowledge worker, the more this person will share knowledge through virtual communication channels;*

ICT supports and facilitates the availability of all organizational information and knowledge. By providing the appropriate IT means for the knowledge workers considering the type of knowledge worker and the need for mobile gears to function best in a certain position.

- *P3: Employees using NWOW make an increased use of web 2.0 tools (containing social elements) to collaborate with each other;*

As the latter proposition has been accepted for this research, ICT has to facilitate the access to these web 2.0 tools. A well-designed IT infrastructure is the enabler to provide access to many web 2.0 tools. Personal hardware (e.g. smartphones

and laptops) can often be upgraded or updated for web 2.0 tools. In many cases, newer hardware and software will operate better with web 2.0 tools, as they are often designed to adopt these relatively new trends. The knowledge sharing character is moving from top-down to bottom-up, meaning that less structure will be retrieved in the sharing of knowledge. This will become a challenge for mostly ICT developers; they have to come up with new ways to make the bulk of social knowledge searchable.

- *P4: Employees using NWOW meet less physically and more virtually when sharing knowledge;*

Again, this proposition, as found to be true in this research, indicates that the ICT infrastructure of the organization remains very important as an enabler of a stable virtual face-to-face meeting. However, another challenge is to provide a stable infrastructure to the working environment outside the office.

7.4 Discussion

This research contained some limitations with regards to the available time to execute a solid research. In order to execute a thorough research in this period of time, at least 3 participating case companies had to be found. Ten invitation conversations to participate in this research took place, without any result; "Employees are overwhelmed with questions of researchers these days" has been said. In order to stay on track with regards to time, concessions have been made in the choice for the case companies. This research would be more solid when the companies had more similarities with each other (e.g. operated in the same sector or using the same organizational structure); this would give a more specific focus to the research. However, due to the scarce availability of organizations in transformation to NWOW, this research has been elaborated on three different industries. In this way the research also has a benefit: being a realistic reflection of the Dutch business landscape where many NWOW initiatives are undertaken, in a variety of sectors. Another point of discussion can be the selection of the participants. The case company contacts selected the participants for this research. This should have been done according to a random selection in both groups (NWOW and Not NWOW). Another similarity was the phase of the pilot, DSM and Enexis were in an evaluation phase while Centric was in a beginning phase, which influenced the case study results as proposition 5 can consent.

An overwhelming number of scientific articles about knowledge management and knowledge sharing are published between 1995 and 2010. To overcome this hurdle a poisoning paper (Klein, 2008) has been used in order to prioritize the research literature. The judgment about the richness of literature in this research was dependent on interpretation of author.

Furthermore, there are many knowledge working positions. This research treated strategic and operational functions as equals. However, both function groups should be distinguished in order to make better propositions for whom a certain statement counts. To bring more structure into the participants'

knowledge, working types have been determined by the researcher; this of course should be explained and asked the participant himself.

Next, during the second part of the CSR interviews, twelve scenarios have been proposed in order to get a channel choice with a reason why a certain channel was chosen. However, many employees named the factor time as the critical factor their choice was dependent on. This can be overcome by a better think-through of the scenarios. During this research, the researcher has orally explained what he wanted to know and for all scenarios chosen that time matters when this was unclear.

Moreover, research assumed that NWOW employees knew how to use chat, virtual workspaces and videoconference tools. However many NWOW employees did not (or never) really worked with these tools or the possibilities. This way it is hard to get a clear view of employees who are using communication tools to their full potential.

7.5 Future research

The propositions that have been developed in this research need to be validated by other researches, using other research methods. In order to generalize the results of this research to a larger group or population, all NWOW employees, for example, quantitative research needs to be executed. Next, future research on the third generation of knowledge sharing, focusing on knowledge sharing only (i.e. without the implications of NWOW), should be a great addition in the field of knowledge management.

The knowledge sharing character is moving from top-down to bottom-up, meaning that less structure will be retrieved in the sharing of knowledge. It will become a challenge for ICT developers to come up with new ways to make the bulk of social knowledge searchable. Research from the technical informatics domain, as well as the social behavioral domain, could elaborate on how it can be realized technically and how it should be treated: how can someone share knowledge more intuitively?

Chapter 8 - References

- Aalst, W. van der, Hofstede, A. ter, & Weske, M. (2003). Business process management: A survey. In W.M.P. van der Aalst, A.H.M. ter Hofstede, M. Weske (Eds.), *International Conference on Business Process Management (BPM 2003)*, vol. 2678 of Lecture Notes in Computer Science, SpringerVerlag, Berlin, 2003, pp. 1–12.
- Ashford, S. J., George, E., & Blatt, R. (2007). Old assumption, New Work: The opportunities and challenges of research on nonstandard employment. In A. P. Brief & J. P. Walsh (Eds.), *Academy of Management Annals*, (pp. 37–41).
- Argote, L., McEvily, B., & Reagans, R. (2003). Managing Knowledge in Organizations: An Integrative Framework and Review of Emerging Themes. *Management Science*, 49(4), 571–582. doi:10.1287/mnsc.49.4.571.14424
- Baane, R., Houtkamp P., & Knotter, M. (2010). *The new world of work unravelled – Het nieuwe werken ontrafeld – over Bricks, Bytes & Behavior*.1-168. Koninklijke Van Gorcum BV. ISBN 9789023245858.
- Bebensee, T., Helms, R., & Spruit, M. (2011). Exploring Web 2.0 Applications as a Mean of Bolstering up Knowledge Management. *Journal of Knowledge Management*, 9(1), 1–84.
- Bailey, D. E., & Kurland, N. B. (2002). A review of telework research: findings, new directions, and lessons for the study of modern work. *Journal of Organizational Behavior*, 23(4), 383–400.
- Bass, B.M. (1985). *Leadership and performance beyond expectations*. New York: Free Press.
- Bijl, D. (2007). *Het nieuwe werken*, Den Haag: Academic Service.
- Bijl, D. (2009). *Aan de slag met Het Nieuwe Werken*, Zeewolde: Par CC.
- Bijl, D. (2011). *Journey towards the New Way of Working - creating sustainable performance and joy at work*. Zeewolde: Par CC.
- Berg, E. van den, (2010). *Het Nieuwe Werken : Het einde voor of het einde van je privéleven? Afstudeerscriptie E. van den Berg*, Utrecht: Universiteit Utrecht.
- Bontekoning, A. C. (2007). *Generaties in organisaties: Een onderzoek naar generatieverschillen en de effecten daarvan op de ontwikkeling van organisaties*. Ridderkerk: Labyrint Publications.
- Borgatti, S., & Cross, R. (2003). A relational view of information seeking and learning in social networks. *Management science*, 49(4), 432–445.

- Bosua, R., & Scheepers, R. (2007). Towards a model to explain knowledge sharing in complex organizational environments. *Knowledge Management Research & Practice*, 5(2), 93.
- Bowen, D.E. & Lawler, E.E. (1995). Empowering Service Employees. *Sloan Management Review*, 36 (4), 73-84.
- Brown, J. S. & Duguid, P. (2001). Knowledge and organization: A social practice perspective, *Organization Science*, 12(2), 192-213.
- Bødker, S., & Christiansen, E. (2002). *Lost and Found in Flexibility*. University of Aarhus, Center for New Ways of Working.
- Carlson, J. R., & Zmud, R. W. (1999). Channel expansion theory and the experiential nature of media richness perceptions. *Academy of Management*, 42(2), 153–170.
- Cross, R., Parker, A., Prusak, L., & Borgatti, S. P. (2001). Knowing what we know: Supporting knowledge creation and sharing in social networks. *Organizational Dynamics*, 30(2), 100–120.
- Dalkir, K. (2005). *Knowledge management in theory and practice*. Amsterdam; Boston: Elsevier/Butterworth Heinemann.
- Daft, R. L. (2007). *Understanding the theory and design of organizations*. Mason, OH, USA: Thomson South-Western.
- Daft, R. L., & Lengel, R. H. (1984). Information richness: A new approach to managerial behavior and organization design. In L. L. Cummings & B. Staw (Eds.), *Research in organizational behavior* (Vol. 6, pp. 191 – 233). Greenwich, CT: JAI Press.
- Davenport, T. H., & Prusak, L. (1998). *Working Knowledge: How Organizations Manage What They Know*. Boston: Harvard Business School press.
- De Long, D.W., & Fahey, L. (2000). Diagnosing cultural barriers to knowledge management. *The Academy of Management Executive*, 14(4), 113-127.
- Drucker, P. F. (1969). *The Age of Discontinuity: Guidelines to Our Changing Society*, Heinemann, London.
- Drucker, P. F. (1999). "Knowledge worker productivity: the biggest challenge", California Management Review, Vol. 41, Winter, pp. 79-94.
- DSM Company Strategy. (n.d.). Retrieved on August 30, 2012, from http://www.dsm.com/en_US/cworld/public/about/pages/company_strategy.jsp.

- Duff, A. (1996). The literature search: a library-based model for information skills instruction. *Library Review*, 45, 14-18.
- Edmondson, A., & McManus, S. (2007). Methodological fit in management field research. *Academy of management review*, 32(4), 1155–1179.
- European Commission. (2003). The new SME definition: user guide and model declaration. *Journal of the European Union*, 124, p.36.
- Freie Universität Berlin. (2007). Retreived on October 1, 2012, from <http://userwikis.fu-berlin.de/display/energywiki/distribution+system+operator..>
- Gajendran, R.S., & Harrison, D.A. (2007). The Good, the Bad, and the Unknown About Telecommuting: Meta-Analysis of Psychological Mediators and Individual Consequences. *Journal of Applied Psychology*, 92(6), p. 1524-1541.
- Gates, B. (2005). *The New World of Work*. Microsoft Executive Briefing.
- Greene, C., & Myerson, J. (2011). Space for thought: designing for knowledge workers. *Facilities*, 29(1/2), 19-30.
- Grover, V., & Davenport, T. H. (2001). General perspectives on knowledge management: Fostering a research agenda. *Journal of Management Information Systems*, 18(1), 5-21.
- Hansen, M. T., Nohria, N., & Tierney, T. (1999). What is your strategy for managing knowledge. *Harvard Business Review, March/Apr*, 106-116.
- Heck, E. van, Baalen, P. van, Meulen, N. van der, & Oosterhout,M. van (2011). Het Nieuwe Werken Barometer. Rotterdam School of Management – Erasmus University. *Erasmus @Work Research*. Briefing, July 2011, p. 1-4.
- Hofstede, G, Hofstede, G.J., & Minkov, M. (2010). *Cultures and Organizations - Software of the mind - Intercultural cooperation and its importance for survival*. McGraw-Hill.
- Hughson, T. L., & Goodman, P. S. (1986). Telecommuting: Corporate practices and benefits. *National Productivity Review*, 5(4), 315–324.
- Huss, W. (1988). A move toward sceanrio analysis. *International Journal of Forecasting*, 4, 377–388.
- Huysman, M. H., & Wit, D. de, (2004). *Knowledge Sharing in Practice*. Dordrecht: Kluwer Academics.
- Ipe, M. (2003). Knowledge Sharing in Organizations: A Conceptual Framework. *Human Resource Development Review*, 2(4), 337-359.

- Kent, A., Lancour, H., & Daily, J. E. (1978). Compare ASTAFS, a tool for evaluating reference works (Eds) *Encyclopedia of Library and Information Science*, 25, Marcel Dekker, New York, NY, 1978, pp. 146-8.
- King, W.R. (2006). Knowledge sharing. In: D. G. Schwartz, editor. *The encyclopedia of knowledge management*. Idea Group Publishers; p. 493-8.
- Klein, J. H. (2008). Position Paper - Some directions for research in knowledge sharing. *Knowledge management research & practice* 6, 41-46.
- Kok, A. de, & Helms, R. W. (n.d.). *The New Way of Working and Telework: Definition and positioning*. Unpublished manuscript.
- Machlup, F. (1962). "The Production and Distribution of Knowledge in the United States", Princeton, NJ: Princeton University Press.
- McEvily, B., & Zaheer, A. (1999). Bridging ties: A source of firm heterogeneity in competitive capabilities. *Strategic Management*, 20 1133-1156.
- Musser, J., & O'Reilly, T. (2006). Web 2.0 Principles and Best Practices. *O'Reilly radar*. Retrieved from http://oreilly.com/catalog/web2report/chapter/web20_report_excerpt.pdf
- Nilles, J. M., (1975). Telecommunications and organizational decentralization. *IEEE Transactions On Communications*, 23, 1142-1147.
- Nilles, J. M. (1994). *Making Telecommuting Happen: A Guide for Telemanagers and Telecommuters*. Van Nostrand Reinhold: New York.
- Nilles, J. M. (1998). *Managing telework: Strategies for managing the virtual workforce*. New York: John Wiley and Sons.
- Nonaka, I. (1994). A dynamic theory of organizational knowledge creation. *Organization science*, 5(1), 14-37.
- Nonaka, I., & Takeuchi, H. (1995). *The Knowledge-Creating Company - How Japanese Companies Create the Dynamics of Innovation*. Oxford, UK: Oxford University Press.
- Nonaka, I., & Takeuchi, H. (1996). *De kenniscreërende onderneming*, Scriptum, Lannoo.
- Olson, M. H., & Prims, S. B., (1984). Working at home with computers: work and non-work issues. *Journal of Social Issues* 40, 97-112.
- Orlikowski, W. J. (1992). The duality of technology: Rethinking the concept of technology in organizations. *Organization Science*, 3, 398-427.

- Pyöriä, P. (2005). "The concept of knowledge work revisited", *Journal of Knowledge Management*, 9(3) 116 - 127.
- Peters, P., de Bruijn, T., Bakker, A., & van der Heijden, B. (2011). Plezier in Het Nieuwe Werken? Randvoorwaarden voor "werkgerelateerde Flow" onder Nieuwe Arbeidscondities. *Tijdschrift voor HRM*, 1.
- Pous, Mr. V. de, & Wielen, J. M. M. van der (2010). *Visions from the practice on The Way of Working - Praktijkvisies op Het Nieuwe Werken*. Telewerkforum. Ten Brink.
- Polanyi, M. (1967). *The tacit dimension*. London: Routledge and Kegan Paul.
- PwC. (2011). *Een verkenning van macro-economische effecten van Het Nieuwe Werken*. PricewaterhouseCoopers Accountants N.V.
- Reich, R. B. (1991). *The Work of Nations: Preparing Ourselves for 21st-Century Capitalism*, Alfred A. Knopf, New York, NY.
- Schaffer, R. H. & Thomson, H. A. (1992). Successful Change Programs Begin with Results. *Harvard Business Review*, January-February, p. 80 - 89.
- Snyder, J. L., & Lee-Partridge, J. E. (2009). Understanding Choice of Information and Communication Channels in Knowledge Sharing. Phoenix, Usa, 1-9.
- Soekijad, M. (2005). *Dare to share: Knowledge sharing professionals in co-opetitive networks*. Delft: Doctoral Dissertation at TU Delft.
- Stam, P. (2011). *Het nieuwe werken meegewogen*. Utrecht: Master thesis Utrecht University.
- Tapscott, D. (2008). *Grown Up Digital: How the Net Generation Is Changing Your World*. New York: McGraw-Hill.
- Uzzi, B., & Lancaster, R. (2003). The role of relationships in interfirm knowledge transfer and learning: The case of corporate debt markets. *Management Sci.* 49(4) 383-399.
- Veldhoed, E. (2005). *The art of Working. De integrale betekenis van onze virtuele, fysieke en mentale werkomgevingen*. ISBN-13: 9789052614908.
- Verbruggen-letty, H., & Thunnissen, M. (2010). *Het Nieuwe Werken, van dromen... naar doen!* ISBN/EAN: 978-90-815081-1-7
- Verschuren, P., & Doorewaard, H. (2007). *Het ontwerpen van een onderzoek*. Den Haag: Lemma.
- Volberda, H.W. (1999). *Building the Flexible Firm: How to Remain Competitive*. Oxford, USA: Oxford University Press.

- Webster, J., & Watson, R. T. (2002). Analyzing the past to prepare for the future: Writing a literature review. *MIS Quarterly*, 26(2).
- Weggeman, M. (1997). *Kennismanagement: inrichting en besturing van kennisintensieve organisaties*. Schiedam: Scriptum Books.
- Wieringa, R., Heerkens, H., & Regnell, B. (2009). How to Write and Read a Scientific Evaluation Paper. *Requirements Engineering Conference, 2009. RE '09. 17th IEEE International*, pp.361-364.
- Yin, R. K. (2009). *Case Study Research*. Thousand Oaks , Ca.: Sage Publications.
- Zuckerman, E.W., (2001). Networks, diversity and performance: The social capital of R&D units. *Organization science*, 12 502–517.

Appendices

Appendix A - Case study protocol

Case study protocol

Introduction

This research attempts to reveal possible effects of the new way of working concept on knowledge sharing within organizations. In the first phase (phase a, see Figure 1) of the research experts on the topic of knowledge sharing and experts on the topic of NWOW have been interviewed. Together with a literature study on both previously mentioned topics this research tries to answer the following research question and sub questions:

“How will the ‘new way of working’ concept affect knowledge sharing in Dutch knowledge intensive organizations and how can this be best supported by ICT?”

- A. What is the NWOW concept and how does it compare to older similar concepts?
- B. What changes in knowledge sharing when the NWOW concept is introduced?
- C. How can knowledge sharing be supported by ICT?
- D. What communication channels are used for knowledge sharing activities and is NWOW of influence?

The case study research will mainly answer sub questions: b (partially), c (partially) and d (completely). Below in Figure 1 you can see “multiple case studies” in phase b, where this case study protocol is about.

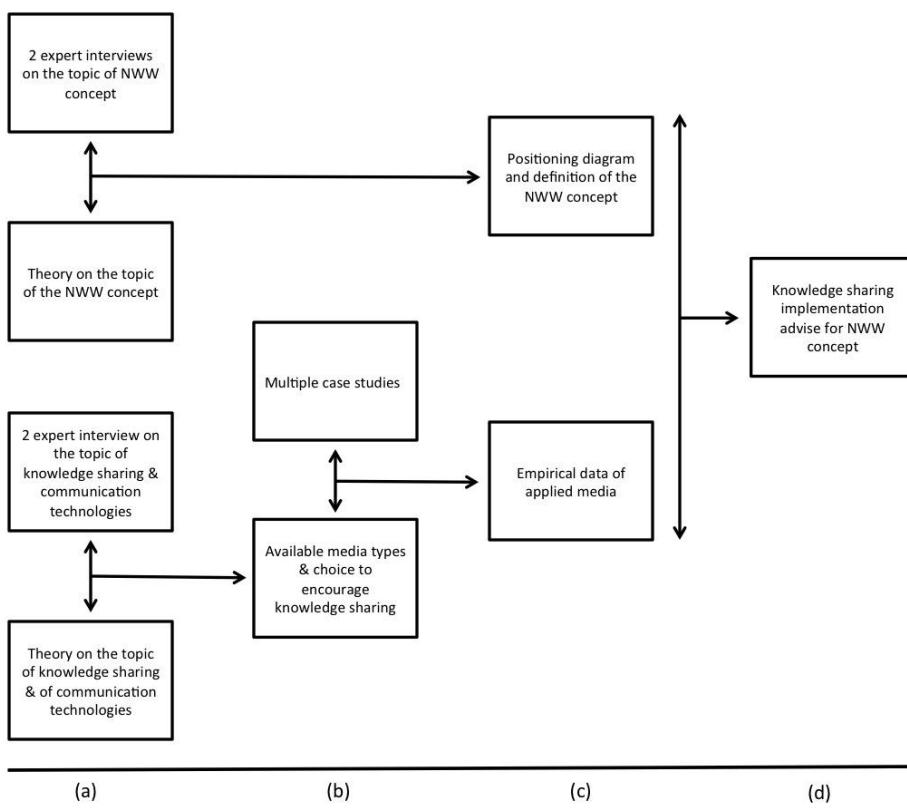


Figure 1

Multiple case study approach

As the type of research is explanatory, answering a “how” question, a type 4 multiple-case (embedded) research design has been chosen. Reason for this was that a multiple-case study is more compelling than a single-case study what makes the overall study regarded as being more robust (Yin, 2008). Replication is important for multiple-case studies in order to get useful findings. Three different cases make this research a “literal replication” in which each case will be carefully selected so that it predicts similar results.

For this research three case companies will be investigated. The scope of the research embraces large Dutch for-profit organizations with a minimum headcount of 150. The case companies will only be selected for this research when they have NWOW (partially) implemented. Organizations running a pilot project on NWOW are desired. Alternatively, an organization that completely implemented NWOW can be used only if employees are in place that went through the process of implementation and experienced the previous situation.

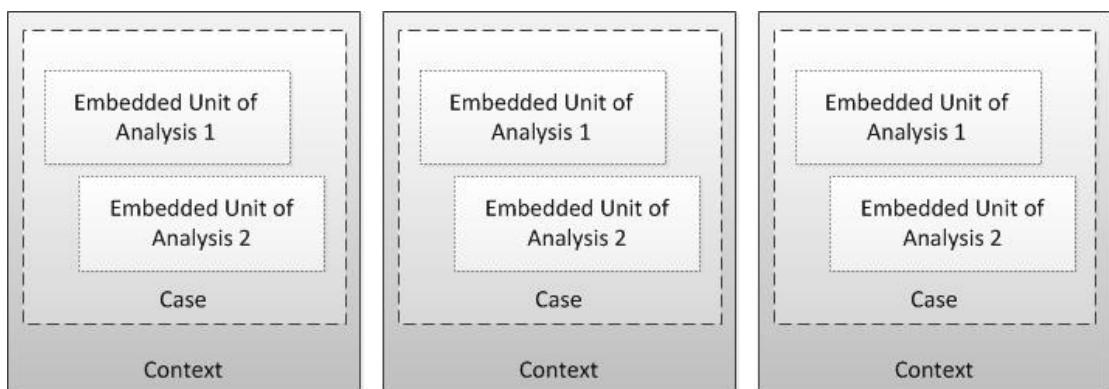


Figure 2: Multiple-case design containing multiple units of analysis.

The target of this research is to find differences in knowledge sharing between employees that use NWOW (Embedded Unit of Analysis 1) and employees that do not use NWOW (Embedded Unit of Analysis 2) within an organization. Differences may be found within the two groups in the same case.

Furthermore, differences may be found between the two groups in a cross-case comparison. The way NWOW actually is implemented within a case organization may vary, emphasizing different elements of NWOW than others. We will consider this to be context and will be investigated using a document study per case in advance.

Case study protocol

The role of the case study protocol is two-folded; first it guides the case study investigator who has to follow the same procedure for every single case. So, corresponding findings within - and cross-case, can be used as a robust result. Second, by using a case study protocol the study will be more reliable.

Research quality

In order to produce a quality research, the construct validity of the case study will be checked before execution by the research supervisor and the so called “champions” within the case organizations. The internal validity is important for

this research in order to prove how a causal relationship can be established. In the case study interview the same questions are asked over two units of analysis. The group of employees using NWOW will however have some additional questions in the interview, as they are only applicable for them.

To meet external validity requirements in this research, the investigator has chosen to use three case organizations instead of one. In this way, the cross-case results may give a rich image of NWOW in large Dutch, for-profit organizations. This research will be a preliminary step finding effects of NWOW and will give focus to further quantitative research on this topic.

Field procedures

Three case organizations have been chosen, being: Royal DSM N.V, Centric B.V and Enexis.

Within every organization a “champion” is willing to help the investigator, taking the most communication efforts to the internal organization for his account, most of time because of their interest in the results of the study or personal relation to the investigator or supervisor.

Contact information

DSM: Sven Kort, sven.kort@dsm.com;

Centric: Manon van Beek, manon.van.beek@centric.eu;

Enexis: Esther Hehne, esther.hehne@enexis.nl.

When visiting a case organization the investigator has to check-in by the reception and waits until the champion allocates an appropriate office room, with a minimum of two chairs.

The Dutch language will be used to the participating parties, because this is easier for the participants in answering the interviews and easier for the investigator. All interviews will be recorded, after explicit agreement of the participant.

NWOW dialects

Most organizations implement the NWOW concept as far as appropriate for them. Because no clear definition for NWOW is in place, many organizations implement a so-called dialect.

DSM:

NWOW = nWOW (using a different notation)

Centric:

NWOW = CWOW (Centric Way of Working)

Bricks, Bytes and Behaviour = People, Places and Technology.

Enexis:

NWOW = X-werken

Data collection procedure

In the early e-mail contact with the case organization, the investigator explains in a nut shell what he wants to investigate and how he wants to accomplish this (using a document analysis and interviews).

Open interview

The first interview will be held with the company champion, to gain general information, implementation process information and also to explain the research in more detail. These conversations will not be recorded. However, notations will be made by the investigator and used in the document analysis.

Document analysis

In the first face-to-face contact, the investigator has to reveal the research in detail to the champion of the case organization. During the appointment it has to be explained again that a document analysis will be executed and that documents involved by the implementation are wanted. The documents (most of time advices or project initiation documents) will be e-mailed or printed for the investigator to analyze.

If it is only possible to execute a document analysis on site to obey security rules of an organization, an appointment will be made to execute this analysis on site.

The document analysis will start with a company briefing elaborating on the core business of the company. This information can easily be found using the internet. Questions that need to be answered are prepared before the documents are handed over. The questions can be found below (in Dutch language):

- *Door wie (welke afdeling) is HNW geïnitieerd in de organisatie, waarom en wanneer?*
- *Hoe is het geïmplementeerd in de organisatie? (test pilot, gefaseerd, big bang, anders..)*
- *Welke veranderingen (vernieuwingen) hebben er plaatsgevonden op organisatie gebied door de komst van HNW?*
 - *En door wie? (interne afdeling, extern bedrijf, anders...)*
 - *Waarom?*
 - *Hoe is dat gedaan?*
 - *Zijn er resultaten over bekend over toepassing? (succesvol / niet succesvol)*
- *Welke veranderingen hebben er plaatsgevonden op fysiek facilitair gebied door de komst van HNW? En door wie?*
 - *En door wie? (interne afdeling, extern bedrijf, anders...)*
 - *Hoe is dat gedaan?*
 - *Zijn er resultaten over bekend over toepassing? (succesvol / niet succesvol)*

- *Welke veranderingen hebben er plaatsgevonden op technisch gebied door de komst van HNW?*
 - *Successors voor bestaande hardware / software? En door wie? (interne afdeling, extern bedrijf, anders...)*
 - *Hoe is dat gedaan?*
 - *Zijn er resultaten over bekend over toepassing? (succesvol / niet succesvol)*
- *Eventueel: iets te weten gekomen over kennisdelen binnen organisatie? Bijvoorbeeld scenario's, oude patronen in kennisdelen, nieuwe patronen in kennisdelen?*

The questions will be answered in a summary form containing 1.5 pages about the NWOW approach of the case company, based on the available information.

Additional remarks, gained during the first face-to-face contact will be added at the end of the document analysis. The remarks mainly involve the company approach to knowledge management and knowledge sharing.

Case study interviews

Semi-structured interviews will be executed with 6 employees of each case company. The interview exists out of two parts: a question part and a scenario part. All questions are the same for both groups (units of analysis) except for the NWOW users, which will have some additional questions. Again the semi-structured interview will be in the Dutch language, for its ease of understanding by the participants. The interview will take up to 45 minutes, where 60 minutes are scheduled, ideally in a face-to-face setting where the investigator travels to the remote site. It's also possible to do the interview by phone (or Skype) when participants prefer this. When an interview takes place by phone the participant will receive the questions of the interview one hour before the actual interview takes place in this way legacy in connection can cause less problems during the interview. Otherwise, the participant will get a print with the semi-structured interview questions.

The selection of the participants will be done in accordance with the champion of the company. Distinguishing the employees that fit to the appropriate group. Planning of the interviews will be decided in consultation with the participant and the investigator.

All interviews will be recorded (when allowed) only for use by the investigator as reference. Below you find the universal version of the interview, which means that the specific company dialect hasn't taken into account. This of course will be done when actually executing the interview. The interview with use of the dialect will then first be checked by the case organization champion before it will be used. In the interview the investigator has chosen to use the he-perspective to improve the readability of the interview.

Case company interview (universal version) part 1

The first word indicates the type of question being asked (General, Bricks, Bytes, Behaviour or Knowledge Sharing). The italic words are extra information for the investigator. The participants will not see both.

Algemene informatie over participant

1. **Algemeen** - Welke functie heeft u? (*kenniswerker check*)
2. **Algemeen** - Welke nationaliteit heeft u? (*ivm eventuele cultuur verschillen*)

Wel betrokken bij <HNW> pilot (zo nee, ga beneden verder!)

3. **Algemeen** - Hoe ervaart u <HNW>? (*is persoon positief of negatief over onderwerp?*)
4. **Algemeen** - Hoe bent u betrokken bij <HNW>? Is daar een reden voor? (*met welke rol? en, hoe bekend is iemand met de materie?*)
5. **Behaviour** - Heeft u instructies of trainingen gekregen in het kader van <HNW>? (*gebruik ICT, gedrag*)
6. **Behaviour** - Welke faciliteiten of regels zijn er sinds <HNW> op het gebied van kennis delen veranderd? (*zoals software / bijeenkomsten, het antwoord hierop is onder te verdelen in bricks, bytes and behaviour om te zien wát medewerkers het meest opvalt*)
7. **Behaviour** - Zijn er nieuwe regels in het kader van <HNW> door organisatie opgelegd? (*hoe vaak thuiswerken of op kantoor*)
8. **Bytes** - Welke software gebruikt u om samen te werken met collega's?
 - a. En hoe wordt er kennis gedeeld?
9. **Bricks** - Heeft de verandering van het kantoor (naar activiteit gebaseerde ruimtes) invloed op kennis delen met uw collega's?
10. **Knowledge sharing** - Kunt u collega's makkelijk vinden op basis van hun expertise of specialiteiten?
 - a. Hoe? (*benadering, virtueel of fysiek*)
 - b. Wordt er vervolgens ook met u mee gedacht om uw probleem op te lossen?
 - c. Kunt u de organisatiecultuur omschrijven ten aanzien van het delen van kennis? (*vertrouwelijke sfeer? Wat als fouten gemaakt worden?*)
11. **Behaviour** - Is de organisatiecultuur veranderd ten aanzien van het uitwisselen van kennis sinds <HNW>?
12. **Knowledge sharing** - Hoe zou kennis delen binnen uw organisatie verbeterd kunnen worden?

Niet betrokken bij <HNW>

3. **Algemeen** - Bent u bekend met <HNW>? (*is persoon positief of negatief over onderwerp?*)
4. **Algemeen** - Waarom bent u niet betrokken bij <HNW>? *Is daar een reden?*
5. **Knowledge sharing** - Welke faciliteiten zijn er ter beschikking gesteld binnen uw organisatie op het gebied van kennis delen? (zoals software / bijeenkomsten)
6. **Bytes** - Welke software gebruikt u om samen te werken met collega's?
 - a. Wordt er kennis gedeeld? Zo ja, hoe? (*software / bijeenkomsten*)
7. **Knowledge sharing (cross et al. 2001)**- Kunt u collega's makkelijk vinden op basis van hun expertise of specialiteiten?
 - a. Hoe? (*benadering, virtueel of fysiek*)
 - b. Wordt er vervolgens ook met u mee gedacht om uw probleem op te lossen?
 - c. Kunt u de organisatiecultuur omschrijven ten aanzien van het delen van kennis? (*vertrouwelijke sfeer? Wat als fouten gemaakt worden?*)
8. **Knowledge sharing** - Hoe zou kennis delen binnen uw organisatie verbeterd kunnen worden?

Case company interview (universal version) part 2

A brief explanation will be written on the scenario interview to remind the employees about the answering possibilities. Reason for this is that employees will not be familiar with the term knowledge sharing and the possible approaches to communicate knowledge. Below the interview scenarios more information about asking supplementary questions is drawn.

Noot vooraf:

Het is belangrijk dat u weet welke keuzes u kunt maken als het gaat over "kennis delen" bij de hieronder staande scenario's. Denk bij kennis delen bijvoorbeeld aan: face-to-face contact , telefonisch contact, project of BU vergadering, trainingen, communicatie software (zoals e-mail, chat, collaboratie software, video conference, intranet berichten, blogs, forums, sociale media of online shared workspace), etc.

Scenario's:

1. Stel je voor dat je een voordeligere manier van reizen ontdekt hebt die toepasbaar is voor de hele organisatie. Hoe zou je deze kennis delen met je organisatie?
2. Stel je voor dat je een calamiteit hebt waargenomen bij een klant toen je daar aanwezig was. Jij hebt een idee over hoe men dit in jouw organisatie zou kunnen voorkomen. Hoe deel jij deze gevoelige kennis met je organisatie?
3. Stel je voor dat jij weet dat er grote interesse vanuit een bestaande klant is voor het project waar je aan meewerkt. Hoe deel je deze kennis met je projectteam?
4. Stel je voor dat jij erachter komt dat belangrijke projectdocumenten, die je zo snel mogelijk nodig hebt voor een advies aan een klant, zoek zijn geraakt of misschien wel nooit gemaakt zijn. Hoe deel je deze kennis met je projectteam?
5. Stel je voor dat je als eerste ontdekt dat de belangrijkste stakeholder van het project waar je aan werkt zich wil terugtrekken. Hoe deel je deze kennis je projectleider?
6. Stel je voor dat je ontdekt dat er op regelmatige basis diefstal plaats vindt van artikelen waar enkel jij en je projectteam toegang toe hebben. Hoe deel je deze kennis je projectleider?
7. Stel je voor dat je een bepaalde ontwikkeling in je vakgebied ziet welke van belang kan zijn voor een bestuurslid van je organisatie die je niet persoonlijk kent. Hoe deel je deze kennis met hem?
8. Stel je voor dat je erachter komt dat er onterecht salaris wordt ingehouden bij jou en diverse medewerkers van je organisatie en een HR-medewerker je doorverwijst naar zijn of haar leiding gevende die je niet kent. Hoe deel je deze gevoelige kennis met iemand die je niet persoonlijk kent?
9. Stel je voor dat je hebt een tip voor een collega van jouw projectteam om een bepaalde taak sneller uit te voeren. Hoe deel je deze kennis met je collega?

10. Stel je voor dat een gelijkwaardige collega in jouw projectteam zijn verantwoordelijkheden niet neemt en jij weet wat voor een gevolgen dit voor hem kan hebben. Hoe deel je deze kennis met hem?
11. Stel je voor dat je iets hoort over een nieuwe collega die je niet persoonlijk kent die bezig is met een ander project met een soortgelijke rol als de jouwe in jouw project en dat je diverse handige tips voor hem hebt. Hoe deel je deze kennis?
12. Stel je voor dat je iets leest over een collega die je niet persoonlijk kent, die bezig is met een ander project met een soort gelijke rol als de jouwe in jouw project en dat hij zich, volgens jou door menselijke fout, niet houdt aan wet en regelgeving. Hoe deel je deze kennis met hem?

Scenario answering categories

During the scenarios interview, the investigator will try put the answer in the following flow (in Dutch). So the answer on scenario 1 for example can be something like:

Scenario 1: 2-a-i-1: "omdat dit een typisch punt op de meeting agenda is."

1. Virtueel
 - a. Communicatie kanaal? (telefoon, computer, anders?)
 - i. Software keuze?
 1. Formeel
 - a. Nette e-mail (one-to-one)
 - b. Bericht via intranet (one-to-many)
 2. Informeel
 - a. Via IM (one-to-one)
 - b. Via social media (one-to-one of one-to-many)
 - ii. Waarom?
 2. Fysiek (face-to-face)
 - a. Formeel
 - i. Tijdens meeting of training
 - ii. Afspraak maken en naar persoon toe gaan
 1. Waarom?
 - b. Informeel
 - i. Bij toevallig treffen
 - ii. Zonder afspraak naar persoon toe gaan
 1. Waarom?

Elaboration

Previous detailed scenarios are based on the following list of high-level scenarios (in Dutch). The numbers of the high-level scenarios correspond with the detailed scenarios above:

1. Algemene informatie voor hele organisatie
2. Gevoelige informatie voor hele organisatie
3. Algemene informatie voor je project team
4. Gevoelige informatie voor je project team
5. Algemene informatie voor een meerdere collega die je kent (teamleider, projectleider)
6. Gevoelige informatie voor een meerdere collega die je kent
7. Algemene informatie voor een meerdere collega die je niet kent (raad van bestuurslid, CHR)
8. Gevoelige informatie voor een meerdere collega die je niet kent
9. Algemene informatie voor een gelijkwaardige collega die je kent (project lid)
10. Gevoelige informatie voor een gelijkwaardige collega die je kent
11. Algemene informatie voor een gelijkwaardige collega die je niet kent (medewerker van ander project)
12. Gevoelige informatie voor een gelijkwaardige collega die je niet kent

Theory on scenario development

Scenarios have been chosen as a research instrument to make it more concrete for participants to answer the interview questions. Huss (1988) stated that "A scenario is a narrative description of a consistent set of factors which define in a probabilistic sense alternative sets of future business conditions."

The list above is developed based on the theory of Snyder (2009) who noted: "The present study is a preliminary attempt at searching for answers to the important questions we have raised here. We seek to understand the decisions employees make in using technologies for knowledge sharing. We ask the following questions:

4. To what information and communication technologies do employees have access for sharing knowledge?
5. What information and communication technologies do employees use when sharing knowledge?
6. What factors influence the choice of information and communication technologies when sharing knowledge?"

Snyder (2009) distinguished 4 different types of knowledge sharing, being:

- sharing general organizational information
- sharing sensitive organizational information
- sharing general project information
- sharing sensitive project information

Snyder's types of knowledge sharing are approached from the knowledge sharing source. In the discussion section, Snyder (2009) argues: "Next, we would like to gather additional qualitative data through in-depth interviews. For example, we can ask employees to describe specific, yet typical organizational knowledge sharing practices. We can also use interviews to look more closely at the nature of the information employees share, rather than the vague categories of general and sensitive information."

To enrich the theory above, the knowledge sharing framework by Ipe (2003) seem to make these vague terms more specific using the following factors influencing knowledge sharing:

- Nature of knowledge
 - tacit vs. explicit
 - value attributed to it (*so, I think public and private also belong to this*)
- Motivation to share
 - internal factors (e.g. perceived power, reciprocity, etc.)
 - external factors (e.g. relationship with recipient, rewards for sharing)
- Opportunities to share
 - Formal (e.g. trainings, work teams, purposive learning channels)
 - Informal (e.g. social network update, relational learning channels)
- (Culture of work environment influence all factors above.)

The four different types of knowledge sharing have been extended using the 6 factors above. When combining them with the four factors of Snyder (2009) we get the high-level scenario list as drawn in the beginning of this section.

The factors will be tested as follows:

- Nature of knowledge:
 - Receiving unity (organization, group or individual)
 - Value attributed to knowledge: general or sensitive
- Motivation to share:
 - Internal factor: familiar or unfamiliar (assuming that an employee doesn't know the reciprocity of its unfamiliar colleague).
 - External factor: superior or equality (relation with colleague)
- Opportunity to share:
 - The answers of the scenario will indicate the opportunities to share (how employees communicate, what they choose, and why).

Assumptions

Assumptions that are made in order to come up with the detailed scenarios are:

- A team leader or project leader is a superior colleague you know;
- A member of the board of directors or the Chief Human Resources are superior colleagues you don't know personally;
- You know your colleagues, that work on the same project as you, personally;
- An employee doesn't know all employees of other project within the organization.

Data collection plan

In order to gather a strong chain of evidence the investigator has chosen to use two research instruments, being:

- 1 open interview;
- Document analysis;
- 6 semi-structured interviews.

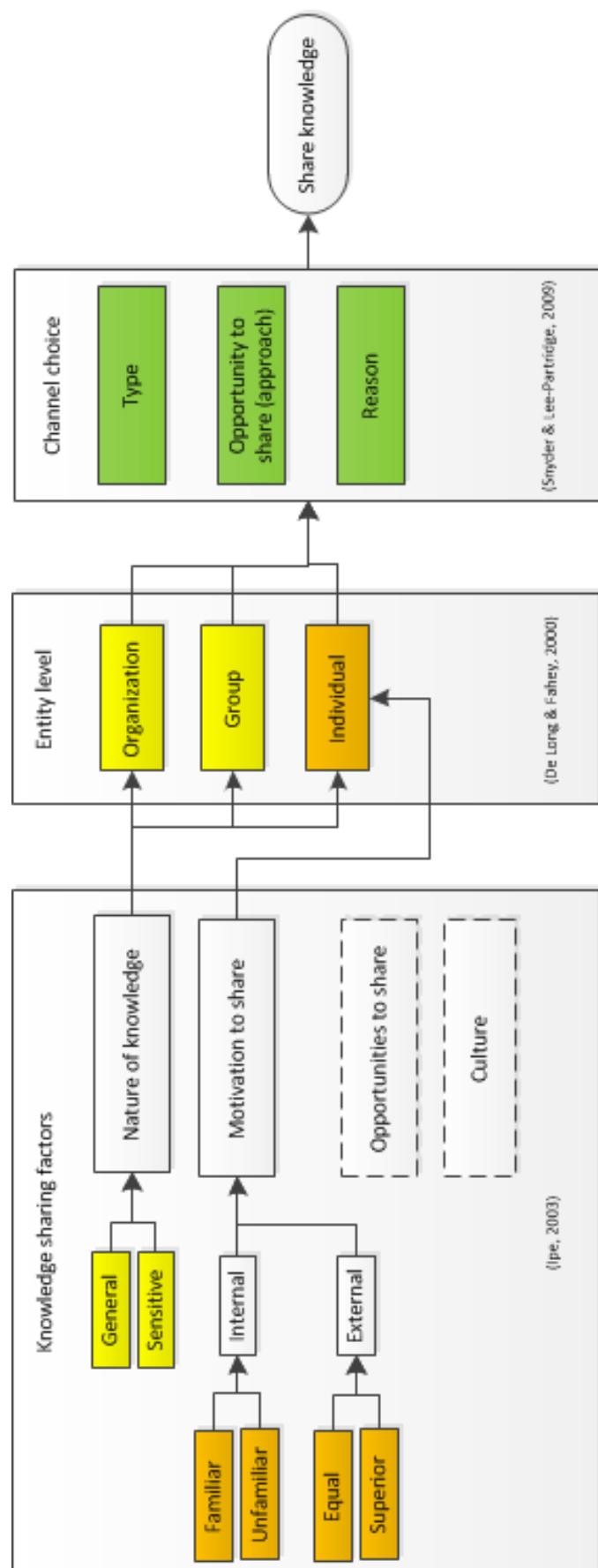
The investigator will be totally dependent on the organization champion in receiving useful documents to analyze in the document analysis.

Outline of case study report

Three individual case study reports will be drawn, for each case one. The organizations will receive these case study reports when finished. Cross-case conclusions will be drawn later on in the master thesis. These results will also be exchanged with the case companies. The outline of the case study reports will be as follows:

- Title
- Table of contents
- Introduction to case study and case company
- Document analysis
 - Approach
 - Result
- Case study
 - Approach
 - Result
- Conclusion
- Bibliographical information
- Appendix
 - Raw data input

Appendix B - Scenario development model



Appendix C - Application portfolio

Organization	Application	Mainly used for (as mentioned by participants)		To collaborate with		Knowledge strategy		NWOW	NtNWOW
		Being a	document sharing and collaboration platform	colleagues	everyone	codification	codification	3	3
Centric	MS SharePoint	personal information manager	email, agenda	colleagues, customers	everyone	codification	codification	2	3
Centric	MS Outlook	collaboration platform	communicating and collaborating	colleagues	everyone	codification	codification	2	2
Centric	T114ALL	web conferencing tool	not mentioned	colleagues	colleagues, whole organization	personalization	personalization	1	0
Centric	Oracle Web Conferencing	social platform	communicating	colleagues	whole organization	hybrid	hybrid	1	0
Centric	Yammer	instant messaging platform	chat	colleagues	colleagues	personalization	personalization	1	1
Centric	MS OCS / Lync	operating system	temporary directory sharing	colleagues	colleagues	codification	codification	0	1
Centric	MS Windows share	personnal information manager	email, agenda	colleagues	everyone	codification	codification	2	2
DSM	MS Outlook	videoconferencing tool	videoconferencing	colleagues	colleagues	personalization	personalization	1	3
DSM	MS LiveMeeting	document sharing and collaboration platform	document storing and sharing, communication, profile	colleagues, team	colleagues	hybrid	hybrid	3	0
DSM	MS SharePoint	document sharing and collaboration platform	document storing and sharing	colleagues	colleagues	codification	codification	0	1
DSM	MS OCS / Lync	instant messaging platform	availability, chat, call, videoconference, remotedesktop	colleagues	colleagues	personalization	personalization	3	0
DSM	MS OCS	instant messaging platform	chat	colleagues	colleagues	personalization	personalization	0	2
DSM	Intranet	internal website	news, blogs, profiles	colleagues	colleagues	hybrid	hybrid	1	0
DSM	Intranet	internal website	news	n/a	n/a	codification	codification	0	1
DSM	Training compass	e-learning tool	e-learning	colleagues	colleagues	personalization	personalization	0	1
DSM	Cisco WebEx	web conferencing tool	videoconferencing	colleagues	colleagues	personalization	personalization	1	0
DSM	Tandberg videoconference	videoconference device	videoconferencing	colleagues	colleagues	hybrid	hybrid	1	0
DSM	Yammer	social platform	organization wide communication	colleagues, whole organization	colleagues	personalization	personalization	3	3
DSM	Remedy On demand	service management tool	incident management	colleagues	colleagues	codification	codification	1	0
DSM	E-lab notebook	digital library	lab notes storing	n/a	n/a	codification	codification	0	1
DSM	DSM store	digital library	document storing	colleagues	colleagues	codification	codification	0	1
Enexis	MS Outlook	personal information manager	email, agenda	everyone	everyone	codification	codification	3	3
Enexis	MS OCS / Lync	instant messaging platform	availability, chat, call, videoconference, remotedesktop	colleagues	colleagues	personalization	personalization	3	2
Enexis	MS SharePoint	document sharing and collaboration platform	document storing and sharing	colleagues, team	colleagues	hybrid	hybrid	3	3
Enexis	Intranet	internal website	news, blogs, profiles	colleagues	colleagues	hybrid	hybrid	2	1
Enexis	Intranet	internal website	news	n/a	n/a	codification	codification	0	1
Enexis	MS Windows share	operating system	temporary directory sharing	colleagues, whole organization	colleagues	codification	codification	1	1
Enexis	Yammer	social platform	organization wide communication	colleagues, whole organization	colleagues	hybrid	hybrid	2	0
Enexis	Wiki	internal encyclopedies	storing process knowledge	n/a	n/a	codification	codification	1	0
Enexis	Projectplace	virtual workspace in cloud	document storing and project collaboration	colleagues, team, customers	colleagues	hybrid	hybrid	1	0
Enexis	Digital project directory	Project archive tool	document storing	colleagues	colleagues	codification	codification	0	1