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Challenges of Information Work in the New World of Work

A qualitative study at Microsoft Services

Jeroen A.J. ter Heerdt

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Graduation committee:
dr. T.V. Bondarouk (University of Twente, SMG, HRM)
drs. C. Huijs (University of Twente, EEMCS, IS)
ir. R.J. Bosuw (Microsoft B.V.)

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Date	February 6, 2008
Author	J.A.J. ter Heerdt, BSc.
Email address	j.a.j.terheerdt@alumnus.utwente.nl
Student number	s0013366
Program	Business Information Technology
Track	ICT & Innovation
University	University of Twente
Company	Microsoft B.V. Boeingavenue 30 1119 PE Schiphol-Rijk
Graduation committee	**dr. T.V. Bondarouk** University of Twente, School of Management and Governance (SMG), chair HRM **drs. C. Huijs** University of Twente, Electrical Engineering, Mathematics and Computer Science (EEMCS), chair IS **ir. R.J. Bouw** Microsoft B.V., Group Practice Manager

Management Summary

This document presents the results from an exploration of Information Worker related challenges in the New World of Work (NWOW). The study has taken place in collaboration with Microsoft Services in the Netherlands. Microsoft B.V. is an example space for Microsoft worldwide to investigate how the NWOW vision will work in practice. The study at hand tries to help make the transition from the current situation to the NWOW situation easier by indicating possible future challenges and investigating their causes, effects and countermeasures. In this regard, our study focuses on Microsoft Services Consultants, employees of Microsoft Services, which is a part of Microsoft B.V. These Consultants have been characterized as Information Workers.

Three challenges of Information Workers have been analyzed, viz.:

- *Information Overload*. A perceived mismatch between information processing capacities and information processing requirements.
- *Lack of Control over Information*. Uncontrollability, felt because of information flowing more freely among various parties
- *Lack of Networking Support*. A perceived need for increased connectivity, both outgoing and ingoing, both professionally and privately.

The causes and effects of and countermeasures against these three challenges have been investigated both in theory and in practice, by interviewing a number of Consultants. In our empirical study we have followed a qualitative approach, primarily looking for diversity in answers instead of congruence, aiming to provide the most complete investigation possible.

Several possible causes and effects of and countermeasures against these challenges have been discovered in literature, and the practical investigation expanded these findings with causes, effects and countermeasures specifically for the situation of Microsoft Services Consultants. This resulted in is a list of causes and effects of and countermeasures against these challenges so the challenges can be anticipated, detected and addressed. The table below shows the Top-5 most important causes, effects of and countermeasures against the three challenges. The complete result tables listing all causes, effects and countermeasures that have been identified can be found elsewhere in this document.

Information Overload
Causes
Number of items of information rises
Pressure and distraction
E-mails
Senders screen outgoing information insufficiently
Too many inputs from the environment
Effects
Stress, confusion and cognitive strain
Missed opportunities
Decision accuracy/quality lowered
Inefficient work
Lack of critical evaluation (become too credulous) and superficial analysis
Countermeasures
Training programs to augment information literacy: information processing skills such as file handling, using email, classification of documents, etc.
Raise general quality of information (i.e. its usefulness, conciseness) by defining quality standards
Intelligent information management (prioritization)
Schedule uninterrupted blocks of time for completing critical work
Customization of information
Lack of Control over Information
Causes
Amount of information available has increased

Digitalization of information and the easiness with which this is stored
More demanding stakeholders
Classification of data is difficult
Increased internal / external transparency
Effects
Losing competitive advantage
Loss of image, status and trust
Quality of service is lowered
Frustration
Various negative effects, such as fines
Countermeasures
Information security awareness program
Investigate, structure/classify and clean up information
Make it easier to follow compliancy rules
Keep in touch with stakeholders that request information
Build trust
Lack of Networking Support
Causes
The amount of useless communication
Frequent changes in team membership
Teleworking / working in various locations
Variable office hours
Increased use of the Internet for communicating
Effects
Nuances in communication will be lost
Communication and collaboration become inefficient
Organization's image is damaged (problems with transparency influence image)
Demotivation
Erroneous decisions
Countermeasures
Social events for creating social bonding
Usage of tools
Central meeting place for social contact
Provide team psychological safety
Define a culture of knowledge sharing within organization

We recommend management to keep a close watch on the causes and effects that came forward from our investigation, for example by periodically investigating whether employees experience causes and effects of the various possible problems. By doing this possible problems can be detected early and be dealt with efficiently. The list of countermeasures provides a tailor made list of managerial actions to cope with these problems, if they arise.

Specifically, we recommend to take the following countermeasures now, before the challenges arise or become uncontrollable:

- ***Intensify social events.*** Social events were frequently mentioned as a way of addressing Lack of Networking Support. Organizations should provide social events and opportunities for employees to come and stay in contact with colleagues.
- ***Provide integrating overviews of information from various sources.*** When a lot of information is available on different locations, it is difficult to find it and connect the various information items into an integrated overview. Organizations should look for ways of providing integrating overviews of information from various sources. Possible ways of doing this are hiring a so called information integrator or presenting information differently on systems such as an intranet.
- ***Clarify choices in the New World of Work implementation.*** Some Microsoft Services Consultants feel the NWOW does not bring anything new to their situation. We recommend explaining the choices made in the NWOW implementation, and customizing them, in order to strengthen Consultant's interests and therefore their active participation in it, before Consultants lose interest in the NWOW implementation.

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Foreword

The preparation for my final project started in 2005, when Maarten-Jan Vermeulen, Academic Relations Manager at Microsoft, asked me to consider doing my final project there. At that time, I had not met the requirements for starting my final project. In February, 2007, I finished my courses and so in March of that year I started my final project at Microsoft Services. The months before were spend on choosing a subject for my final project, in collaboration with Manfred Simonis and René Bouw, both working at Microsoft.

René put me on the "New World of Work" train, and I started my journey with that train. At this moment I am still on that train, together with all employees of Microsoft B.V., most of whom hopped on earlier than I did. René asked me to investigate the New World of Work situation for a subgroup of employees of Microsoft B.V., namely Microsoft Services Consultants. Microsoft Services Consultants are working at Microsoft Services and support customers and partners with the use of Microsoft (based) solutions. After some scoping we agreed that my final project would aim at identifying and investigating future challenges of the Microsoft Services Consultants in the New World of Work.

This document is the main result of this project. It presents the results of the project and tries to describe the rationale behind it. All this has not been just my work; many persons were involved. In my opinion, projects are almost always collaborations between several people. Therefore, I have chosen to use a plural form instead of a singular form while writing.

Tanya Bondarouk, Corrie Huijs and René Bouw were the ones that helped me stay on the right track. Most of the times I was totally *overloaded* when I returned from a meeting with one or more of them. Sometimes my face would change to a *signaling color*, but I always knew that all they wanted was to improve the quality of my work. I thank them for their patience, remarks and effort.

Apart from Tanya, Corrie and René, who were officially involved in my final project, several others have dedicated their time and thoughts to this project; sometimes after I asked for their opinion, sometimes spontaneously, but always valuable. I especially like to thank the following persons: Klaas Poortema, for his help with the statistics; Evelien Poortema, for some practical advice; Maarten ter Heerdt, for his patience and precise comments on the quality of the English text; Anne Poortema, for being many things: sparring partner, helping hand, criticaster. I remember the numerous conversations we had about my final project, my frustrations, my ideas and my wishes. Sometimes you just sat and listened thereby allowing me to reflect on my own words, sometimes you generated ideas and insights. Your help proved invaluable for me and my project.

Of course, there are many more people to thank, who all influenced me and this project in some way. This last group includes my mother, my family, my friends and the anonymous interviewees who sat down and spent some hours talking to me and answering my questions.

Finally I would like to thank someone whom I cannot thank personally anymore: my father, who worked and lived for the education of others. For him, education was most important; I wish he could have been here, to see his youngest son graduating. I hope he can see us and if he can, I hope he is proud. I hope he is proud of me, but also of his wife, his other sons, their wives and my girlfriend, and his grandchildren. Thank you, dad, for everything you have done.

Jeroen A.J. ter Heerdt,

Nieuw-Vennep, 6 februari 2008

1. Introduction

Microsoft Corp. has developed a vision that is called the New World of Work. It describes the way individuals, organizations and governments will work in the next ten years, based on three central trends identified in the current world. This New World of Work vision has impact on the way of organizing and working.

Microsoft B.V. (the Netherlands) is the example space for Microsoft worldwide to investigate how the New World of Work will work in practice. This means that Microsoft Netherlands will be transforming to a New World of Work situation soon. The goal is to learn from this transformation in order to make the transformation of other parts of Microsoft easier.

Our study investigates a part of Microsoft B.V., viz. Microsoft Services. Within Microsoft Services we focus on one 'type' of employee, viz. Microsoft Services Consultants. Our study aims at identifying and investigating (future) challenges of Consultants in the New World of Work. This document describes among others the result of this study.

This document is organized as follows. First, an introduction into the organization of Microsoft Services is given (section 2), followed by a more extensive description of the rationale behind this research (section 3). Research questions will be developed in that section. Section 4 introduces the New World of Work, followed by a discussing of Information Workers and Information Work in section 5. Section 5 also establishes a link between Microsoft Services Consultants and Information Workers and presents future Information Worker challenges. A theoretic review of these challenges of Information Workers will be given in section 6. In section 7 the second part of the study is presented, which is an empirical study to investigate the challenges of Information Workers, their causes, effects and countermeasures in practice. Section 8 then presents the results of the empirical study, and section 9 discusses the results. The last two sections (10 and 11) present conclusions of the study and recommendations for future research.

2. Microsoft Services

Microsoft Services is part of Microsoft B.V., the division of Microsoft Corporation in the Netherlands. Apart from Microsoft Services, Microsoft B.V. also includes marketing and sales departments. The goal of Microsoft Services is to provide consulting services for Microsoft solutions to customers, or, officially stated:

> *We help customers realize their full potential through accelerated adoption and productive use of Microsoft technologies.*
> *We are a global team of exceptional people who deliver world class services with partners, earning customer confidence, trust, and loyalty by:*
> - *Improving the overall Customer and Partner Experience*
> - *Serving as the customer advocates within Microsoft*
> - *Driving customer-centric product improvement*

On July 26, 2007 Microsoft Services consisted of 160 individuals, most of them regular employees (127), and "vendors" (27), which are individuals that are hired by Microsoft on a project basis.

The delivery part of Microsoft Services is divided in teams, each focusing on a different part of the IT field, on different types of customers or on a specific group of individuals within an organization, such as senior executives. The teams are:

- Application Development
- Enterprise Strategy
- Infrastructure
- Information Worker
- Project Managers
- Technical Account Managers

The employees in all groups but the last can be characterized as consultants, i.e. providing consulting services to customers.

As stated in the goal of Microsoft Services (see above) Microsoft Services provides services to their customers and partners. Partners help Microsoft Services to implement products in customer organizations. Some examples of customers of Microsoft Services are the top 30 enterprise and public sector organizations. Partners include Avanade, Macaw, Aviva Solutions and Info Support.

Microsoft Netherlands has adopted a progressive strategy in the adoption of the New World of Work vision. From a 'practice what you preach' point of view, Microsoft Netherlands has decided to transform itself into an organization that is ready for the New World of Work. This transformation is done in three dimensions, viz.:

- ***Physical.*** At the time of this writing a new building is being built for Microsoft Netherlands. This building is designed to be New World of Work ready, and is to become a meeting place for employees rather than a place the employees come to in order to be able to do their job.
- ***Mental.*** The New World of Work has a great impact on the way individuals work and relate to colleagues. In order to be successful in the New World of Work, the mindset of employees needs to be changed.
- ***Virtual.*** The virtual world is created by innovations in IT, which are major drivers of the New World of Work. In this last dimension, the changes in IT needed to be ready for the New World of Work are investigated.

3. Research Rationale

In the sections above, the environment in which this study was conducted has been introduced. As described in the section above, Microsoft Netherlands is transforming itself into an organization that is ready for the New World of Work and will be able to show how the New World of Work can work in practice. In order to be able to successfully make the transition from the current way of working to the New World of Work, at this moment, several projects are investigating various aspects of this New World of Work and their impact on Microsoft Services and Microsoft Services Consultants. The current project set out with a rather general goal of investigating how the New World of Work would look for Microsoft Services Consultants and how those people need to be supported. A complete investigation of the New World of Work was out of scope for this study, because of time limitations.

As with every organizational change, managing the resistance to the changes is of paramount importance. One of the reasons for resistance to change is uncertainty about future events (Daft, 2000a). This study aims to reduce this uncertainty by investigating what challenges could arise for employees in the New World of Work. Thus, the overall research question for this study is:

> *What challenges do arise for Information Workers in the New World of Work and what are the causes of these challenges in the job of a Microsoft Services Consultant?*

In this overall research question several concepts are present, viz.: *Information Workers*, the *New World of Work* and *Microsoft Services Consultant*. In the following sections we will investigate these concepts further. Here we only present a short definition.

- ***Information Worker (IW)***: the term Microsoft uses to describe a person working with knowledge inside an organization. It is closely related to the more common term 'knowledge worker'.
- ***New World of Work (NWOW)***: a vision articulated by Microsoft investigating the challenges the current trends in our world present for employees, organizations and governments in the next ten years.
- ***Microsoft Services Consultant***: a Consultant working for Microsoft Services Netherlands, the part of Microsoft B.V. that is doing consultancy for Microsoft solutions.

In order to be able to answer the overall research question introduced above several research questions have been defined

1. What is the New World of Work?
2. What is an Information Worker?
3. What are the most important challenges for Information Workers in the New World of Work and what are the causes, effects of and solutions for these challenges?
4. What does the job of a Microsoft Services Consultant look like and how can Microsoft Services Consultants be related to Information Workers?
5. How do the most important challenges for Information Workers in the New World of Work, as identified, relate to the job of a Microsoft Services Consultant?
6. What are the causes of the most important challenges for Information Workers in the New World of Work, as identified, in the job of a Microsoft Services Consultant?

The following diagram clarifies the way these questions will help to answer the overall research question.

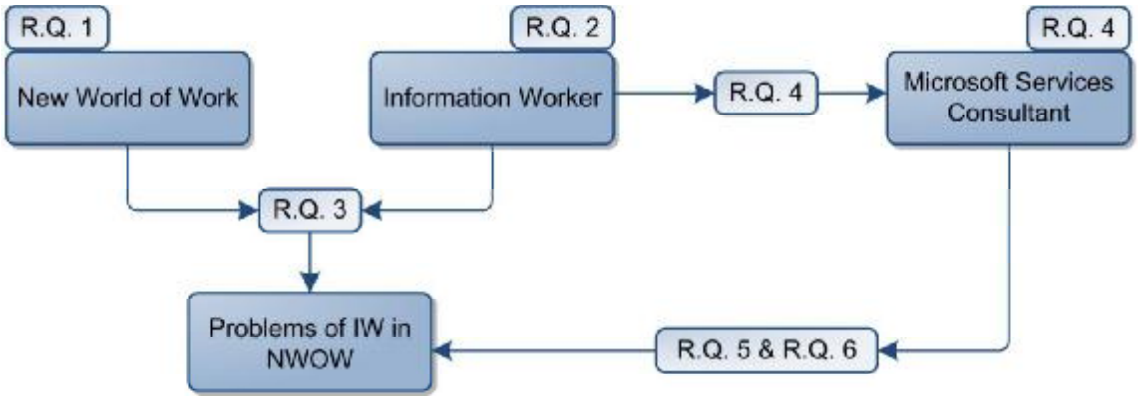


Figure 1 Research questions

As is visible from the diagram above, research questions one, two and four are exploring concepts, namely the New World of Work, Information Worker and Microsoft Services Consultant respectively. Research question 3 investigates the relation between the New World of Work and Information Workers. Research question four investigates the relation between the concepts of a Microsoft Services Consultant and Information Worker, after which research question five and six investigate the relation between Microsoft Services Consultants and the challenges of Information Workers in the New World which are being investigated with research question three.

Research questions one, two and three are theoretical in nature, as they present an investigation and combination of concepts. As such, a literature study is used to answer those questions.

Research questions four, five and six are more practical in nature, as those research questions start with information from daily practice and develop a link between this practice and the theory (see diagram).

For answering research question four, "personas" are used, a descriptive method based on the observation of people. A persona is an archetype of stakeholders with a name and other human characteristics, such as knowledge, experience and character. This seems a suitable method, because Microsoft has successfully used it before, and thus one can assume that the individuals in the Microsoft organization are used to this method. Personas are accepted as a way of making the investigation of users or in general a group of people clearer to readers and easier to discuss. The personas to be developed will be based on real life observation of individuals and are developed in collaboration with the individuals observed. In addition, observations from general experience in the work situation at Microsoft are integrated in the personas.

Research question five and six will be answered by interviewing selected individuals from the group of Microsoft Services Consultants. In these interviews the Consultants will be questioned about the challenges that have been identified in research question three in order to see whether they really are a (possible future) challenge in the job of a Microsoft Services Consultant. By asking Microsoft Services Consultants about whether or not they experience symptoms of the challenges identified, an evaluation of these challenges can be made, indicating whether or not these challenges already are a important challenge or can possibly become a future challenge. If the result indicate that the challenges identified are indeed a challenge for Microsoft Services Consultants the solutions for and countermeasures against these challenges will be of interest for the Microsoft Services organization. Also the interviews will be used to challenge the interviewees to think about effects and countermeasures against these challenges, whereby the effects and countermeasures identified in the literature will be helpful.

The next section will introduce the New World of Work.

4. The New World of Work

The New World of Work (NWOW) is a vision of Microsoft Corp. first articulated by Bill Gates in May 2005 (Gates III, 2005) and detailed by Dan Rasmus (see for example (Rasmus, 2005a)). It identifies and examines three trends in the changing world, investigates the challenges they present for workers, organizations and governments in the next ten years and describes how investments in technology and practices to empower Information Workers can lead to better outcomes. It thereby argues that Information Workers are to become the most important type of workers within an organization. Therefore, the vision mostly focuses on Information Workers. The three trends identified will be discussed below, followed by the four business scenarios identified from the vision's analysis. This section concludes with a discussion of the vision of the New World of Work.

4.1. Trends

The New World of Work identifies three trends, which are discussed below.

4.1.1. Globalization

Globalization is defined by the Encyclopedia Britannica (http://www.britannica.com/eb/article-9344667) as:

> *The process by which the experience of everyday life, marked by the diffusion of commodities and ideas, can foster a standardization of cultural expressions around the world.*

Globalization allows goods, capital, labor and knowledge to flow more freely around the globe, allowing for example outsourcing. People and countries that earlier were unable to produce for and consume of the markets of other countries are enabled to do so by globalization. As such, more people, more organizations and more countries will take part in what is called the global market. Currently the world is experiencing what Friedman in his book "The World is Flat" (Friedman, 2006) calls Globalization 3.0; the third wave of globalization, in which individuals start to collaborate globally, in contrast to the first and second wave of globalization, where countries respectively organizations started to collaborate across borders and across the world.
Globalization brings benefits as well as downsides, and debates about specific results of the globalization are ongoing. For example, there is no consensus about whether outsourcing is beneficial for the western world, or that it may result in a decline in prosperity for the western world.

4.1.2. Demographic Changes

In the near future the Baby Boomers will have reached the age to leave the workforce. As fertility rates around the world are falling below levels necessary to replace the retiring workers, a problem is bound to rise. When there are not enough workers to replace the retiring workers, a shortage of labor occurs. This can be solved by requesting people to stay in the workforce longer or doing more with less people. According to the Dutch *Centraal Bureau voor de Statistiek (CBS;* Central Statistical Bureau) the amount of people aged 50 or older, working more than twelve hours a week has increased by 60.000 between 1996 and 2006, to 195.000. This increase is attributed to demographic ageing (CBS, 2007).
Moreover, the young workers are part of the generation born after 1979, called the NetGen(eration), Generation-Y or Millennials. This generation is very different in behavior on the job and expectations of the job. The combination of older workers working until they are of higher age, and the next generation workers coming to the workforce will result in a workforce where very different generations are present. This has effects on managers and organizations. The NetGen has, for example, a busier private schedule than for

example the Baby Boomers and possibly will request a life-work balanced workplace, which is very different from the 'sixty hour work weeks defined' by the Baby Boomers (Heathfield).

4.1.3. Technological Innovation

Technological innovation is continuing, it is foreseen that technology will make access to people, information and knowledge easier, anywhere and anytime. Technological innovation is allowing people to work remotely. Technological innovation in itself is enabling parts of what above is discussed as globalization; the opportunity for organizations to buy labor where it is inexpensive, of the highest quality or most available. Computing power will probably continue to grow, and devices to unlock and use this power will become cheaper, and thus will come in reach for more people.

Technology allows the work to come to the people rather than the people having to come to the work. This has various implications; the office will become a place to meet colleagues and customers, rather than a place to work. As such, less office space is needed, as employees will likely not be in the office all together at the same time. This also has implications for management and colleagues; specifically, colleagues will not see each other every day in the office and managers will not be able to keep up the practice of 'managing by walking around', simply because the people they manage will not be in the office all the time, although (G. B. Davis, 2002) states that mobile computing expands the reach of managing by walking around. In this view managing by walking around would still be very well possible, even if people are not present in the office.

Bringing work to people instead of bringing people to work will have an impact on the amount of traffic. If people work from their homes, they do not have to travel, which will result in less time wasted in traffic jams. Also, the individuals are more flexible in deciding when to work, and will better be able to combine a job with the task of caring for a child, for example. On the other hand, working from home stresses the need for a good work-life balance, and agreements need to be made about behavioral rules at home.

4.2. Business Scenarios

The New World of Work uses scenario planning and personas to analyze the trends discussed above. Four main business challenge scenarios are identified, which are described below.

4.2.1. One World of Business

The 'One World of Business' scenario is detailed in (Rasmus, 2005c).

Globalization makes the world more economically integrated. Labor, capital, goods and knowledge are more easily transported from one place in the world to another. For organizations, a global world of business has serious impacts; the number of potential customers increases dramatically, as do the number of potential competitors, partners, employees, copycats and organizations influencing the organization negatively and positively. The potential number of governments, legal and governmental rules an organization has to deal with also increases, as an organization starts to sell her products in various countries, recruit employees from various countries and/or set up partnerships with other organizations from various countries.

In a global world of business, collaboration will be of utmost importance. Worldwide collaboration, for example in the form of virtual teams, will become more common. Knowledge will be shared via (digital) channels, among individuals in various countries. Consequently, organizations need to think about what knowledge to share with whom over what channel at which occasion. Security measures for intellectual assets will have to become better (Rasmus, 2005c) and at the same time more flexible, thus protecting the organization's knowledge to unauthenticated disclosure, and allowing stakeholders, such as employees, partners, governments and customers, around the world to access the organization's knowledge. An organization's

firewall is becoming less of a wall and more of a ruin, as more holes (ports) are made (opened) to allow better access to documents and knowledge. There is need for more precise and flexible ways of protecting an organization's information, an improved Information Rights Management (IRM) mechanism.

4.2.2. Always On, Always Connected

The 'Always On, Always Connected' scenario is detailed in (Rasmus, 2006a).

Technological innovation is helping people to whatever, whoever they like (private or work related), whenever, wherever, with the tools they prefer. Wireless networks continue to spread, and mobile devices get more powerful and integrate more tasks (Rasmus, 2006a). This is true for a large part of the world.

The continuous access to information and people to some extent implies the reverse: an individual will also continuously be accessible for others, including other individuals, but also organizations. Privacy issues will then arise, as well as problems with dealing with a lot of information; if it is assumed that when people and organizations have the ability to communicate continuously, they will actually do that, an individual has to deal with more inputs from the environment, some requested, some unsolicited. This raises issues of processing information, prioritizing information for processing, placing information in the right context, etc. These issues are particularly important when one realizes that something that is received as input (data) can only become information after it is combined with some indication of relevance and of purpose: information only becomes knowledge after it is applied, i.e. processed (Tobin, 1997).

An individual's job will be present continuously since the technological innovation will improve access to work related items such as documents and colleagues. In other words, one could decide to work on Saturday in order to make the deadline on Monday. This will mingle work and private life, and as such redefine the boundaries between the two types of life. It is likely that a working individual will not divide his/her week in what we now know as 'normal', i.e. five days filled with eight hours working and the rest private time, followed by two days private time. Individuals will be freer to make their own division of work and private life. In this setting, the responsibility for completing the work lies with the individual. In such a situation, an hour-based reward system becomes inappropriate, as people will work at home. An organization could choose for the other extreme, namely project-based rewarding. When a project-based reward system is used, the responsibility for the amount of work to be done in order to finish the project lies completely with the individual. Also, an individual can choose for himself when and where to work. These developments seem positive, provided that a person has enough self-discipline and self-organizing skills to cope with this new situation.

Having continuous access to computing power and electronic communication networks influences the processes of knowledge work, such as communication, coordination, document sharing, knowledge exchange and collaboration (G. B. Davis, 2002).

4.2.3. Transparent Organizations

The 'Transparent Organizations' scenario is detailed in (Rasmus, 2006b).

Transparency in a business context means that the organization is open about the processes and information in the organization. This openness is directed to governments, customers, partners and other stakeholder organizations. It is important to note that this increased openness will increase the risk of information leaking to organizations or individuals who should not receive this information, and thus increased transparency is a risk to the proprietary information of the organization.

Transparency in organizations is requested by regulation (see for example the Sarbanes-Oxley act, see http://www.soxlaw.com), customers or customer-groups. Transparency is needed to enable close collaboration with partners, which seems to be an important requirement for prosperity in the future. Also, transparency can help to establish a better relationship with customers, thus can be a mechanism to create customer commitment. Moreover, transparency in organizations can result in reworking and reanalyzing the organization's processes to increase efficiency.

4.2.4. Evolution of the Work Force

The 'Evolution of the Work Force' scenario is detailed in (Rasmus, 2005b).

The workforce is influenced by globalization, demographic changes and technological innovation; globalization allows for organizations to seek labor where it is the cheapest, of the highest quality or available in the highest amount. This results in a diverse work force in nationalities and cultures. The workforce is ageing, and there are not enough young employees to replace the employees that have reached the age of retirement. As a result, many older employees stay with the organization. Consequently, the workforce is growing diverse, with very different habits and views to the job and work in general. Technological innovation is allowing people to work anywhere, anytime, resulting in changed relations with colleagues, managers and the organization. Also, information processing capacities are rapidly becoming a important skill in organizations (Tushman, 1978; Whicker, 2004), resulting in the notion that in the near future knowledge workers, or Information Workers will become the most important type of employees. See section 5 for a discussion of Information Workers.

4.3. Discussion

The New World of Work vision is a vision of Microsoft Corp. and thus it 's articulated by a company 'selling' information technology, hardware, software as well as consultancy. As such, it is logical that the New World of Work vision is focused on technology and specifically information technology. IT has been found to positively influence knowledge worker productivity (Gaimon, 1997). Also, IT productivity is a key factor influencing growth in the knowledge worker sector (Gaimon, 1997).
The three trends that provide the foundation for the New World of Work vision are trends that have been recognized widely in the world; the globalization, the recent demographic changes and technological innovation all are trends that are present in academic publications, as well as public discussions and newspapers.
Microsoft is not the only organization that is looking for a way to cope with our changing environment. Interpolis, in the Netherlands, has also gone through a process which bears close resemblance to the New World of Work vision. The project at Interpolis is called '*Helder werken*', which literally means 'Working Clearly' (see http://www.interpolis.nl/overinterpolis/helderwerken/default.aspx (in Dutch)). In short it means improving transparency, both internally and externally. The project has resulted in big changes in the offices of Interpolis, the way Interpolis selects employees, the way Interpolis conducts business and the way people within Interpolis work with each other. In particularly the transparency of Interpolis towards customers has increased.
Gartner Inc. (Austin, 2005) introduces the 'High-Performance Workplace', which bears close resemblance to the New World of Work. For example, collaboration support, content and knowledge management and productivity tools are all elements that are discussed in the New World of Work vision and also are presented as important in the High-Performance Workplace.

In the next section, the central type of worker in the New World of Work, the Information Worker, is discussed.

5. Information Workers

Information Worker is the term the New World of Work vision, and Microsoft itself, uses for an individual working with information or knowledge within an organization. In today's knowledge economy, knowledge-based capabilities are becoming more and more important (Whicker, 2004). Information Workers are the ones within organizations who posses just that: knowledge-based capabilities. The importance of the function of information gathering and processing has already been recognized some time ago, by Tushman and Nadler (Tushman, 1978). Also, several authors stress the need for managing knowledge as a product (Wang, 1998) or even state that knowledge capital is of such importance that it should be listed on the balance of a company (Strassmann, 1999). The Knowledge Worker sector has become important to overall productivity, because of size and growth (Drury, 1999). As Gartner Inc. (Casonato, 2002) puts it: 'The individual owns the key resource of the knowledge economy — tacit and explicit knowledge and most of that knowledge is lost when he or she decides to leave the enterprise'.

5.1. Defining "Information Worker"

Mark Bower, developer Consultant in the Solutions Group of Microsoft Consulting Services in the UK explains that the term Information Worker is not just another name for a Knowledge Worker. He states: "Information Worker is the superset of 3 classes of worker with different information and technology usage characteristics. (…) The Knowledge Worker (…), The Structured Task Worker (…), The Data Entry Worker" (Bower, 2005). In the article by Dan Rasmus about the New World of Work vision a definition of an Information Worker is presented (Rasmus, 2006c):

> *[An Information Worker is] a person who uses information to assist in making decisions or taking actions, or a person who creates information that informs the decisions or actions of others.*

As indicated by (Bower, 2005; Rasmus, 2006c) the term Information Worker is closely related to a more common term in literature: Knowledge Worker. According to (Rasmus, 2006c) "knowledge work, in Drucker's now-classic definition, is too narrow to define the type of work that has evolved over the past 30 years", therefore the term Information Worker is proposed.

In the following sections the term 'Information Worker' will be investigated. As Information Worker is an extension of the term 'Knowledge Worker' the investigation is based on what is known about Knowledge Workers.

5.2. Defining "Information Work"

If the difference between Information Work and Knowledge Work is viewed on literally, the fact that Information Work is regarded as an extension of the term Knowledge Work is contradictory with the view that $\kappa = \iota + \alpha$, where κ is knowledge, ι is information and α stands for application, thus information becomes knowledge after it has been applied to something, such as the job of an individual or the current situation (Tobin, 1997). Although this is an interesting relationship, the meaning for the difference between Knowledge Work and Information Work comes down to a choice of words.

The term Knowledge Worker has originally been introduced by Peter F. Drucker, in 1959, as a differentiator between employees that do not own the means of production, and those who do own their means of production. This latter group is the people the Knowledge Workers; they 'produce' with their brain and 'sell' brain-hours to the organization. By contrast, manual workers typically do not own the factory equipment they

use to produce their output. This way of identifying Knowledge Workers is not very clear, and as a result various augmenting descriptions of Knowledge Workers exist. In particular, Knowledge Work has been defined as a profession, as a characteristic of individuals, as an individual activity and as organizational behavior (see (Kelloway, 2000) for a discussion of these four ways of defining Knowledge Work).

The view of Drucker when defining Knowledge Work is still largely true for Information Workers, as the main means of production is their brain and thus the means of production is owned by the Information Worker.

(Kelloway, 2000) defines Knowledge Work as to comprise the creation, application, transmission and acquisition of knowledge. As such, examples of output of Knowledge Work are: 'analyses, evaluations, instructions, programs, plans, assurances, reasoning or arguments, decisions and action plans' (G. B. Davis, 2002). (G. B. Davis, 2002) describes Knowledge Work as 'human mental work performed to generate useful information and knowledge'. The same author also indicates what Knowledge Workers do to produce their output: '[In doing their work,] Knowledge Workers access data, use knowledge, employ mental models, and apply significant concentration and attention' (G. B. Davis, 2002). Tasks of a Knowledge worker are: *job-specific tasks*, such as preparing a budget, *knowledge-building and maintenance tasks*, such as reading literature, attending professional meetings, and *work management tasks*, such as planning and scheduling work (G. B. Davis, 2002). It is apparent that Knowledge Work productivity depends on the self management capabilities of the Knowledge Worker (G. B. Davis, 2002).

In our opinion, the fact that Knowledge Work productivity is dependent on the self management capabilities of the individual performing the work is also true for Information Work. In fact, it may be that this dependency is even of greater importance than in the situation of Knowledge Work, in a traditional environment, as Information Work in the New World of Work setting may involve increased responsibility on the individual for the choices where to work and when. This increased responsibility increases the need to self management capabilities.

5.3. Differences between Information Workers and other employees

(Kidd, 1994) indicates an important distinction between Knowledge Workers and other employees: 'Companies value knowledge workers for their diversity. Faced with the same phenomena, each knowledge worker provides a different output and it is this variation which is their key benefit to the company' (Kidd, 1994). This expected diversity in output among knowledge workers is very different from the expected homogenous output by manual workers. Also, in the discussion of Knowledge Workers by (Kidd, 1994) it is apparent that Knowledge Workers do their job, which is solving problems and generating output, by using internal 'tools', rather than external. Those tools could be feeling, rules of thumb, experience, knowledge of examples, etc.

In our view, Information Workers are or should be valued like Knowledge Workers, namely for their diversity of output. The fact that Information Work is an activity mostly performed with 'internal tools' implies this diversity of output. Forcing an Information Worker to produce exactly the same output as a colleague, when being provided with identical input, would force the Information Worker to not let his personal characteristics influence the output. Also, forcing an Information Worker to produce exactly the same output at two different moments (now and in a half year from now), when provided with identical input, would be hard to accomplish for the Information Worker, as the individual is likely to have gained new insights and knowledge in the meantime, and thus the individual would have to be exactly aware of which knowledge and insights should not be taken into account. In our opinion, this would not be possible: a human being always, either explicitly or implicitly, combines input with the knowledge already available, feelings and other personal characteristics. Moreover, we view this as a negative thing, as the fact that individuals gain insights and knowledge over time and thus are able to adapt their output is what makes them more valuable for Information Work than robots.

The fact that Information Workers own the means of production and that Information Workers produce different output when faced with the same information poses an important challenge to organizations now and even more in the New World of Work; If a Knowledge Worker leaves the job, the organization loses the means of production, the knowledge collected in that means of production and when hiring a new Knowledge Worker as replacement there is no guarantee that the organization will get the same quality and type of output as the previous Knowledge Worker provided (Kidd, 1994). This is very different compared to manual work. The same is true for Information Workers. This situation is the reason why the New World of Work stresses the need for organizations to retain existing employees and at the same time attract new ones (Rasmus, 2005a, 2005b) and stimulate knowledge sharing between the existing and new employees, in order to minimize the loss of knowledge when employees leave the organization.

Theoretically, a 'pure' Information Worker can exist, i.e. an individual that only performs Information Work related tasks. In our opinion, most Information Workers found in practice will be what (Drucker, 1999) calls 'technologists', i.e. individuals that perform a mix of Knowledge Work and manual labor. An example of a technologist, as presented by (Drucker, 1999) are surgeons. Surgeons have a lot of knowledge, inside their heads; when doing their jobs they use that knowledge and decide what to do with their hands in order to cure the patient.

(Kidd, 1994) discusses two characteristics of the way Knowledge Workers store information. According to the author Knowledge Workers do not depend heavily on stored information. As a result, they do not carry much written information with them as they travel. It seems that Knowledge Workers assimilate information and store it in their heads rather than on paper, as other employees seem to do. This is not to say that they do not have a lot of papers on their desk, but they know by heart what is written on these papers. As such, Knowledge Workers tend to use information on paper to be able to physically manipulate (i.e. move) the concepts in their heads (Kidd, 1994). Also, the pile of papers can be a way of demonstrating output and results of work (Kidd, 1994), as Knowledge Work is mostly tacit, and not visible to others. In our opinion, Information Work follows the same characteristic; it is intangible, and most information is stored in the head of the individual.

5.4. Supporting Information Workers

In this section we investigate how Information Workers can be supported by the organization, by the management and with tools.

5.4.1. Organization and Environment

In order for individuals to engage in Information Work, the environment has to be supportive to this kind of work. (Kelloway, 2000) states that individuals will engage in Knowledge Work when they have the ability, motivation and opportunity to do so. Kelloway sees it as the task of management to establish these conditions. The author identifies several organizational characteristics as potential predictors of ability, motivation and opportunity, such as: culture, job design, social interaction and leadership. In our opinion, the prerequisites for individuals to engage in Information Work are the same as for Knowledge Work. As such, an organization needs to be able to give individuals the ability, motivation and opportunity to engage in Information Work. Partly this is a task of management, since a manager can create the environment needed. In addition to the manager also colleagues can play an important role in the creation of needed prerequisites for engaging in Information Work. If an individual's colleagues are not receptive to thoughts, ideas or suggestions and are unable or unwilling to supply the individual with their thoughts, ideas or suggestions, that individual's Information Work will be negatively influenced. Indirectly, making sure colleagues are also creating the environment needed to engage in Information Work, is a task of the manager as well, since the manager can shape the rules of the environment.

(Drury, 1999) investigates the constraints Knowledge Workers experience in the productive use of Information Technology. The authors divided the constraints Knowledge Workers perceive in five categories, which are listed here in order of importance: infrastructure, technical issues, information, task issues and cost issues. In the infrastructure category, training and management attitude were the most important constraints. In the technical issues category, (lack of) hardware upgrades and technical support were important constraints. Moreover, Knowledge Workers are dissatisfied with the reliability, speed or accessibility of IT. In the category of information constraints, format of information, accessibility of information and quality were the most important issues. In the category of task issues, training was provided as a good solution to problems. Overall, (Drury, 1999) presents the following ranking of solutions: 1) improve training ; 2) improve technical infrastructure; 3) upgrade hardware; 4) improve support; 5) standardize information.

(Drury, 1999) also compare solutions given by the respondents in their study with the solutions frequently discussed in literature. Interestingly, user involvement and participation, which were discussed frequently in literature, were given a low importance by the respondents (Drury, 1999). Also, re-engineering and outsourcing were not considered useful solutions (Drury, 1999).

The finding that improving training is the most important by (Drury, 1999) is supported by (Dickover, 2002), although the author argues that training and learning should be incorporated in the job of an individual. (Dickover, 2002) proposes a learn-while-doing way of training, instead of the more traditional learn-then-do training. (Dickover, 2002) states: 'If we accept the notion that the job is a learning environment, then it is clear how we should go about supporting knowledge workers' job performance: Our learning assets, knowledge assets, and performance support tools must be designed and integrated to support knowledge workers engaged in performing work tasks and solving work problems. At the moment when the knowledge worker needs to find information, generate new skills, access job aids, or engage in conversation, all relevant sources should be available to support them'.

We support the findings by (Drury, 1999) and (Dickover, 2002); in our opinion, training in for example time and information management, is an important countermeasure against hesitation to use Information tools. For example, as the amount of information coming to an individual increases, that individual can become hesitant to using an email program, exactly because of this high amount of information. A training in how to categorize and prioritize information could help reduce this hesitation.

The godfather of the term Knowledge Worker, Peter F. Drucker (Drucker, 1993, 1999), has investigated factors that determine Knowledge Worker productivity. The author argues that it is important to ask the question 'What is the task?', in order to define the task. The answer to this question should be given by Knowledge Workers themselves, because the first problem that has to be solved when starting with Knowledge Work is finding out what the task is, in order to be able to focus on the task (Drucker, 1999). Other important factors the author lists are: *autonomy* (Knowledge Workers have to manage themselves), *continuing innovation as part of the work*, *continuous learning and continuous teaching* (A Knowledge Worker must be able to learn continuously as well as to spread the knowledge the individual already posseses), *quality of output is at least as important as quantity of output*, *Knowledge Workers should be treated as asset instead of a cost* (to make sure Knowledge Workers will 'want' to work for the organization). These findings by Drucker stress the need for self management capabilities even more.

5.4.2. Management

As noted above, most activities that are performed when doing Information Work are performed "inside" the individual doing the Information Work. As such, output is often not visible. Specifically, it is difficult to see the knowledge of an individual that has been refreshed, added of rebuilt inside the individual after, e.g., reading an article or attending a professional meeting. As such, a manager who evaluates individuals by the visible volume of their output will likely have to adapt, as Information Work is less visible than manual work. Moreover, if a

manager needs to see people in order to be able to evaluate whether or not they are doing their job well enough and making enough progress, he/she will also experience problems, because Information Workers can work anywhere, as the main means of production follows them everywhere they go.

(Daft, 2000b) describes changes in the 'paradigm' of management, which is the transition of the vertical organization to the 'learning organization'. This learning organization bears resemblance with what the New World of Work vision describes; global markets, diverse workforce and electronic technology. (Daft, 2000b) states that managers in a 'learning organization' should be focused on customers and employees instead of profits, use a empowering style of leadership instead of an autocratic style, organize for a team based work style, and promote collaborative relationships among employees, instead of a competitive relationship. These findings are applicable to the New World of Work also.

5.4.3. Tools

(Kidd, 1994) gives some pointers on how to effectively support Knowledge Work with (electronic) tools, based on the characteristics of knowledge work introduced in the same article (see section 5.3). The pointers given are:

1) do not try to help the Knowledge Worker by providing a tool that helps to 'understand' information. The Knowledge Workers can do that by themselves, after they are informed;
2) concentrate on capturing and reproducing rather than interpretation. Interpretation will be done by the Knowledge Workers themselves. A tool should help them with saving their input in every way possible;
3) See people as the primary computing devices and let tools present a problem in ways enable humans to process it. Tools should treat presentation as a primary goal rather than a side effect of computation;
4) Knowledge Workers cannot predict what will inform them and how that will be done;
5) Knowledge Workers have a need for labeling, in order to store information electronically;
6) Storing information is not an alternative to being informed by it;
7) Forgetting is not necessarily a bad aspect of humans. Tools do not have to cover this 'habit'.

Tools, whether electronic or not, have been helping individuals with storing and retrieving information, such as document and personal information (Kidd, 1994). It seems that, based on the three characteristics of Knowledge Workers as proposed by (Kidd, 1994) (see section 5.3), Knowledge Workers tend to use (electronic) tools for the visualization of ideas or concepts, whether in words or in drawings, not meaning to save and reuse that quick sketch. The (electronic) tool is then used for sense-making, or 'emptying ones head'. Thus, tools should be enable an individual to quickly make and manipulate a sketch of one or more concepts, in any way, albeit with words or in drawings or any other way, rather than helping a person store and categorize that information.

5.5. Challenges

Various sources discuss problems of Knowledge Workers and Information Workers. Apart from academic literature, Microsoft also identifies problems of Information Workers.

(Drury, 1999) warns: 'future productivity is threatened [by] emerging problems such as stress, strain, anxiety and Information Overload'. Sustaining future productivity of Knowledge Workers is critical for the survival of western companies, because Knowledge Work is the comparative advantage the developed countries have over developing countries, such as India and China (Drucker, 1993, 1999; Friedman, 2006).

(G. B. Davis, 2002) focuses on one part of the future of Knowledge Workers: unlimited access computing. The author lists several possible 'undesirable effects' or challenges of the increased unlimited access computing. Unlimited access computing (presumably) will (G. B. Davis, 2002):

- increase the number of competing demands for attention. An individual may be accepting and processing many interruptions. This habit can lower productivity. Scheduling work becomes of paramount importance.
- blur the boundary between work and private life, and will intrude into the private time of an individual. It is important to keep private time available, because it is needed for rest and renewal.
- increase the amount of information an individual can request. Also the amount of unsolicited information will increase. Too much data will consume the scarce attention of an individual and will negatively influence the decision accuracy. Where managers earlier complained not having enough information, they now have plenty of information, so the challenge becomes to gain insight into what is important and thus needs attention.
- Increase the communication capabilities of an individual, possible resulting in an increase in communications without achieving increased productivity.

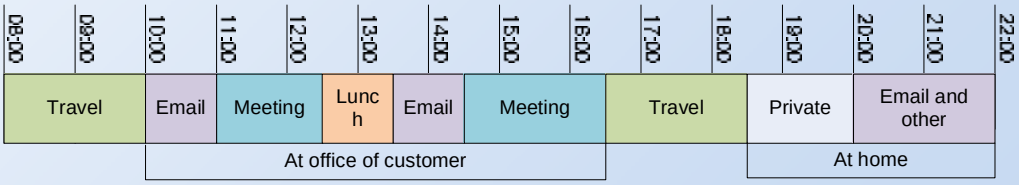
5.6. Microsoft Services Consultants

In this section we will describe the Microsoft Services Consultants. We start the description by presenting a persona. Personas are a descriptive method based on the observation of people, first introduced by Alan Cooper in (Cooper, 2004). A persona is an archetype of stakeholders with a name and other human characteristics, such as knowledge, experience and character. This seems a suitable method, because Microsoft is using it successfully, and thus one can presume that the individuals in the Microsoft organization are used to this method. Personas are accepted as a way of making the investigation of users or in general a group of people clearer to readers and easier to discuss. Personas are used by Microsoft together with scenario's to provide insight into a situation at the customer. The persona used here is shown in Textbox 1 and is aimed at providing a more lifelike introduction to Microsoft Services Consultants. It is based on real life observation of individual and has been developed in collaboration with the individual observed. In addition, observations from general experience in the work situation at Microsoft are integrated in the persona. In Textbox 1 the persona used is shown.

Introducing 'Mathieu'

Mathieu is a 37 year old man, who is married and has young kids. He wears jeans, a shirt, a jacket and sneakers and considers himself a 'techie'. He spends two evenings a week on sports: swimming and tennis. During weekends and other free time he tries to spend as much time as possible with his family and children, although he sometimes also finishes some work on Saturday. Mathieu's wife works in the health care sector, thus her working times are flexible. Mathieu adapts his working schedule to hers.

Mathieu is a Microsoft Services Consultant since 2002, works five days a week, and he has one day off for parental leave every two weeks, normally on Mondays. On that day he has one way traffic with the company: he reads his email, but will not react to them, unless strictly necessary. Also, on that day, he does not answer phone calls from customers, but he does answer phone calls from his manager and colleagues. During holidays Mathieu also reads his email, because he feels he otherwise will miss important information.
Mathieu currently is on a project at two customers of Microsoft, both in the financial sector. He works two days a week for both customers, so totaling four days. One day a week he is what he calls 'flexibly available'. This means he chooses to do the work requesting most attention at that moment. This can result in him working at the office of one of his customers, at the office of Microsoft or at home.
In the figure below a typical day of Mathieu is depicted. At 08:00 Mathieu leaves from home, with a typical two hour drive to the office of the customer. During this drive he makes several phone calls. From 10:00 until 16:30 he is present at the office of the customer, and spends his time with meetings, email and discussion with colleagues. In total, Mathieu spends 6,5 hours at the office of the customer. At 16:30 Mathieu leaves the office of the customer for a two hour drive home, picking up the children from the daycare. The time span 18:30 until 20:00 is labeled 'Private': this is the time Mathieu spends with his family having dinner together and bringing the children to bed. When the children sleep, Mathieu spends another two hours working and goes to sleep at around 22:00. As is visible from this figure, the total amount of hours spent on working for the company, i.e. email, meetings, discussing with colleagues, is 7,5 hours on this typical day (excluding the time spent working while travelling). Of course, the total amount of hours worked will differ from day to day.



As is visible from the figure above, the 'processes' Mathieu executes while performing his tasks are emailing and having meetings. More generalized, this can be seen as communicating, as email is a way to communicate asynchronously with colleagues at Microsoft, customers and private relations. Meetings are an important way of communicating with customers.

Textbox 1 Introducing 'Mathieu' (persona)

In het context of this study Microsoft Services Consultants are individuals working for Microsoft Services, the Netherlands, like Mathieu, see Textbox 1 above. At the time of this writing there are 80 Microsoft Services Consultants, divided in five organizational groups, each with a specific focus. These groups are called: Enterprise Strategy, Application Development, Infrastructure, Information Worker and Project Management.

Microsoft Services Consultants are supporting customers and partners with the use of Microsoft (based) solutions. Microsoft Services Consultants build long term relationships with the customer and they help the customer to reduce the risk of Microsoft IT projects and they can collaborate with the customer on a strategic level.

Microsoft Services Consultants work in a telework setting. All of them have a laptop and can work virtually everywhere, anytime. As a result, office hours are virtually nonexistent. So, in one sense, one could say that

part of the New World of Work is already present in the job of a Microsoft Services Consultant. Microsoft Services Consultants work at various locations, mostly at the office of customers or at home.

Microsoft Services Consultants are mostly male, and the average age is 35. Their education levels are high, most of them have a University degree or equivalent and have a normal to strong IT affinity.

In our opinion, Microsoft Services Consultants are Information Workers. As discussed in section 5, Information Workers are individuals that use information to assist in making decisions or taking actions. Microsoft Services Consultants use information to judge the situation at the customer, investigate the possible actions and choose a course of action. They use their knowledge, the knowledge of colleagues and other experts to make decisions. As such, in our opinion, the problems of Information Workers as discussed in section 6 will be applicable to Microsoft Services Consultants.

In the rest of this document the word *Consultant* will be used as a shorthand for *Microsoft Services Consultant*. Moreover, the word *employer* will be used as a shorthand for *Microsoft Services*, unless it is stated that the word is meant differently. The reason for the use of the general term *employer* instead of the for this situation more specific name *Microsoft Services* is that with using the general term *employer* it is more clear that the remarks are possibly true for the job of a consultant in general, and not specifically for this situation and this type of consultants.

5.7. Information Worker Problems

In this section we will discuss the Information Worker challenges that, in our opinion, are the most relevant to both individuals and organizations in the New World of Work. These challenges will be investigated in literature in section 6 and will be investigated in practice in the empirical part of this study (section 7 and further).

5.7.1. Information Overload

Organizations and individuals working in those organizations are exposed to ever increasing amounts of data they are required to process (Tushman, 1978) due to increased connectivity, increased use of IT, etc. Individuals and thus organizations, however have a limited information processing capacity. This gives rise to an important challenge: coping with Information Overload, i.e. the situation that the information processing requirements exceed the information processing capacities. The problem of Information Overload has been noted by (G. B. Davis, 2002) and by (Drury, 1999) as a challenge posed by unlimited access computing.

5.7.2. Lack of Control over Information

Technological innovation in the field of IT has made it possible for individuals and organizations to store, transmit and manipulate enormous amounts of information. Whilst this made the existence of whole new ways of doing business possible, it also poses threats, as the information systems that store the information are vulnerable to unauthorized access.

On one hand, organizations are challenged to protect their information from outsiders, as increased connectivity and unlimited access computing have made organizations more flexible but also weaker; an employee is able to access information from within the organization anywhere or take it with him/her. This is indeed making the organization more flexible, but also more vulnerable, since information is transmitted over various, possibly insecure networks.

On the other hand, due to several scandals, governments and customers are requesting more insight in the way an organization conducts its business and in the financial statements. This corporate governance has been made effective in the law of various countries, see for example the Dutch 'Tabaksblat code' (see

http://www.commissiecorporategovernance.nl/ (in Dutch, also available in English)) and the 'Sarbanes Oxley act' (see http://www.soxlaw.com).

Thus, organizations are challenged to balance between on one hand protecting their information against unsolicited access and on the other hand providing enough transparency to governments and customers. This challenge is even more complicated when organizations start to operate globally; the organization then has to deal with many, possibly very different, governments, legislations and other interests

These challenges are also influencing the individuals within organizations, as they will presumably be required to give more insight in the way they work so the organization as a whole can meet the demands posed by governments, customers and other stakeholders. In our opinion, Information Workers are highly affected by this situation, as Information Workers store, process and hold relatively big amounts of information when compared to other types of employees within an organization.

5.7.3. Lack of Networking Support

Increasingly, organizations are operating globally, with employees working in various countries. This has enabled round-the clock operating, enabling an organization to continue to produce their products and help their customers 24 hours a day. Organizations are becoming virtual organizations, with (global) virtual teams as their primary way of organizing collaboration. A (global) virtual team poses interesting challenges to individuals working within the team; how can you trust someone and collaborate with that person when you have never met the person and possibly never will? How will you search for and find information within the organization you are working for if you are working in a different country? How will you get information about important changes in the policies or information about that organization if you are working in a different time zone?

Not only are organizations increasingly operating globally, employees also increasingly request more flexible work situations, such as a telework setting or flexible office hours. When this happens within an organization, employees can experience difficulties connecting to colleagues and getting information. This happens for example when they work in a different location than their colleagues (teleworking) or they work on a different moment than their colleagues (flexible office hours). Employees can have difficulties creating and sustaining a network with colleagues, the organization and private contacts. These difficulties will need to be solved, i.e. there is a need for what we call Networking Support.

5.7.4. Future tools and Information Worker problems

Microsoft believes that in order to be able to succeed in the New World of Work organizations need to empower 'people through the right training and the right tools to better handle the information that the global information based economy relies on. (...) The Information Worker tool set must evolve to meet new challenges caused by the changing work environment.' (Rasmus, 2005a) . In the vision of the New World of Work, these future tools will help workers and organizations to:

- Reduce Information Overload
- Enable team collaboration
- Enable inter organizational collaboration
- Manage communication channels
- Support rich presence
- Help workers find the right information
- Spot trends for business intelligence
- Use insights to optimize structured workflow

In Table 1 the relations between these characteristics of Information Worker tools of the future and the challenges of Information Workers as described in above are shown. As visible from Table 1, Lack of Networking Support and Lack of Control over Information are addressed most, closely followed by Information Overload.

Characteristic of tool	Information Worker Challenges		
	Information Overload	Lack of Control over Information	Lack of Networking Support
Reduce Information overload	✔		
Enable team collaboration		✔	✔
Enable inter-organizational collaboration		✔	✔
Manage communication channels	✔	✔	✔
Support rich presence	✔		✔
Help workers find the right information	✔	✔	✔
Spot trends for business intelligence			
Use insights to optimize structured workflow		✔	

Table 1 Challenges and future tools

5.7.5. Conclusion

The New World of Work poses significant challenges to Information Workers and the organizations the Information Workers work for. The three main challenges, Information Overload, Lack of Control over Information and Lack of Networking Support, will be investigated in theory in section 6. In this investigation we will develop an understanding of the challenges, their causes and effects and possible solutions for the challenges. In the table above we have already investigated what, according to the New World of Work vision, are characteristics of future tools and how these will help address the challenges (see Table 1). Still, in order to investigate whether or not these challenges are important in practice, we will investigate these challenges in the situation of Microsoft Services Consultants. This empirical study will be presented in section 7 and beyond.

6. Information Worker Challenges: Theoretic Review

In this section we will investigate the main challenges of Information Workers, as introduced in the sections above. We will explore the current knowledge on the subjects, looking for a description of the challenge, the causes, the effects and the solutions. Finally, we will present a preliminary model showing our current understanding of these challenges.

6.1. Information Overload (IO)

6.1.1. The Concept

As early as 1956, Miller introduced the concept of the 'magical number seven', which describes that people are limited in the capacity of information they can receive, remember and process in a given time (Miller, 1956).

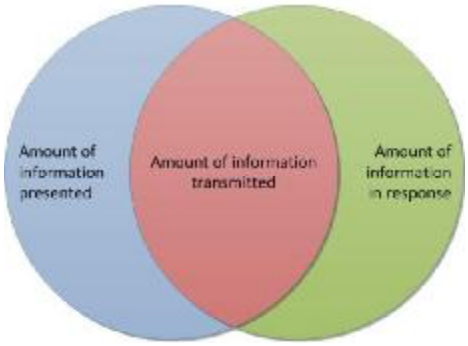


Figure 2 Communication Channel

Although the outcomes of the research by Miller have later been questioned, for example by (Owen, 1992), the central notion still stands: people can be seen as a 'communication channel', schematically depicted in Figure 2. The left circle in this figure is the amount of information presented to the person, and the right circle is the amount of information in the person's 'response', which can be for example a decision, a report, or an opinion. The overlap can been seen as the amount of information transmitted, thus as the amount of information a person actually uses in creating the 'response' (Miller, 1956). Miller notes that if the amount of information presented is increased, the amount of information transmitted will also increase, up to some point where it will level off. This point is called the 'channel capacity' (Miller, 1956).

6.1.1.1. Inverted U-curve

According to Eppler et al., later research by Schroder et al. in 1967, has introduced a view on Information Overload that is generally referred to as the inverted U-curve (Eppler, 2004), which is reproduced in Figure 3. In this figure it is depicted that when information load increases decision accuracy will presumably increase, up to a certain maximum. From that point on the decision accuracy will decrease. Although in Figure 3 decision accuracy is plotted on the vertical axis, it is applicable to other situations. This representation of information load bears close resemblance with the 'channel capacity' as introduced by Miller (see above). In fact, the inverted U-curve of Information Overload is the same as what Miller states, except that it goes one step further, as the inverted U-curve shows that the decision accuracy, or response quality, will decrease after the 'channel capacity' has been reached.

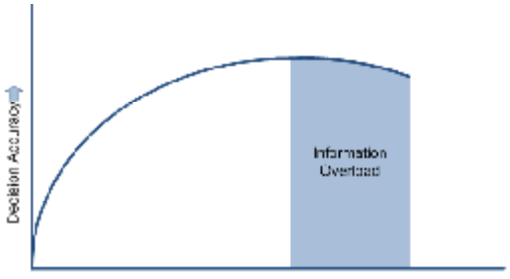


Figure 3 The inverted U-curve of Information Overload (adapted from (Eppler, 2004))

Generally the inverted U-curve is taken as a representation of the first important description of Information Overload (Eppler, 2004). The limitation shown in Figure 3, combined with an increase in the amount, complexity and diversity of information available can, according to Bawden et al., result in a state of

Information Overload, which 'is usually taken to represent a state of affairs where an individual's efficiency in using information in their work is hampered by the amount of relevant, and potentially useful, information available to them' (Bawden, 1999). In ordinary language the term 'Information Overload' is used to describe a state of 'receiving too much information' (Eppler, 2004).

6.1.1.2. Definitions

Information Overload can be defined in various ways. One classic definition is based on the information-processing view of organizations as proposed by Galbraith and discussed in (Tushman, 1978). In this definition the information processing capacity of an individual is compared to the requirements set for the information processing. The following formula then describes the situation of Information Overload: $\gamma = \rho > \sigma$ (Eppler, 2004), or, $\gamma = \rho - \sigma$, where γ is the Information Overload, ρ represents the information processing requirements, i.e. the amount of information that has to be processed within a certain time period, and σ represents the information processing capacities available in the time period (Eppler, 2004). Thus, Information Overload is the difference between the requirements set for information processing and the capacities of information processing available. If the requirements posed are higher than the capacities available a situation of Information Overload will occur. In accordance with this definition Schick et al. (Schick, 1990) stress time as a 'critical and scarce resource' (Schick, 1990) regarding the Information Overload problem.

In other studies (for example in (Keller, 1987)) it is proposed that information has 'at least two dimensions, quantity and quality, and these two dimensions have opposing influences on decision effectiveness' (Keller, 1987). The quantitative dimension of information holds the amount of information that has to be processed in a given time period (ρ), and the available information processing capacity in the given time period (σ) (Eppler, 2004). (Keller, 1987) concludes that decision effectiveness increases and levels off at a certain point as the amount of information available increases, while the average quality level of the information is kept at the same level. The quality dimension of information has been explored by others; according to (Eppler, 2004) by Schneider, 1987, who 'distinguishes various information attributes, such as the level of novelty, ambiguity, uncertainty, intensity, or complexity. These information characteristics or quality attributes can either contribute to overload or reduce it' (Eppler, 2004). Related to the quality of information is the value of information. An interesting model is the value added model of information as proposed by (Simpson, 1995). This model proposes five groups of elements of value in information, named *Truth* (accuracy, validity), *Guidance* (solution identification, problem awareness), *Scarcity* (originality, creativity), *Accessibility* (knowledge of location, ease of access) and *Weight* (relevance, timeliness, medium). In a context of business, the most important group of elements is Weight, because when an item of information has enough weight, this creates a need for decisions and actions (Simpson, 1995).

Information overload can occur when a person:

- does not understand available information
- feels overwhelmed by the amount of information to be understood
- does not know whether certain information exists
- does not know where to find information
- knows where to find information, but does not have the key to access it

Textbox 2 Reasons for Information Overload (adapted from (Nelson, 1994))

Another view on Information Overload is presented by Nelson (Nelson, 1994). The author lists various reasons why Information Overload can occur to a person, which have been adapted from Wurman, 1989. The list is depicted in Textbox 2. These issues can be linked to other viewpoints, presented above. The first reason listed in Textbox 2 can be caused by a high complexity or ambiguity of the information. The second reason is mainly

the amount of information (the quantity dimension, or ρ). The third, fourth and fifth reasons bear close resemblance with what Simpson and Prusak (Simpson, 1995) call *Accessibility of information*. Interestingly, Nelson finds information quantity as one of the mean reasons for feelings of Information Overload (Nelson, 1994).

6.1.1.3. New or old phenomenon?

Looking at the time span of articles about Information Overload, it seems clear that Information Overload is not a new phenomenon. Moreover, Noyes and Thomas (Noyes, 1995) point out that as early as in 1880 a desk was promoted as being a solution for storage and filing of books and papers. This seems to indicate that the challenge of Information Overload is not new. But, on the other hand, the amount of information available to a person has significantly increased in more recent years, partly due to advances in telecommunication, such as Internet and email. For example, if one compares the situation that Peter J. Denning describes in his 1982 ACM President's Letter titled 'Electronic Junk' (Denning, 1982) to the situation of a person that is now in the workforce in an knowledge worker job, it seems that the information coming towards a person, either pushed or requested, has increased. Denning describes his situation in 1982 as follows: 'In my own situation, which is not unique, I must deal with a constant barrage of information. In one day I typically receive 5-10 pieces of regular junk mail, 15-25 regular letters, 5 pieces of campus mail, 5 reports or documents (...), 5-10 incoming phone calls, 10-20 local electronic messages, and 10-20 external electronic messages' (Denning, 1982). In the 1999 study by Bawden et al. (Bawden, 1999), out of 30 respondents to the question 'I have more information than I can cope with', 17 agreed or strongly agreed, 8 disagreed, and 5 were neutral. IT works as a 'two-edged sword'; it has caused part of the problem, but also provided ways to cope with the increased amount of information (Bawden, 1999).

6.1.2. Definition of the Concept of Information Overload

The section above (6.1.1) has presented several views on Information Overload as well as several definitions of the concept. Based on this overview, we define Information Overload as:

> *The perception of the mismatch between information processing capacities and information processing requirements.*

This definition captures an important notion, namely that Information Overload is a perception, and thus subjective. Also, this definition leaves room for an interpretation on both an individual and organizational level.

6.1.3. Causes of Information Overload

Eppler et al. (Eppler, 2004) provide an analysis of the causes of Information Overload. The authors relate the reasons for Information Overload to five constructs, as shown in Figure 4. The five constructs are interrelated, and usually Information Overload is caused by a mix of the five causes (Eppler, 2004). The constructs influence the information processing requirements ρ and the information processing capacities σ, as introduced above (section 6.1.1) (Eppler, 2004). Eppler et al. place the organizational design of a company as the most important factor influencing Information Overload. Changes in organizational structure, for example decentralization or centralization can lead to a greater ρ because of the need for more intensive communication and coordination (Eppler, 2004).

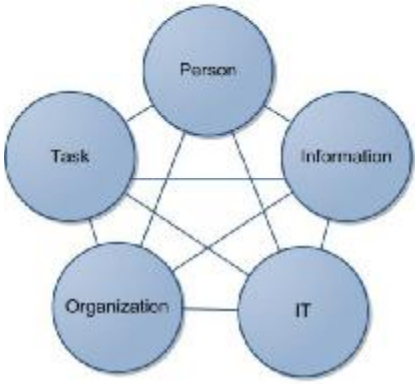


Figure 4 Causes of Information Overload (adapted from (Eppler, 2004))

Various other authors (Schick, 1990; Tushman, 1978), in contrast, show that better coordination through (communication) standards, standard procedures, etc, result in a lower ρ and a higher σ.

According to Eppler et al., the next important factor is the information itself. Here, not only the amount of information is important ((Jacoby, 1984) argues that when the number of information items rises, information load is increased), but also the characteristics, such as the level of uncertainty, ambiguity, novelty, complexity and intensity (Eppler, 2004). Simpson and Prusak (Simpson, 1995) add more elements of value in information to this, such as accuracy, relevance, timeliness, etc. Also, the authors argue that improving the quality, by improving the value, of the information can improve a person's σ. Sparrow (Sparrow, 1999) indicates that information that is of low quality, not relevant, or ambiguous will result in higher load when a person has to deal with the information. (Bawden, 1999) states that it 'is tempting and usual to assume that a major contributing factor (...) is the TMI effect: too much information', but also the increasing 'diversity' of the information is a factor. This diversity can occur both in the form in which the information is presented, and in the nature of the information itself (Bawden, 1999). (Ho, 2001) identifies three dimensions of information in the context of Information Overload, namely quantity ('too much information'), quality ('low quality of information') and format ('diverse formats of information').

The third important element Eppler et al. indicate is the person working with the information. In various older studies it is simply stated that a person's capacity to process information is limited (see for example (Jacoby, 1984; Tushman, 1978)). More recent studies provide a more detailed analysis of the factors limiting a person's σ. (Swain, 2000) suggests the level of experience of a person is a limiting factor and (Owen, 1992) identifies personal skills as a limiting factor. Hiltz and Turoff (Hiltz, 1985) suggest that the experience a person has with the system that provides the information will increase a person's σ. Individuals must learn screening skills, and beginners tend to read everything, thus increasing information load (Hiltz, 1985). (Maes, 1994) suggests that individuals do not change their habit of interaction with computers fast enough to keep up with the technological developments.

Another important factor is the task that is associated with the information, for example the processes that need to be followed while making use of the information (Eppler, 2004). If the process is complex and not routine, the information load will be higher, and the time pressure will also increase (Grisé, 2000; Schick, 1990), thus increasing the ρ. Interruptions are also influencing the way information is perceived, used and processed (Speier, 1997), as they force the individual to switch attention between various things. Having to do things in parallel can also result in a lower σ (O'Reilly III, 1980). (Bawden, 1999) indicates that the changing nature of work being carried out by individuals can also be a reason for an increasing information load, as well as the so-called 'disintermediation' of searching for information; people are more and more supposed to find the information they need on their own. This seems to agree with the trend toward knowledge work visible in the modern society (Beardsly, 2006; Johnson, 2005; Rasmus, 2005a).

The last factor Eppler et al. indentify is information technology. Eppler et al. state that the 'use and misuse [of information technology] are a major reason why Information Overload has become a critical issue in many organizations in the 1980s and 1990s' (Eppler, 2004). Examples of misuse of e-mail are needless 'cc-ing' of messages, huge mailing lists, and spamming (Bawden, 1999). IT has helped to cope with information load, but at the same time created (part of the) problem (Bawden, 1999; Schultze, 1998). For example, e-mail is an asynchronous way of communication, thus the need for direct reaction is suggested to have a smaller interference with normal work (Edmunds, 2000). On the other hand, other authors suggest that the instant notification of an arrival of a new email message, which has been build in into many e-mail systems, results in a high number of interruptions (Speier, 1997) and create the need for immediate answer to the arrived e-mail. Findings from the research of Speier et al. (Speier, 1997) suggest that these features should be disabled. Also, Edmunds and Morris (Edmunds, 2000) state that a push mechanism for selected information increases the amount of potential irrelevant information a person has to deal with. On the other hand, the same authors

indicate that using a push mechanism for information reduces the time needed to retrieve the information. (Schultze, 1998) gives a number of technical reasons for Information Overload, viz.: the increase in storage capacity, the lowering of costs for duplication of information and the increased speed of access to information. Edmunds and Morris add that the usage of various channels for the same content is also increasing information load (Edmunds, 2000).

Edmunds and Morris list seven reasons why managers collect too much information, and thus risk becoming overloaded. The reasons are listed below. The person (Edmunds, 2000):

- collects the information to show a commitment to rationalism and competence, because they believe that improves decision making;
- receives high amounts of unwanted or unrequested information;
- uses information to check information they already have;
- feels a need to justify their decision, and use information to do this;
- collects information, just in case it may prove useful;
- wants to play safe and use all information possible;
- uses information as a currency - not to get left behind.

(Eppler, 2004) provides a table listing various causes of Information Overload, reproduced with permission of the original authors in Appendix 1.

6.1.4. Discussion of the Causes of Information Overload

The factors playing a role in the occurrence of Information Overload can be divided in five categories, namely: person, information, task, organization and IT. Typically, the cause of Information Overload is a combination of one or more factors from one or more categories. Some much-noted causes of Information Overload are: number of items of information has increased, increased use and misuse of IT such as email and increased complexity of tasks.

Category	Cause of Information Overload
Personal factors	• Limitations in the individual human information-processing capacity
	• Decision scope and resulting documentation needs
	• Motivation, attitude, satisfaction
	• Personal traits (experience, skills, ideology, age)
	• Personal situation (time of the day, noise, temperature, amount of sleep)
	• Senders screen outgoing information insufficiently
	• Users of computer adapt their way of interacting with computers too slowly with respect to the technological development
	• Social communication barriers break down

	• The person
	  • collects the information to show a commitment to rationalism and competence, because they believe that improves decision making;
	  • receives high amounts of unwanted or unrequested information;
	  • uses information to check information they already have;
	  • feels a need to justify their decision, and use information to do this;
	  • collects information, just in case it may prove useful;
	  • wants to play safe and use all information possible;
	  • uses information as a currency - not to get left behind.

Information characteristics	• Number of items of information rises
	• Uncertainty of information (info needed vs. info available)
	• Diversity of information and number of alternatives increase
	• Ambiguity of information
	• Novelty of information
	• Complexity of information
	• Intensity of information

Category	Cause of Information Overload
	• Dimensions of information increase
	• Information quality, value, half life
	• Overabundance of irrelevant information
	• Incremental decreases in decision effectiveness due to additional information quantity are greater than the incremental increases in decision effectiveness due to additional information quality
Task and process parameters	• Tasks are less routine
	• Complexity of tasks and task interdependencies
	• Time pressure
	• Task interruptions for complex tasks
	• Too many, too detailed standards (in accounting)
	• Simultaneous input of information into the process
	• Innovations evolve rapidly – shortened life cycle
	• Interdisciplinary work
Environment	• Too many inputs from the environment
	• Inputs follow each other too fast to enable processing
	• The quantity of information produced is too high
	• Failure to create 'high quality' information
Organizational design	• Collaborative work
	• Centralization (bottlenecks) or disintermediation (information searching is done by end users rather than by information professionals)
	• Accumulation of information to demonstrate power
	• Group heterogeneity
	• New information and communication technologies (e.g. groupware)
	• Pursuing a number of tasks simultaneously, resulting in a tendency to ask for more information than strictly needed
	• Pressure and distraction
Information technology	• Push systems
	• E-mails
	• Intranet, extranet, Internet
	• Rise in number of television channels
	• Various distribution channels for the same content
	• Vast storage capacity of the systems
	• Low duplication costs
	• Speed of access
	• Computers communicate solely by graphical output, straining our visual sense
	• Use and misuse of IT

Table 2 Causes of Information Overload ((Eppler, 2004), reproduced and extended with permission from the authors]

6.1.5. Effects of Information Overload

Information Overload has impacts on various parts of organization and on people. A study by Reuters (Reuters, 1996), indicates that:

- two thirds of managers believed that Information Overload has caused lower job satisfaction;
- two thirds of managers believed that Information Overload had negatively influenced their personal relationships;
- one third of managers believed that Information Overload had damaged their health;
- almost half of the managers believed that Information Overload had delayed or negatively affected important decisions.

The effects of Information Overload have been analyzed on two levels: the individual and organizational level.

(Milgram, 1970) has investigated the signal overload for people living in large cities. The results from this study identify six reactions people frequently showed in reaction to the (almost) constant exposure to heavy

information load, namely: 'allocation of less time to each input, disregard of low priority inputs, redrawing of boundaries in some social interactions to shift the burden of overload to the other party of the exchange, reduction of inputs by filtering devices, refusal of communication reception (via unlisted telephone numbers, unfriendly facial expressions, etc.), and finally creation of specialized institutions to absorb inputs that would otherwise swamp the individual' (Eppler, 2004). (Malhotra, 1984) states that consumers who become overloaded with information will be confused, experience cognitive strain and other dysfunctional consequences. Information anxiety, which is a feeling of 'drowning' in a sea of information, is also a possible consequence of Information Overload (Sparrow, 1999).

If these reactions would be the same for people in an organizational context, results could be disastrous. Several authors have investigated the effects of Information Overload on the individual level in organizational contexts. Interesting effects that have been identified are:

- cognitive strain and stress (Schick, 1990; Sparrow, 1999; Stanley, 1997);
- lack of perspective (Schick, 1990);
- a lowered job satisfaction (Jacoby, 1984);
- a greater error-tolerance (Sparrow, 1999);
- ill-health (Stanley, 1997);
- a desire or need to leave the job (Stanley, 1997);
- feelings of inability to cope (Sparrow, 1999);
- feelings of inadequacy of knowledge (Sparrow, 1999);
- an inability to use information to make a decision – paralysis by analysis as (Eppler, 2004) calls it.

(Hiltz, 1985) presents a list of effects of Information Overload by Sheridan, 1974. The authors state that for either the traditional or the electronic context in which Information Overload occurs the basis responses are the same; 'individuals might (Hiltz, 1985):

- fail to respond to certain inputs,
- respond less accurately than they would otherwise,
- respond incorrectly,
- store inputs and then respond to them as time permits,
- systematically ignore (filter) some features of the input,
- recode the inputs in a more compact of effective form, or,
- quit (in extreme cases). '

According to (O'Reilly III, 1980), there is evidence that higher amounts of relevant information will lead to better decision making performance, and that higher amounts of irrelevant information will negatively influence a person's ability to identify the relevant information and thereby reduce decision making performance. This is also supported by the results from a study by (Hwang, 1998). It is striking that people tend to use and seek more information than required. This results in lowered decision making performance, but the person is more confident in and satisfied with the decision (O'Reilly III, 1980).

(Jacoby, 1984) states that 'there is evidence to suggest that increases in information load can make processing more time consuming and can also cause consumers to pay less attention to relevant information (...). At least in these respects, high levels of information load are dysfunctional'. Regarding this, the rather unique viewpoint (Hansen, 2001) takes is very interesting; if information is so omnipresent in organizations that people get overloaded, attention will become a scarce resource. Producers of information then have to compete with each other for this scarce resource. The authors develop strategies for gaining attention. Maybe an investigation of the ways information producers, albeit systems, persons, organization subunits, institutions or anything else, compete for this information can shed an interesting light on the state of information

distribution in organizations. This investigation could for example result in a conclusion that too many information producers use the same way of presenting the information and that in that particular organization agreements need to be made about which producer uses what communication channel to present which information, thus creating a more transparent view of the information available, and giving consumers the ability to make a more estimated guess of which information to find where and how.

According to (Sparrow, 1999) managers tend to 'punctuate' the flow of information when trying to cope with a high volume of information. As (Sparrow, 1999) puts it: 'This "punctuation" begins with omission, then greater tolerance of error, miscuing or misattributing the source of information, filtering its message, abstracting its meaning, attempting to use multiple channels to decode and transmit its content, and finally through seeking escape'. The habit to filter a message and abstracting its meaning until only a bare minimum in volume of the information is left, is what became known as the 'PowerPoint-syndrome'.

(Swain, 2000) approaches Information Overload from the viewpoint of information search strategies. As the amount of information associated with a task of making a choice increases, the proportion of total information search decreases and the information search variability increases. Also, the search strategies used are becoming more intra dimensional, focusing on evaluations across dimensions, rather than across alternatives (Swain, 2000).

At the organizational level, (Sparrow, 1999) states that managers become blinded to more important matters and give their attention to irrelevant issues. More time is devoted to the process of information search, and too little to processing and learning from the information found. (Sparrow, 1999) states: 'a key management challenge is to find ways to utilize the available brain power of the organizations' employees whilst not getting them bogged down under a welter of data'. (Ho, 2001) indicates that business productivity is negatively affected by Information Overload

If employees are suffering from Information Overload this can result in (Eppler, 2004):

- loss of control over information
- higher time requirements for information handling, and time delays
- lowered Decision accuracy and quality
- inefficient work
- demotivation
- negatively affected satisfaction

(Eppler, 2004) provides a table listing various effects of Information Overload, reproduced with permission from the original authors in Appendix 2.

6.1.6. Discussion of the Effects of Information Overload

Information Overload has effects on the individual as well as on the organization level. Generally, when an organization's employees suffer from Information Overload, this will result in time delays, inefficient work and demotivation. For an employee having to cope with situations where Information Overload is always or almost always present can be a reason to quit the job. Moreover, an individual's mental health can be affected. In Table 3 the effects of Information Overload on the individual level that can have an effect on the organizational level are shown. As is visible from this table Information Overload can have many serious effects, such as delays in performing tasks, stressed employees and an increased possibility of losing employees. Therefore it is important that organizations are aware of what Information Overload is (discussed in section 6.1.1), what the causes of Information Overload are (discussed in section 6.1.3) and what could be applicable solutions for Information Overload (discussed in section 6.1.7).

Individual Effect	Organizational Effect
Higher time requirements for information handling and time delays	The time needed to process information increases, thus processes are slower
Abstraction and necessity to give meaning lead to misinterpretation	Possibility of faulty interpretation of important information
Decision accuracy/quality lowered	Decisions made are of less quality
Decision effectiveness lowered	Decisions made are less effective
Inefficient work	The time needed to perform a task increases
Potential paralysis and delay of decisions	Decisions are delayed
Demotivation	Demotivated employees
Satisfaction negatively affected	Unsatisfied employees
Stress, confusion, and cognitive strain	Stressed employees
Lack of learning since too little time is at disposition	Employee learning is hampered
Greater tolerance of error	Increased possibility of using erroneous information
Sense of loss of control leads to a breakdown in communication	Communication among employees will be slower
Ill health	The health of employees is negatively influenced, resulting in increased time off the job
Desire or need to leave the job	Increased possibility of losing employees

Table 3 Effects of Information Overload on individual and organizational levels (adapted from (Eppler, 2004))

Information Overload has many possible effects, shown in Table 4. This table is an extension of the work by (Eppler, 2004) and is reproduced with permission from the authors. In Appendix 2, the table of effects of Information Overload is shown, together with the references to the articles.

Category	Effect of Information Overload
Limited information search and retrieval strategies	• Search strategies through information sets become less systematic (this is less true for more experienced searchers)
	• Limited search directions
	• Move from compensatory search patterns to noncompensatory search patterns
	• Identification and selection of relevant information becomes increasingly difficult
	• Difficulties to reach target groups (sender perspective)
Arbitrary information analysis and organization	• Overlapping and inconsistent information categories
	• Ignore information and be highly selective (omission)
	• Loss of control over information
	• Lack of critical evaluation (become too credulous) and superficial analysis
	• Loss of differentiation
	• Relationship between details and overall perspective is weakened and peripherical cues get overestimated
	• Higher time requirements for information handling and time delays
	• Abstraction and necessity to give meaning lead to misinterpretation
Suboptimal decisions	• Decision accuracy/quality lowered
	• Decision effectiveness lowered
	• Inefficient work
	• Potential paralysis and delay of decisions
Strenuous personal situation	• Demotivation
	• Satisfaction negatively affected
	• Stress, confusion, and cognitive strain
	• Lack of learning since too little time is at disposition
	• Greater tolerance of error
	• Lack of perspective
	• Sense of loss of control leads to a breakdown in communication
	• False sense of security due to uncertainty reduction (overconfidence)

Table 4 Effects of Information Overload ((Eppler, 2004), reproduced and extended with permission from the authors)

6.1.7. Countermeasures and Solutions

Solutions to problems should in general not only attack the effects of the problem, but also try to reduce the causes of the problem in order to have not only a softening but a real curing effect.

(Schick, 1990) uses a tree diagram to investigate (mostly organizational) countermeasures to reduce the likelihood of Information Overload, which is depicted in Figure 5. Although some of the countermeasures proposed here are outdated and not all countermeasures proposed in the literature are visible in the tree, the decomposition of the options available in an organization is very clear.

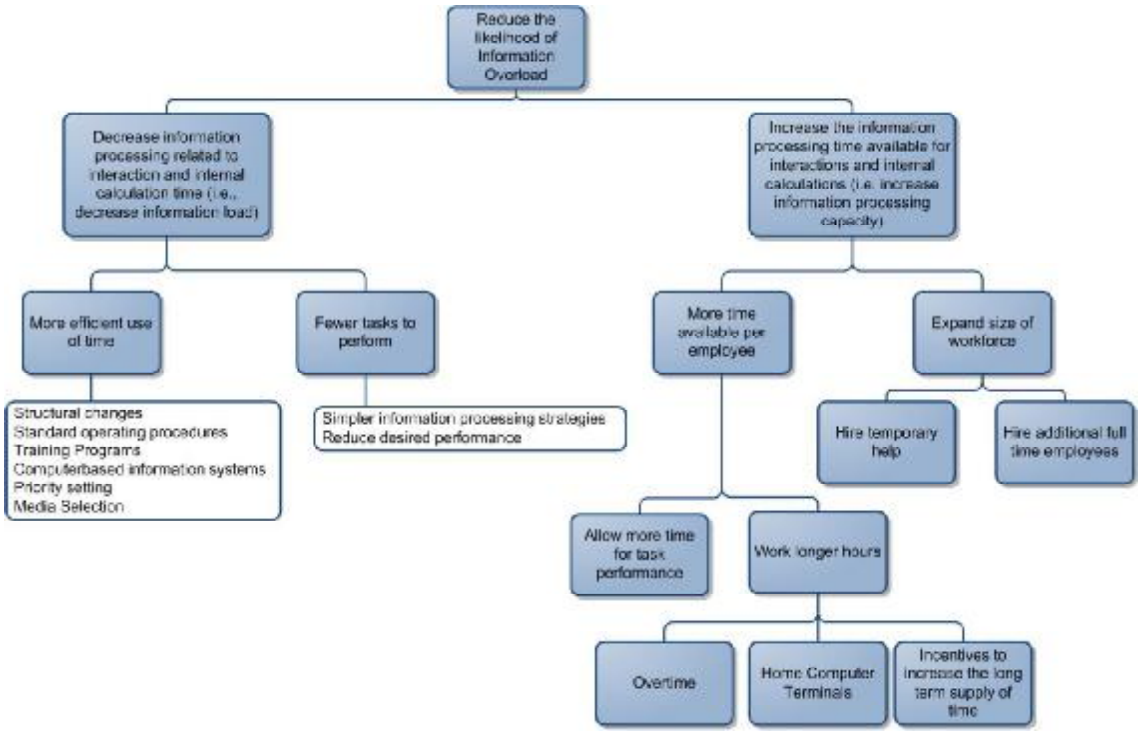


Figure 5 Strategies to reduce the likelihood of Information Overload, adapted from (Schick, 1990)

(Eppler, 2004) divides countermeasures to Information Overload in the same five categories as the authors used for the analysis of the causes of Information Overload, namely: information, individual, organizational design, process and information technology. We will adopt this structure.

6.1.7.1. Information

(Simpson, 1995) proposes that information should be carrying more value than it is now and should be delivered in the most convenient way and format. The authors have developed a model of the value of information to make the shift of focus from quantity to quality in information provision clearer. (Eppler, 2004) adds that, according to Ackoff, 1967, the information should be 'visualized, compressed and aggregated', and that, according to Herbig & Kramer, 1994, 'signals and testimonials are used to minimize the risk associated with information'. This last addition seems to call for an increase in what (Simpson, 1995) calls the validity of information.

6.1.7.2. Individual

At the individual level, several authors propose training individuals to ensure a higher information literacy of information consumers (Eppler, 2004; Schick, 1990). According to (Eppler, 2004) Bawden, 2001 advises 'to give employees the right tools so they can improve their time (...) management (...) skills'. (Edmunds, 2000) advises to supply tooling to employees so they can improve their information management skills. These two clear advises are closely linked to the New World of Work vision of Microsoft (Rasmus, 2005a), where the first point mentioned in a list of things the Information Worker's tools of the future should help with is 'Reducing Information Overload':

> *Pattern recognition technology and adaptive filtering – using rules and learned behavior – will soon be able to provide Information Workers with intelligent software that can automate many of the routine details of work. This software will have the capability to "learn" the needs of the Information Worker, and deliver a range of integrated information based on inferred context. This next-generation technology will automatically know whose phone calls to let through and which emails to put in a priority queue, based on a user's social network, hierarchy of business associates, and workload. As the software application learns (or is trained) the individual user's work preferences, it will know, for example, that while writing a priority memo on deadline, a user should not be interrupted by phone calls or emails unless it's a manager or spouse.*

6.1.7.3. Organizational design

(Eppler, 2004) indicates that there are authors, such as Bawden, 2001, who see the focus on collaborative and interdisciplinary work as a cause of Information Overload, instead of as a countermeasure, as Galbraith 1974 does.

6.1.7.4. Process

(Edmunds, 2000) suggests a thorough collaboration with information specialists for teams throughout the organization. (Schick, 1990) suggests a standardization of recurring procedures, since that will decrease the information load associated with thinking about how to do a task, because that has already been defined. (Grisé, 2000) suggests using collaborative tools for cognitive support, thus helping people to cope with the burden of information load.

6.1.7.5. Information technology

(Brewster, 1997) proposes multimodal interfaces for computer systems, in order to distribute the information load more evenly over a person's senses. The rationale behind this is that currently, interaction with computer systems is focused too much on the visual sense and not enough on other senses.

(Grisé, 2000) presents various solutions, proposed by other authors, to the Information Overload problem in the situation of idea organization and links them to specific Group Support Systems (GSS) features. The authors list the following characteristics, that help to reduce Information Overload, that have been included in features of GSS: queuing and filtering of information, reducing the total number of ideas generated, creating a more intuitive user interface, electronic sorting of ideas into batches, automatic indexing and clustering of ideas into common categories, providing a team map with drill down features. These solutions and features seem to be aimed at improving the quality of the information, decreasing its complexity or reducing problems originating from the interface of the system.

Information technology should help people with prioritization (Schick, 1990) and quality filtering (Edmunds, 2000; Grisé, 2000; Hiltz, 1985) of information. (Berghel, 1997; Edmunds, 2000; Maes, 1994) suggest usage of agents helping in retrieving relevant information and filtering irrelevant information, based on the interests and search habits of the user. Also, the quality of information could be better evaluated if users could score the

information by a simple voting system (Denning, 1982; Hiltz, 1985), something that is already visible at the support part of websites of for example software companies. (Hiltz, 1985) proposes the use of push technologies instead of pull, in order to decrease the time needed to retrieve information. Other authors have indicated that these push mechanisms could interrupt the work of an individual and therefore have a negative effect on the information processing capacity of that individual (Speier, 1997).

(Eppler, 2004) provides a table listing various countermeasures against Information Overload, reproduced with permission of the original authors in Appendix 3.

6.1.8. Discussion of the Countermeasures against Information Overload

Information Overload is a serious challenge for individuals as well as organizations, as organizations will be negatively influenced when their employees suffer from Information Overload. One of the most mentioned countermeasures against Information Overload is to train employees in for example self-, time- and information management.

In order to be able to cope with Information Overload, several countermeasures are possible. The countermeasures found in literature are shown in Table 5. In Appendix 3, the table of countermeasures of Information Overload as found in the literature is shown, together with the references to the articles.

Category	Countermeasure
Personal factors	• Improve personal time management skills and techniques
	• Training programs to augment information literacy: information processing skills such as file handling, using email, classification of document, etc.
	• Improve personal information management
	• Systematic priority setting
	• Improve the screening skills for information
Information characteristics	• Raise general quality of information (i.e. its usefulness, conciseness) by defining quality standards
	• Focus on creating value added information
	• Promulgation of rules for information and communication design (e.g. e-mail etiquette)
	• Compress, aggregate, categorize, and structure information
	• Visualization, the use of graphs
	• Formalization of language
	• Brand names for information
	• Form must follow function must follow usability
	• Simplify functionalities and design of products
	• Customization of information
	• Intelligent interfaces
	• Determine various versions of information with various levels of detail and elaborate additional information that serves as summaries
	• Organize text with hypertext structures or gophers
	• Interlink various information types (as internal with external information)
Task and process parameters	• Standardize operating procedures
	• Define decision modes developed for specific decision processes (e.g., decision rules)
	• Install an exception-reporting system
	• Allow more time for task performance
	• Schedule uninterrupted blocks of time for completing critical work
	• Adequate selection of media for the task
	• Handle incoming information at once
	• Collaboration with information specialists within the teams
	• Bring decisions to where information exists when this information is qualitative and ambiguous
	• Install process enablers for cognitive support
	• Use simpler information processing strategies
	• Regulate the rate of information flow
	• Search procedures and strategy
	• Define specific, clear goals for the information in order to contextualize it and turn it meaningful
	• Communicate information needs to providers

Category	Countermeasure
	• Provide incentives that are directly related with decisions in order to make decision relevant information be processed more effectively
	• Install a measurement system for information quality
Organizational design	• Coordination through interlinked units
	• Augment info processing capacity through changes in organizational design
	• Creation of lateral relationships (integrate roles, create liaisons between roles, teamwork, etc.)
	• Coordination by goal setting, hierarchy, and rules depending on frequency of exceptions (uncertainty)
	• Creation of self contained tasks (reduced division of labor, authority structures based on output categories)→ autonomous groups
	• Reduced vergence among people (e.g., with regard to expectations) through socialization (e.g., frequent face to face interactions)
	• Install appropriate measures of performance
	• Hire additional employees
	• Create slack resources
Information technology application	• Intelligent information management (prioritization)
	• Install voting structures to make users evaluate the information
	• Prefer push to pull technologies
	• Facilitator support through ICT tools
	• Decision support systems should reduce a large set of alternatives to a manageable size
	• Use natural language processing systems (search with artificial intelligence)
	• Information quality filters
	• Intelligent data selectors (intelligent agents)
	• Use systems that offer various information organization options (e.g. filing systems)
	• Multimodal interfaces

Table 5 Countermeasures against Information Overload ([Eppler, 2004], reproduced and extended with permission from the authors)

6.2. Lack of Control over Information (LCI)

6.2.1. The Concept

The term Lack of Control over Information (LCI) is not as unambiguous as Information Overload, and thus, the term can be understood in various ways. The following will indicate what we define as Lack of Control over Information and why.

In a world of increasing global integration, organizations find themselves operating more freely across borders of regions and countries. Also, they will cooperate with other organizations more intensively, and probably will experience a growth in diversity of locus and cultural background of their employees. Moreover, as the market becomes global, organizations will find themselves producing and selling their products in different markets, which have their own 'rules', operating in countries ruled by different governments, each with its own regulatory apparatus and its own compliancy rules. Organizations will need ways to deal with multiple, possibly overlapping, regulatory environments. This calls for external transparency of work processes and business information.

As globalization continues it can become difficult to gain competitive advantage. One strategy would be to try to always be ahead of the competition (first seller), calling for fast work processes, optimized for the situation and the product. For this, organizations need to be internally transparent in order to be able to observe, measure and adjust work processes faster and better.

Apart from competitors and governments, customers also can force organizations to become more transparent. Globalization and the information society have given the customer more choices in alternative products and more information about the products as well as more ways to retrieve the information desired.

Organizations will have to monitor and influence the perception of customers and customer-organizations. Organizations will need to become more open with customers and partners, to show the values of the organization and to maintain the value of their brands and products, to establish trust between them and their customers and maintain a high reputation.

Establishing trust is extending into what is called corporate citizenship. Corporate citizenship is the term for the collection of activities and organizational processes adopted by organizations to meet their social responsibilities (Maignan, 1999) and is defined as: "the extent to which businesses meet the economic, legal, ethical, and discretionary responsibilities placed on them by their various stakeholders" (Maignan, 1999). As is indicated above, various stakeholders (customers, competitors, partners, governments, other public stakeholders, etc) will become more demanding toward organizations to comply with to various values or rules.

In conclusion, organizations need to become more transparent externally as well as internally, in order to be able to thrive in a global information society. Transparency can be achieved by transforming centralized control structures into decentralized, organic networks, resulting in an organization characterized by cooperation rather than control, where information sharing is facilitated and where there is a high level of interpersonal and inter-organizational connectivity (Dhillon, 2000). An organization then becomes a network of individuals creating, processing and distributing information (Dhillon, 2000).

These developments will result in information flowing more freely among individuals and organizations, between organizations and customers, organizations and public stakeholders, etc. Thus, an organization needs to be aware of the Lack of Control over Information this flow of information can cause, and need ways to cope with it. Moreover, some research indicates that employees are familiar with security requirements of information on paper, but as soon as information is electronic (that is stored in an information system) employees are not necessarily familiar with the security requirements anymore. The widespread use of IT has caused 'security blindness' on part of the users (Dhillon, 2000).

The relationships between the various concepts and developments indicated above have been visualized in Figure 6.

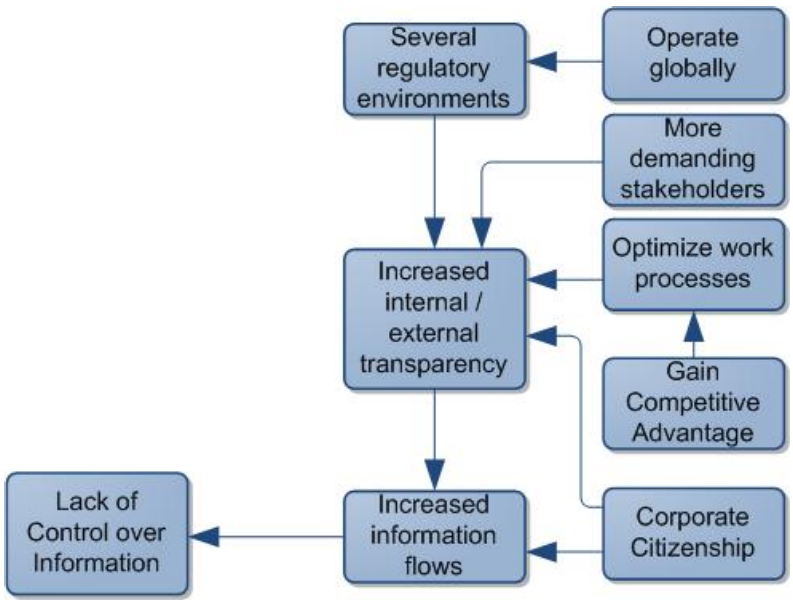


Figure 6 Causes of Lack of Control over Information

6.2.2. Causes of Lack of Control over Information

As is visible from Figure 6 above the direct cause of LCI is an increased flow of information among individuals within the organization, as well as between organizations and individuals in those organizations. Moreover, information is flowing more easily to public stakeholders (customers, governments, etc), because of human error, or security issues. There are various indirect causes of LCI, some of which have been depicted in Figure 6 above.

Also, there is a causal relationship between Information Overload and LCI, namely an increased Information Overload can, among others, result in a loss of control over information (Eppler, 2004). Although it is not entirely clear what way of loss of control over information is meant, one could argue that a person suffering from Information Overload will be more unspecific about which information he gives to whom. On the other hand, in this regard loss of control over information could also mean that the person simply loses control because of the amount of information he or she gets confronted with, which is not the type of loss of control over information discussed here.

6.2.3. Effects of Lack of Control over Information

In the course of the investigation of LCI we did not find literature investigating the possible effects of LCI. In our view, the effect of LCI will be a loss of image, status and trust for an organization. It appears that if an organization is not able to work with their information securely, customers, partners and governments will probably lose their belief in the organization, resulting in various negative effects for the organization, such as fines. As such, LCI is a problem an organization will want to minimize, in order to save itself from negative effects.

6.2.4. Countermeasures / Solutions

Coping with LCI can be seen as improving information or computer security. Although technical, the problem of improving information or computer security is not technical per se, but social and organizational as well, because the technical systems are being used and operated by individuals (Dhillon, 2000).

(Dhillon, 2000) proposes several 'information security principles for the next decade', because, as the authors argue, the security of information should not only consider the data, but also the organizational context. Thus, the traditional information security principles (confidentiality, integrity, availability) need to be extended, because they are very restricted (Dhillon, 2000).

The principles (Dhillon, 2000) proposes to add are called RITE (*r*esponsibility, *i*ntegrity, *t*rust, *e*thicality):

- Responsibility (and knowledge of roles). Individuals will be expected to develop their own work practices on a basis of a clear understanding of responsibilities. Thus, the role one has in an organization needs to be very clear and well understood.
- Integrity (as requirement of membership). As information has become the most important asset of organizations, integrity of individuals working with this information is important and needs to be maintained continuously.
- Trust (as distinct from control). When the emphasis in organizations shifts from supervision and external control to self control, a system of mutual trust needs to be in place. (Dhillon, 2000) discusses the concept of the half life of trust in this regard. The trust between two parties will become less and eventually evaporate over time, introducing the need for a re-establishment of the trust.
- Ethicality (as opposed to rules). In all organizations, apart from the rules that are explicitly stated, there are several implicit expectations about the ethics and the behavior of an individual. In

> organizations that are operating in a manner where self control is very important, it can become difficult for a new member of the organization to get acquainted with the ethics and working norms.

(R. von Solms, 1996) states that the aim of information security management today is 'to enhance confidence in the effectiveness of the information services within an organization'. This confidence can only be passed on to external parties with great effort (R. von Solms, 1996). The authors argue that the 'second generation' of information security management has certainly arrived, and that it will not only be focused inwards, as the first generation was, but also outwards. (Blakley, 2002) argues that information security is failing because the technology focuses primarily on risk mitigation. The authors argue that information security should be treated with the characteristics of a physician: 'particularly important in our view are the ethical obligation to apply only appropriate treatments and protect confidentiality of those treated, and the professional obligation to report information to "public health authorities"' (Blakley, 2002).

Several authors (B. von Solms, 2001; R. von Solms, 1996) argue that top management need to see information security as their responsibility, as it is the key to competitive advantage, and information is one of a organizations most valuable assets (Dhillon, 2000)

(Siponen, 2000) introduces the idea of an information security awareness program as a means to improve information security. This seems logical as every protection is as weak as its weakest link, and if the weakest link are the individuals working with the information, because they are not well educated in information security, improving their education would improve the protection. (Siponen, 2000) concludes that such an approach should 'satisfy the requirements of behavioral theories and provide answers for end users, explaining (or letting them observe) why they should follow security guidelines'.

6.2.5. Discussion of Lack of Control over Information

Lack of Control over Information is causes by increased information flows, which are caused by an increased need for internal/external transparency. If an organization does not manage this Lack of Control over information well, the organization will find information to be flowing to individuals not allowed to have that information, both inside and outside the organization. The organization then can experience a loss of image or other negative effects, such as fines. Table 6 lists the causes, effects of and countermeasures against Lack of Control over Information as discussed above.

Category	Item
Causes	• Increased information flows • Increased internal / external transparency • Several regulatory environments • More demanding stakeholders • Optimize work processes • Corporate citizenship
Effects	• Loss of image, status and trust • Various negative effects, such as fines
Countermeasures	• Information security principles • Information security is responsibility of top management • Information security awareness program

Table 6 Causes, effects of and countermeasures against Lack of Control over Information

6.3. Lack of Networking Support (LNS)

6.3.1. The Concept

The developments of globalization, technological innovation and the changing workforce indicate a need for changed ways of organizing organizations (Lipnack, 1999). Organizations are becoming virtual or network organizations, with (global) virtual teams as a way of collaborating (Child, 2001; Iacono, 1997). A thorough understanding of the way virtual teams 'behave' is needed in order to manage a virtual organization (Iacono, 1997)

An individual working in a virtual team is geographically seperated from (most of) his/her colleagues, either within the team or outside the team. The social contact with team colleagues during the lunch break or the discussions 'at the coffee machine' will no longer be possible or at least less common. In this situation, the individual working remotely can lose contact with his/her colleagues and the organization the individual is part of. An individual experiences more difficulties in accessing information and knowledge, as 'in most enterprises, an employee will get 50 percent to 75 percent of his or her relevant information directly from other people' (Cascnato, 2002). If an individual is not working in a virtual team, but either the individual or his/her colleagues work in a telework setting, the same problems can arise. These problems can for example result in demotivation, feelings of being left alone and lower effectiveness.

In addition to possible problems with work related connections to individuals and information, an individual can also experience problems connecting to private relations. Increasingly, individuals need or want to mix time devoted to professional and private activities. For example, individuals want their family to be able to reach them during office hours, wherever they are. In addition, it is possible that individuals want their colleagues to be able to reach them outside normal working hours, or want to be able to reach their colleagues.

In the situations described, there is a need for increased connectivity, both outgoing and ingoing, both professionally and private. In other words, there is a need for Networking Support.

6.3.2. Causes

In a traditional organization, where every employee works in the same building, has the same working hours and lunch breaks and the transition between professional and private life is done by physically entering or leaving the office, networking support will not be much of a problem since virtually all employees and information are readily available. In this situation it is clear at what times and at what locations colleagues and information are not available for consultation.

Increasingly, such traditional situations become less common and it is understood that in the New World of Work these situations will be an exception rather than a normal situation. The causes for the need for networking support are indeed the developments that enable organizations to transform from a traditional organization to a new organization. In such a new organization, one or more of the following is present:

- Teleworking / working in various locations
- Variable office hours, depending on workload or preference
- (Virtual) Teams

These elements are all resulting in the need for networking support as they all decrease the possibility of direct contact with colleagues, managers, information sources and others in the organization.

6.3.3. Effects

When an individual experiences the need for increased connectivity, the individual is lacking contact with other people or cannot reach the information needed. The individual experiencing this need can feel isolated and become frustrated with the lack of connectivity to other people and to information. This can result in demotivation and lower effectiveness, in turn result in the consequences of these problems for the organization. Although the lack of connectivity may resulting in various negative effects, depending on the personality of the individual experiencing the lack of connectivity, it may also have a short term positive effect on particularly the effectiveness of the work; a lack of connectivity implies that an individual will not be disturbed, simply becomes he or she is not within reach, thus a possible result can be a higher effectiveness of the individual.

6.3.4. Countermeasures / Solutions

In the organizations of the future, the need for networking support will be prevalent and will have to be solved by using tools, as using a tool is the only way of connection to someone else when geographically dispersed. In this sense, with tool every (electronic) device or application is meant that helps people to communicate. In this definition, a traditional telephone is a tool, as is a cell phone, a laptop, a program that runs on that laptop (such as a browser, an email client, an instant messaging application, a RSS feed reader), etc. The use of tools can make the world 'go small', i.e. it enables an individual to reach another person virtually regardless of where both parties are and what they are doing. It also enables an individual to reach any information regardless of where that information resides, provided that the individual is given access to that information.

6.3.5. Tools

The term networking as used in this study consists of various tasks, namely:

- Reaching work related relations and being reachable for work-related relations;
- Reaching private relations and being reachable for private relations;
- Finding and accessing information within or outside the organization's borders.

Tools that effectively support networking have to enable the execution of all or some of these tasks. For example an email client, instant messaging (possibly with voice and video capabilities) and a (cell) phone are tools that have been specifically developed to support reaching other individuals, both professionals and privates. For finding and accessing information a browser, search engines, RSS feeds, etc, can give some support.

An interesting notion is that using a tool for communication is presumably always less 'rich' than face to face communication. Today, even with capabilities for transmitting text, voice and video over a network something is missing the communication. In essence, one could state that communication via any device means using a 'low-fidelity channel', i.e. a communication channel that poses restrictions on the amount, type and/or quality of the information transferred over that communication channel. Low-fidelity channels can exist because of for example bandwidth limitations, quality of service problems or limitations on carrying distance of certain signals. In contrast, face to face communication could be a 'high fidelity channel', posing no or few restrictions on the information transferred. For example, facial expressions are an important cue in human communication. Even with the technology today, these facial expressions are either completely lost or partly lost because of the low fidelity channels that are used. Future tools would have to make sure the users always get the best experience possible while using the tool even when the tool has to receive and transmit information over an extreme low fidelity channel.

The last task identified in the list above (finding and accessing information within or outside the organization's borders) is particularly important, as organization's are increasingly dependent on their information and the accessibility of that information to their employees and the inaccessibility of that information to individuals who should not read it (see also the discussion of lack of control over information, section 6.2). So, for an organization, it is of paramount importance that employees can find information and/or access the individuals having that information for example either for a quick insight or update on some matter or for a thorough reading or discussion about the affairs with a customer.

It would seem that in order to solve this an information management policy is sufficient, in which employees are required to upload documents that are finalized (for example a customer's offering) to a known location and ensure that the documents are given relevant tags. In such a way another employee could go to that location (presumably a server with a web application running on it) and type in the keywords (for example the customer's name) and get a list of documents that are available. In a new organization, where people work everywhere at any time, this is increasingly hard to 'enforce', as for example a manager has little control over the way a person working remotely shares his information and whether or not this person adheres to the information management policy. Moreover, having to upload documents in order to make them accessible is experienced as an unimportant, time consuming task. This notion is supported by Gartner Inc. (Casonato, 2002) in a research note stating: ''(...) more than 80 percent of the enterprise's digitized resources are not accessible to the enterprise as a whole because they reside in individual hard drives and in personal files.' In addition to that, tags that are given by a human being always bear the risk of not correctly reflecting the contents of the document. There is an opportunity to do this automatically, by using a tool. At the time of this writing, Microsoft is developing such a tool named 'Knowledge Network' (see http://blogs.msdn.com/kn/). The current version tool, once installed, scans the user's email messages and instant messaging contacts twice a week, looking for contact persons and subjects. It then builds connections to those persons indicating a strength of the bond (build on the number of emails exchanged over time). Also, it lists keywords that the user has used. These connections and keywords are then published on a central server, building a knowledge network, that can expand beyond the organization's borders, if an employee within the organization communicates with someone from outside the organization on a certain subject. As a result, when someone enters a keyword on the central server, all persons that have communicated about that subject are shown.

Although this tool is rather rudimentary right now, it is a good start. In order to be successful in supporting the finding and accessing of knowledge within an organization, the tool could be expanded to analyze documents in certain directories, instant messaging conversations or internet searches. Also, it is important that not only it becomes known who in the organization has communicated about a certain subject, but also with whom and when, in order to make an evaluation of the relevance of the knowledge possible. In addition, the relation between the person that is supposed to have some knowledge about the subject (knowledge owner) and the person using the application to search for that knowledge (searcher) should be depicted, in order to make it possible for the searcher to decide on whether or not to try to reach that knowledge owner, for example because of the position in the organization the knowledge owner is in. The integration with a corporate address book and agenda would then be the next step, in order to make it possible to contact the knowledge owner or investigate what would be a good time to contact the person. The benefit of making the application run automatically regularly (for example once every two weeks) is that individuals can create a knowledge network without much effort. In our opinion, it is still important that the relationships found during the analysis are presented to the user before being published on the central server, so a user can remove private conversations, such as instant messaging chats with a private relation, and/or can flag that person not to be included in the analysis for the future.

6.3.6. Psychological safety

(Edmondson, 1999) discusses the concept of team psychological safety, which is defined as 'a shared belief that the team is safe for interpersonal risk taking' (Edmondson, 1999). Team psychological safety 'is a sense of confidence that the team will not embarrass, reject or punish someone for speaking up' (Edmondson, 1999).

A team in which persons experience this sense of confidence will perform better, as team psychological safety is positively associated with learning behavior in the team, which in turn positively influences team performance (Edmondson, 1999).

While creating an environment that allows for this sense of confidence is difficult in 'normal' teams, it will be even more cumbersome in virtual teams or virtual networks, as the persons joining in on the team or network will be geographically dispersed and in some cases will not have seen and will never see the faces of their team members or communication partners.

For team psychological safety to 'exist' in a team, team members must mutually respect and trust each other (Edmondson, 1999). This is an interesting relationship, as trust in (virtual) teams is discussed thoroughly in literature (see for example (Child, 2001; Iacono, 1997; Jarvenpaa, 1999; Lipnack, 1999; Rittenbruch, 1998)). Some authors (for example (Child, 2001; Lipnack, 1999)) even state that trust is the most important factor influencing virtual team performance.

Thus, as teams are becoming the main way of organizing collaboration, the performance of the organization becomes increasingly dependent on the performance of the teams within that organization. And, as team psychological safety indirectly has a positive influence on team performance, making sure a atmosphere of psychological safety is present in the teams in the organization, i.e. building a situation where individuals in the team trust each other, is important. Trust can also be an enabler of virtual organizations that have a structure of project teams (Rittenbruch, 1998): when there is no trust among the persons within the team, there will not be a successful virtual organization, which is essentially the collection of all the teams. Thus, it is argued in (Rittenbruch, 1998), one of the main design goals of virtual organizations is fostering trust, by providing internal information, i.e. making activities, decisions and organization structure visible to all members of the organization.

In order to create the opportunity for trust to arise among virtual team members, (Jarvenpaa, 1999) argues that global virtual teams need to explicitly display certain behavior. Early in the team's life social communication and communication of enthusiasm are seen as communication behaviors that enable trust. Also early in a team's life, individual initiative is important to enable trust to grow. Later in the team's life, predictable communication and substantial and timely responses are important enablers of trust. In this phase of the team's life positive leadership is an enabler of trust (Jarvenpaa, 1999).

(Child, 2001) created an overview of the phases of evolution of trust. The author identifies three phases: trust based on calculation (found in new relationships), trust based on mutual understanding (formed by working together), trust based on bonding (formed by liking each other). According to the author, trust can be fostered by:

- maintaining clarity and realism in commitments
- improving predictability by insuring open communication and resolving conflicts
- trying to move towards mutual bonding, for example by encouraging socializing between members of the team. Also, the leaders of the organizations involved in the collaboration could have a friendly relationship and give this relationship full attention.

(Suchan, 2001) indicates that in the case study discussed, in order to provide the foundation for trust among team members and trust in the team leader, the team leader organized a multi day, face to face, kickoff meeting. The concept of kick off meetings is not unknown in 'normal' teams, and as such it may be interesting to indeed organize such a kick off meeting for a virtual team, if possible.

6.3.7. Discussion of Lack of Networking Support

Providing networking support is an important task of organizations in order to enable their employees to reach other persons and information, as being able to effectively work with information is becoming a important challenge to organizations. The previous sections discussed the causes, effects of and countermeasures against Lack of Networking Support. The causes, effects and countermeasures are reproduced in Table 7.

Category	Item
Causes	• Teleworking / working in various locations • Variable office hours • (Virtual) Teams
Effects	• Feelings of isolation • Frustration • Demotivation • Lower effectiveness • Short term higher effectiveness
Countermeasures	• Usage of tools • Provide team psychological safety

Table 7 Causes, effects of and countermeasures against Lack of Networking Support

6.4. Research framework

In Figure 7 shows the main challenges in the world of the Information Worker (see section 5 for a discussion of Information Workers and their challenges). It is based on the theoretical discussion of the challenges of Information Workers as presented in section 6. In the empirical part of this study, the causes of Information Overload, Lack of Control over Information and Networking Support will be investigated in practice, in the situation of Microsoft Services Consultants (see section 5.6). Except for the countermeasures against Lack of Networking Support, the effects of and countermeasures against these three problems will be used to reflect the findings in the empirical part of this study on (see section 7 and further). The countermeasures against Lack of Networking Support, i.e. usage of tools and provide team psychological trust will also be discussed in the empirical part of this study (section 7 and further).

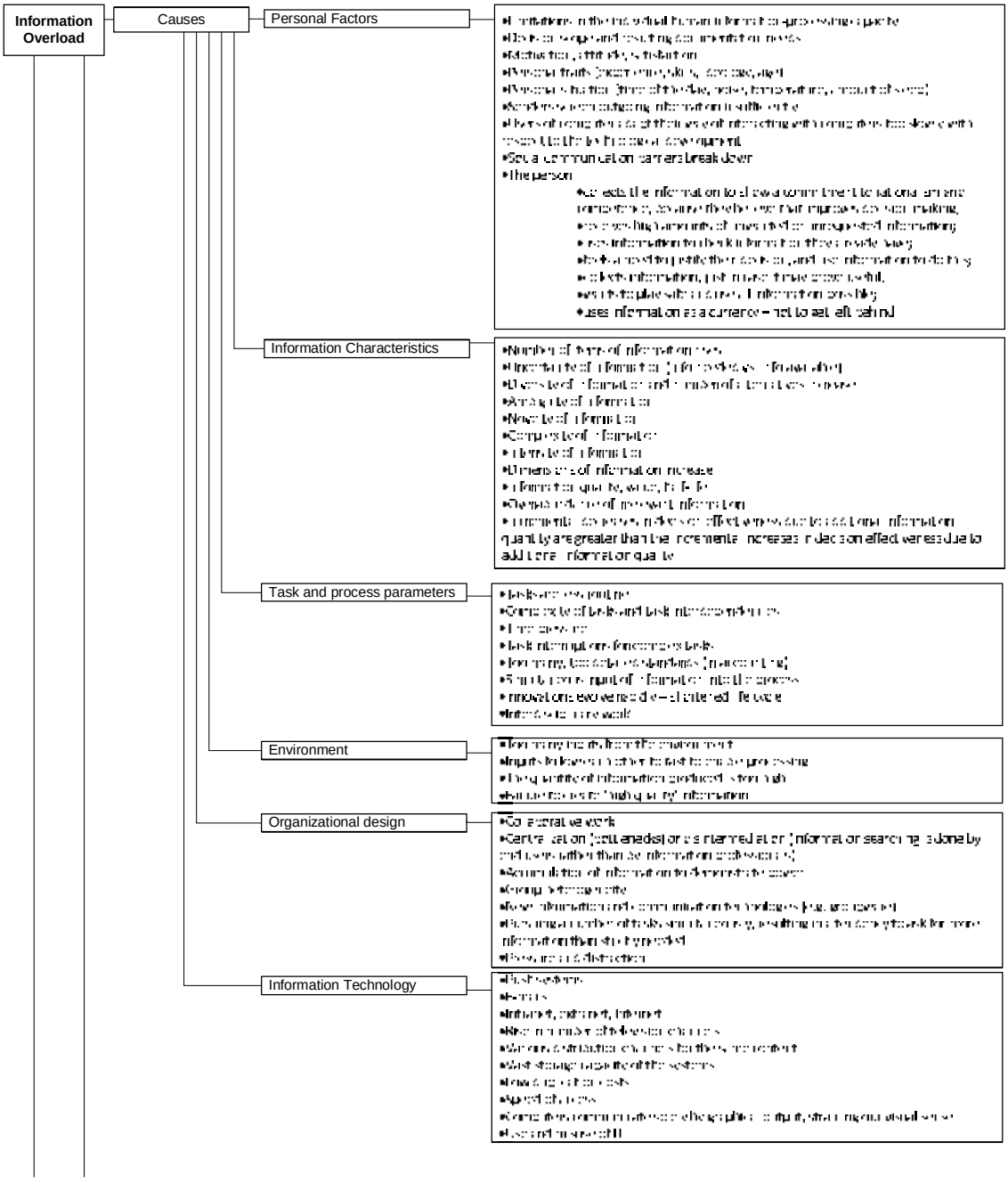
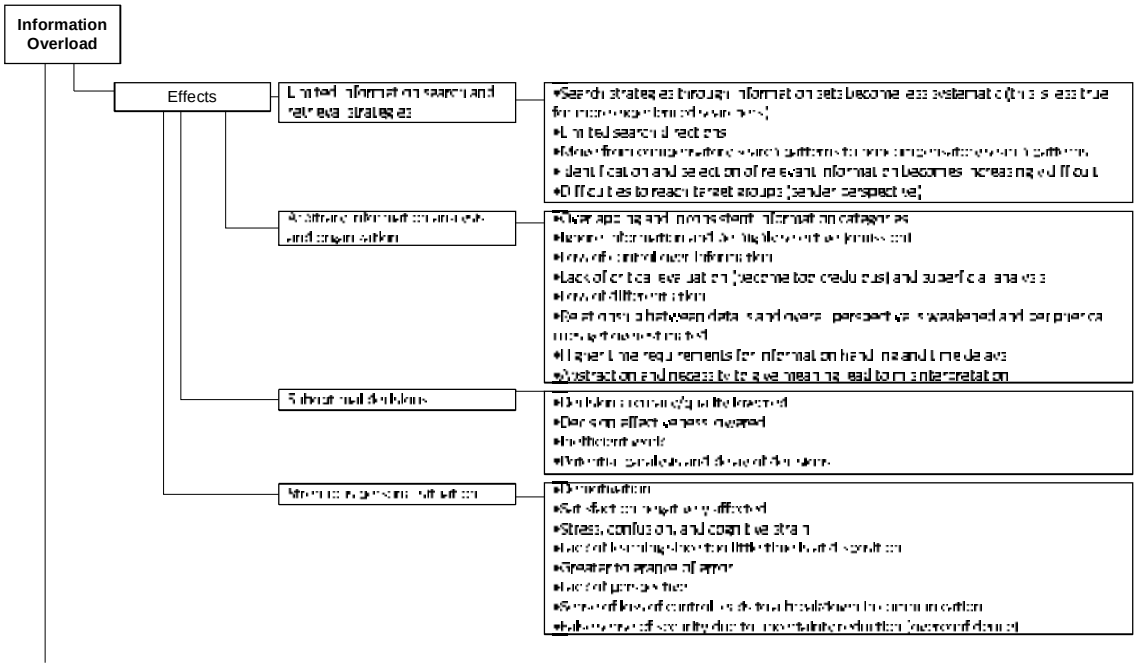
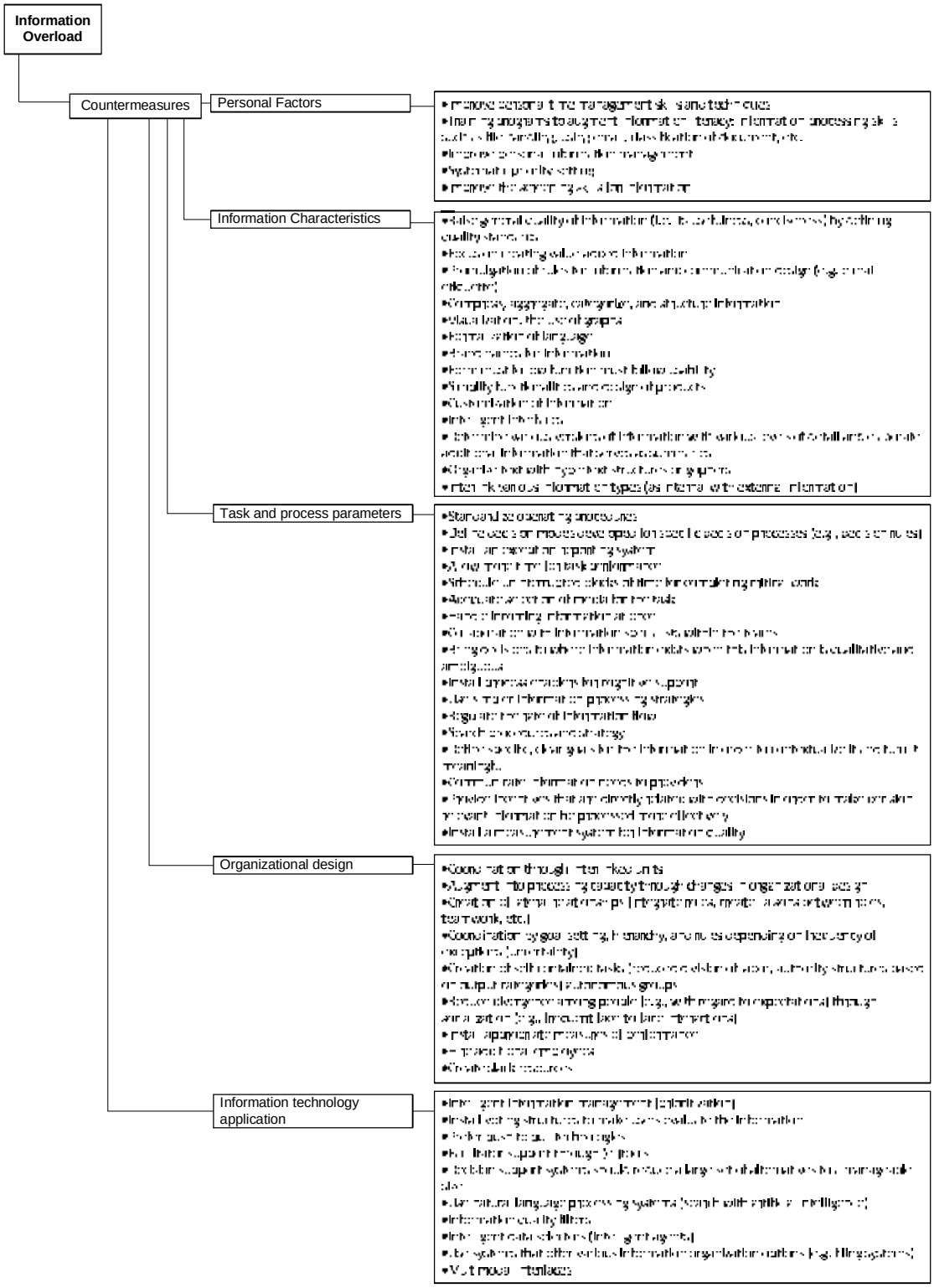


Figure 7 Research framework



Research framework (continued)



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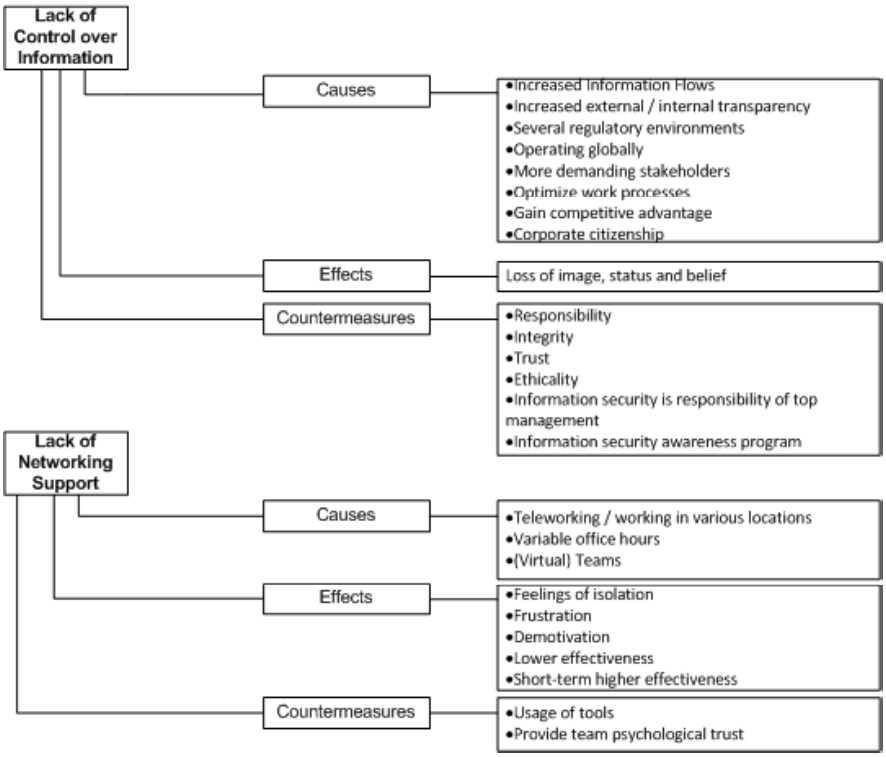

Research framework (continued)

7. Empirical study

The goal of this empirical study is to investigate the causes of the three key Information Worker challenges as discussed above in the situation of Microsoft Services Consultants and to investigate which effects of and solutions for these challenges can be seen in the situation of Microsoft Services Consultants.

7.1. Methodology

7.1.1. Research rationale

The foregoing has investigated challenges of Information Workers. Since Consultants are Information Workers themselves, it would be interesting to investigate the perceptions of individual Consultants on these challenges. What do they think about these challenges? Do they experience them, or not? Do they indicate other challenges that are not apparent from this study so far?

In order to answer these and other questions, the empirical study is led by this question:

> *What are the specific characteristics of Information Overload, Lack of Control over Information and Lack of Networking Support for Microsoft Services Consultants within the New World of Work?*

As apparent from this question, we aim to investigate the *specific characteristics* of the challenges of *Information Workers in general* for the *specific situation of Microsoft Services Consultants* in the New World of Work. Thus, we are looking for context specific characteristics of challenges applicable to a larger population, namely the Information Workers.

Our study can be characterized as qualitative research, as we strive to investigate the subject from an open, interpretive viewpoint, and we have relatively few research subjects under investigation in this study. Moreover, as stated in the goal of this study (see above), we seek to *investigate* the specific characteristics of the subject in the situation of Microsoft Services Consultants, and thus will not be testing theory in practice, which is common in quantitative research (see (Stokking) for a discussion of qualitative versus quantitative research).

In order to investigate the specific characteristics, we need to consult the research population and discover their opinions and thoughts about the subject. In general, this is called interpretive research. (Klein, 1999) states: 'Interpretive research can help (…) to understand human thought and action in social and organizational contexts'. As we are indeed looking for opinions and thoughts about the subject, structuring our study according to the interpretive research principle seems useful. (Walsham, 1995) provides a structured discussion of the interpretive research method. Although the discussion in (Walsham, 1995) is about case studies in Information Systems research, the general structuring of the discussion of the method is useful for our purposes. It helps clarifying the structure of and rationale behind our empirical study. We discuss the structure of our empirical study by presenting the following elements: the role of theory, the role of the researcher and research instruments, research population and sampling, result analysis and reporting.

7.1.1.1. Role of theory

The theory developed above provides a guideline to the topics and approach of our empirical study. This is also how we will use Figure 7: it is a cognitive map, a theoretical framework showing previous knowledge, helping us to design the empirical study. The cognitive map shows that the main challenges of Information Workers are Information Overload, Lack of Control over Information and Lack of Network Support, and that each challenge

has its own specific causes, effects and countermeasures. In essence, the cognitive map provides structure for the way we will gather data.

7.1.1.2. Role of the researcher

(Walsham, 1995) identifies two different roles of the researcher, namely outside observer and involved researcher, where the former, though of course influenced by his/her own subjectivity preserves more distance from the subjects investigated than the latter. The role we play as a researcher in this study is more the role of an involved researcher than of an outside observer, because we have been part of the field organization for six months. Still, also elements from the outside observer are present in our role, because we tried to keep an open view, with some distance as our involvement in the field organization for this study was only temporary.

7.1.1.3. Research instruments

Generalized, the goal of the empirical part of this study is to investigate the opinion of humans about a certain subject. Thus, it seems logical to ask questions to the research population about their opinion about the subject. According to (Verschuren, 1999) there are two techniques for asking questions, namely interviewing and polling. The two techniques differ on the degree of pre-structuring and openness, where interviewing is more open, less pre-structured, thus allowing for a more free expression of opinions compared to polls. Polls are pre-structured, listing a number of questions to be answered, thus directing the thoughts of the interviewee towards answers to questions. In our opinion, interviews are more suited for this study, as we want interviewees to be able to express themselves, and we think that a poll would discourage free expression.

(Verschuren, 1999) identifies two types of interviews, namely by telephone and face-to-face. The risk with interviewing by telephone is that the body language of the interviewee is not available. Of course, this could partly be solved by using modern communication systems, such as video and audio conferencing, but we prefer to use face-to-face interviews, so we can achieve the maximum amount of interaction possible with the interviewee.

Face-to-face interviews can exist in two types, according to (Verschuren, 1999), namely: individual interviews or group interviews. In our opinion, individual interviews are best suited for this situation, as this allows an undivided focus on the interviewee and his/her opinion. Moreover, practically speaking, it would be very hard to get a number of interviewees together at one moment at one location, as Microsoft Services Consultants have flexible working hours and working locations. In addition, choosing for group interviews also introduces several other questions, such as the number of interviewees per group, how to make sure everyone gets the same attention, etc.

In our opinion, interviews are a suitable way of gathering data for this study, as interviews allow for a certain amount of pre-structuring, while allowing the interviewee to freely express his/her opinion about the subject. Moreover, the interviewer can interact with the interviewee and thus direct the interview based on the answers of the interviewee, thus allowing for the questions to be adapted to the interviewee.

In the empirical part of this study we used face-to-face interviews primary as a means of gathering data, whereas document analysis and observations already played an important part in this study up until this point; documents and books about the New World of Work vision have been analyzed, as well as documents about Microsoft Services, and observation has been used to characterize Microsoft Services Consultants. The analysis of the New World of Work allows for a more complete perspective on the various elements in this study. The characterization of Microsoft Services Consultants and the analysis of Microsoft Services is important as it sets the stage for the empirical part of this study. Microsoft Services Consultants were observed in order to increase our understanding of them and their jobs. The observations did not focus on the problems they experienced.

As we use interviews as our main way of gathering data in the empirical part of this study, the goal of the interviews will be to provide information to answer the question posed in the beginning of this section (section 7.1.1). We are looking for specific characteristics of the challenges of Information Workers in the situation of Microsoft Services Consultants in the New World of Work. The interviews will be semi-structured, in order to give enough freedom to the interviewee to express their opinion about the subject. We are looking for variety of answers among interviewees. As such, all opinions are important, even if they are only supported by one individual.

7.1.1.4. Research population and sampling

The research population for this study consists of Microsoft Services Consultants, working for Microsoft Services in the Netherlands. The total number of Microsoft Services Consultants at the time of this writing is 80, divided over five organizational groups. We took the same size sample out of each of the five organizational groups. With a sample size of three, the total number of interviews conducted is (3x5=) 15. The interviews were performed at a rate of two interviews a day, with transcription of the interviews on the same day.

All interviews are recorded digitally (after permission of the interviewee) using Microsoft Office OneNote 2007, a tool for making notes. This tool allows not only to record audio, but also enables us to keep notes while recording. The notes are linked directly to the moment in the audio stream that the notes were taken, thus making the audio stream easier to process. Interviews have been anonymous, but general questions were asked about the interviewee in order to make the reporting more useful. In order to be able to refer to specific interviews, we chose a nickname together with the interviewee.

The selection of interviewees has been done in collaboration with the manager of each team, by asking him/her to provide a suggestion for three representatives of his/her team.

7.1.1.5. Transcriptions, result analysis and reporting

The transcriptions of the interviews were done on the same day the interviews were held. The transcribing was done by the interviewer, whereby the recordings of the interviews were used as the primary source. For easy analysis, the transcriptions consisted of four parts; the first part contained the general information about the interviewee, whereas the other three parts contained the information gathered from the interview about each problem discussed. This way the transcriptions had the same structure as the interviews.

Interviewees were asked to identify causes, effects and solutions for the three possible challenges we identified before.

During the interviews, the interviewees were also asked to fill out a short form about the tools they used, in which they were asked to indicate whether or not they were familiar with the tool, and if so the volume of usage, the perceived usefulness and the perceived ease of use.

This way of dealing with the interview transcriptions allowed us to present statements such as: 'Consultant X provided an interesting new solution to Information Overload' and 'None of the Consultants interviewed ranked information management training as a solution for Information Overload'.

7.1.2. Interview protocol

As argued above, interviews were used as the main way of gathering data in this empirical study. The interview can be divided in six blocks, each with a specific subject or purpose. In Table 8 below the six blocks are shown, together with the estimated time needed for the blocks. As is visible from Table 8, the total estimated time for the interview was 1,5 hour. The list in Table 8 Interview parts serves solely the purpose of clarification, because

during the interview, the interviewee was given the freedom to express his/her opinion about the subjects intermingled. We encouraged the interviewees to express their opinion by specifically stating that in the introduction of the interview. In doing so, the results presumably contained the results we wanted: the opinion of the interviewees.

The first part of the interview (introduction) was meant to clarify the goal of the interview, explaining the processing of results and transcriptions and 'to break the ice'. Moreover, we aimed at agreeing on the nickname to be used in the rest of the study. The next part, general information, poses questions about the interviewee him- / herself, so possible trends in the results could be spotted later. For example, the question about the years of experience could identify differences between persons with more than five years experience and those with less. The next section discussed the New World of Work. As the New World of Work is the context of the challenges of the Information Workers we viewed it as important to know the opinion about this subject beforehand.

The next three sections discussed the three Information Worker challenges more closely. The last section was meant for wrapping up the interview, and making further arrangements, such as dealing with the transcriptions. We allowed the interviewees to adjust or complete the transcription of the interview, by asking the interviewees whether or not they would like to receive the transcription. This way, the interviewee had better control over what results were drawn from the interview. Moreover, in doing this, we avoided errors made because of incorrect interpretation of what was said during the interview.

The questions in the interview protocol were derived from the cognitive map as shown in Figure 7. Each challenge is discussed in a separate block, each with the same questions in order to make comparison between the three challenges possible. The only exception to this is the discussion of Lack of Networking Support, where we included questions about the use of tools.

We specifically avoided the use of the word problem in the questions, so the steering of the interviewee by the questions is supposed to have been minimal.

The interview was conducted in Dutch, as were the transcriptions. In Appendix 4 the Dutch version of the interview protocol is shown. In Appendix 5 a version of the interview protocol translated into English is shown.

Block	Description / Purpose	Estimated duration (minutes)
Introduction	Introducing purpose of interview, the structure, what will be done with the information retrieved, etc.	5
General Information	Get general information about the interviewee, such as function within the organization, years of experience and education	10
New World of Work	Investigate the opinion of the interviewee about the New World of Work.	15
Information Overload	Investigate the opinion of the interviewee about Information Overload	15
Lack of Control over Information	Investigate the opinion of the interviewee about Lack of Control over Information	15
Lack of Networking Support	Investigate the opinion of the interviewee about Lack of Networking Support	15
Wrapping up	Closing down the interview	5
Total duration, including ten minutes slack (minutes)		**90**

Table 8 Interview parts

8. Interview results

In this section we will present the results of the interviews conducted. The structure of this chapter follows the structure of the interviews and the results will be presented by providing quotes from the interviews. Each section will be concluded with a short summary of the findings.

8.1. General remarks

As indicated in the previous chapter, fifteen interviews were conducted. Interviewees were selected from the five organizational groups, three from each group. Fourteen of these interviews have been conducted according to plan, whereas one interview was different. In that interview the amount of time available (90 minutes) was spent on discussing the New World of Work. As a result, we got some interesting insights in the New World of Work from that interview, but not in the other subjects. This does not mean that we see the interview as useless: the interviewee had many interesting and confronting opinions about the New World of Work, and thus the interview was valuable for our discussion of the New World of Work, and we will include the information retrieved from this interview in our discussion.

Also, thirteen of the fifteen interviewees filled out our questionnaire about tools (see Appendix 6). The reason for this was that the questionnaire was much more elaborate during the first interview and the interviewee did not have time to fill out the questionnaire. In addition in the interview where we discussed the New World of Work very thoroughly we did not have time to present this questionnaire. Directly after the first interview we changed our way of working for this question and reduced the questionnaire to only the tools. This updated questionnaire is shown in Appendix 6. This new, in size reduced, questionnaire turned out to be short enough to fill out during the interviews, in a couple of minutes.

8.2. General information about the interviewees

8.2.1. Division of interviewees among teams

All interviewees were part of Microsoft Services. Interviewees were equally divided between the five organization groups; three interviewees from every group.

8.2.2. Working Experience

The working experience ranged from two years to 25 years. Most of the interviewees worked at Microsoft for several years, although there were some interviewees who worked at Microsoft since a couple of months, but had previous experience in other organizations.

8.2.3. Age

The average age of the interviewees is 37, which is exactly the average age at Microsoft Netherlands. The youngest of the interviewees was born in 1981 and the oldest in 1961.

8.2.4. Private and work situation

From the interview results, three working places can be distinguished, namely 1) customer's office, 2) Microsoft's office and 3) home. Some interviewees incicate that their primary working location is at the office of the customer they are working for:

> "A customer's office is my primary place to work."
> "I work at the office of the customer mostly"

"90% of my time I work at the location of the customer"

Others indicated that they work at home primarily:

"I work at home most of the time"

The office of Microsoft is used as a place to meet colleagues and perform tasks not directly related to the content of a person's tasks, such as reporting expenses or meeting with a manager. Also, the office of Microsoft seems not to be a place Consultants go to very frequently, as is indicated by the following remarks:

"I am only at the office of Microsoft to keep in touch with colleagues"
"I try to be at Microsoft's office every Friday, for keeping social contact with colleagues"
"I work one day in two weeks at Microsoft's office"

Almost all interviewees work full-time, although some interviewees indicated they work on a 80% basis, thus formally they work four days a week. The interviewees that explicitly mentioned the hours spent on working all indicated that they work more than 40 hours a week:

"I also work in the evenings and during the weekends (at an) average of 60 hours per week"

It seems that the kind of tasks Consultants have, are a reason for not working at home for a large portion of the time. The tasks of a Consultant always have to do with customers, their preferences and wishes. Some Consultants said:

"Rarely, I work at home, because of a need of visibility for the customer"
"I work at home if possible, but the customers prefer us to work at their location"
"My work does not allow me to work at home, but I would like to be able to"

In the textbox below the results found in this paragraph are listed.

1. For some interviewees, the primary working location is at the office of the customer
2. For some interviewees, the primary working location is at home
3. The office of Microsoft is mostly used to perform tasks that are not directly related to the content of an individual's job, such as reporting expenses and meeting with colleagues
4. Interviewees work more than 40 hours a week
5. The customer's preferences and the content of the job influence the choice of working location and reduce the possibilities to work at home.

Textbox 3 General information about the interviewees

8.3. The New World of Work

8.3.1. Interpretation of the New World of Work vision

The descriptions of the New World of Work as given by the interviewees were all different, but based on the results we distilled some key points about the New World of Work, which are shown in Table 9. The order in which the descriptions are presented is random.

Category	Quotes
The individual is an important asset	"The focus is on the individual" "Persons are becoming more important" "The New World of Work is a vision on how persons can be put more centrally in professional life" "We put persons back in the middle of the work"
The individual becomes the centre of organization with the organization giving support to the individual.	"The decisions of the individuals are supported by systems" "The organization delivers support in such a way that for both parties the work is as pleasant as possible" "[We] organize processes around [the individuals]" "Activities will be the centre of the way of organizing"
The individual gets the freedom to structure his/her days himself/herself. Work is becoming location and time independent, and working at home becomes one of the possibilities, next to work at the office of your employer or at the customer's office.	"The individual performing an activity will decide how, where and when to perform that activity" "An individual can divide his/her time" "There are less strict office hours, one can work at home and switch between work and private time at will" "The New World of Work is about having the possibility to structure your work the way it fits you the best" "You can share information, wherever you are, independent of the device you are using. As a team, you can collaborate across distances: work becomes location- and time-independent. The New World of Work makes it possible to combine and optimize these possibilities" "The individual is free to choose where, when and how to work and communicate. The individual is in control over his/her work and life, instead of others deciding that for the individual" "An employee has commitments and customers, but is free to decide how to perform the tasks"
The goal of the New World of Work is to work more efficiently or to stay efficient.	"The New World of Work allows us to adapt our way of working so we can become or stay efficient" "The goal is to let individuals perform their tasks as good as possible" "Individuals can become more efficient and effective, because of this enhanced freedom" "If this happens we could work more efficiently. The New World of Work is about helping people to work more efficiently" "The New World of Work is about saving money and working more efficient"
The compensation of work will be based on deliverables and quality, instead of quantity, hours spent or presence.	"Compensation will be based on services and quality, instead of quantity" "One is compensated based on result, not on hours worked" "In the New World of Work employees will be judged based on made agreements (deliverables) and not on presence anymore"

Table 9 Content analysis of interpretations of the New World of Work vision from interviews

A remark made by one of the interviewees sums up the New World of Work vision:

> "The persons are more productive than the company; flexibility and intelligence resides in individuals, not within an organization"

8.3.2. Role of the New World of Work

General consensus is that the New World of Work is inevitable for branches where the work suits the New World of Work principles, because (future) employees will request this way of working.

> "The New World of Work is inevitable for branches where it is possible"
> "There is a need for the New World of Work, and organizations will have to adopt the principles in order to be able to retain employees, because sooner or later employees will request these possibilities"
> "The New World of Work is inevitable for organizations, because employees will want to further control their own life"

Also, Consultancy and in general Information Work is considered to be suited for the New World of Work principles.

> "The New World of Work is not inevitable, because it is dependent on the type of work and employees. It is inevitable for the Information Workers"
> "Consultancy is very well suited for the New World of Work principles"

The developments on which the New World of Work is based (see section 4.1) are considered unstoppable, and the New World of Work provides a way to cope with these developments:

> "The New World of Work is a global development, that is occurring no matter what; it will influence organizations, sooner or later, dependent on their strategy"
> "The New World of Work [provides] a way to cope with the developments in the outside world"

Some interviewees indicated that they believe that if many people would work according to the New World of Work principles problems such as traffic jams could be reduced, as people can choose to travel at any time:

> "If a large portion of the people able to work according to the New World of Work principles would actually do that, the amount of traffic jams would be reduced. An advantage of the New World of Work is to drive to work after the traffic jams and to go home before the traffic jams."

Also the New World of Work is viewed as beneficial both to employees and customers:

> "If you can start working according to the New World of Work principles this will result in higher job satisfaction and higher quality of outcomes"

In the textbox below the results found in this paragraph are listed.

1. The New World of Work is inevitable for branches where the work suits the New World of Work principles
2. Consultancy and Information Work is considered to be suited for the New World of Work
3. The developments on which the New World of Work is based are considered unstoppable and the New World of Work provides a way to cope with these developments
4. The New World of Work will have effects on society, for example in the reduction of traffic jams
5. The New World of Work is beneficial for both employees and customers

Textbox 4 Perceptions about the role of the New World of Work

8.3.3. Novelty of New World of Work and effect on individual's life

Some interviewees raised the issue of the novelty of the New World of Work. Some indicated that the New World of Work is not new for Consultants:

> "I have always been working in a situation with flexible workspaces and the possibility to work wherever and whenever you want. So, for me, the New World of Work is the same thing [as before]"
> "I have been working according to the New World of Work principles for some time now"
> "I have been working according to the New World of Work principles for eight years, but technology has made things easier"
> "For Consultants the New World of Work brings nothing new: we have already been used to this way of working for several years"
> "[I am] already doing the New World of Work"
> "Currently I am a ready living in the New World of Work, although I am still learning"
> "I think I am already living in the New World of Work"

In addition to the suggestion that the New World of Work brings nothing new to Consultants, some had the opinion that the New World of Work in itself is not new, that there are organizations that have gone through the changes related to the New World of Work and that there are organizations specialized in helping other organizations to go through these changes:

> "There are companies that have gone through this process before, but Microsoft does not call for their help"
> "The New World of Work is not new. There are many examples in the outside world of organizations that have already gone through this, but Microsoft tends to try to invent things for themselves. [...] We try to invent things ourselves instead of learning from others"

When asked which part of the New World of Work would be the most influencing on the person's life one interviewee expressed the opinion that technological changes will most influence the individual's life. By contrast, others state that technological changes have already had a big impact and that it is now important to see how people will deal with this:

> "Technological innovation and globalization have already had a big impact, so it now important how people will deal with this"

The challenge of making agreements with colleagues and customers about how to work, collaborate and communicate is again mentioned, as well as making more efficient use of your time and the freedom to structure your working day:

> "Making agreements about working with colleagues and customers will become the biggest challenge"
> "Make more efficient use of time, such as using the time spent on travel for your work [and] the freedom to structure your work to your liking [will influence my life most]"

In the textbox below the results found in this paragraph are listed.

1. Generally, the New World of Work is not considered as an innovation for the Consultants
2. There are doubts about the novelty of the New World of Work vision itself
3. Dealing with technological changes and globalization is considered as a challenge
4. Making agreements about communication is considered as a challenge
5. Making more efficient use of one's time and the freedom to structure one's working day are considered as important effects of the New World of Work

Textbox 5 Perceptions about the novelty of the New World of Work and the effect on the individual's life

8.3.4. Communication about the New World of Work

Some perceive the communication about the New World of Work as unclear, vague, confusing or of low quality. Another view is that the information did not match the created expectations:

> "The information received did not match the expectations created"
> "Communication has low quality"
> "The communication about the New World of Work is vague"
> "Confusing"
> "Very low quality"

On the other hand, there were also voices stating that the information is enough and of good quality:

"The communication is sufficient"
"The communication is very good |...|. The way of communicating is very good"
"There is enough information available about what the New World of Work is and how it will influence me"
"There have been enough sessions with information about the New World of Work, both on company and Microsoft Services level"

Some say the amount of communication is too much or that the communication has become a goal instead of a means:

"The amount of communication is too much"
"The communication about the New World of Work seems to become a goal instead of a means"

By contrast, another viewpoint is given by the following remark:

"The discussion about the New World of Work and what is means has yet to start"

The readiness of all interviewees for the New World of Work is positive: many simply answered 'yes' when asked if they were ready for the New World of Work. Those who did not answer 'yes' indicated that they were open to changes and know that the New World of Work provides opportunities. Some interviewees express an uncertainty about what will happen in the New World of Work:

"Yes. The New World of Work makes working easier"
"I know that the New World of Work provides chances and possibilities and that I should give that attention"
"Yes, but I don't really know what to expect"
"I am open to changes, as long as there is a clear added value"
"Yes, I am looking forward to the New World of Work"

In the textbox below the results found in this paragraph are listed.

For some interviewees,
1. the communication about the New World of Work is unclear, vague, confusing or of low quality
2. the communication about the New World of Work is enough or of good quality
3. the amount of communication about the New World of Work is too much and communication has become a goal instead of a means
4. the communication about the New World of Work has yet to start: it is not enough at this moment

5. All interviewees feel that they are ready for the New World of Work

Textbox 6 Perceptions about the communication about the New World of Work

8.4. Information Overload

8.4.1. Recognition of the phenomenon

Interviewees recognize Information Overload; most of them simply answered 'yes' when asked whether or not they do recognize Information Overload. Some added remarks relating to the amount of information available and the amount of information coming towards an individual:

"The amount of information to base a decision on can become too much"

"The amount of information available is enormous and there are numerous channels"
"If you want to use all the information available you will get overloaded. You have to find ways to find the truly valuable information and get rid of the rest"
"The amount of information available is high, and thus, the risk exists that things will not get the attention they need"

One interviewee was skeptical about Information Overload, stressing that:

" It| is overhyped"

In the textbox below the results found in this paragraph are listed.

1. All interviewees recognized Information Overload
2. One interviewee stressed that Information Overload is overhyped

Textbox 7 Perceptions about Information Overload

8.4.2. Is Information Overload a problem?

For most of the interviewees Information Overload is not a problem. Either it has never been a problem for the interviewee or the interviewee has found a way to cope with the problem and get (and keep) it under control:

"No, |Information Overload is not a problem for me| because I can handle it"
"I have found a way to handle this problem"
"I have found solutions to this problem"
"No, it does not exist"
"No, but it is a challenge to stay up to date"

Others indicate that Information Overload is a problem that they are slowly learning to cope with, and few state that they do not know how to cope with Information Overload:

"Yes |Information Overload is a problem for me|, but slowly I am able to handle this issue"
"Yes [...], I do not know how to deal with it"
"Yes, it is a threat"

In the textbox below the results found in this paragraph are listed.

1. For most interviewees, Information Overload is not a problem
2. For some interviewees, Information Overload is a problem they are learning to cope with
3. Some interviewees do not know how to cope with Information Overload

Textbox 8 Perceptions about Information Overload as a problem

8.4.3. The amount of Information Load

The opinions of interviewees about whether or not Information Overload has increased over time where very different; some of the interviewees perceive no change in the amount of Information Load over time:

"The Information Load has increased, but my attitude towards it has also changed; in my situation Information Overload has neither increased nor decreased"
"No, [Information Load has not increased]; the amount of information has increased, but also the quality of tools to handle the information has increased"

Others state that the amount of Information Load has increased:

"Yes, my job has become more demanding over time"
"The amount of information available over time has increased, partly because of changes in my job. I have to process more information now than before"
"Yes, the Information Load is still increasing"
"Yes, there is more information coming towards me and I need to process more information to be able to work well"

Still others state that the amount of Information Load has decreased, partly because of culture change within Microsoft, which resulted in less unsolicited information being sent:

"Information Overload within Microsoft has decreased, because I know better which information is valuable and which is not. I made choices and thereby decreased Information Overload [for myself], but also I know that I possibly miss some information"
"Within Microsoft Information Overload has decreased, because of technical and managerial changes"
"Changes in the culture of Microsoft [have reduced the amount of] information sent to me unsolicited"

In the textbox below the results found in this paragraph are listed.

For some interviewees,
1. the amount of Information Load has not changed over time
2. the amount of Information Load has increased over time
3. The amount of Information Load has decreased over time

Textbox 9 Perceptions about the amount of Information Load

8.4.4. Causes of Information Overload

Several causes were mentioned by interviewees. Interviewees that did not perceive Information Overload as a problem were asked to try to think of what could cause Information Overload. In Table 10 we present the list of causes mentioned by interviewees, together with relevant quotes from the interviews. Please note that the order in which the causes are presented was randomly chosen.

Cause	Quotes
Amount of information	"The amount of websites [is a cause of Information Overload]" "The amount of information available [is a cause of Information Overload]" "There is a lot of unstructured information heading our way" "The amount of information available is enormous" "Large amount of information"
The easiness with which information is produced, stored and distributed	"The easiness with which information is produced and distributed [is a cause of Information Overload]" "A lot more information has been digitalized and can more easily be transported" "It has become easier to share information" "Information can be more easily transported via electronic means" "Producing and transporting information has become much easier" "The amount of information produced, stored and made searchable has increased"
Internet	"The existence of Internet is the general cause of Information Overload" "Internet [is a cause of Information Overload]"
Culture within organization	"If the culture within an organization stimulates sharing of information, Information Overload can occur" "The culture within this organization is a factor"
Email	"Email is the most (mis)used way of communicating [within this organization]" "Email is a very confronting way of presenting information" "Outlook is the main source of Information Overload"
High number of channels for information	"There are many ways of getting information" "Having different channels for news [causes Information Overload]"
Low quality of data because of tendency to do things quick (quick-and-dirty)	"Quality of information is low, because the tendency is to complete things quick" "Lack of quality of information"
Cell phones	"A mobile phone can also cause Information Overload: a call always comes unexpected" "A] telephone [is another source of Information Overload]"
Pressure	"Pressure"
Amount of outdated information	"The amount of outdated information [is a cause of Information Overload]"
Being afraid to throw information away	"Some [people] are afraid to throw things [email] away"
Broad area of attention	"[My] area of attention is broad, and therefore I need to pay attention to a lot of things"
Lack of confidence in the knowledge of others	"Some people lack the confidence in the fact that others will have the information needed"
Lack of integrating information systems	"For example, there is no system that integrates and provides all the information about a certain customer"
Lack of structure in information	"The lack of structure in the information [is a cause of Information Overload]"
Lack of to-the-point information	"For unstructured data, the lack of to-the-point information [is a cause of Information Overload]"
Lack of visualization of data	"For structured data, the lack of visualization of data is the main cause [of Information Overload]"
Requesting too much information	"People have the habit to pull too much information towards them, as they are afraid to miss something"
Sending information without considering its relevance to the receivers	"There are many people that just send information without considering whether or not the information is relevant for the receivers"
Tendency to send information to let others think someone actually produces something	"People tend to send a lot of information, in order to let others think they actually produce something"

Table 10 Content analysis of causes of Information Overload from interviews

8.4.5. Effects of Information Overload

Several effects were mentioned by interviewees. Interviewees that did not perceive Information Overload as a problem were asked to try to think of what could be effects of Information Overload. In Table 11 we present the list of effects mentioned by interviewees, together with relevant quotes from the interviews. Please note that the order in which the effects are presented was randomly chosen.

Effect	Quotes
Stress	"Stress [is an effect of Information Overload]" "The feeling arises that you are lagging behind in processing your information; that results in stress"
Miss important information	"Having the feeling that you have missed certain information [is an effect of Information Overload]"
Frustration	"Frustration [is an effect of Information Overload]"
Ignoring information	"Ignoring information [is an effect of Information Overload]" "Erroneous filtering [is an effect of Information Overload]"
Lack of concentration because of frequent interruptions	"Lack of concentration, when you are frequently interrupted by information coming your way [is an effect of Information Overload]" "Unability to finish your work, because of frequent interruptions [is an effect of Information Overload]"
Base decisions on faulty information	"[An effect of Information Overload is that one] base[s] decisions on faulty information"
Having difficulty make decisions, because of the amount of information under consideration	"The amount of information to base a decision on increases, and as a result one will experience difficulties making decisions"
Huge structures of directories inside Inbox	"Huge structures of directories inside Inbox [of email] [are an effect of Information Overload]"
Inability to participate in the community	"[The] Inability to participate in the community [is an effect of Information Overload]"
Information paralysis / inability to act	"Information paralysis, both on the individual and organizational level [is an effect of Information Overload]; an individual will be unable to act, an organization will forget its goals"
It is hard to select the information you need from the information available	"It is hard to select the information you need from all the information available"
Loss of power within organization. Those who can handle Information Overload will become the powerful persons in the organization	"People able to handle Information Overload will become the powerful people within an organization. If you cannot handle Information Overload, you will be left behind"
Making the wrong decisions	"Wrong decisions will be made"
Many emails in mailboxes	"[Keeping] many emails in mailboxes [is an effect of Information Overload]"
Missed opportunities	"Missed opportunities [is an effect of Information Overload]"
Quality of work is lowered as much time is needed to process information	"The quality of work will be lowered as you need too much time for processing the information. As a result, the customer is negatively affected"

Table 11 Content analysis of effects of Information Overload from interviews

8.4.6. Countermeasures against Information Overload

Several countermeasures were mentioned by interviewees. Interviewees that did not perceive Information Overload as a problem were asked to try to think of what could be countermeasures against Information Overload. In Table 12 we present the list of countermeasures mentioned by interviewees, together with relevant quotes from the interviews. Please note that the order in which the countermeasures are presented was randomly chosen.

Countermeasure	Quotes
(Teach people to) filter incoming information	"Teach[ing] people how to filter can help solving Information Overload[]" "One needs to[] filter incoming information: information that does not directly influence me is deleted" "Filtering is key" "Filter information: is this RSS feed useful?" "Change your attitude, by starting to filter information" "Learn to filter: you are free to choose which information you consume" "Learn to filter, but the question remains how?" "I filter my information based on sender"
Use tools to classify and structure information (for example flagging and email rules)	"You can use the tools within Microsoft Office to classify and structure information, [for example you can start] flagging messages for follow-up (for example today, tomorrow, next week)" "Structuring your email by using rules is a countermeasure for Information Overload[]" "Structure email by using email rules" "Process emails directly (flagging)" "You have to structure information, for example by flagging, or using task-lists"
Ask others for information before trying to find it yourself	"Having a network with people can help solve Information Overload, because you can ask others before trying to find information yourself" "Use a network for finding information. I myself am a generalist and I know where I should turn to for specific information (colleagues, websites, email aliases)"
Disable notifications of new email	"Disable popups of new emails and reminders of things in your calendar" "Disables notification of new email"
Improve software (intuitive interfaces, natural language)	"Improve software ([for example by providing] intuitive interfaces, [or possibilities to interact using] natural language). Still there are people that are left behind simply because they cannot use the tools properly" "Provide better tooling"
Stop searching for information at some point and decide on the information available	"Gathering information to up to some point and then make your decision based on the information then available [can help reduce Information Overload]. Do not be a perfectionist in this, because then you become overloaded." "At a certain moment you just need to stop gathering information and make your decision. If the risk of an erroneous decision is higher the time available for gathering information and thinking about it will be longer"
Train people to cope with Information Overload	"People need to be trained to cope with Information Overload" "Training: This problem can be solved by changing a personal attitude towards the problem"
Communicate clearly and make agreements about communication	"Communicate clearly with others and make clear agreements about communication"
Hire an information integrator	"Another solution would be to hire a person to be an Information Integrator: filter and integrate information from different sources and send the result of this process to the rest of the organization"
Improve visualization of information	"Provide visualization of data"
Improve infrastructure	"We need to improve infrastructure, so more people will get access"
Keep professional and private life separated	"Also, keeping your private and work life strictly separated helps to manage Information Overload"
Only read communication when needed, not when it arrives	"Only read communication when needed, not at the moment it arrives"
Organizations should delete outdated information more vigorously	"An organization should be deleting outdated information more vigorously"
Provide an alternative for email	"Provide an alternative for email"
Provide an integrating overview of information from different sources	"Create an overview of information from different sources"
Reserve time slots for email reading and only read your email during that time slots	"Reserve time for reading your email and only read your email during the reserved timeslots"
Scan your email messages instead of reading them completely	"Scan your email messages instead of reading them completely"
Structure group communication	"This problem can be solved by[] structuring group communication"
Structure information hierarchically	"Information should be structured better, to make it easier to search [through] it. We need to structure information hierarchically, from global information down to very specific information"
Verify information with colleagues	"Verify information with colleagues"
When producing information, provide more quality and less quantity	"When you are producing information you should ensure a high quality and less quantity"

Table 12 Content analysis of countermeasures to Information Overload from interviews

8.4.7. Situation in the New World of Work

An interviewee provided an interesting view on the situation with Information Overload in the New World of Work, by suggesting:

> "the new generation of workers [,the] NetGen [,] will be able to distill information from a large amount of data automatically"

One interviewee indicated that the amount of information that flows towards an individual will increase in the New World of Work:

> "People need to be trained to cope with information, because the number of information flows and the amount of tools available to communicate will increase"

By contrast, another one states the opposite:

> "The amount of information that flows towards an individual will decrease, as you will have less contact with your colleagues"

Another view is that the New World of Work will help to cope with Information Overload:

> "The New World of Work will help us cope with Information Overload"

Finally, another opinion was found:

> "No [Information Overload will not change because of the New World of Work], Information Overload has to do with a person, not with the outside world"

In the textbox below the results found in this paragraph are listed.

1. The NetGen might be better able to cope with Information Overload
2. Some interviewees believe that the amount of Information flowing towards an individual will increase in the New World of Work
3. Some interviewees believe that the amount of Information flowing towards an individual will decrease in the New World of Work
4. The New World of Work will help us to cope with Information Overload
5. Information Overload will not change, as it is a personal problem

Textbox 10 Perceptions about Information Overload and the New World of Work

8.5. Lack of Control over Information

8.5.1. Recognition of the phenomenon

Interviewees recognize Lack of Control over Information; most of them simply answered 'yes' when asked whether or not they do recognize Lack of Control over Information, although some indicated that they do not recognize Lack of Control over Information at this moment:

> "No, I do not recognize Lack of Control over Information], not at this moment"
> "No, not at this moment. I feel I need to supply too much information in too many systems"

"No, not really, only when communicating with persons outside of Microsoft: who will read this information and are they allowed to?"

Some added remarks to their answer:

"Yes [I recognize Lack of Control over Information], compliancy is the basis for the execution of business activities"
"It is not that I do not want to supply the information requested, but the way it has to be supplied does not fit with my way of working"
"Yes [I recognize Lack of Control over Information], but the phenomenon is only present at the organizational level: an individual has no influence on this phenomenon. On an organizational level it is important to make sure that people get the information they need to perform their tasks, while that information can be confidential"
"Yes, it is a hot topic, also for customers. There is not enough knowledge about this subject"
"Yes [I recognize Lack of Control over Information], communities are highly influential, next to organizations and governments. If you want a community to have confidence in you, you need to be predictable and do what you say"
"[Yes], sometimes I have to supply information, without having any idea about the use of this information"

In the textbox below the results found in this paragraph are listed.

1. Some interviewees do not recognize Lack of Control over Information
2. Most interviewees do recognize Lack of Control over Information

Textbox 11 Perceptions about Lack of Control over Information

8.5.2. Is Lack of Control over Information a problem?

Lack of Control over Information is not perceived as a problem, but as a challenge:

"No, Lack of Control over Information is not a problem , it is a challenge"
"No [Lack of Control over Information is not a problem for me], but it should be: I think it would be a good thing if compliancy rules were more heavily integrated in our job"

Others indicate that Lack of Control over Information is not a problem:

"No, it is not a problem, it is part of the job"
"It is not a problem, because I can deal with it"
"No, I do not have anything to hide and I support transparency"

In contrast, still others indicate that Lack of Control over Information is indeed a problem:

"Yes. People are executing activities one way because it has 'always' be done that way, instead of questioning the way of executing activities"
"Yes, because you have to pay attention to both the use and misuse of information. Fear is a result of this double attention"
"Yes, and it is present in several aspects: both in information you receive from customers as well as the information that you store (such as email) that you should delete after a certain amount of time"

When asked how the interviewee experienced Lack of Control over Information, some indeed experienced the phenomenon:

"The code of conduct of Microsoft pays attention to compliancy, so I experience this phenomenon"
"It is part of the job, although it could be easier"
"The decisions you have to make regarding this are difficult, although there is training available. It is difficult to decide which information you may use for what purpose and to whom you may show that information"
"I experience this problem mostly in the situation that customers ask for information they may not receive (yet)"
"If you give information to someone else, you lose control over it"
"The political impact of communication is an issue. Outlook helps me to be more transparent towards Microsoft"

Others indicate that they do not believe Lack of Control over Information will be a challenge for them:

"Lack of Control over Information is not and will not be present in my job. In my job I will increasingly have to think about this issue in the process of solving a customer's problems"

Still others see Lack of Control over Information as a technical problem:

"It is mostly a technical problem. Within the organization a views exists on who may see which information. This view is not always coherent with practice, so the rules are changed and that causes problems. Memory sticks contain confidential information, files and file systems are not encrypted"

In the textbox below the results found in this paragraph are listed.

For some interviewees,
1. Lack of Control over Information is not a problem, but a challenge
2. Lack of Control over Information is not a problem nor a challenge
3. Lack of Control over Information is a problem

4. Some interviewees perceive Lack of Control over Information as a technical problem

Textbox 12 Perceptions about Lack of Control over Information as a problem

8.5.3. Importance of Lack of Control over Information as a phenomenon

Some interviewees indicated that Lack of Control over Information has started to play a bigger role in their lives than before, mostly because it receives more attention:

"Yes, the world has become more transparent because of the existence of internet"
"Yes, because there is more ignorance: actualization of data is just not happening. When saving information, you also have the obligation to make sure it is updated"
"Yes, it is receiving more attention. As Information Overload grows, you need to process, store and make available more information"
"Yes, it is receiving more attention and pressure from external sources is increasing"
"Microsoft has made me realize what information an employee has"
"Yes, information is much more mobile than before"
"Yes, because of changes in my job. There is however potential for growth of this issue"
"Yes, compliancy is becoming a major issue, all over the world"

In contrast, others indicate that Lack of Control over Information has not increased over time:

"This phenomenon is something of all times, so it has not increased much over time"
"In general, no [it has not increased], but on a small scale, yes [it has increased]: there is more attention for the privacy sensitivity of information"

Still others indicate that the issue of Lack of Control over Information has decreased:

> "The problems have decreased because I got used to it"

In the textbox below the results found in this paragraph are listed.

For some interviewees,

1. Lack of Control over Information has started to play a bigger role in their lives, because it receives more attention
2. Lack of Control over Information has not gained importance over time
3. Lack of Control over Information has lost importance, as they got used to it

Textbox 13 Perceptions about the importance of Lack of Control over Information

8.5.4. Causes of Lack of Control over Information

Several causes were mentioned by interviewees. Interviewees that did not perceive Lack of Control over Information as a problem were asked to try to think of what could cause Lack of Control over Information. In Table 13 we present the list of causes mentioned by interviewees, together with relevant quotes from the interviews. Please note that the order in which the causes are presented was randomly chosen.

Cause	Quotes
External requirements on compliancy	"The requirements on the compliancy have become stronger (for example for taxes): information must be traceable" "External regulation. Also, organizations need to be careful with information" "Compliancy rules create a need for measuring many things"
Amount of information available has increased	"There is more information available and thus more questions will arise for information about other subjects" "Also, the information that is communicated to outside the organization results in more questions"
Digitalization of information and easiness with which this is stored	"More information is kept digitally instead of on paper, thus it is easier to manipulate and change it" "Also, organizations can store information about anything. Information gets separated from its context."
A difference in knowledge is used to make money	"The cause is that a difference in knowledge is used to make money"
Classification of data is difficult	"Classification of data is difficult. You have to do it, and keep doing it for new information that is added"
Increased ignorance	"Increased ignorance"
Increased importance of communities	"Communities become more important"
Information is spread more rapidly and intensively	"Information is spread more rapidly and intensively."
The rules are not clear	"People don't know what rules they should follow and what that the benefit will be for them"
World is becoming more transparent	"The world is getting more transparent"

Table 13 Content analysis of causes of Lack of Control over Information from interviews

8.5.5. Effects of Lack of Control over Information

Several effects were mentioned by interviewees. Interviewees that did not perceive Lack of Control over Information as a problem were asked to try to think of what could be effects of Lack of Control over Information. In Table 14 we present the list of effects mentioned by interviewees, together with relevant

quotes from the interviews. Please note that the order in which the effects are presented was randomly chosen.

Effect	Quotes
Organizations will be forced to become more transparent and if not, they will not survive.	"An organization will be forced to either become more transparent or go out of business, because opinions about an organization are spread quickly via Internet; transparency is needed from the first contact onwards" "An organization will be forced to be more transparent if it wants to do business as it used to" "An organization will go bankrupt if it is not compliant. There is no link between transparency and customer confidence, for example IBM is not transparent but its customers have great confidence in the organization" "Organizations that cannot match the requirements will not survive"
Misuse of organization's information will result in bankruptcy	"Lacking control over Information can result in organizations going bankrupt" "The misuse of an organization's information can result in bankruptcy" "An organization cannot allow persons outside the organization to publish information without its context"
Image of organization will be damaged	"Image of company will be damaged" "The image of the organization will be damaged"
Quality of service is lowered	"In bigger organizations for a customer, it is unclear who is handling your request, so the possibility of receiving different answers on the same question arises" "Quality of service of an organization will be lowered, as information is more difficult to find and thus a customer's question will be less easy to answer"
Frustration	"Frustration"
Losing competitive advantage	"An organization may even lose its competitive advantage, if others know the same as you do"
Organizations become confused	"Organizations can become confused by the emancipated consumer and more-requesting governments. The regulation can become a problem because of the administration involved"
Need to change organization's culture	"A need arises to change the culture inside your organization, because work processes need to be changed"

Table 14 Content analysis of effects of Lack of Control over Information from interviews

8.5.6. Countermeasures against Lack of Control over Information

Several countermeasures were mentioned by interviewees. Interviewees that did not perceive Lack of Control over Information as a problem were asked to try to think of what could be countermeasures against Lack of Control over Information. In Table 15 we present the list of countermeasures mentioned by interviewees, together with relevant quotes from the interviews. Please note that the order in which the countermeasures are presented was randomly chosen.

Countermeasure	Mentioned by
Make employees aware of Lack of Control over Information	"You need to train people to follow these rules" "Mandatory training for employees" "Make employees realize what information they deal with" "Create awareness among employees. Technical solutions are not sufficient yet"
Information Rights Management	"Information Rights Management is a technical solution" "Flows of information have to be augmented with DigitalRightsManagement; by doing this a message is signed and it is clear who wrote the message" "Information Rights Management"
Investigate, structure/classify and clean up information	"Try to structure and clean the information available in the organization" "Investigate which information resides where in the organization. This is the most difficult step. After that, you need to classify that information and structure information according to that classification" "Clearly indicate whether or not information should stay inside the organization"
Become transparent and stay that way	"Become transparent and stay that way"
Make processes clear and clean them up	"The organization's processes have to become more clear and clean"
Add a 'feeling' to your products	"A brand with a good image will be less questioned than a brand with a bad image; organizations may want to find ways to add a feeling to their products, so people can identify with the products"
Focus on the customer	"Focus on the customer"

Countermeasure	Mentioned by
Communicate more clearly	"Communicate more clearly, both internally and externally and make sure a two-way-communication can exist"
Make it easier to follow compliancy rules	"Make it easy to follow the compliancy rules, possibly by automating certain tasks. We need to think about solutions from the user's point of view"
Keep in touch with stakeholders that request information	"Keep in touch with the organization's groups of customers that request information from you"
Be strict: no errors allowed	"Be strict within an organization: no one should be allowed to err on this issue"
Build trust	"Building trust between people is much more important than technical solutions, because technical solutions can always be breached"

Table 15 Content analysis of countermeasures against Lack of Control over Information from interviews

8.5.7. Situation in the New World of Work

Several interviewees suggest that executing too much control over information can hinder the New World of Work, as information sharing is seen as important feature of the New World of Work. Executing too much control over Information can hinder information sharing and thus the New World of Work:

> "Executing to much control over information can hinder the New World of Work, as information sharing will be more difficult"
> "The New World of Work can be hindered by a strong regulation based on Information Rights"

Others foresee problems with the transfer of knowledge when the NetGen enters organizations:

> "There will be problems with the transfer of knowledge when the new generation of workers (NetGen) enters organizations. The NetGen has a different view on business and processes"

There were also voices suggesting that the trend towards more transparency will continue over time, possibly combined with enhanced possibilities in dealing with these issues:

> "Organizations will become even more transparent"
> "This trend will continue in the New World of Work, but it will not make working impossible"
> "This phenomenon will become important for everyone, because more people will need to report based on the results of their work"
> "Maybe the possibilities to deal with this issue will be enhanced"

Others suggest that information will become more mobile, as it increasingly is travelling towards persons instead of the persons towards the information:

> "No big changes for the New World of Work, except that information becomes more volatile, because it travels will ly/to persons more often"

In the textbox below the results found in this paragraph are listed.

1. Executing too much control over information can hinder the New World of Work
2. There will be problems with the transfer of knowledge when the NetGen enters organizations
3. The trend towards more transparency will continue, possibly combined with enhanced possibilities to deal with this transparency
4. Information will become more mobile

Textbox 14 Perceptions about Lack of Control over Information and the New World of Work

8.6. Lack of Networking Support

8.6.1. Recognition of the phenomenon

All interviewees recognize the phenomenon of Lack of Networking Support, they simply answered 'yes'.

8.6.2. Is Lack of Networking Support a problem?

Some of the interviewees do not perceive Lack of Networking Support as a problem:

> "No [it is not a problem], as long as the technological infrastructure supplies the opportunity to keep communicating"
> "No, for me it is not a problem. I do not perceive a lack of non-verbal communication with my colleagues"
> "Microsoft is changing from a matrix organization to a network organization, so the need for networking support increases. Personally, it is not a problem for me, because I have a network of people I can use"
> "It is not a problem, but it is something that needs attention. Our work is increasingly getting global and time- and cultural aspects are increasingly important. In my job, the lack of contact with my colleagues is not really a problem, because we can perform our tasks relatively autonomously"
> "For my branch it is not a problem, because there are enough ways of finding the right person (for example searching, or addressing your question to an email alias)"
> "No, because I have created a network within Microsoft"

In contrast, many interviewees indicated that Lack of Networking Support is a problem:

> "Yes [it is a problem], socially as well as in the context of knowledge gathering"
> "It is difficult to find people who can help you. Current ways of compensation make information sharing less open and honest"
> "In working with people from all over the world it 's a problem"
> "Yes, for example working in teams that are geographically dispersed over the globe"

The problem has been indicated as not being geographical dispersed or living in a different time zone, but the lack of connectivity:

> "The problem is not location or time, but connectivity"
> "No, it is not a problem, because it does not happen frequently, but when it happens I experience a lack of connectivity"

Others provide a comparison between small and stable organizations and their situation:

> "In a small organization, you have enough contact with colleagues, so you know what the others do and what the others know. In a team of which members change frequently, this is already somewhat more difficult. If you divide the team over two buildings, this is even more difficult"

8.6.2.1. Collaboration across time zones

Several interviewees brought about the subject of collaboration across time zones. For some, working across time zones is a problem:

> "In a completely virtual team that consists of people from different countries it is easy not to collaborate"
> "Working in teams that are geographically dispersed over the globe [is difficult]"
> "In working with people from all over the world it is a problem"

For others, collaborating across time zones is not a problem, as long as the work gets done:

> "Collaborating with persons I have never seen is not a problem, as long as the work gets done. If anything is amiss it is difficult to solve the problem. When working remotely it can be become difficult to know the position of the person within an organization"
> "Having to collaborate with people I do not know is not a problem, but for gathering information it can become a problem that you do not see each other anymore"

8.6.2.2. Keeping in touch

Some interviewees indicate another aspect of Lack of Networking Support:

> "Keeping in touch with colleagues is increasingly difficult. When you are just entering an organization, this problem is most apparent, because it is very difficult to get to know your colleagues"
> "It is difficult to be 'one Microsoft'"

In the textbox below the results found in this paragraph are listed.

For some interviewees,

1. Lack of Networking Support is not a problem
2. Lack of Networking Support is a problem
3. working across time zones is a problem
4. working across time zones is not a problem, as long as the work gets done

5. The problem of Lack of Networking Support is about connectivity, not about geographical dispersion
6. In a smaller and more stable organization, employees will have less Lack of Networking Support
7. Keeping in touch with colleagues is increasingly difficult.

Textbox 15 Perceptions about Lack of Networking Support as a problem

8.6.3. Importance of Lack of Networking Support as a phenomenon

An increase of relevance of this phenomenon is perceived by some interviewees:

> "Yes, and it will become an even bigger issue when the readiness, acceptance and tooling for the New World of Work is there"
> "Yes, because of changing tasks (from technical to more socially oriented)"
> "Yes, because of changing tasks"
> "The bigger an organizations grows, the less you know what others do. [Microsoft Services has grown in the last years]"

Others indicate that the phenomenon has not started to play a bigger role:

> "Not really, this is a problem that has been around for a very long time"
> "Yes and no, it is very dependent on the environment you are in"

In the textbox below the results found in this paragraph are listed.

For some interviewees,
1. Lack of Networking Support has started to play a bigger role in their lives over time
2. Lack of Networking Support has not become more relevant over time

Textbox 16 Perceptions about the importance of Lack of Networking Support

8.6.4. Causes of Lack of Networking Support

Several causes were mentioned by interviewees. Interviewees that did not perceive Lack of Networking Support as a problem were asked to try to think of what could cause Lack of Networking Support. In Table 16 we present the list of causes mentioned by interviewees, together with relevant quotes from the interviews. Please note that the order in which the causes are presented was randomly chosen.

Cause	Quotes
Increased physical distance between colleagues	"Teleworking" "Working in different locations" "Because of a increased physical distance between colleagues: we do not meet each other automatically"
Working worldwide	"Working worldwide" "When working worldwide you have to deal with cultural differences"
Compensation structures do not fit with current situation	"Compensation structures do not fit with the current situation (team efforts are not rated, but the individual efforts are)." "Every individual gets his/her own targets, and moves towards that goal, without interaction with colleagues"
Frequent changes in team membership	"Frequent changes in team membership" "When there are too many changes within the organization, the network within the organization will fall apart"
Division in teams, because of organization's growth	"The growth of the organization has caused the division of the organization into teams. This has resulted in less knowledge about what others do"
Externally oriented organization	"The reason for this problem is that Microsoft wants to be an externally oriented organization: working with and for customers. The internal bonding between employees is then difficult to maintain"
Increased use of the Internet for communicating	"Also, internet is used more and more to communicate and people are getting used to this way of communicating"
Pressure	"Pressure negatively influences communication"
The amount of useless communication	"The amount of useless email causes less reactions to useful email, thus hindering communication"

Table 16 Content analysis of causes of Lack of Networking Support from interviews

8.6.5. Effects

Several effects were mentioned by interviewees. Interviewees that did not perceive Lack of Networking Support as a problem were asked to try to think of what could be effects of Lack of Networking Support. In Table 17 we present the list of effects mentioned by interviewees, together with relevant quotes from the interviews. Please note that the order in which the effects are presented was randomly chosen.

Effect	Quotes
Lower efficiency and effectiveness because of dissolving network	"When the network within an organization dissolves, the efficiency will be lowered" "You [will] become less effective" "An organization's effectiveness will decrease" "Daily tasks will take more time"
Organizations become a group of individuals	"Organizations can become a group of individuals that use one brand for communication" "Less connection to the organization you work for" "It becomes difficult to see your position in the context of the whole organization"
Indifference, demotivation	"Indifference, demotivation" "Demotivation because of a lack of social contact"
Nuances in communication will be lost	"Communication via email and instant messaging are less 'rich' than face-to-face communication" "In volatile communication such as digitalized communication, nuances are lost. As a sender of information you need to make sure that what you 'say' does not get misunderstood or misinterpreted by the receiver, for example because in different countries different rules of engagement can be in place"
Communication and collaboration become inefficient	"Communication and collaboration becomes inefficient"
Erroneous decisions	"Erroneous decisions are made"
Frustration	"On the individual level you will perceive frustration because of inability to complete your tasks"
Lack of knowledge	"You will have a lack of knowledge"
Less opportunities to discuss shared problems	"The opportunities to discuss about shared problems will be less"
Innovation slows down	"Organizations will get in trouble, as innovation and processes slow down and become more dependent on individuals"
Organization's growth is tempered	"An organization will be tempered in growth"
Organization's image is damaged (problems with transparency influences image)	"An organization will experience problems with her transparency; if a customer gets three different answers to the same question from different positions in the organization then it will damage the organization's image (transparency is one of the factors that influences image)"
Quality of service lowered	"The quality of your service will be lowered"

Table 17 Content analysis of effects of Lack of Networking Support from interviews

8.6.6. Countermeasures against Lack of Networking Support

Several countermeasures were mentioned by interviewees. Interviewees that did not perceive Lack of Networking Support as a problem were asked to try to think of what could be countermeasures against Lack of Networking Support. In Table 18 we present the list of countermeasures mentioned by interviewees, together with relevant quotes from the interviews. Please note that the order in which the countermeasures are presented was randomly chosen.

Countermeasure	Quotes
Usage of tools	"Tools can be used to make knowledge gathering easier" "Provide technical solutions" "Tools can help to support the processes needed" "Sitting in the same room, around the same table remains the best way of collaborating. Technical solutions can help to come close to this situation, but still some non verbal communication is missing" "Tools can be supportive for the building of this network [between employees], but it starts with personal contact" "Tools give support but no solution" "Tools can help us to create a more exact image of the person with whom we are collaborating" "Digital tools are not a complete solution"
Social events for creating social bonding	"Organizations will have to explicitly pay attention to the social aspects and also reserve budget for social events to stimulate the social contact among employees" "Social events for building social contacts" "Provide social events, so employees can meet each other informally. This results in a network being created." "Provide social events or go to the organization's office more often" "Before the 'real' work starts, we need to create social bonds between employees. This can be done by providing social events"

Countermeasure	Quotes
	"Virtual teams should meet regularly (at least once a year)" "We need to meet regularly (for example once per two months) to create a social basis" "Attend to social events"
Define company's values / goals to provide a social basis for collaboration	"An organization's values can already provide a basic common focus for this social contact" "Create common goals. Common goals are a prerequisite for collaboration" "An organization should be clear what it wants to achieve and what it wants to be"
Use your network to gather knowledge and expand it	"Use your network (ask someone and hope that that person knows someone who knows the answer). The question remains whether or not this is an efficient way of getting information. We need to build a social network" "Use someone's network to expand your own network. You really need to use your network" "Use your network to gather knowledge"
Central meeting place for social contact	"Keeping in touch with colleagues and creating a social bond is more difficult. Maybe an office could be designed specially to stimulate this social contact" "Create a central place meant especially for meeting others"
Structure knowledge sharing by training and social contact	"Structure knowledge sharing. Individuals have to learn to share knowledge and keep doing it automatically. Individuals have to learn that knowledge sharing is giving and receiving. Social contact stimulates knowledge sharing" "Show the benefits of sharing of information"
Buddy system for knowledge gathering	"A buddy system would be a good addition: based on a specific term you can find experts"
Choose the form of communication carefully	"As a sender of information, choose the form you want to use carefully"
Define a culture of knowledge sharing within organization	"Define a clear culture within the organization and make sure your employees live according to this culture"
Enter meeting early	"When working with people from all over the world you can call in early to the conference call, to have some small talk with others"
Well-organized intranet	"A well organized intranet can help finding the right information"

Table 18 Content analysis of countermeasures against Lack of Control over Information from interviews

8.6.7. Tools

Consultants are supported by various Information Worker tools. In Textbox 17 we present a list of tools that support Consultants in communicating with others. This list does not include tools that are viewed to be trivial i.e. they are used by every Consultant. Also, the list does not include tools that are not specifically meant for communicating, such as Word or Excel. All the tools listed are Microsoft tools that are available for use by the interviewees. In this section we give some more background information on these tools to enable better understanding.

- Extranet
- Internet Access Gateway
- Knowledge Network
- Live Meeting
- Office Communicator, including Office Communicator Web Access
- Office Groove
- Office Outlook, including Outlook Web Access
- Office Sharepoint
- Smartphone
- Terminal Services Gateway
- Windows Live Messenger

Textbox 17 List of tools

Extranet

Extranet is described in (Chaffey, 2004) as: "[An Extranet] is formed by extending the Intranet beyond a company to customers, suppliers and partners" (translated from Dutch). Visitors to the site are authenticated,

either by password, IP or user or a combination of these. The Extranet tool within Microsoft allows individuals to make an internal website available for access by an external party, either a customer or a partner.

Internet Access Gateway

Internet Access Gateway enables users to publish internal websites to an external accessible portal, so it can be accessed by employees. A possible use of this tool is making the expense reporting system available from outside the organization's walls.

Knowledge Network

Knowledge Network has been described in section 6.3.5. The Knowledge Network tool is a client that runs on a predetermined schedule on the user's system. Currently, it analyzes email in Office Outlook and instant messaging communication and contacts in Microsoft based IM tools. The user is notified about suggested changes in the profile and has to accept or edit the changes, thereby submitting the profile to a central server. The information is available via a browser, and also an Outlook add-in is provided to search for persons and keywords directly from Outlook.

Live Meeting

Live Meeting is a tool that enables virtual meetings. A user can upload a presentation and present it, complete with audio and video. The tool includes a lobby where users wait to be allowed into the meeting, a question and answer system to ask the presenter a question, a feedback system to allow users to let the presenter know what their opinion is about the speed of the presentation, etc. Moreover, the meeting can be recorded and published on a website for later viewing.

The tool works with a central server on which the information is stored. Users can either be invited to the meeting or can join in freely.

Office Communicator, including Office Communication Web Access

Office Communicator can be seen as a professional Windows Live Messenger / MSN . It integrates with Exchange to provide information about presence based on the calendar of the user (for example, when someone is in a meeting, that is shown in Office Communicator). Office Communicator enables users to send and receive text messages, audio and video.

Office Communicator Mobile is the mobile version of the program, available for Windows Mobile. Office Communicator Web Access is a browser based version of Office Communicator, providing text messaging services from a browser.

For more technical information about Office Communicator, see the discussion of Windows Live Messenger below, as the way in which they work are supposed to be almost identical.

Office Groove

Groove provides secure communication and collaboration possibilities by using workspaces. Workspaces can be created to store and share related documents and work on documents, across organization's boundaries. Groove features synchronization capabilities that make sure that changes made offline by a user are automatically synchronized with all subscribers to the workspace the next time the user is online again. Groove uses a central server to store documents on and provides easy access from the user's system by a Windows client.

Office Outlook, including Office Outlook Web Access

Office Outlook is an personal information management tool which handles email, calendar, task lists and contacts. It relies heavily on Exchange Server for these functions, although Outlook can handle standard POP3 and IMAP email. Email, tasks and calendar items can be flagged and categorized for better overview. Tasks can

be created from and related to email items, and calendar items can also be related to emails. Meeting invitations are presented as emails.

Office Outlook Web Access provides access to a reduced set of functionality via a browser. Office Outlook integrates with, among others, Live Meeting (see above), Office Communicator (see above) and Office OneNote (a note taking application available in the Office Suite).

Office Sharepoint

Office Sharepoint is a system that runs on a web server, which features many applications for sharing and storing documents, having discussions, providing information, etc. All exchanges occur over HTTP.

Smartphone

The Smartphones Consultants use are running Windows Mobile 5.0 or Windows Mobile 6.0. These devices are portable, and are essentially cell phones with extended functionality. Some Smartphones provide a QWERTY keyboard, a touch screen and/or a WIFI connection (which enables the device to connect to WLAN networks provided by a router or access point). As such, the devices are capable of the things 'normal' cell phones can do: making and receiving phone calls, sending and receiving text messages. The Windows Mobile system is an operating system for mobile phones, which provides a file system for storing files (for example photos taking with the built-in camera) and a graphical interface. The Smartphones Consultants use have Outlook Mobile installed and thus are capable of sending and receiving email (which can optionally be retrieved periodically from a server over GPRS). In addition, the tasklist and calendar of the user are available on the device. The information on the device can be synchronized to another device (for example a PC or laptop) via ActiveSync over Bluetooth, Infrared or over GPRS when synchronizing to a server. In addition to these functions, a version of Word, Excel and PowerPoint is running on the devices, enabling the user to view and edit Word, Excel and PowerPoint files. Other software is available, for example for viewing PDF files. The user can visit internet sites by the built-in version of Internet Explorer.

Terminal Services Gateway

Terminal Services Gateway allows users within the organization to use external terminals to access internal systems and sites over HTTP. This is different from extranet and internet access gateway in the sense that it allows access to systems directly, and not only to published information. This allows a user to use the programs available on an organization's system from outside the organization.

Windows Live Messenger

Windows Live Messenger (WLM) is the current name of the Instant Messaging (IM) service of the Microsoft Windows Live platform. The service was previously called MSN Messenger (MSN), and is still best known under this name. Users are identified by a 'Windows Live ID', which is essentially any email address and a password. When logged in, users can send each other text messages, audio and video over the Internet. Other functions include: file transfer, sharing of applications and requesting remote assistance, playing games. Windows Live Messenger is free and available on Windows PC's, Macintosh, Cell phones with Java support or Windows Mobile, XBOX 360.

WLM/MSN uses a command based client-server protocol, called MSNPx. MSNP stands for Microsoft Notification Protocol and is followed by the version number of the protocol. Messages (for example text messages, but also presence information) are sent from a client via a server to one or more other clients. For example, when user A signs out and is listed in user B's contact list, the Notification Server (NS) will send a notification of user A signing out to the client of user B. Client of user B is then responsible for indeed showing user A as offline. The NS is the basis for an WLM/MSN session, as it handles presence information: a user that is not connected to the NS is not available for contacts to chat with.

Text messages, file transfers, audio and video, etcetera are handled by a Switchboard (SB). A instant messaging session between two clients is handled by a SB. Thus, being in two conversations at once means connecting to two SB servers at once. There is no direct connection between two clients when in a conversation; the SB acts like a proxy between the users.

This list of tools as shown in Textbox 17 was used to investigate the acceptance of the tools available, in order to see which tools are used for what purpose and how that relates to providing networking support. The acceptance of tools is, according to the Technology Acceptance Model, influenced by the perceived usefulness and the ease of use of the tool (F. D. Davis, 1989). We used this notion while investigating the usage of tools and thus asked the interviewees to score each tool in three dimensions: frequency of use, usefulness and ease of use. The questionnaire used in the interviews is depicted in Appendix 6.

The results of this questionnaire are depicted in Appendix 8, here we will discuss the results. In Appendix 9, the results are shown graphically. Table 19 below provides an overview.

8.6.7.1. Familiarity

Almost all tools were familiar to every interviewee, except for Internet Access Gateway (five interviewees not familiar), Knowledge Network (eleven interviewees not familiar) and Terminal Services Gateway (five interviewees not familiar).

8.6.7.2. Frequency of use

The tools that are used most frequent by Consultants are Office Outlook and the Smartphone, closely followed by Office Sharepoint. Of the tools with which all Consultants were familiar Live Meeting is used the least. When also the tools with less than complete familiarity among Consultants are taking in consideration Knowledge Network is used the least.

8.6.7.3. Usefulness

The tools that are perceived by Consultants as the most useful are Office Outlook and the Smartphone. Of the tools with which all Consultants were familiar Office Groove and Windows Live Messenger are perceived as the least useful. This situation does not change when also the tools with which not all Consultants were familiar are included in the comparison.

8.6.7.4. Ease of use

Again, Office Outlook and the Smartphone are perceived as the most easy to use. Of the tools with which all Consultants were familiar Extranet, Office Groove, Office Sharepoint and Terminal Services Gateway are perceived as having the lowest ease of use. When all the tools are considered Internet Access Gateway, Knowledge Network and Terminal Services Gateway also score lowest.

In Table 19 below the acceptance of the tools by the Consultants is shown. Values in columns rank from empty to five stars. The table is based on the Technology Acceptance Model; we have added a column indicating the familiarity with the tool.

Tool	Familiarity	Frequency of use	Usefulness	Ease of use
Extranet				
Internet Access Gateway				
Knowledge Network				
Live Meeting				
Office Communicator, including Office Communicator Web Access				
Office Groove				
Office Outlook, including Outlook Web Access				
Office Sharepoint				
Smartphone				
Terminal Services Gateway				
Windows Live Messenger				

Table 19 Overview of the acceptance of the tools by the Consultants (based on the Technology Acceptance Model)

The table above shows that Office Outlook and the Smartphone are used most frequently, while those tools are also perceived as the most useful and easy to use. In addition, Windows Live Messenger has also received a high score for ease of use. Terminal Services Gateway and Knowledge Networking are used least frequent. Terminal Services Gateway and Office Groove are scoring the lowest on perceived usefulness, while the ease of use of Extranet, Internet Access Gateway, Knowledge Networking, Office Groove, Office Sharepoint and Terminal Services Gateway are perceived as the least easy to use.

8.6.8. Situation in the New World of Work

Interviewees indicate that the social network within Microsoft will become worse, since there will be less face-to-face contact between colleagues, resulting in less knowledge about each other and thus less knowledge about what your colleagues do and know:

> "The social network within Microsoft will be worse: colleagues will be further dispersed than before"
> "Less physical contact will result in less knowledge about each other and thus less knowledge about what your colleagues do and know"

Others indicate to believe that this issue will not change in the New World of Work:

> "Lack of Networking Support will not change in the New World of Work"

One interviewee suggested that the importance of asynchronous communication will become less in the New World of Work:

> "The importance of Outlook will be lowered, as email is an asynchronous way of communicating, and there are many alternatives"

In the textbox below the results found in this paragraph are listed.

1. Some interviewees believe the social network within Microsoft will become worse in the New World of Work
2. Some interviewees believe that Lack of Networking Support will not change in the New World of Work
3. The importance of asynchronous communication might become less in the New World of Work

Textbox 18 Perceptions about Lack of Networking Support and the New World of Work

8.7. Lack of Networking Support is the most important phenomenon

The final question posed to Consultants during the interview was to look back and reflect on Information Overload, Lack of Control over Information and Lack of Networking Support and indicate which of those three concepts was the most important to them.

One interviewee suggested a relation between the three concepts:

> "Lack of Networking Support is the most important, because of Information Overload and Lack of Control over Information"
> "All three problems have a clear 'human' component"

Thus, according to this viewpoint, because organizations and individuals feel the problems of Information Overload and the Lack of Control over Information, most attention must be given to Lack of Networking Support.

Lack of Networking Support is seen as the most important concept because of social aspects:

> "Solving Lack of Networking Support is the biggest challenge"
> "Lack of Networking Support, because of the social aspects"
> "Lack of Networking Support provides the most opportunities and possibilities"
> "Lack of Networking Support, because our organization is growing fast"
> "Lack of Networking Support is the biggest danger for organizations. The power is inside the people, not inside tools"

Another interviewee suggested:

> "Information Overload and Lack of Networking Support are equally important"

For some, Information Overload is the most important:

> "Information Overload is the biggest problem. Lack of Networking Support is something personal and Lack of Control over Information is not a problem for me"
> "Information Overload is the biggest challenge for me. Every day I am working to keep it under control"
> "Information Overload, because you continuously need to distill information from the large amount of data you receive"

One interviewee indicated that Lack of Control over Information is the biggest challenge:

> "We have to find a balance between what information to share and what information to keep. Sharing more is not always better; more efficient communication will lead to higher effectiveness"

In the textbox below the results found in this paragraph are listed.

1. All three concepts have a clear 'human' component
2. Because organizations feel the problems of Information Overload and Lack of Control over Information, most attention must be given to Lack of Networking Support
3. For some interviewees, Lack of Networking Support is the most important concept, because of the social aspects

For some interviewees,

4. Information Overload and Lack of Networking Support are equally important
5. Information Overload is the most important concept

6. For one interviewee, Lack of Control over Information is the most important concept

Textbox 19 Perceptions about the relative importance of the three challenges

8.8. Overview of interview results

In Figure 7 we presented a research framework based on literature. It listed the causes, effects and solutions for Information Overload, Lack of Control over Information and Lack of Networking Support. In Figure 8, Figure 9 and Figure 10 below we present a frame of reference, in which the results from the interviews conducted are shown. This frame of reference provides an overview of our results and will be used in the analysis of the results.

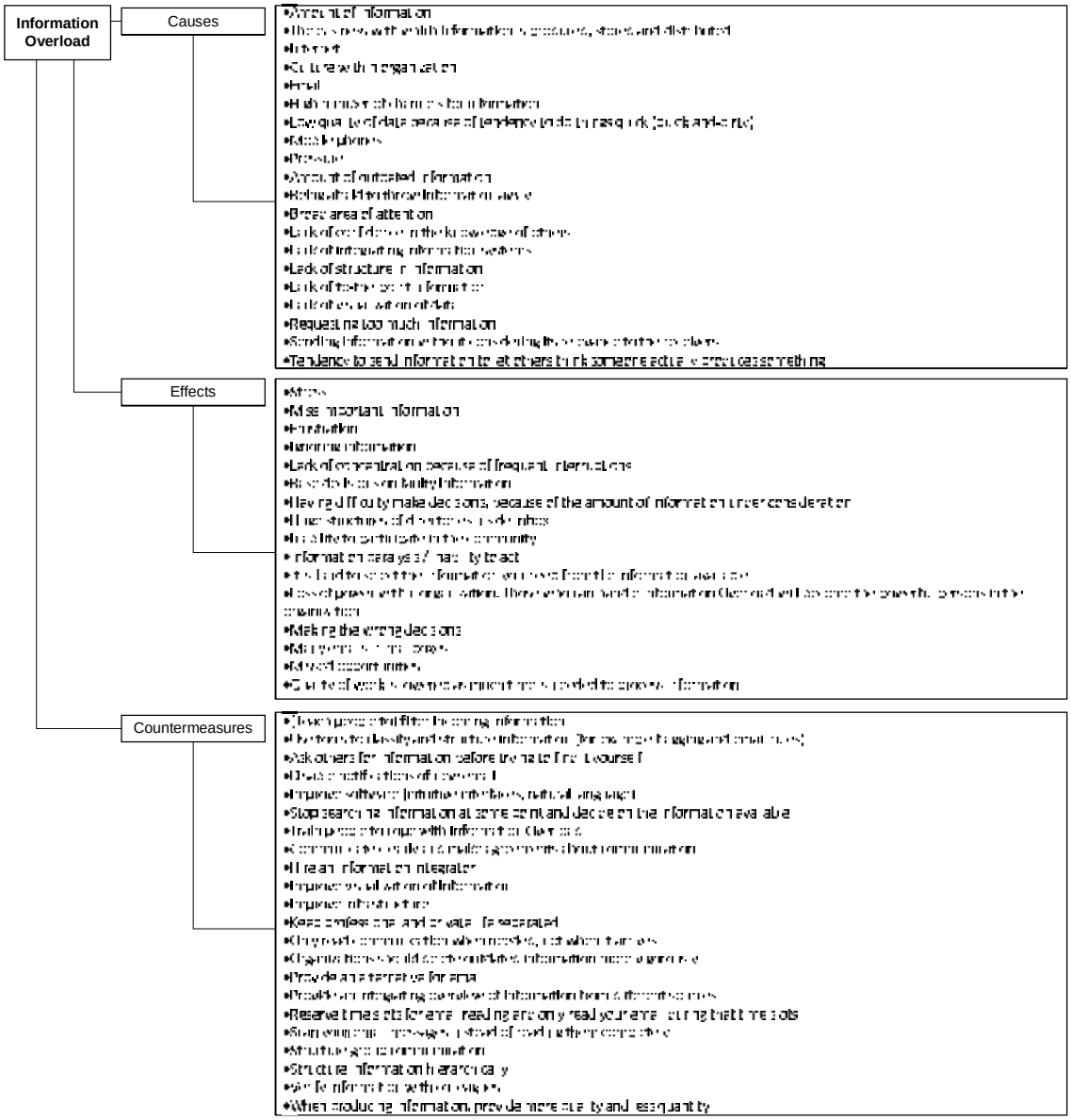

Figure 8 Frame of reference of interview results for Information Overload

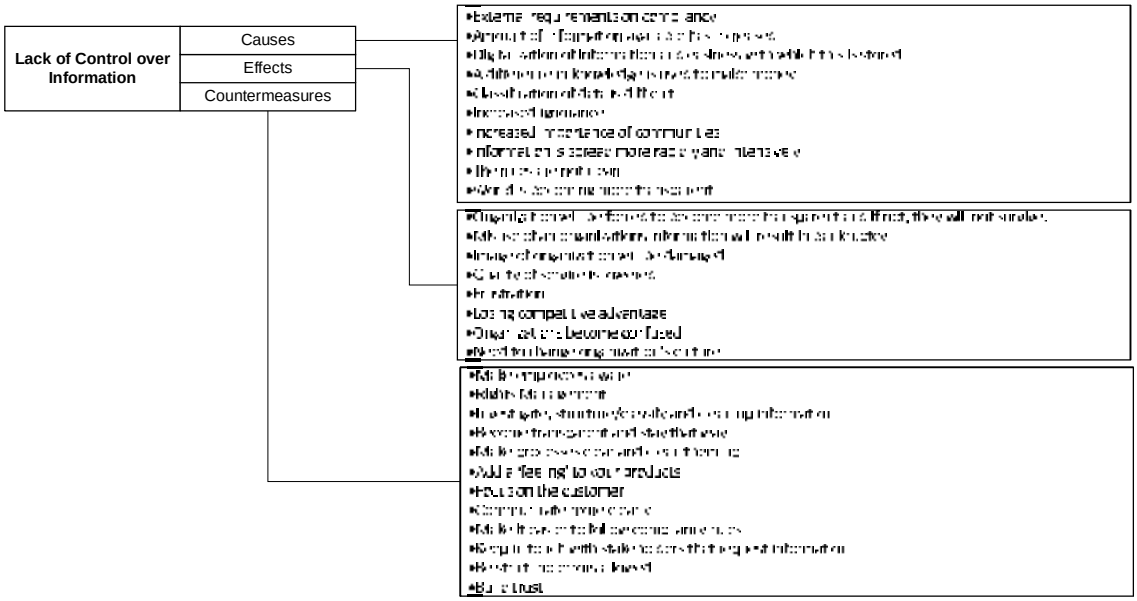

Figure 9 Frame of reference of interview results for Lack of Control over Information

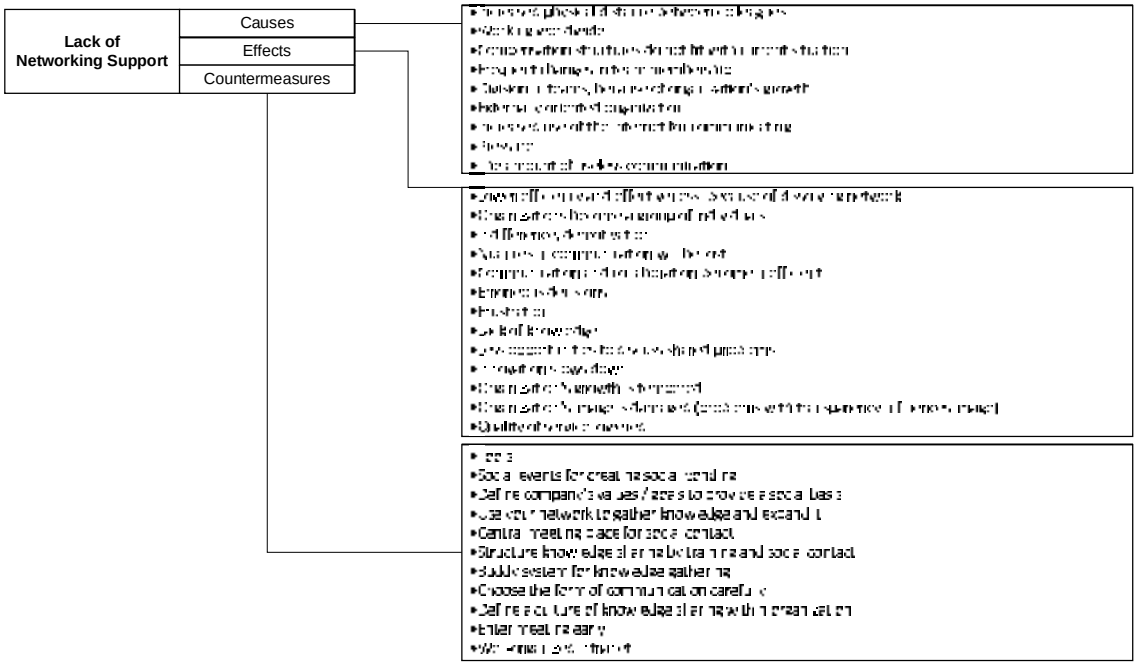

Figure 10 Frame of reference of interview results for Lack of Networking Support

9. Discussion

In this section we will discuss the results from the interviews as presented in section 8. We will relate the results to literature and investigate relations between answers to questions. The discussion follows the same structure as the interview protocol and the presentation of the results did, starting with general information about the respondents (section 9.1). The next section (9.2) discusses the results of the questions about the New World of Work , followed by Information Overload (section 9.3), Lack of Control over Information (section 9.4), Lack of Networking Support (section 9.5) and Tools (section 9.6). In section 9.7 we discuss which of the three phenomenon is considered the most important. This chapter concludes with an investigation of the possible causes for the difference in results when our study is compared to others (section 9.8).

In this section we also relate the results from the interviews to the literature used in this study. The body of knowledge for this study consisted mainly of literature related to the New World of Work, Information Overload, Lack of Control over Information and Lack of Networking Support. Therefore, some results were not found in the literature studied and are presented as such. This does not mean that the results are completely novel; it means that the results were not discussed in the literature studied for this study.

9.1. Information about respondents

9.1.1. Private and work situation

The two main working locations of interviewees were at home and at the office of the customer. Most interviewees have created some kind of work place at home or are planning to do so. The office of Microsoft is used mostly as a place to meet colleagues and perform tasks not directly related to the job. It seems the choice of where to work is dependent on the tasks, the preferences of the customer and the private situation and preference. In a discussion about the way of working at Microsoft, a manager, not one of the interviewees, said: "I start to worry if I see them at the office more often". Clearly, this manager indicates that Consultants are expected to work outside the office: something must be wrong if Consultants start to work at Microsoft's office more.

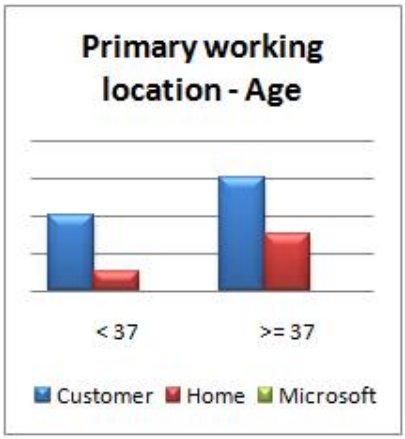

Figure 11 Primary working location - Age

9.1.2. Primary working location and age

In Figure 11 we have plotted the primary working location and age. Of those younger than 37, 80% indicates that they work at the office of the customer most of the time. Of those aged 37 or older 67% indicates they work at the office of the customer most of the time. This indicates that those younger than 37 seem to work at home less than those aged 37 or older. This could be interpreted as a denial of the popular belief that the 'next generation' of employees will want to work at home more than the generations before. It is however important to note that the tasks of the older employees may very well be more suited for working at home than the younger employees; it may be that younger employees need more time at the customer's office than older employees, as the latter group is presumably more experienced. Also, the graph does not express a

Figure 12 Primary working location - Experience

preference of working location, but only the primary working location, which is influenced by more factors than only personal preference (see section 9.1.1 above).

9.1.3. Primary working location and experience

In Figure 12 we have plotted the primary working location and working experience. We divided the interviewees into two equal groups, those with up to six years of experience and those with more than six years of experience. The scores for the primary working location for these groups are exactly the same, thus we can conclude that the primary working location is not dependant on working experience for this group of Consultants.

9.1.4. Primary working location and team

In Figure 13 we have plotted primary working location and team membership of the interviewees. In each category there are three individuals, as we selected three interviewees from each team.

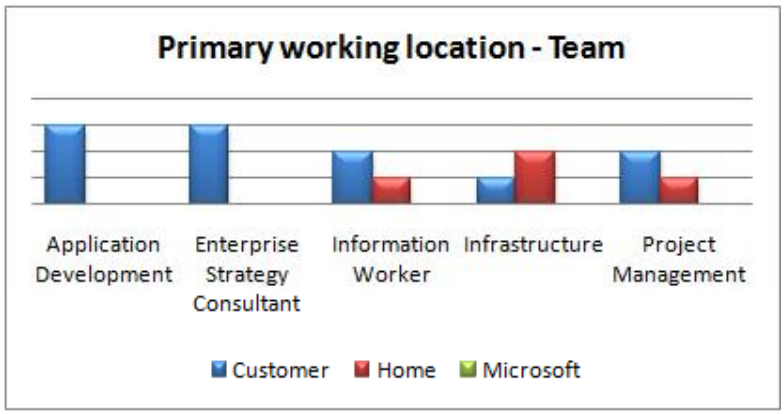

Figure 13 Primary working location - Team

As is visible from Figure 13 the interviewees that are part of the Application Development and Enterprise Strategy Consultant teams all indicated they work primarily at the office of the customer. For the Information Worker and Project Management teams two individuals indicated they work at the office of the customer primarily and for the Infrastructure team one individual indicated to work at the office of the customer primarily. Interesting is the score for Project Management, as in our opinion Project Management is a task that has a lot to do with location; a project manager leads the project at the location where the project takes place, i.e. the customer's office. We expected, that for example the more technically oriented Consultants, such as those in the Application Development and Infrastructure teams, would not necessarily work at the office of the customer. This expectation is true for the Infrastructure team in our study, but not for the Application Development team.

9.1.5. Age and working experience

In Figure 14 we have plotted the age of interviewees against the (relevant) working experience in years. With relevant we mean working experience in IT consultancy. In addition, we have included a trend-line, which depicts the optimal, linear relation between age and relevant working experience: since, if a person becomes one year older, the person will presumably have one more year of working experience, provided that the person does not change jobs or stops working.

Based on the plot shown in Figure 14 we assumed that in this dataset there is no strong relationship between age and working experience of subjects. In order to investigate this assumption more formally, we use the following linear regression model: $Y_i = \beta_0 + \beta_1 x_i + \varepsilon_i$, with $Y_i =$ working experience of person i, $x_i =$ age of person i, $\varepsilon_i =$ error. In order to investigate whether or not age and working experience are related in this data set, we must test null hypothesis $H_0: \beta_1 = 0$ against alternative hypothesis $H_1: \beta_1 \neq 0$, with test statistic $T = \frac{\hat{\beta}_1}{s_{\hat{\beta}_1}} = \frac{r}{\sqrt{(1-r^2)/(n-2)}}$ (see (Healy)), with $r =$ the sample coefficient of correlation and $n =$the number of subjects in the data, which is 15. As is visible from the figure below the value of r^2 is 0,499, thus

$r = \sqrt{0{,}499} = 0{,}706$. Thus, $T = \frac{0{,}706}{\sqrt{(1-0{,}499)/13}} = \frac{0{,}706}{0{,}196} = 3{,}60$. For a 1% uncertainty level we reject H_0 when $T \leq -3{,}01$ or $T \geq 3{,}01$. Thus, we accept H_1 : there is a relation between age and working experience in this dataset, although it is not strong.

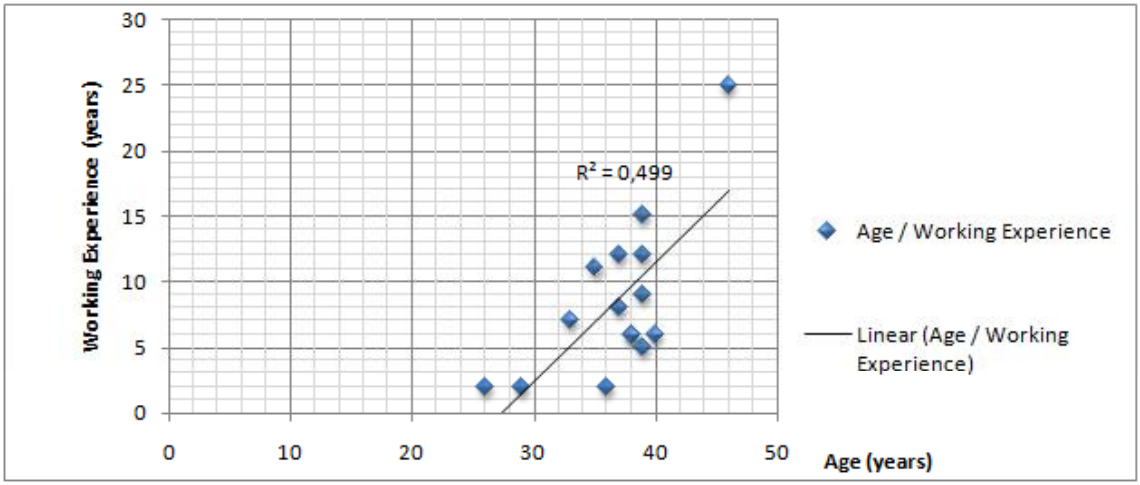

Figure 14 Working Experience - Age

Of course, these results are only valid for our study, with a relatively small group of subjects (15). The results should not be generalized to all Consultants.

9.1.6. Summary

The primary working location of Consultants is at the office of the customer. The office of Microsoft is used as a place to perform tasks not directly related to the content of an individual's tasks, such as meeting with colleagues. There are Consultants who work at home primarily, but in our study most of the Consultants work at the office of the customer most of the time, see section 9.1.2. This is a normal situation, as everyone has his/her own preferences and also has the ability to choose according to these preferences, within certain constraints.

No relation between primary working location and working experience has been found. The relation between primary working location and team membership has also been investigated, but because of the small samples of the teams (3) this result is hard to interpret.

In the group of respondents there is only a weak relation between age and working experience.

9.2. The New World of Work

9.2.1. Match between official documents and interviewee's interpretation

In Table 9 (see page 73) the items in the descriptions of the New World of Work as given by interviewees are listed. All elements mentioned by interviewees can be found in the original documents about the New World of Work. The following shows where the elements mentioned by interviewees can be found in the original New World of Work documents.

- **The individual is an important asset.** (Rasmus, 2005a) states: "We should not forget that the ability to adapt and innovate is fundamentally a *human* talent. Empowering *people* to work more efficiently and effectively in the 'digital workstyle' of the new world of work should be at the center of any organization's strategy as it addresses the coming era of rapid change and increasing global integration". This indicates a focus on the individual.
- **The individual becomes the centre of organization with the organization giving support to the individual.** As mentioned above (Rasmus, 2005a) states that allowing people to work more efficiently and effectively should be at the center of any organization's strategy, which matches with the description given by the interviewees.
- **The individual gets the freedom to structure his/her days himself/herself. Work is becoming location and time independent, and working at home becomes one of the possibilities, next to work at the office of your employer or at the customer's office.** (Rasmus, 2005a, 2006a) discusses the possibilities of bringing the work to the person instead of the person to the work and the freedom to choose where and when to work.
- **The goal of the New World of Work is to work more efficiently or to stay efficient.** As mentioned above (Rasmus, 2005a), which discusses the New World of Work vision, states that an organization's strategy should be focused on allowing people to work more efficiently and effectively. It is not explicitly mentioned as a goal of the New World of Work, but can be seen as such.
- **The compensation of work will be based on deliverables and quality, instead of quantity, hours spent or presence.** (Rasmus, 2006a) lists task-based compensation as one of the possible implications of the decentralization of information work.

Interviewees indicated that they believe the New World of Work is inevitable for organizations. The developments on which the New World of Work is based are considered unstoppable. Already, there are indications of this in various studies among students; flexible working hours are considered almost as important as salary. So, an organization needs to supply the freedom and flexibility associated with the New World of Work in order to attract and retain employees.

We conclude that the interpretation of the New World of Work as given by respondents fits with the official New World of Work vision as detailed by Rasmus: all elements that were mentioned can be found in the official New World of Work vision documents.

9.2.2. Novelty of the New World of Work

We can agree with the interviewees that indicated that the New World of Work seems to bring nothing new for Consultants. It is important to note here that the implementation of the New World of Work is a company-wide initiative, thus also marketing, sales and finance will go through this change. In our opinion, the New World of Work implementation will indeed bring something new to the Consultants, but in order to ensure a successful company-wide implementation, everyone involved should be brought to the same "level". The Consultants seem to be the group within the company with the highest IT affinity and are indeed working according to the New World of Work principles more than for example someone working in salary administration. Consultants work at the customer's office or at home, at times that fit the tasks at hand and the current situation, whereas someone working in salary administration works at the office of Microsoft all the time, and with less flexible working hours. After everyone has been brought to the same "level" we are confident the New World of Work implementation will start to bring something new to Consultants. What exactly that will be is of course difficult to predict. One of the things that seem to be "New World of Work" like and is not implemented for Consultants yet is the result based rewarding.

In addition to that, some interviewees expressed the opinion that the New World of Work vision itself is not new. According to them, Microsoft should consult organizations that have already gone through this change instead of trying to invent "the wheel" again. To some extent we can agree with this, because it seems a good idea to tap into the knowledge others have instead of trying to create that knowledge yourself. On the other hand, the New World of Work vision was originally written for Microsoft by Dan Rasmus, an internationally recognized expert in knowledge management and collaboration technology, who worked as an analyst with the Giga Information Group and Forrester Research. Thus, in our opinion, the vision of the New World of Work is based on a considerable amount of knowledge and experience in the field.

We can understand that some interviewees feel that the translation of the New World of Work principles to actions (training, etc) within Microsoft the Netherlands, is done by persons with a small amount of knowledge about the subject, but we think that can partly be explained by what we noted above: the whole company has to be brought to the same "level" and Consultants are already at that "level".

Concluding, the New World of Work is not perceived as new by the Consultants: it is a natural and logical environment for their tasks; a Consultant is used to working primarily at the office of the customer. So, for Consultants, the New World of Work is a rather natural and logical environment. We are however confident that as soon as the whole company is at the same "level" with the Consultants, the New World of Work will indeed have something new in store for this group.

9.2.3. Communication about the New World of Work

In our opinion, the cause of the communication being perceived as vague or of low quality is that the people communicating it themselves are still looking for what the New World of Work exactly is; they lack the experience. This is not necessarily a problem. The persons communicating the New World of Work vision within Microsoft have themselves recognized this fact and explicitly mention that the way to the New World of Work is a journey for everyone, even for them. The downside of mentioning this explicitly is that others can perceive the communication and implementation of the New World of Work as having a low quality.

Some interviewees indicated that the amount of communication about the New World of Work is too much. In our opinion, this attitude can partly be explained by the remark made by one interviewee:

> "The pitfall is that you will not give enough attention to the communication about the New World of Work because you think you already live in the New World of Work"

Indeed, the interviewees stating the volume of New World of Work communication is too high also indicate that they believe they already live in the New World of Work.

It is interesting to note that although the general opinion is that the New World of Work is not 'new' for Consultants, there is still a need for communication about this. The question then arises why there is a need for improved communication about the New World of Work if the New World of Work is not new for Consultants? The problem lies in the fact that although the general opinion is that the New World of Work is not new for Consultants, at the same time the remark was made that it is unclear what the New World of Work will bring exactly. In our opinion, there lies the need for the improved communication: indicate the consequences for Consultants, beyond the level of what they already know (such as working anywhere, anytime).

Although the communication about the New World of Work may generally be seen as not having a high quality, the readiness among Consultants to join in the New World of Work is there: all respondents indicated that they were ready for, or even looking forward to, the New World of Work and the changes that it will bring.

9.2.4. Factors influencing New World of Work implementation

From the interviews, several factors that influence a New World of Work implementation can be extracted. Here we discuss will the factors found.

9.2.4.1. Clear goals

Interviewees indicate that the goals of the New World of Work should be made clear in order to ensure a successful implementation:

> "The New World of Work can only be introduced successfully if the goals are very clear"
> "It is difficult to say you are ready, because the goal is not clear"

Indeed, other interviewees indicate that it is unclear how the New World of Work would have to be implemented in an organization:

> "It is unclear how this will be implemented in an organization"
> "It is not clear how to implement the New World of Work at customer's offices"
> "The challenge will be to explain this vision to customers"

9.2.4.2. Having the right "kind" of people

It is interesting to note that only a few of the interviewees mention an important factor to the successful implementation of the New World of Work: having the right people. As one of the interviewees puts it:

> "It is important to have the right "kind" of people, because the New World of Work is not about not having to work anymore"

The underlying statement is that the freedom given to employees by the New World of Work to structure their own work also brings responsibility for the employee to actually *work*. Another interviewee indicates a suspicion that working in the New World of Work would be more difficult for people with a lower education or lower competence on self management:

> "I suspect the New World of Work will be more difficult for people with a lower education"

In our view, having the right kind of people for the New World of Work is not only important because the people still have to work, but also because people will have to *stop working*. When the work becomes increasingly time and location independent, it would be easy to never stop working, just because you *can* work anywhere and anytime. This is indicated by some interviewees:

> "My work is my hobby"
> "I work also in the evenings and during weekends, with an average of 60 hours a week"

In our view, this effect would harm the idea of the New World of Work, viz.: allowing people to play a role in more than only their working environment. At first, this situation might not be perceived by the individual as a problem, since in the IT business, it is very well possible that the work is also the individuals hobby, but in the long run this will turn out to be a problem.

As large as the impact for an employee will be to be able to work anywhere, anytime, the impact of this will also affect the environment of an employee, his/her family or the people he/she lives with. How to cope with this impact is of course difficult. An interviewee, someone with first-hand experience on this, indicates the following:

> "When you start working at home, you first have to discuss this with your family. After all you will be seeing each other much more during the day. You have to think about where in the house you want to work: on the couch, in the kitchen or in a separate room? Another factor is the communication to the office, that needs to be optimal"

Although these remarks are helpful, the precise way of dealing with these issues is out of the scope of this study.

9.2.4.3. Clear agreements

Interviewees indicate that when individuals can work anywhere and anytime, and also will actually do that, agreements need to be made on how to collaborate with others, how to communicate and how to deliver your 'product':

> "Making agreements about working with colleagues and customers will become the biggest challenge"
> "The New World of Work is about having the possibility to structure your work the way it fits you best. That means you have to make agreements on how to collaborate, how to perform your tasks and how and when you communicate"

In our opinion, this is an important notion for management in the New World of Work: come to an agreement with your employees on these factors.

9.2.5. Summary

A distinct notion that stands out from these results is that the New World of Work is perceived as dependent on the type of organization, the type of work and on the type of individuals in the organization. The latter is most interesting, and provides an opportunity for future research: investigate whether there are specific characteristics to the individuals that are successful in the New World of Work and what those specific characteristics might be.

Three factors have been found that influence the implementation of the New World of Work: clear goals, having the right "kind" of people and clear agreements. The need for clear agreements on how to work, collaborate and communicate is an interesting result, as it seems to call for an investigation in how to make those agreements, what should be the span of the agreements and what should be their content. In our opinion, the agreements to be made are again dependent on the organization, the employees and the type of work; it seems that there will be no "one-size-fits-all" solution for these agreements, although that is something that could be investigated further.

For Microsoft internally, the remarks about the communication about the New World of Work are interesting, as a relatively large portion of the interviewees had a less than positive opinion about this communication. This can partly be explained by the fact that the New World of Work implementation is a company-wide initiative, and Consultants are already at a higher level of IT use and acceptance than others. The latter have to be brought to the same or comparable level as the Consultants in order to ensure a successful New World of Work implementation.

Although the quality of the communication about the New World of Work is not perceived as high, the Consultants do know what the New World of Work officially is; this is apparent from the match between the official documents and the interpretation given by the interviewees. All elements mentioned by interviewees were also present in the official documents. No interviewee gave a complete overview of the New World of Work, which, in our opinion, is hard or even impossible to do, as the New World of Work vision is an enormous initiative that has impact on many things. An individual can only pick out things that influence him directly and use that to create his/her own interpretation of the New World of Work

In addition, the results show that the New World of Work is not perceived as fully new by the Consultants: it is a natural and logical environment for their tasks; a Consultant is used to working primarily at the office of the customer. We are however confident that as soon as the whole company is one the same "level" as the Consultants are, the New World of Work will indeed have something new in store for this group, as the environment of the Consultants changes. The Consultants will have to be patient and keep their positive attitude towards the New World of Work.

9.3. Information Overload

9.3.1. Recognition of Information Overload

All respondents recognized Information Overload, although one of them stressed that Information Overload is an overhyped phenomenon.

9.3.2. Information Overload is not a problem

For most of the interviewees, Information Overload is not a problem, although some interviewees indicated that Information Overload is indeed a problem they are slowing learning to cope with. These opposite opinions are nothing unusual, as they are common with every problem.

9.3.3. Amount of Information Load

The opinions about whether or not Information Load has increased were also different and opposite; there is no general opinion about this. Some interviewees indicated that Information Load has not changed, while others indicated that Information Load has increased and still others stated that Information Load has decreased.

9.3.4. Causes of Information Overload

In Table 20 the causes of Information Overload as mentioned by interviewees are listed, ordered by the number of interviewees that mentioned that specific cause. In the last column of Table 20 the entry in Table 2 (page 46) with the same or a comparable cause is shown. Thus, this column indicates whether the cause mentioned by interviewees was directly mentioned in literature. If there is no entry in the last column for a particular cause, this means that no direct link to literature was found.

Number	Cause	Times mentioned	Listed cause in Table 2 (as found in literature)
1	Amount of information	6	Number of items of information rises
2	The easiness with which information is produced, stored and distributed	6	• vast storage capacity of the systems • use and misuse of IT • low duplication costs
3	Internet	3	Internet
4	Culture within organization	3	
5	Email	3	Emails
6	High number of channels for information	2	Various distribution channels for the same content
7	Low quality of data because of tendency to do things quickly (quick and dirty)	2	• Overabundance of irrelevant information • (lack of) information quality, value • Information half-life
8	Cell phones	2	
9	Pressure	2	Pressure and distraction
10	Amount of outdated information	1	• Overabundance of irrelevant information • (lack of) information quality, value • Information half-life

Number	Cause	Times mentioned	Listed cause in Table 2 (as found in literature)
11	Being afraid to throw information away	1	
12	Broad area of attention	1	Pursuing a number of tasks simultaneously
13	Lack of confidence in the knowledge of others	1	
14	Lack of integrating information systems	1	
15	Lack of structure in information	1	
16	Lack of to-the-point information	1	
17	Lack of visualization of data	1	
18	Requesting too much information	1	The person collects information, just in case it may prove useful
19	Sending information without considering its relevance to the receivers	1	Senders screen outgoing information insufficiently
20	Tendency to send information to let others think someone actually produces something	1	

Table 20 Causes of Information Overload from interviews

As is visible from the table above, most causes mentioned during the interviews were also found in literature. The causes that were mentioned most (number one and two, both mentioned six times) by interviewees are found directly in literature.

What is interesting to note is that the organization's culture is mentioned three times as a cause of Information Overload (number four). In our opinion, what is meant is the following: if an organization's culture is focused on stimulating sharing of information, this could, in the opinion of some interviewees, result in rise of amount of information available (cause number one), resulting in Information Overload. As such, we think the culture within an organization is not a direct cause of Information Overload, but an indirect cause. This can be the reason why the cause has not been found in literature. If indeed a organizational culture of information sharing will cause Information Overload, this can very well become problematic in the New World of Work. In general, the possibility to share information whenever, with whomever, is seen as something that is needed for the New World of Work. Thus, an organization that wants to enable the New World of Work will be promoting information sharing amongst employees, but has to pay attention to the suggestion that in doing so, it might as well promote Information Overload.

The next cause that was not found in literature is cause number 8 ('cell phones'). This cause has been mentioned by two interviewees and the remark related to this cause was:

> "A mobile phone can [also] cause Information Overload: a call always comes unexpected"

Generalized, what the interviewee suggests is that Information Overload is caused by interruptions in an individual's work due to external influences. This general cause is indeed found in literature, namely in (Speier, 1997), as 'task interruptions for complex tasks' and, somewhat more generalized, in (O'Reilly III, 1980), as 'pressure and distraction'.

People tend to store information, even if it has become useless, as is indicated by cause number 11 ('Being afraid to throw information away'). This cause suggests that if one is afraid to throw information away, i.e. keeps information (possibly after it has become useless), one may experience Information Overload. This cause seems to be related with what is found in (Edmunds, 2000). The authors list several personal factors that can cause Information Overload, one of which can be related to this cause, viz.: 'the person collects information, just in case it may prove useful'. This suggests a tendency to keep collecting information and being reluctant to throw it away, because it may prove useful sometime in the future.

When someone has a lack of confidence in the knowledge of others, Information Overload could occur, as is suggested in cause number 13. In our opinion, this cause is an indirect cause, as the lack of confidence in the knowledge of others will result in the individual collecting more information, which in turn could cause

Information Overload. Thus, in our view, cause number 13 is an indirect cause of Information Overload, which could lead to a direct cause of Information Overload, namely the habit to collect too much information (cause number 18).

Causes number 14 ('Lack of integrating information systems') and 15 ('Lack of structure in information') are related, as both suggest to bring more structure into information. These causes suggest that a lack of structure in information can cause Information Overload. Of course, this could be seen as low quality information; information that could be structured but is not, is of lower quality than information that is indeed structured.

Cause number 16 ('Lack of to-the-point information') seems to be related to a cause found in literature, namely 'Overabundance of irrelevant information' (Nelson, 1994); if an information unit is not to-the-point one could say there is too much irrelevant information in that unit: an overabundance of irrelevant information.

Cause number 17 ('lack of visualization of data') suggests that if data would be visualized more, for example by using graphs or drawings, information could be more easily consumed. In our opinion, this is dependent on personal preference; for some the tables with raw data mean more than a graph with lines, for others graphs are more easily understandable than tables with raw data. Still, the possibility that the lack of visualization of data can cause Information Overload is interesting. It seems to call again for more structure in Information and reducing the complexity of Information.

The last cause that is listed in the table above (number 20, 'Tendency to send information to let others think someone actually produces something') has to do with the nature of Information Work; most activities performed in Information Work are not visible from the outside, but are happening inside the individual; an Information Worker collects information, thinks about it, applies his/her own knowledge and then provides the outcomes of this process to the outside world. An Information Worker could feel the need to just send information to others during this process, to show he/she is actually working. This tendency to just send information could result in others experiencing Information Overload, as more information is sent towards them unsolicited. Thus, this tendency is an indirect cause, which is related to one cause of Information Overload that has been found in literature, viz.: 'Senders screen outgoing information insufficiently'.

In Figure 15 the above discussion has been depicted. The causes of Information Overload mentioned during the interviews are shown, with their relation to Information Overload. If a cause is, in our opinion, an indirect cause it is connected either via another cause that has been mentioned during the interviews or via a cause that has been found in literature, to which it is related.

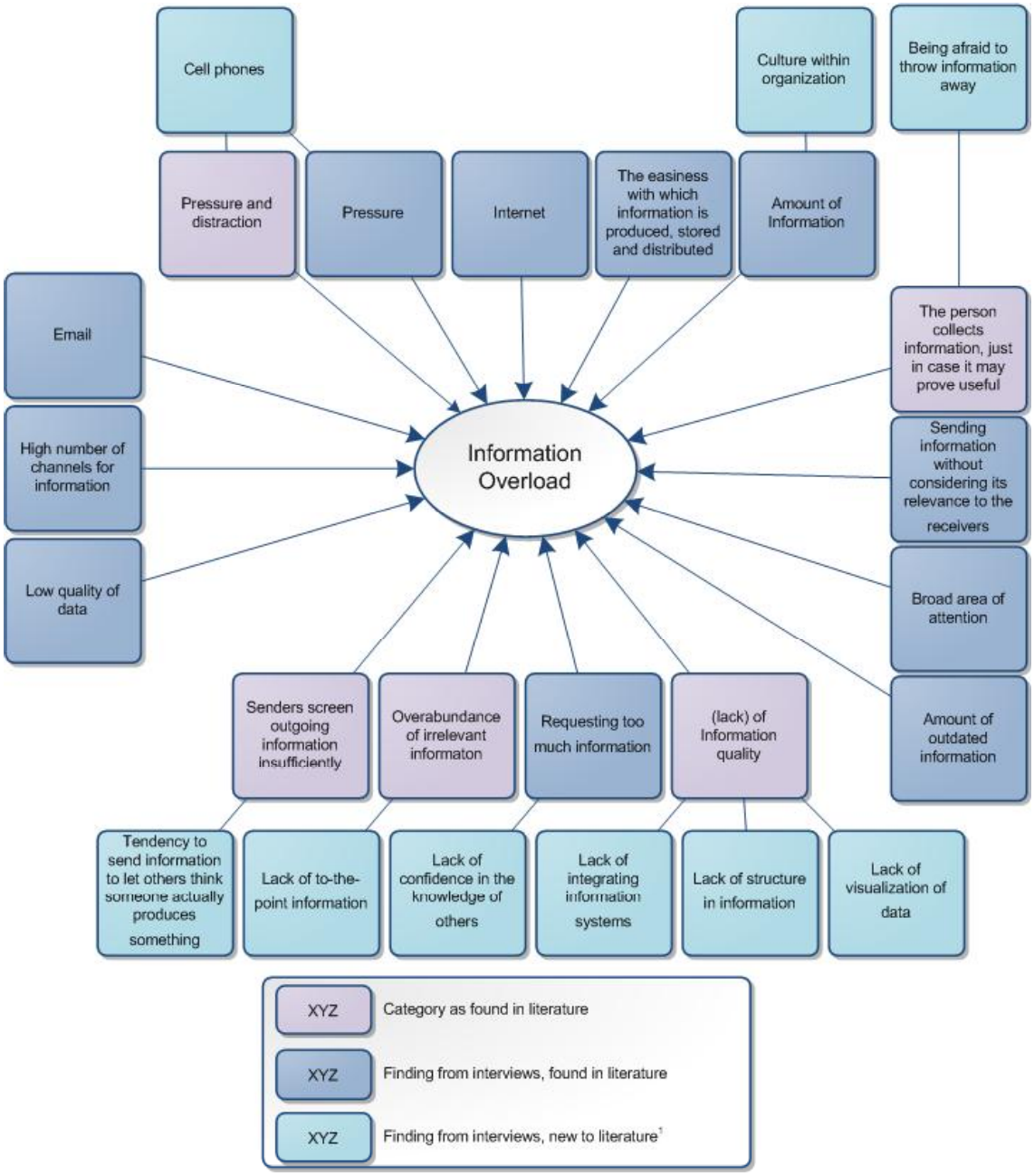

Figure 15 Cognitive map of causes of Information Overload

9.3.5. Effects of Information Overload

In Table 21 the effects of Information Overload as mentioned by interviewees are listed, ordered by the number of interviewees that mentioned that specific effect. In the last column of Table 21 the entry in Table 4

[1] 'New to literature' means that we have not found the item(s) in the literature studied. It does not mean that the item is not discussed elsewhere.

(page 49) with the same or a comparable effect is shown. Thus, this column indicates whether the effect mentioned by interviewees was directly mentioned in literature. If there is no entry in the last column for a particular effect, this means that no direct link to literature was found.

Number	Effect	Times mentioned	Listed effect in Table 4 (as found in literature)
1	Stress	4	Stress, confusion, and cognitive strain
2	Miss important information	3	
3	Frustration	2	• Stress, confusion, and cognitive strain • Satisfaction negatively affected
4	Ignoring information	2	Ignore information and be highly selective (omission)
5	Lack of concentration because of frequent interruptions	2	
6	Base decisions on faulty information	1	Decision accuracy/quality lowered
7	Having difficulty make decisions, because of the amount of information under consideration	1	• Potential paralysis and delay of decisions • Higher time requirements for information handling and time delays
8	Huge structures of directories inside inbox	1	
9	Inability to participate in the community	1	
10	Information paralysis / inability to act	1	Potential paralysis and delay of decisions
11	It is hard to select the information you need from the information available	1	Identification and selection of relevant information becomes increasingly difficult
12	Loss of power within organization. Those who can handle Information Overload will become the powerful persons in the organization	1	
13	Making the wrong decisions	1	Decision accuracy / quality lowered
14	Many emails in mailboxes	1	
15	Missed opportunities	1	
16	Quality of work is lowered as much time is needed to process information	1	Decision accuracy / quality lowered

Table 21 Effects of Information Overload from interviews

Interestingly, effect number two as shown in Table 21 above, 'Miss important information', is not identified as an effect of Information Overload in the literature. A closely related but slightly different effect is indeed identified, namely ignoring information. Effect number two is different from ignoring information in the sense that in order to ignore certain information someone has to receive the information and deliberately choose to ignore it, for example based on the sender of an email. Effect number two talks about missing important information, which in our opinion is something that can happen without an individual actually reacting (part) of the information (such as the name of the sender of an email), just because there is too much other information available at that moment. If the person at a certain moment in time thinks again about this information it can be too late: the person has actually missed the information rather than ignored it.

Effect number five ('Lack of concentration because of frequent interruptions') seems to be closely related to two causes of Information Overload that have been identified in the literature ('Task interruptions for complex tasks' and 'Pressure and distraction', see Table 2). Interruptions are viewed as a cause of Information Overload and also as an effect of it, thus in turn causing less concentration, with possible effects like lower effectiveness and unfinished work.

A more organizational political effect of Information Overload is suggested by effect number twelve, which sees the loss of (political) power within an organization as an effect of suffering from Information Overload. By contrast, individuals who are able to handle Information Overload will, as is suggested by effect number twelve, become the new powerful individuals within the organization. In our opinion, this effect can be partly explained by effect number nine ('Inability to participate in the community'); as an individual is less able to participate in an organization's community, his/her political influence can decrease, since there will be fewer opportunities to create a platform for the individual's opinion.

In Figure 16 the above discussion has been depicted. The effects of Information Overload mentioned during the interviews are shown, with their relation to Information Overload. If an effect is, in our opinion, an indirect effect it is connected either via another effect that has been mentioned during the interviews or via an effect that has been found in literature, to which it is related. Also, relations between effects found are shown.

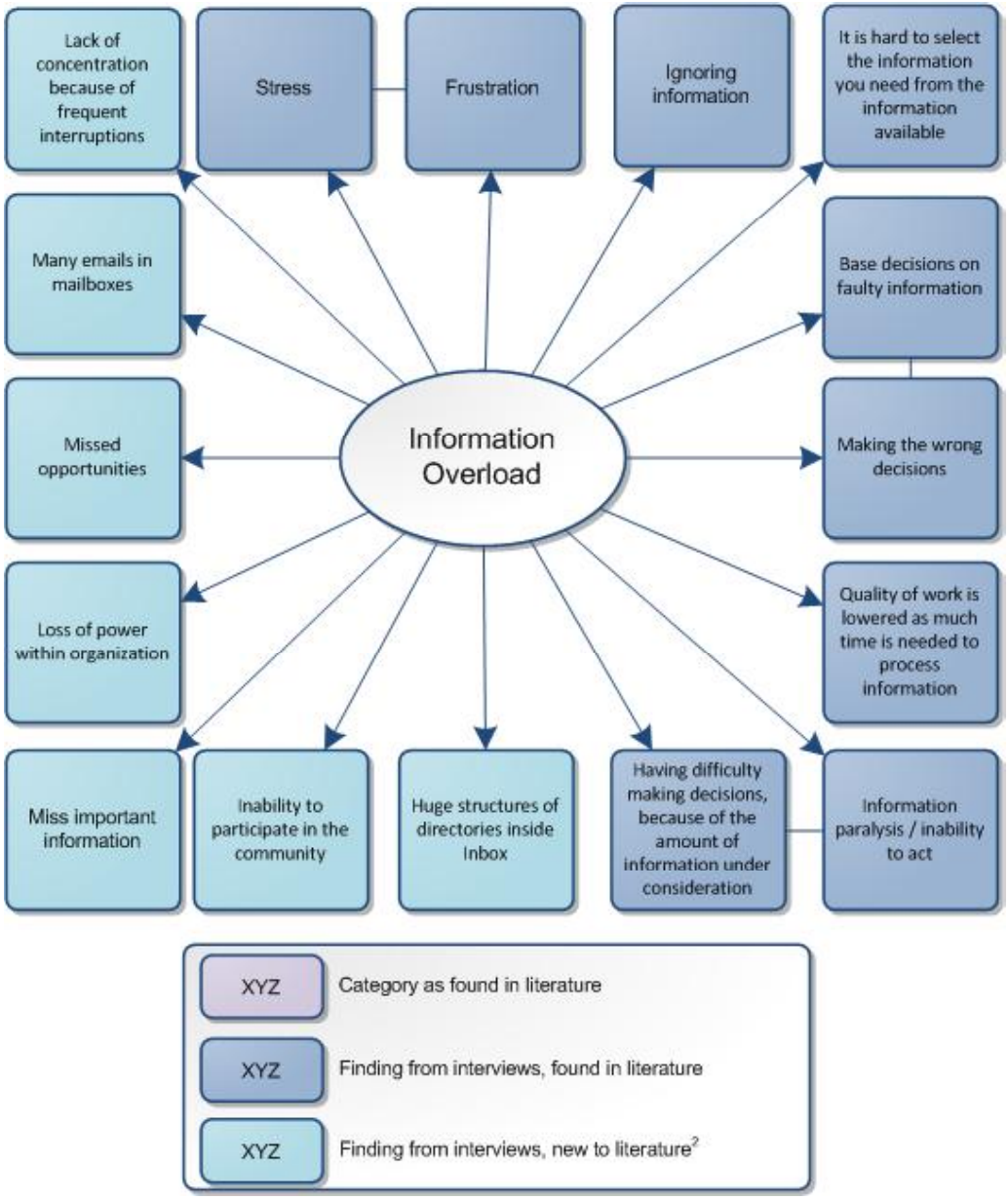

Figure 16 Cognitive map of effects of Information Overload

[2] 'New to literature' means that we have not found the item(s) in the literature studied. It does not mean that the item is not discussed elsewhere.

9.3.6. Countermeasures against Information Overload

In Table 22 the countermeasures against Information Overload as mentioned by interviewees are listed, ordered by the number of interviewees that mentioned that specific countermeasure. In the last column of Table 22 the entry in Table 5 (page 53) with the same or a comparable countermeasure is shown. Thus, this column indicates whether the countermeasure mentioned by interviewees was directly mentioned in literature. If there is no entry in the last column for a particular countermeasure, this means that no direct link to literature was found

Number	Countermeasure	Times mentioned	Listed countermeasure in Table 5 (as found in literature)
1	(Teach people to) filter incoming information	9	Improve the screening skills for information
2	Use tools to classify and structure information (for example flagging and email rules)	6	• Training programs to augment information literacy • Improve personal information management
3	Ask others for information before trying to find it yourself	2	
4	Disable notifications of new email	2	
5	Improve software (intuitive interfaces, natural language)	2	• Intelligent interfaces • Intelligent information management • Use natural language processing systems • Intelligent data selectors
6	Stop searching for information at some point and decide on the information available	2	
7	Train people to cope with Information Overload	2	• Improve personal time management skills and techniques • Training programs to augment information literacy • Improve personal information management
8	Communicate clearly and make agreements about communication	1	
9	Hire an information integrator	1	
10	Improve visualization of information	1	Visualization, the use of graphs
11	Improve infrastructure	1	
12	Keep professional and private life separated	1	
13	Only read communication when needed, not when it arrives	1	
14	Organizations should delete outdated information more vigorously	1	
15	Provide an alternative for email	1	
16	Provide an integrating overview of information from different sources	1	• Compress, aggregate, categorize and structure information • Interlink various information types
17	Reserve time slots for email reading and only read your email during that time slots	1	Improve personal time management skills and techniques
18	Scan your email messages instead of reading them completely	1	
19	Structure group communication	1	Promulgation of rules for information and communication design
20	Structure information hierarchically	1	
21	Verify information with colleagues	1	
22	When producing information, provide more quality and less quantity	1	• Raise general quality of information by defining quality standards • Focus on creating value added information

Table 22 Countermeasures to Information Overload from interviews

The findings in the literature and in our study are quite consistent, as the top two most mentioned countermeasures against Information Overload found in our study are also present in literature.

The findings from our study show that a possible countermeasure against Information Overload could be to ask others for help; number three suggests to first ask your colleagues before trying to find the information on your own, while number 21 comes in play a little later, as it suggests to verify (found) information about a certain subject with colleagues, before you use that information to base your decisions on.

Another basic countermeasure that has been suggested is number six ('Stop searching for information at some point and decide on the information available'), which is indeed, in our view, the way of dealing with the high amount of information, which we call the 'ostrich-tactic': an individual searches for information about a certain subject up to a certain point in time, then stops searching for information and uses only the information found to base a decision on. It is clear that this tactic will indeed stop you from searching for information continuously and thus will help making a decision on the subject, but the problem is: what is a suitable point in time to stop searching for information and how is that point in time determined? In our view, several factors can play a role in determining that point in time, such as priority of the decision, relative negative effects suffered if wrong decisions are made and pressure from others. This countermeasure is related to effect number four and six as it allows the individual to ignore information (effect number four) and increases the risk of basing decisions on faulty or incomplete information (effect number six).

Countermeasure number eight ('Communicate clearly and make agreements about communication') is related to something that has been identified as a factor in the successful implementation of the New World of Work, viz. the need to make agreements on the way of working and communicating. Thus, it seems that making these agreements would have a twofold effect: Information Overload could be reduced and possibly the New World of Work implementation would have a higher chance of being successful.

Countermeasure number 13 ('Only read communication when needed, not when it arrives') seems to be contradictory to a countermeasure found in literature, namely 'Handle incoming information at once'. We think both countermeasures can help, because handling information at once will make processing the pile of information easier, because an individual processes the pile of information bit-by-bit, as it arrives. On the other hand, reading/processing information only when needed, not when it arrives, provides a way to shield of yourself from the interruptions and thus presumably results in a better concentration and higher efficiency.

9.3.6.1. Organizational countermeasures

Countermeasures 9 ('Hire an information integrator') and 14 ('Organizations should delete outdated information more vigorously') provide organizational countermeasures that were not found in literature.

An information integrator in this context is seen as a person that is hired by an organization to receive communication directed towards (part of) the organization and filter that communication before forwarding the information contained in the communication towards the rest of the organization. At first sight this seems a feasible solution, but there is one important problem: basically, with this countermeasure you are bringing the decision-point about whether information is useful or not down to one person for the whole or part of the organization. This results in a problem, because what is considered useful by one person can be considered useless by another, and vice versa.

The other organizational countermeasure suggested, is that organizations should have more stricter rules on storing information. Outdated information should be detected and subsequently deleted. In our view, this can be done by providing a button on internal websites that readers can press if they consider the information to be outdated. This would then notify the author of the information and also the person that is responsible for information deletion within the organization. The appropriate action can then be taken, which would be either updating the information or deleting it.

9.3.6.2. Structure information hierarchically

Countermeasure number 20 suggests to structure information hierarchically. This countermeasure is maybe not a countermeasure against Information Overload itself, but makes information easier findable and thus can reduce the Information Overload originating from the difficulty to find relevant information in the pile of information available. General terms can be used as a starting point and subsequently be refined into more specific terms, and so on, until the desired amount of focus has been found.

In Figure 17 the above discussion has been depicted. The countermeasures against Information Overload mentioned during the interviews are shown, with their relation to Information Overload. If a countermeasure is, in our opinion, an indirect countermeasure it is connected either via another countermeasure that has been mentioned during the interviews or via a countermeasure that has been found in literature, to which it is related. Also, relations between countermeasures found are shown.

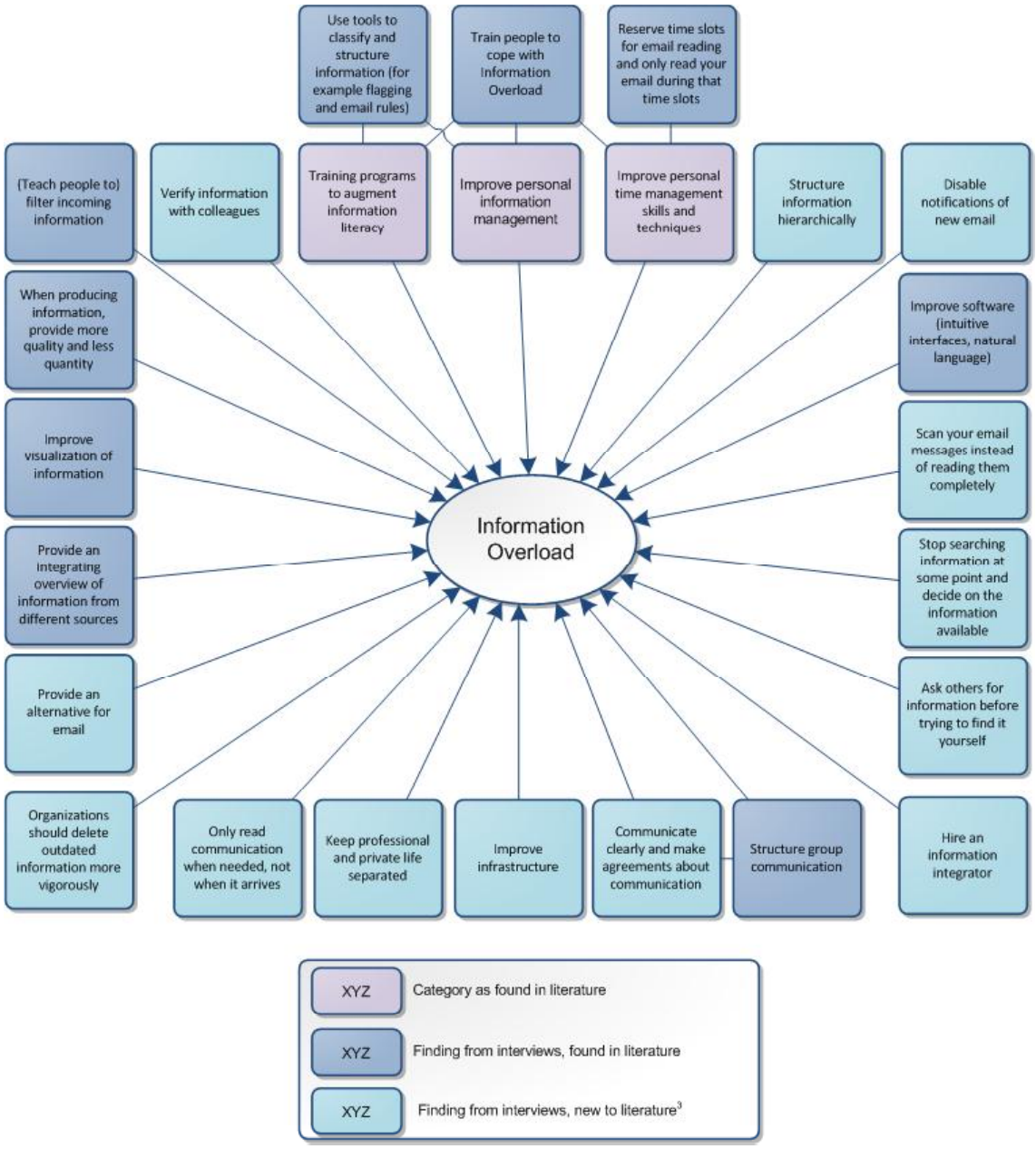

Figure 17 cognitive map of countermeasures against Information Overload

9.3.7. Situation in the New World of Work

Interviewees suggested that the NetGen will be better able to deal with Information Overload. Whether or not this will be true remains debatable, but we certainly feel that the NetGen will be more used to tools for searching and finding information than Generation X and the Baby Boomers. In some sense they will have to,

[3] 'New to literature' means that we have not found the item(s) in the literature studied. It does not mean that the item is not discussed elsewhere.

because, there will probably be no decrease in the amount of information flowing towards an individual. The amount of information flowing towards an individual might even increase in the future.

The suggestion that the NetGen will 'automatically' be better able to handle Information Overload remains debatable, although there are indications that the NetGen is indeed a very different type of worker, compared to Baby Boomers and Generation X. (Heathfield) for example, provides eleven tips for managing Millennials, as the author calls the individuals in the NetGen. Some of the tips given by the author are: 'Take advantage of your millennial employee's computer, cell phone, and electronic literacy' and 'Millennial employees are multi-taskers on a scale you've never seen before'. Since pursuing a number of tasks simultaneously is a cause of Information Overload (O'Reilly III, 1980), it seems that if one would be able to better perform various tasks at once one could reduce Information Overload. Moreover, the NetGen seems to be able to work better with IT tools than the generations before (Heathfield). Thus, it could be that the NetGen is better able to search for information.

9.3.8. Conclusion on Information Overload

Concluding, the results from our study suggest that Information Overload is not perceived as a problem, but as a challenge and a possible future problem. Information Overload has to be kept under control as the situation is not likely to improve in the future, although some interviewees suggested that the next generation of workers (NetGen) will be able to better handle Information Overload, as they may have incorporated the search strategies for finding information in a large amount of data. This suggestion remains debatable, although there are indications of the NetGen being a different type of worker than the Baby Boomers and Generation X. Whether this will result in the NetGen being able to better handle Information Overload or other problems remains to be seen.

The results from our study also indicate that neither increase nor decrease in Information Load is perceived among interviewees. This seems contrary to the popular belief in literature that the number of times Information Overload occurs has increased over the years and it still increasing (see section 6.1.1.3).

The results from our study are to some extent consistent with literature: the most mentioned causes, effects of and countermeasures against Information Overload were also found in literature. On the other hand, we also found a number of causes, effects and countermeasures that were not found in literature. Some of those new items were not directly influencing Information Overload. So, strictly spoken, they are neither causes, nor effects nor countermeasures against Information Overload.

9.3.8.1. Items not found in literature

In Table 23 below the causes, effects and countermeasures are listed that were present in the results from our study, but could not be linked to existing literature. This does not mean that these items are not discussed in literature at all: the items cannot be directly linked to the literature consulted in this study and it may very well be that the items are indeed discussed in other literature.

Effects
Miss important information
Lack of concentration because of frequent interruptions
Huge structures of directories inside Inbox
Inability to participate in the community
Loss of power within organization. Those who can handle Information Overload will become the powerful persons in the organization
Many emails in mailboxes
Missed opportunities
Countermeasures
Ask others for information before trying to find it yourself
Disable notifications of new email
Stop searching information at some point and decide on the information available
Communicate clearly and make agreements about communication
Hire an information integrator
Improve infrastructure
Keep professional and private life separated
Only read communication when needed, not when it arrives
Organizations should delete outdated information more vigorously
Provide an alternative for email
Reserve time slots for email reading and only read your email during that time slots
Scan your email messages instead of reading them completely
Structure information hierarchically
Verify information with colleagues

Table 23 Information Overload: Effects and countermeasures not found in consulted literature

9.3.8.2. Cognitive map

In Figure 18 we present a cognitive map of the findings on Information Overload. Causes, effects and countermeasures are depicted with their relations to each other. For sake of readability we did not include Information Overload in the diagram. In the outmost ring are the countermeasures against Information Overload. The innermost ring contains the causes of Information Overload. The ring in between contains the effects of Information Overload. Relations are shown between causes and countermeasures, between causes and effects and between countermeasures and effects. For sake of readability we have included the same cognitive map in a larger version in Appendix 10.

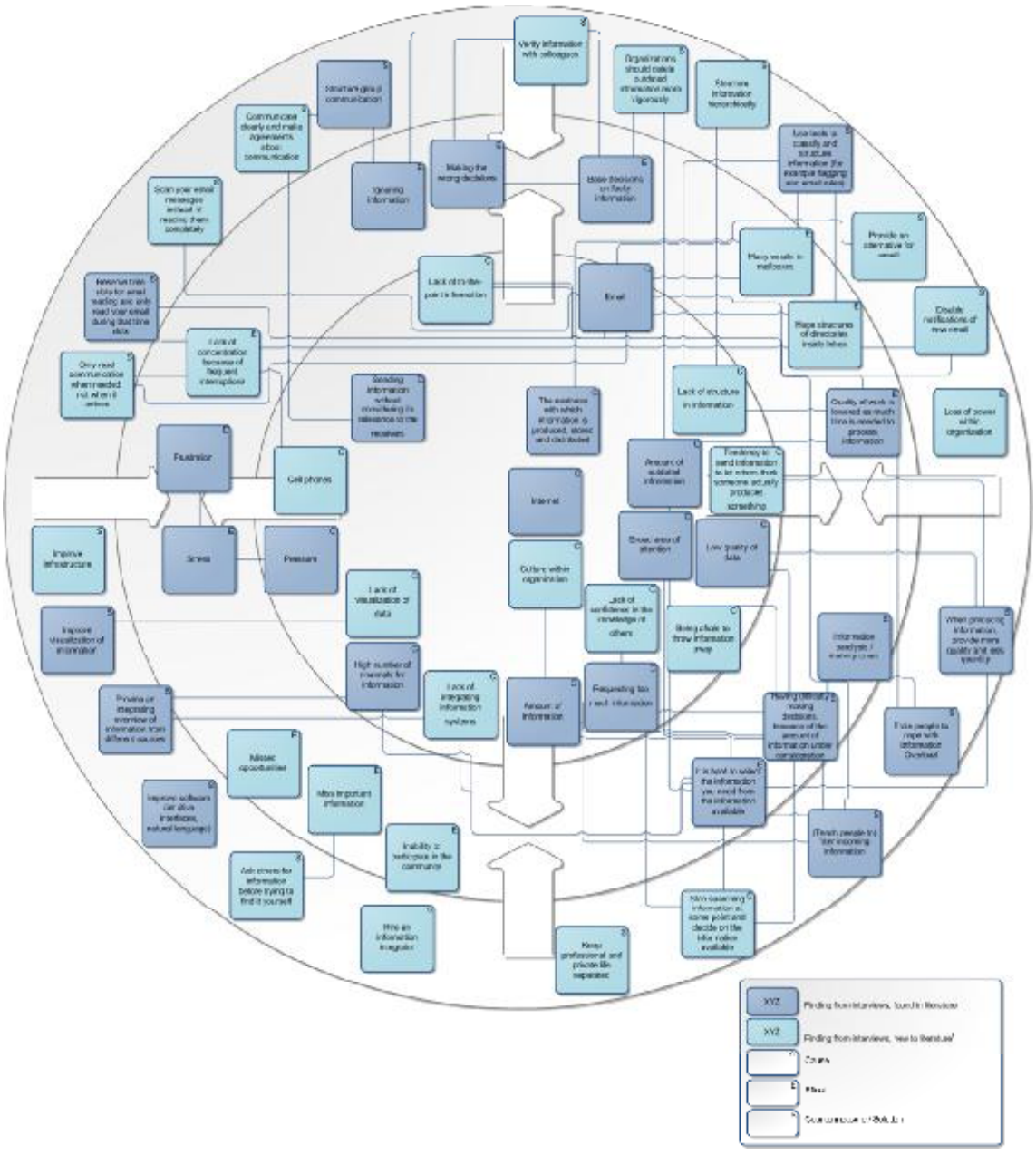

Figure 18 Cognitive map of Information Overload: Causes, effects and countermeasures combined

[4] 'New to literature' means that we have not found the item(s) in the literature studied. It does not mean that the item is not discussed elsewhere.

9.3.8.3. Overview

In Table 24 below we have merged the findings from literature on Information Overload, earlier presented in Table 2 (causes), Table 4 (effects) and Table 5 (countermeasures), with the findings on Information Overload originating from our study: the items not found in consulted literature, presented earlier in Table 23. Table 24 provides an overview of the causes of, effects of and countermeasures against Information Overload originating from literature as well as our study, and thus provides the most complete overview possible in this study.

Causes		
	Personal factors	
		Limitations in the individual human information-processing capacity
		Decision scope and resulting documentation needs
		Motivation, attitude, satisfaction
		Personal traits (experience, skills, ideology, age)
		Personal situation (time of the day, noise, temperature, amount of sleep)
		Senders screen outgoing information insufficiently
		Users of computer adapt their way of interacting with computers too slowly with respect to the technological development
		Social communication barriers break down
		The person • collects the information to show a commitment to rationality and competence, because they believe that improves decision-making; • receives high amounts of unwanted or unrequested information; • uses information to check information they already have; • feels a need to justify their decision, and use information to do this; • collects information, just in case it may prove useful; • wants to play safe and use all information possible; • uses information as a currency – not to get left behind.
	Information characteristics	
		Number of items of information rises
		Uncertainty of information (info needed vs. info available)
		Diversity of information and number of alternatives increase
		Ambiguity of information
		Novelty of information
		Complexity of information
		Intensity of information
		Dimensions of information increase
		Information quality, value, half life
		Overabundance of irrelevant information
		Incremental decreases in decision effectiveness due to additional information quantity are greater than the incremental increases in decision effectiveness due to additional information quality
	Task and process parameters	
		Tasks are less routine
		Complexity of tasks and task interdependencies
		Time pressure
		Task interruptions for complex tasks
		Too many, too detailed standards (in accounting)
		Simultaneous input of information into the process
		Innovations evolve rapidly – shortened life cycle
		Interdisciplinary work
	Environment	
		Too many inputs from the environment
		Inputs follow each other to fast to enable processing
		The quantity of information produced is too high
		Failure to create 'high quality' information
	Organizational design	
		Collaborative work
		Centralization (bottleneck) or disintermediation (information searching is done by end users rather than by information professionals)

		Accumulation of information to demonstrate power
		New information and communication technologies (e.g. groupware)
		Pursuing a number of tasks simultaneously, resulting in a tendency to ask for more information than strictly needed
		Pressure and distraction
	Information technology	
		Push systems
		E-mails
		Intranet, extranet, Internet
		Rise in number of television channels
		Various distribution channels for the same content
		Vast storage capacity of the systems
		Low duplication costs
		Speed of access
		Computers communicate solely by graphical output, straining our visual sense
		Use and misuse of IT
Effects		
	Limited information search and retrieval strategies	
		Search strategies through information sets become less systematic (this is less true for more experienced searchers)
		Limited search directions
		Move from compensatory search patterns to noncompensatory search patterns
		Identification and selection of relevant information becomes increasingly difficult
		Difficulties to reach target groups (sender perspective)
		Miss important information
	Arbitrary information analysis and organization	
		Overlapping and inconsistent information categories
		Ignore information and be highly selective (omission)
		Loss of control over information
		Lack of critical evaluation (become too credulous) and superficial analysis
		Loss of differentiation
		Relationship between details and overall perspective is weakened and peripherical cues get overestimated
		Higher time requirements for information handling and time delays
		Abstraction and necessity to give meaning lead to misinterpretation
	Suboptimal decisions	
		Decision accuracy/quality lowered
		Decision effectiveness lowered
		Inefficient work
		Potential paralysis and delay of decisions
	Strenuous personal situation	
		Demotivation
		Satisfaction negatively affected
		Stress, confusion, and cognitive strain
		Lack of learning since too little time is at disposition
		Greater tolerance of error
		Lack of perspective
		Sense of loss of control leads to a breakdown in communication
		False sense of security due to uncertainty reduction (overconfidence)
		Lack of concentration because of frequent interruptions
	Other	
		Huge structures of directories inside mbox
		Inability to participate in the community
		Loss of power within organization. Those who can handle Information Overload will become the powerful persons in the organization
		Many emails in mailboxes
		Missed opportunities
Countermeasures		
	Personal factors	
		Improve personal time management skills and techniques
		Training programs to augment information literacy: information processing skills such as file handling, using email, classification of document, etc.
		Improve personal information management
		Systematic priority setting

		Improve the screening skills for information
		Keep professional and private life separated
		Reserve time slots for email reading and only read your email during that time slots
		Scan your email messages instead of reading them completely
		Only read communication when needed, not when it arrives
		Verify information with colleagues
		Ask others for information before trying to find it yourself
		Stop searching information at some point and decide on the information available
	Information characteristics	
		Raise general quality of information (i.e. its usefulness, conciseness) by defining quality standards
		Focus on creating value added information
		Promulgation of rules for information and communication design (e.g. e mail etiquette)
		Compress, aggregate, categorize, and structure information
		Formalization of language
		Brand names for information
		Form must follow function must to low usability
		Simplify functionalities and design of products
		Customization of information
		Intelligent interfaces
		Determine various versions of information with various levels of detail and elaborate additional information that serves as summaries
		Organize text with hypertext structures or gophers
		Interlink various information types (as internal with external information)
		Structure information hierarchically
		Organizations should delete outdated information more vigorously
	Task and process parameters	
		Standardize operating procedures
		Define decision modes developed for specific decision processes (e.g., decision rules)
		Install an exception reporting system
		Allow more time for task performance
		Schedule uninterrupted blocks of time for completing critical work
		Adequate selection of media for the task
		Handle incoming information at once
		Collaboration with information specialists within the teams
		Bring decisions to where information exists when this information is qualitative and ambiguous
		Install process enablers for cognitive support
		Use simpler information processing strategies
		Regulate the rate of information flow
		Search procedures and strategy
		Define specific, clear goals for the information in order to contextualize it and turn it meaningful
		Communicate information needs to providers
		Provide incentives that are directly related with decisions in order to make decision relevant information be processed more effectively
		Install a measurement system for information quality
		Communicate clearly and make agreements about communication
	Organizational design	
		Coordination through interlinked units
		Augment info processing capacity through changes in organizational design
		Creation of lateral relationships (integrate roles, create liaisons between roles, teamwork, etc.)
		Coordination by goal setting, hierarchy, and rules depending on frequency of exceptions (uncertainty)
		Creation of self contained tasks (reduced division of labor, authority structures based on output categories)→ autonomous groups
		Reduce divergence among people (e.g., with regard to expectations) through socialization (e.g., frequent face to face interactions)
		Install appropriate measures of performance
		Hire additional employees
		Create slack resources

		Hire an information integrator
	Information technology application	
		Intelligent information management (prioritization)
		Install voting structures to make users evaluate the information
		Prefer push to pull technologies
		Facilitator support through (e-)tools
		Decision support systems should reduce a large set of alternatives to a manageable size
		Use natural language processing systems (search with artificial intelligence)
		Information quality filters
		Intelligent data selectors (intelligent agents)
		Use systems that offer various information organization options (e.g. filing systems)
		Multimodal interfaces
		Improve infrastructure
		Disable notifications of new email
		Provide an alternative for email

Table 24 Information Overload: Causes, effects and countermeasures complete

9.3.8.4. The five most important causes, effects and countermeasures

We have developed a top-5 of the most important causes, effects of and countermeasures against Information Overload, which is an selection of the overview presented in Table 24. The top-5 for Information Overload is shown in Table 25 below.

Causes
Number of items of information rises
Pressure and distraction
E-mails
Senders screen outgoing information insufficiently
Too many inputs from the environment
Effects
Stress, confusion and cognitive strain
Missed opportunities
Decision accuracy/quality lowered
Inefficient work
Lack of critical evaluation (become too credulous) and superficial analysis
Countermeasures
Training programs to augment information literacy: information processing skills such as file handling, using email, classification of documents, etc.
Raise general quality of information (i.e. its usefulness, conciseness) by defining quality standards
Intelligent information management (prioritization)
Schedule uninterrupted blocks of time for completing critical work
Customization of information

Table 25 Information Overload: Top-5 causes, effects and countermeasures

In our opinion, the Top-5 as presented above provides management with an short overview of what are causes and effects of and countermeasures against Information Overload. It is based on our experience with the subject and is influenced both by literature and results from interviews. We have chosen these causes, effects and countermeasures for several reasons; either the chosen item fits the organization of Microsoft Services or we view it as very important, based on literature. For example, the cause 'senders screen outgoing information insufficiently' is a complaint that was heard often during interviews and during the time we were present in the organization. In addition, 'inefficient work' is in the list of effects, as we feel that it is an important effect of Information Overload management should be aware of.

9.4. Lack of Control over Information

9.4.1. Recognition of Lack of Control over Information

Most interviewees do recognize Lack of Control over Information in their personal situation, but the opposite opinion was also expressed: there were a so individuals that did not recognize Lack of Control over Information in their personal situation. Thus, there is no agreement among interviewees about whether or not Lack of Control over Information is present in their situation.

9.4.2. Is Lack of Control over Information a problem?

Opinions about whether or not Lack of Control over Information is a problem were diverse; some interviewees indicated that Lack of Control over Information is not a problem, but a challenge. For others Lack of Control over Information is part of the job, they perceive it neither as a problem nor as a challenge. The opposite opinion was also heard: Lack of Control over Information is indeed a problem for some interviewees. Still another opinion was given by the classification of Lack of Control over Information as a purely technical problem: it does not have any impact on individuals, and can be solved by technical countermeasures.

There is no agreement among respondents of our study about whether or not Lack of Control over Information is a problem in their situation. Also, respondents did not agree on the importance of Lack of Control over Information, as some indicated that Lack of Control over Information has become more important over time, while others indicated that Lack of Control over Information had lost importance in their lives. Still others perceived no change in the importance of Lack of Control over Information.

9.4.3. Causes of Lack of Control over Information

In Table 26 the causes of Lack of Control over Information as mentioned by interviewees are listed, ordered by the number of interviewees that mentioned that specific cause. In the last column of Table 26 the entry in Table 6 (page 56) with the same or a comparable cause is shown. Thus, this column indicates whether the cause mentioned by interviewees was directly mentioned in literature. If there is no entry in the last column for a particular cause, this means that no direct link to literature was found.

Number	Cause	Times mentioned	Listed cause in Table 6 (as found in literature)
1	External requirements on compliancy	3	• More demanding stakeholders • Several regulatory environments
2	Amount of information available has increased	2	
3	Digitalization of information and easiness with which this is stored	2	
4	A difference in knowledge is used to make money	1	
5	Classification of data is difficult	1	
6	Increased ignorance	1	
7	Increased importance of communities	1	More demanding stakeholders
8	Information is spread more rapidly and intensively	1	Increased information flows
9	The rules are not clear	1	
10	World is becoming more transparent	1	

Table 26 Causes of Lack of Control over Information from interviews

The most-mentioned cause of Lack of Control over Information ('External requirements on compliancy', number one) is indeed also mentioned in literature. It is interesting to note that apart from cause numbers one, seven and eight no causes mentioned match with literature. Cause number seven ('Increased importance of communities') is not directly related to Lack of Control over Information, but can cause it indirectly. An increased importance of communities means that organizations have to deal with at least one stakeholder that is demanding more than before. This higher demand from stakeholders can cause Lack of Control over Information.

Among the causes not mentioned in literature are the digitalization of information, the amount of information available and the easiness with which information is collected and stored. If more information is available for collection and that information is retrieved and stored easier than before, the owner of that information can indeed experience a Lack of Control over Information.

Some very general causes are causes four, five, six, nine and ten. Of these causes, number five seems to be focused on a technical aspect of the problem, namely the classification of data in confidential and non-confidential information. Information in both categories have to be treated differently, one is supposed to be only available to employees, and the other is freely available. In theory, all information should be classified in one of the two categories, but it turns out to be difficult to do this and also to keep doing this when new information is added. With the fact that information is so mobile, it is of utmost importance to keep the classification of information correct, complete and precise.

In Figure 19 the above discussion has been depicted. The causes of Lack of Control over Information mentioned during the interviews are shown, with their relation to Lack of Control over Information. If a cause is, in our opinion, an indirect cause it is connected either via another cause that has been mentioned during the interviews or via a cause that has been found in literature, to which it is related.

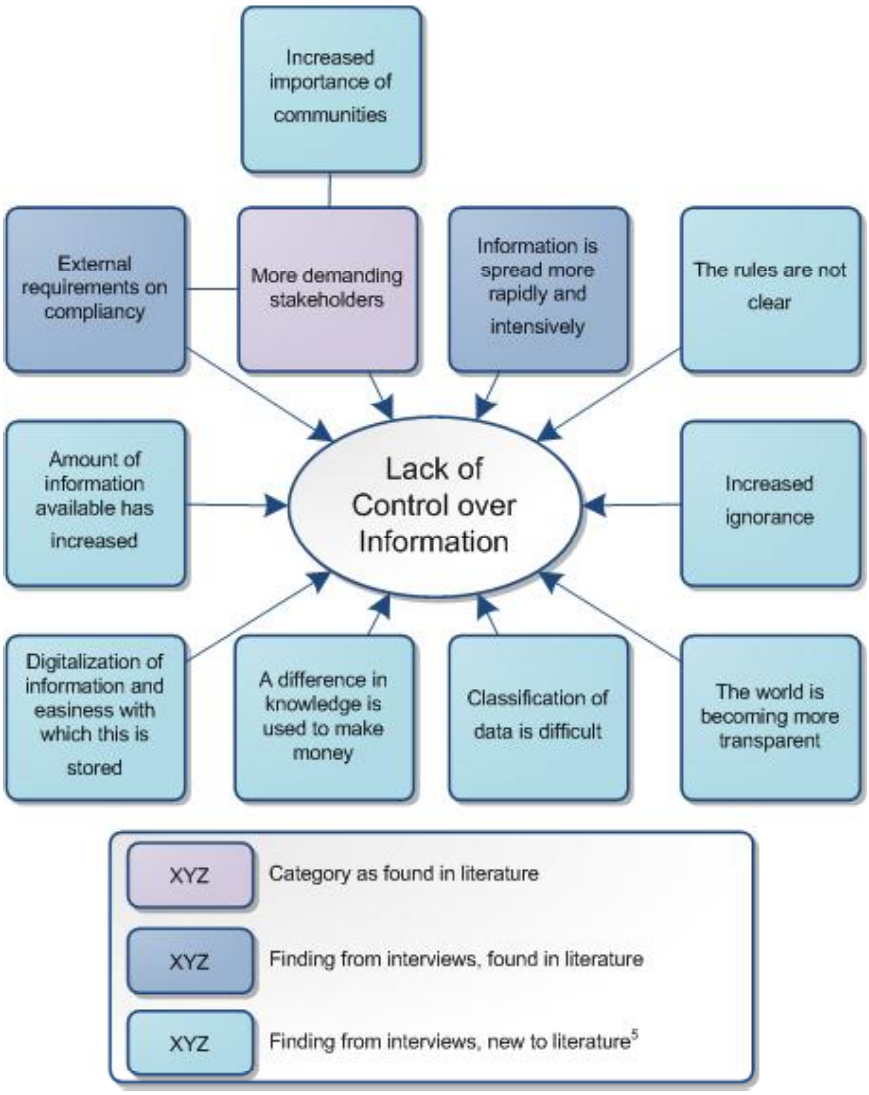

Figure 19 Cognitive map of causes of Lack of Control over Information

9.4.4. Effects of Lack of Control over Information

In Table 27 the effects of Lack of Control over Information as mentioned by interviewees are listed, ordered by the number of interviewees that mentioned that specific effect. In the last column of Table 27 the entry in Table 6 (page 56) with the same or a comparable effect is shown. Thus, this column indicates whether the effect mentioned by interviewees was directly mentioned in literature. If there is no entry in the last column for a particular effect, this means that no direct link to literature was found.

[5] 'New to literature' means that we have not found the item(s) in the literature studied. It does not mean that the item is not discussed elsewhere.

Number	Effect	Times mentioned	Listed effect in Table 6 (as found in literature)
1	Organizations will be forced to become more transparent and if not, they will not survive.	4	Various negative effects, such as fines
2	Misuse of an organizations information will result in bankruptcy	3	Various negative effects, such as fines
3	Image of organization will be damaged	2	Loss of image, status and trust
4	Quality of service is lowered	2	
5	Frustration	1	
6	Losing competitive advantage	1	
7	Organizations become confused	1	
8	Need to change organization's culture	1	

Table 27 Effects of Lack of Control over Information from interviews

Effects number four, five, six, seven and eight were not directly mentioned in Table 6. One reason for this can be the focus of the research leading to Table 6, as the effects listed in that table are externally oriented, while the effects that were discussed during the interviews are internally oriented (four, five, six, seven and eight). Effect number four, 'Quality of service is lowered', is a result of the lack of knowledge of which information resides where in the organization and thus a customer can get different answers to the same question from different parts of the organization. Effect number five, 'Frustration', can be interpreted in both an external and internal way: frustration at the side of the customer, for example because of the lower quality of service. Internally, frustration can be seen as frustration at the side of the employee, who feels that he or she is seemingly not capable of providing customers with good quality information, or is confronted with the fact that customers and other stakeholders posses some information they should not posses. Effect number seven, 'Organizations become confused', is an internal problem, which is closely related to effect number five, 'Frustration'. Also, effect number eight, 'Need to change organization's culture' is closely related with this part of the problem, in the sense that individuals within the organization get frustrated or confused because of the lack of insight in where information resides within the organization and how that can be reached. The organization's culture needs to be changed to solve that, aiming to provice more internal transparency.

Effect number six, 'Losing competitive advantage' is in fact an internal problem, with an external result, namely presumably more competition. The reason we see this effect as internal, is because the fact that an organization lost its competitive advantage is something that has to be detected inside an organization and also will have to be solved internally, either by trying to regain the competitive advantage or by taking other measures.

In Figure 20 the above discussion has been depicted. The effects of Lack of Control over Information mentioned during the interviews are shown, with their relation to Lack of Control over Information. If an effect is, in our opinion, an indirect effect it is connected either via another effect that has been mentioned during the interviews or via a effect that has been found in literature, to which it is related.

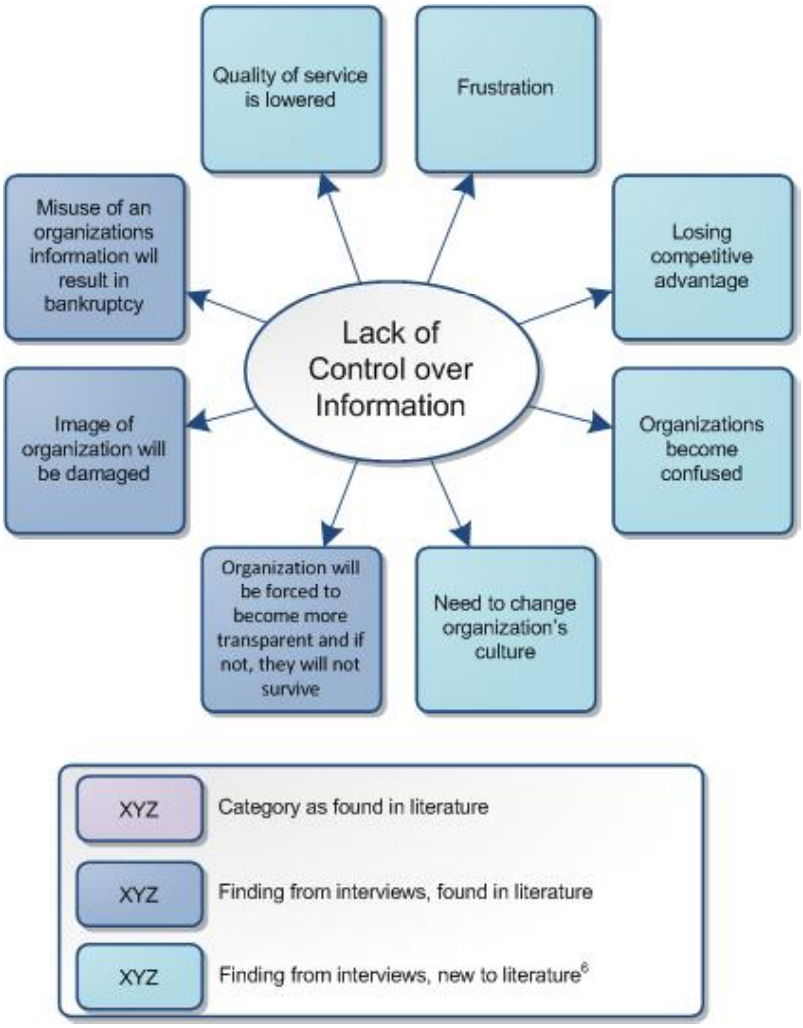

Figure 20 Cognitive map of effects of Lack of Control over Information

9.4.5. Countermeasures against Lack of Control over Information

In Table 28 the countermeasures against Lack of Control over Information as mentioned by interviewees are listed, ordered by the number of interviewees that mentioned that specific countermeasure. In the last column of Table 28 the entry in Table 6 (page 56) with the same or a comparable countermeasure is shown. Thus, this column indicates whether the countermeasure mentioned by interviewees was directly mentioned in literature. If there is no entry in the last column for a particular countermeasure, this means that was no direct link to literature was found.

[6] 'New to literature' means that we have not found the item(s) in the literature studied. It does not mean that the item is not discussed elsewhere.

Number	Countermeasure	Times mentioned	Listed countermeasure in Table 6 (as found in literature)
1	Make employees aware	4	Information security awareness program
2	Rights Management	3	Information security principles
3	Investigate, structure/classify and clean up information	3	
4	Become transparent and stay that way	1	
5	Make processes clear and clean them up	1	
6	Add a 'feeling' to your products	1	
7	Focus on the customer	1	
8	Communicate more clearly	1	
9	Make it easier to follow compliancy rules	1	
10	Keep in touch with stakeholders that request information	1	
11	Be strict: no errors allowed	1	
12	Build trust	1	

Table 28 Countermeasures against Lack of Control over Information from interviews

Countermeasure number one in the table above suggests to train employees to be more aware of the problems and more capable of dealing with them. This can be augmented with countermeasure number eleven, which suggests to allow no errors by employees on this type of problem; employees who fail to follow the rules should be fired. As such, we view countermeasure number eleven as an indirect countermeasure, as it is related to countermeasure number one.

Countermeasure number two in the table above is a technical solution which helps organizations to safeguard their information from unauthorized use. Usage policies are augmented to a piece of information, describing what is allowed to be done with that piece of information, such as save it, print it, forward it, etc. Rights Management is a solution provided by Microsoft, but in general it fits in the solution of providing Information security principles.

An interesting viewpoint for countermeasures against Lack of Control over Information is provided by countermeasures ten and twelve, which suggest to build trust between your organization and stakeholders. Also, a (renewed) focus on the customer (countermeasure number seven) and communicating more clearly (countermeasure number eight) can help to provide this trust and thus presumably will reduce the amount of (critical) questions posed by these stakeholders groups.

Adding a 'feeling' to your product (countermeasure number six) is an interesting one, because it is based on the assumption that when customers can identify themselves more with a product and have a feeling of belonging to the customer base of an organization, they will be less critical towards the organization and its products. Also an organization that has customers who identify themselves with the organization and its products, does presumably not have to be as transparent as others. This strategy is something we can already see happening at several organizations, such as Philips and Apple. It involves not only getting into the mind of people, but also into their hearts: consumers who love the brand or the products will presumably be more forgiving.

In Figure 21 the above has been depicted. The countermeasures against Lack of Control over Information mentioned during the interviews are shown, with their relation to Lack of Control over Information. If a countermeasure is, in our opinion, an indirect countermeasure it is connected either via another countermeasure that has been mentioned during the interviews or via a countermeasure that has been found in literature, to which it is related.

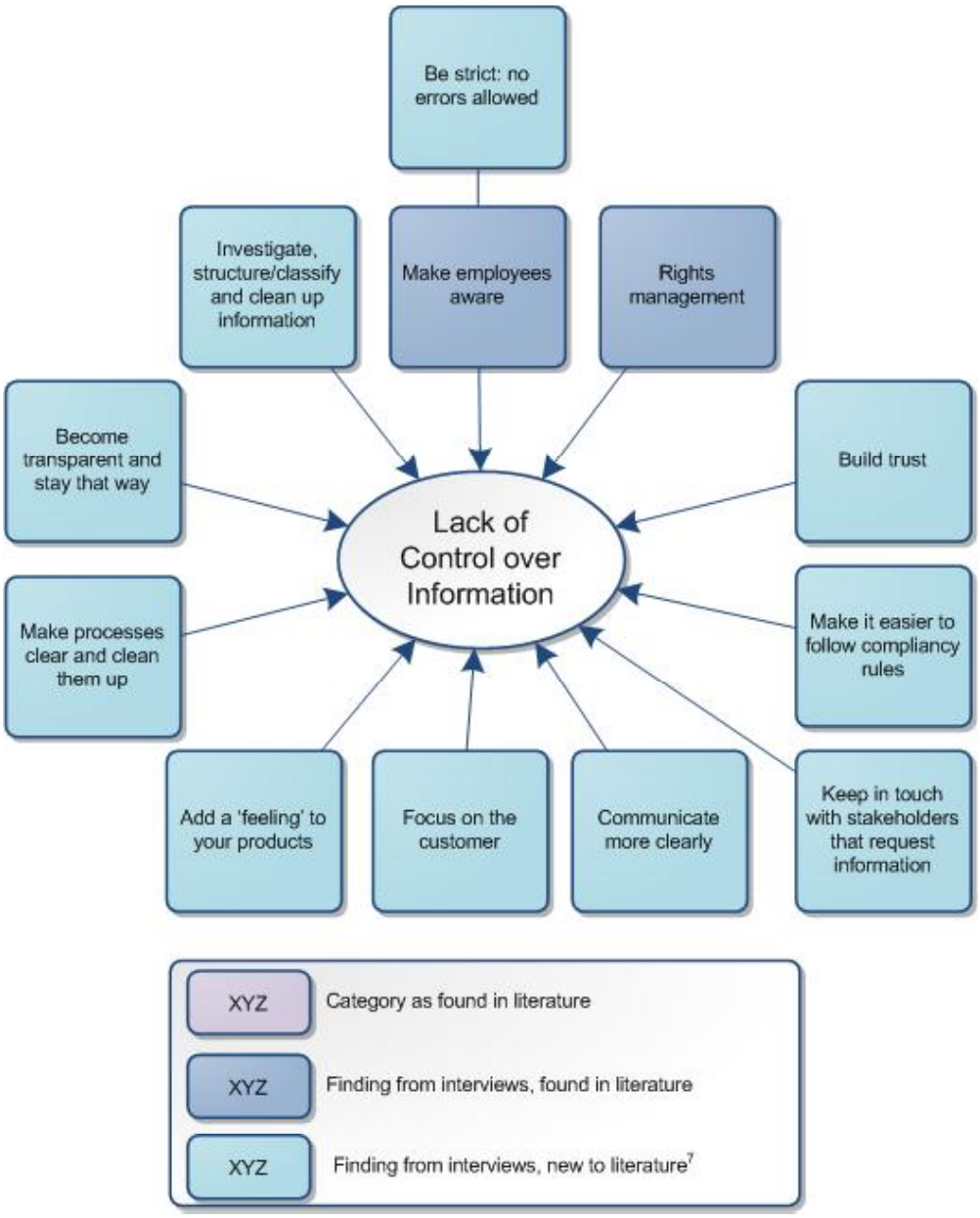

Figure 21 Cognitive map of countermeasures against Lack of Control over Information

9.4.6. Conclusion

Concluding, the results from our study suggest that Lack of Control over Information is not perceived as a problem, but as a challenge, although there were voices that Lack of Control over Information is indeed a problem. Interestingly, trying to solve the problem by executing a strict control over information is perceived as making the New World of Work less probable, since information sharing is seen as an important feature of the New World of Work and stringent control over information can hinder information sharing.

[7] 'New to literature' means that we have not found the item(s) in the literature studied. It does not mean that the item is not discussed elsewhere.

The results from our study also indicate an increase in Lack of Control over Information is perceived among interviewees, which can partly be explained by an increase in attention for the subject, because of governmental regulation, which poses strict requirements on organizations and their information, and partly by technological innovation, which allows information to travel more easily.

9.4.6.1. Items not found in literature

The results from our study are to some extent consistent with literature: some causes of, effects of and countermeasures against Lack of Control over Information that were mentioned were also found in literature. On the other hand, we also found a number of causes, effects and countermeasures that were not found in literature. In Table 29 below the causes, effects and countermeasures are listed that were present in the results from our study, but could not be linked to existing literature. This does not mean that these items are not discussed in literature at all: the items cannot be directly linked to the literature consulted in this study and it may very well be possible that the items are indeed discussed in other literature.

Causes
Amount of information available has increased
Digitalization of information and easiness with which this is stored
A difference in knowledge is used to make money
Classification of data is difficult
Increased ignorance
The rules are not clear
World is becoming more transparent
Effects
Quality of service is lowered
Frustration
Losing competitive advantage
Organizations become confused
Need to change organization's culture
Countermeasures
Investigate, structure/classify and clean up information
Become transparent and stay that way
Make processes clear and clean them up
Add a 'feeling' to your products
Focus on the customer
Communicate more clearly
Make it easier to follow compliancy rules
Keep in touch with stakeholders that request information
Be strict: no errors allowed
Build trust

Table 29 Lack of Control over Information: Causes, effects and countermeasures not found in consulted literature

9.4.6.2. Cognitive map

In Figure 22 we present a cognitive map of the findings on Lack of Control over Information. Causes, effects and countermeasures are depicted with their relations to each other. For sake of readability we did not include Lack of Control over Information in the diagram. In the outmost ring are the countermeasures against Lack of Control over Information. The innermost ring contains the causes of Lack of Control over Information. The ring in between contains the effects of Lack of Control over Information. Relations are shown between causes and countermeasures, between causes and effects and between countermeasures and effects.

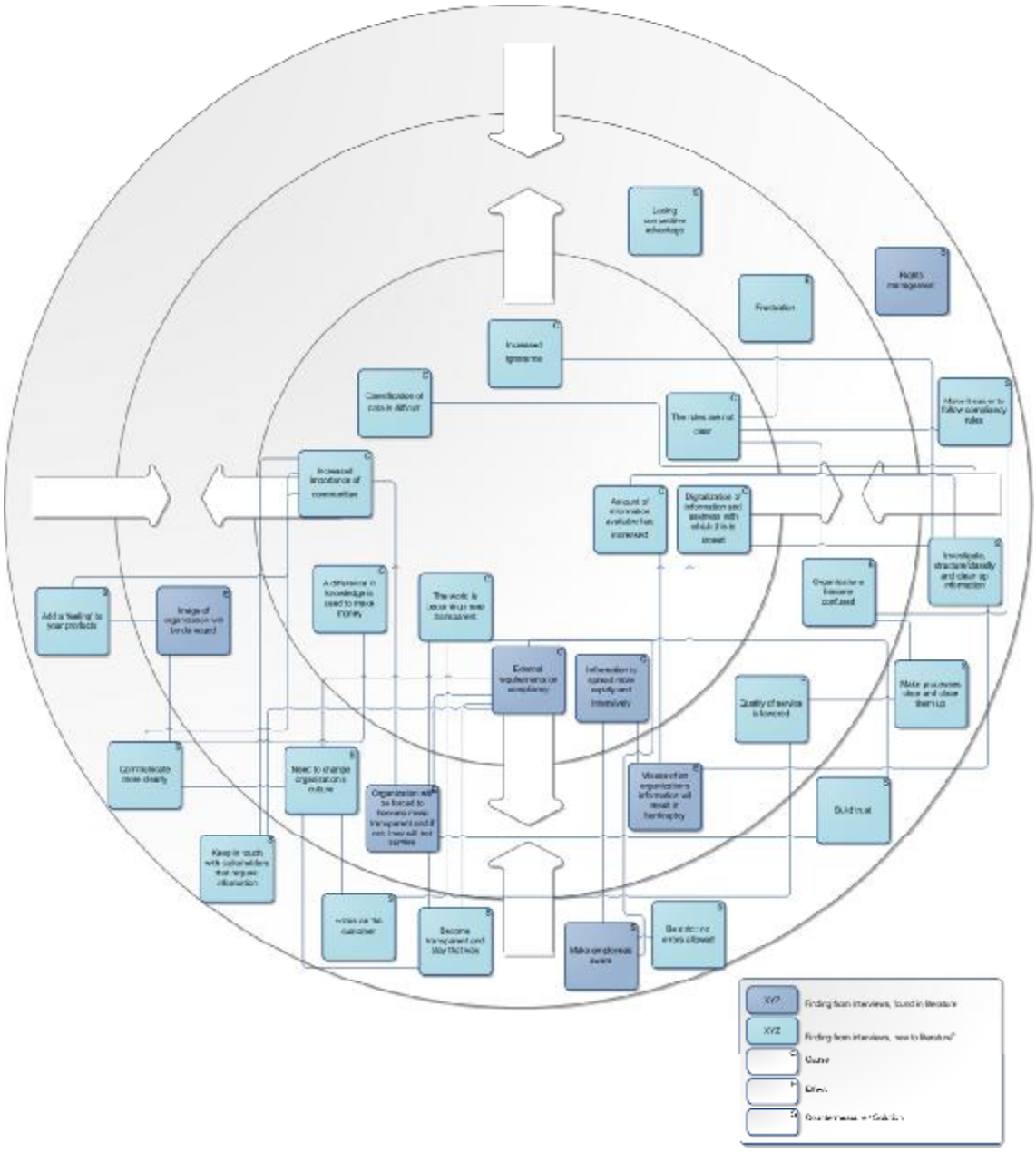

Figure 22 Cognitive map of Lack of Control over Information: Causes, effects and countermeasures combined

9.4.6.3. Overview

In Table 30 below we have merged the findings from literature on Lack of Control over Information, earlier presented in Table 6, with the findings on Lack of Control over Information originating from our study: the items not found in consulted literature, presented earlier in Table 29. Table 30 provides an overview of the

[8] 'New to literature' means that we have not found the item(s) in the literature studied. It does not mean that the item is not discussed elsewhere.

causes, effects of and countermeasures against Lack of Control over Information originating from literature as well as our study, and thus provides the most complete overview possible in this study.

Causes
Amount of information available has increased
Digitalization of information and easiness with which this is stored
A difference in knowledge is used to make money
Classification of data is difficult
Increased ignorance
The rules are not clear
World is becoming more transparent
Increased information flows
Increased internal / external transparency
Several regulatory environments
More demanding stakeholders
Optimize work processes
Corporate citizenship
Effects
Quality of service is lowered
Frustration
Losing competitive advantage
Organizations become confused
Need to change organization's culture
Loss of image, status and trust
Various negative effects, such as fines
Countermeasures
Investigate, structure/classify and clean up information
Become transparent and stay that way
Make processes clear and clean them up
Add a 'feeling' to your products
Focus on the customer
Communicate more clearly
Make it easier to follow compliancy rules
Keep in touch with stakeholders that request information
Be strict: no errors allowed
Build trust
Information security principles
Information security is responsibility of top management
Information security awareness program

Table 30 Lack of Control over Information: Causes, effects and countermeasures complete

9.4.6.4. The five most important causes, effects and countermeasures

We have developed a top-5 of the most important causes, effects of and countermeasures against Lack of Control over Information, which is an selection of the overview presented in Table 30. The top-5 for Lack of Control over Information is shown in Table 31 below.

Causes
Amount of information available has increased
Digitalization of information and the easiness with which this is stored
More demanding stakeholders
Classification of data is difficult
Increased internal / external transparency
Effects
Losing competitive advantage
Loss of image, status and trust
Quality of service is lowered
Frustration
Various negative effects, such as fines
Countermeasures
Information security awareness program
Investigate, structure/classify and clean up information
Make it easier to follow compliancy rules
Keep in touch with stakeholders that request information
Build trust

Table 31 Lack of Control over Information: Top-5 causes, effects and countermeasures

In our opinion, the Top-5 as presented above provides management with an short overview of what are causes and effects of and countermeasures against Lack of Control over Information. It is based on our experience with the subject and is influenced both by literature and results from interviews. We have chosen these causes, effects and countermeasures for several reasons; either the chosen item fits the organization of Microsoft Services or we view it as very important, based on literature.

9.5. Lack of Networking Support

9.5.1. Recognition of Lack of Networking Support

All interviewees agree and recognize the phenomenon.

9.5.2. Is Lack of Networking Support a problem?

Opinions about whether or not Lack of Networking Support is a problem were diverse and opposite; some interviewees indicated that Lack of Networking Support is not a problem, while others do identify Lack of Networking Support as a problem in their lives.

The problem of Lack of Networking Support is not caused by geographical dispersion or by living in a different time zone, but by a lack of connectivity. In our view, this matches with the view on this problem as presented in section 6.3.5, where we discussed 'low fidelity channels', channels that are not providing optimal connectivity to the outside world. A so, Lack of Networking Support is likely to occur less in small and 'stable' organizations, where team membership does not change very often.

There is no agreement among respondents on whether or not having to work across time zones is a problem; some respondents indeed identified this as a problem, others did not. In our opinion, having to work across time zones, i.e. working in a international virtual team, does not necessarily have to be a problem for the individuals in the team. However, when something is amiss, it can be hard to solve the problem, because of the geographical dispersion; it is hard to reach someone who does not react to the normal, digital communication channels (email, instant messaging) or falls asleep in a conference call, due to time zone issues. Moreover, it is

hard to judge the position of the person in the organization and it is easier to blame someone else for errors made.

In our opinion, Lack of Networking Support consists of problems with both geographical dispersion and lack of connectivity. For example, if person A lives in the Netherlands and person B in Sidney, Australia, the time difference will be 10 hours. This is a considerable geographical distance and also a considerable difference in time zone. Thus, Lack of Networking Support will likely be experienced when person A and B have to collaborate, as they work on very different hours. The other party will be slow to react to email or instant messaging and video conferencing is almost impossible. If, in addition, the connectivity between A and B is of low quality, the Lack of Networking Support will be even stronger, as there might not even be an instant messaging connection or video conferencing might not be possible. This will make it even harder to collaborate successfully.

There is no agreement among respondents of our study about whether or not Lack of Networking Support has become more important over time. Some indicated that Lack of Networking Support has started to play a bigger role in their lives, while others perceived no change in the importance of Lack of Networking Support.

9.5.3. Causes of Lack of Networking Support

In Table 32 the causes of Lack of Networking Support as mentioned by interviewees are listed, ordered by the number of interviewees that mentioned that specific cause. In the last column of Table 32 the entry in Table 7 (page 61) with the same or a comparable cause is shown. Thus, this column indicates whether the cause mentioned by interviewees was directly mentioned in literature. If there is no entry in the last column for a particular cause, this means that no direct link to literature was found.

Number	Cause	Times mentioned	Listed cause in Table 7 (as found in literature)
1	Increased physical distance between colleagues	3	Teleworking / working in different locations
2	Working worldwide	3	
3	Compensation structures do not fit with current situation	2	
4	Frequent changes in team membership	2	
5	Division in teams, because of organization's growth	1	(Virtual) Teams
6	Externally oriented organization	1	
7	Increased use of the Internet for communicating	1	
8	Pressure	1	
9	The amount of useless communication	1	

Table 32 Causes of Lack of Networking Support from interviews

In contrast with what interviewees expressed about Lack of Networking Support (i.e. Lack of Networking Support is not caused by geographical dispersion, but by a lack of connectivity), the most mentioned cause of Lack of Networking Support is the increased physical distance between colleagues.

Cause number two ('Working Worldwide') seems to be an important cause of Lack of Networking Support amongst Consultants. Many causes mentioned by interviewees basically are resulting in a increased difficulty in getting to know each other and keeping in touch (causes one, two, four, five and seven). This seems to match with the notions discussed in section 6.3.1.

Interestingly, cause number three ('Compensation structures do not fit with current situation') seems to indicate a whole other cause of Lack of Networking Support, namely that an individual gets his/her own targets, and will move towards that goal, without interaction with colleagues. Team efforts are not compensated, but individual efforts are. This way of compensating can result in people focusing on their own tasks, possibly creating barriers to protect their knowledge and thus can cause problems for others to work with them, or reach them and tap in to their knowledge. This is also related with cause number six ('Externally oriented organization'), which basically presents the notion that as people are focused on their external stakeholders (customers), it is increasingly difficult to get and stay in contact with them, because they are pursuing their own goals.

The last two causes of Lack of Networking Support (number eight and nine) are giving another viewpoint on Lack of Networking Support. Pressure is seen as a cause of Lack of Networking Support, because as people experience more time pressure on their tasks, they will presumably reserve less time for social contact and keeping in touch with colleagues. Also, the amount of irrelevant communication (for example email) can clutter up communication and connectivity with others. Useful emails are lost in the high amounts of useless email and the probability that useful emails will be answered will be lower.

In Figure 23 the above discussion has been depicted. The causes of Lack of Networking Support mentioned during the interviews are shown, with their relation to Lack of Networking Support. If a cause is, in our opinion, an indirect cause it is connected either via another cause that has been mentioned during the interviews or via a cause that has been found in literature, to which it is related.

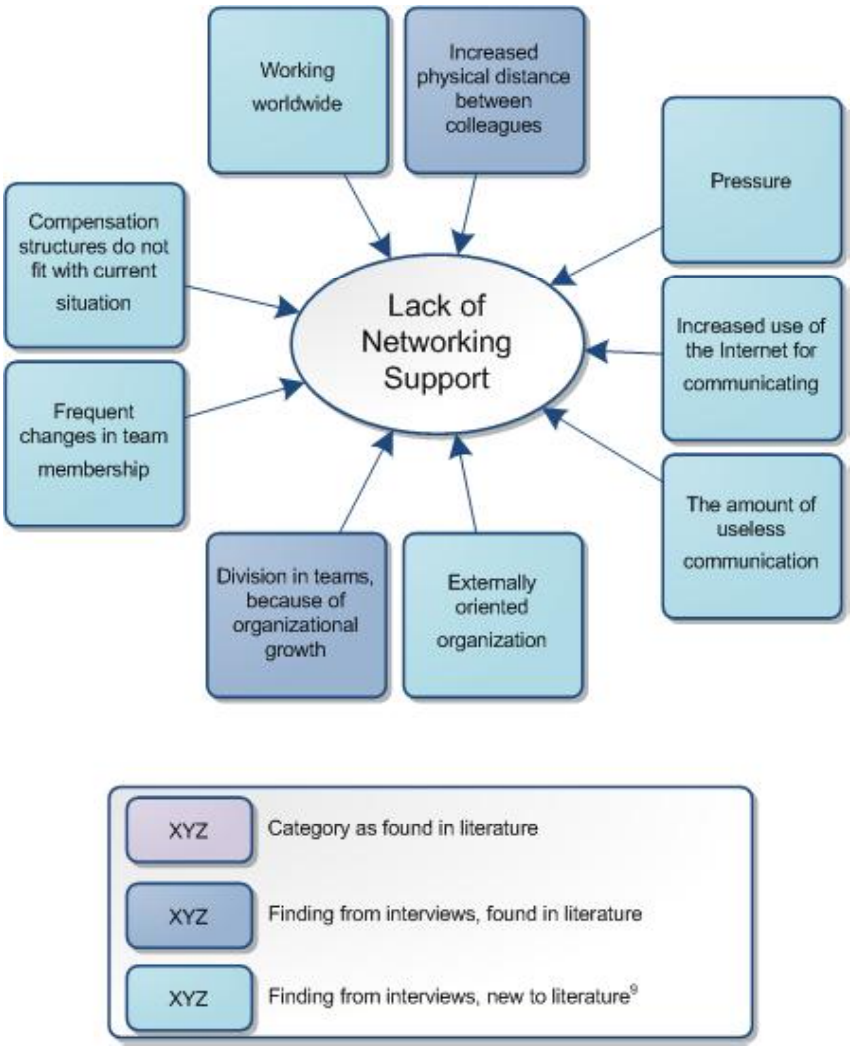

Figure 23 Cognitive map of causes of Lack of Networking Support

9.5.4. Effects of Lack of Networking Support

In Table 33 the effects of Lack of Networking Support as mentioned by interviewees are listed, ordered by the number of interviewees that mentioned that specific effect. In the last column of Table 33 the entry in Table 7 (page 61) with the same or a comparable effect is shown. Thus, this column indicates whether the effect mentioned by interviewees was directly mentioned in literature. If there is no entry in the last column for a particular effect, this means that no direct link to literature was found.

[9] 'New to literature' means that we have not found the item(s) in the literature studied. It does not mean that the item is not discussed elsewhere.

Number	Effect	Times mentioned	Listed effect in Table 7 (as found in literature)
1	Lower efficiency and effectiveness because of dissolving network	4	Lower effectiveness
2	Organizations become a group of individuals	3	
3	Indifference, demotivation	2	Demotivation
4	Nuances in communication will be lost	2	
5	Communication and collaboration become inefficient	1	
6	Erroneous decisions	1	
7	Frustration	1	Frustration
8	Lack of knowledge	1	
9	Less opportunities to discuss shared problems	1	
10	Innovation slows down	1	
11	Organization's growth is tempered	1	
12	Organization's image is damaged (problems with transparency influences image)	1	
13	Quality of service lowered	1	

Table 33 Effects of Lack of Networking Support from interviews

Many effects of Lack of Networking Support have been mentioned by interviewees that were not found in literature. Among these effects is effect number two ('Organizations become a group of individuals') which can be partly linked to the effect mentioned in Table 7, called 'Feelings of isolation', which can be seen as a result of an organization becoming a group of individuals.

Another interesting effect of Lack of Networking Support that has been discussed during the interviews is number twelve ('Organization's image is damaged'). The underlying premise is that a lack of communication between employees will result in less transparency towards customers, as the chance that customers will receive different answers from different individuals rises, and thus the quality of service is lowered (effect number thirteen). Combining this lowered transparency with the premise that transparency is one of the factors influencing an organization's image results in the suggestion that an organization's image can be harmed when employees experience a Lack of Networking Support.

In Figure 24 the above discussion has been depicted. The effects of Lack of Networking Support mentioned during the interviews are shown, with their relation to Lack of Networking Support. If an effect is, in our opinion, an indirect effect it is connected either via another effect that has been mentioned during the interviews or via a effect that has been found in literature, to which it is related.

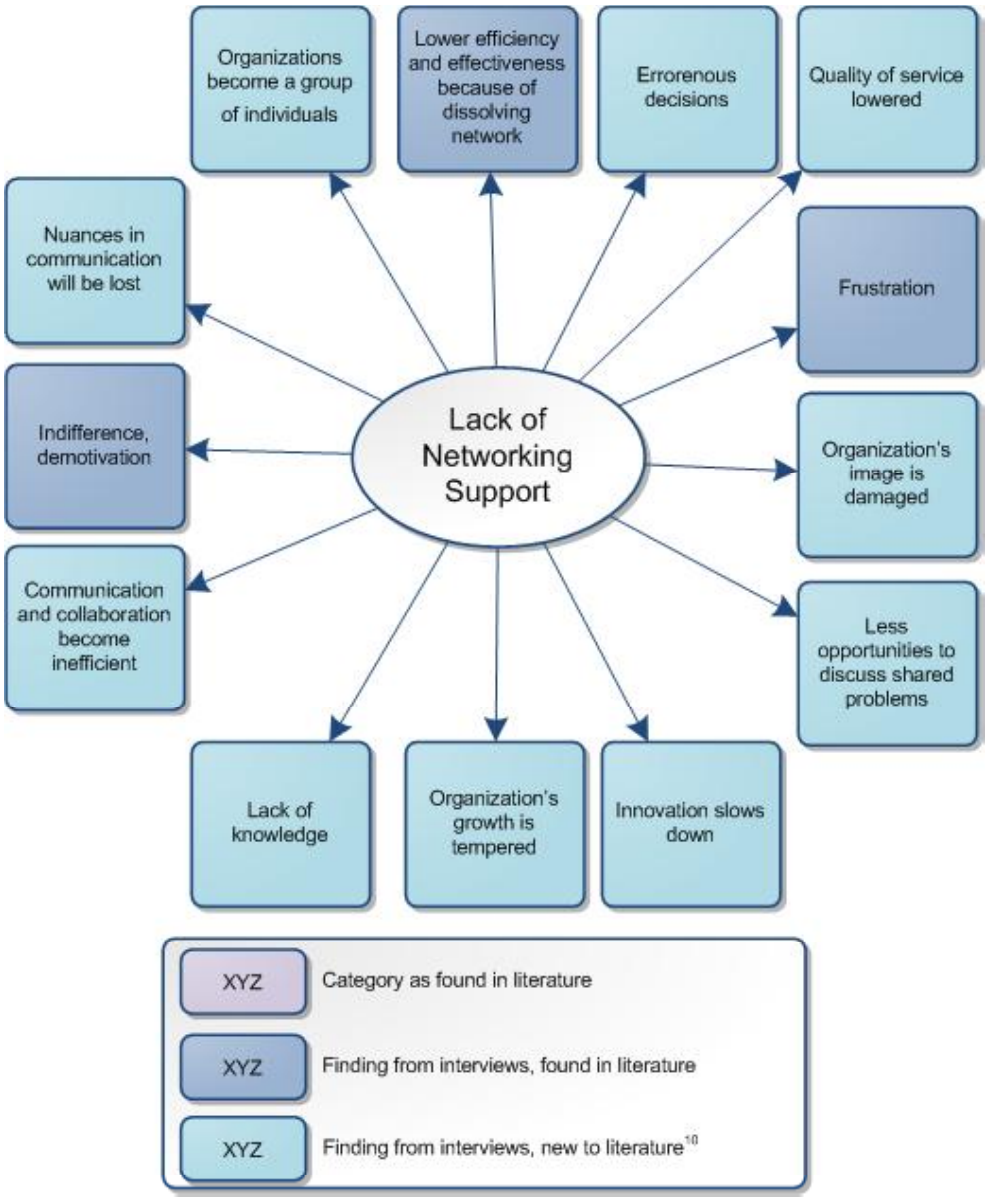

Figure 24 Cognitive map of effects of Lack of Networking Support

9.5.5. Countermeasures against Lack of Networking Support

In Table 34 the countermeasures against Lack of Networking Support as mentioned by interviewees are listed, ordered by the number of interviewees that mentioned that specific countermeasure. In the last column of Table 34 the entry in Table 7 (page 61) with the same or a comparable countermeasure is shown. Thus, this column indicates whether the countermeasure mentioned by interviewees was directly mentioned in literature. If there is no entry in the last column for a particular countermeasure, this means that no direct link to literature was found.

[10] 'New to literature' means that we have not found the item(s) in the literature studied. It does not mean that the item is not discussed elsewhere.

Number	Countermeasure	Times mentioned	Listed countermeasure in Table 7 (as found in literature)
1	Tools	8	Usage of tools
2	Social events for creating social bonding	8	
3	Define company's values / goals to provide a social basis	3	
4	Use your network to gather knowledge and expand it	3	
5	Central meeting place for social contact	2	
6	Structure knowledge sharing by training and social contact	2	
7	Buddy system for knowledge gathering	1	
8	Choose the form of communication carefully	1	
9	Define a culture of knowledge sharing within organization	1	
10	Enter meeting early	1	
11	Well-organized intranet	1	

Table 34 Countermeasures against Lack of Networking Support from interviews

9.5.5.1. Usage of tools

Although the most mentioned countermeasure is the usage of tools, one has to note that all interviewees indicated that a technical solutions such as using tools is not a complete solution and that tools can provide support to others countermeasures against Lack of Control over Information. The usage of tools has been further investigated and will be discussed in section 9.6 below.

9.5.5.2. Social contact

One of those other countermeasures is number two ('Social events'), which is aimed at creating a social bonding between individuals within an organization or a team. A social event can occur on an organizational scale, on a department scale and on a team scale. As such, this countermeasures also includes the countermeasure that has previously been called 'provide team psychological safety' (see section 6.3.6). Also, other countermeasures, such as number three, five and six seem to be aimed at providing psychological safety, either within a team or organization. Countermeasure number ten ('Enter a meeting early') seems to be aimed at getting the chance to have some social contact with your colleagues. This countermeasure is possible in physical meetings as well as virtual meetings or conference calls.

9.5.5.3. Accessing and sharing knowledge

Several countermeasures mentioned are aimed at making individuals share knowledge and providing the possibilities to access that knowledge. In this context, tools are again supportive. Specifically, countermeasures number four, six, seven, nine and eleven are aimed at making the access and sharing of knowledge within the organization easier and more accepted. An interesting way to find the right information is provided by countermeasure number seven ('Buddy system'). This countermeasure could also provide a way to cope with Information Overload. In essence, the buddy system is based on an expert network: a system is created that links experts to subjects, and individuals can search for subjects and find ways to contact experts on that subject. The importance of a network is also suggested by countermeasure number four ('Use your network'). Another way of making it easier to find information is suggested with countermeasure number eleven: namely by providing a well-organized intranet. Essentially this countermeasure points at a more critical need, namely that of identifying, structuring and making accessible the organization's information.
Making sharing of knowledge more accepted within an organization can be done by training individuals to share knowledge, let them experience the benefits of knowledge sharing (countermeasure number six) and by defining a strong culture of knowledge sharing within an organization (countermeasure number nine).

In Figure 25 the above discussion has been depicted. The countermeasures against Lack of Networking Support mentioned during the interviews are shown, with their relation to Lack of Networking Support. If a countermeasure is, in our opinion, an indirect countermeasure it is connected either via another

countermeasure that has been mentioned during the interviews or via a countermeasure that has been found in literature, to which it is related.

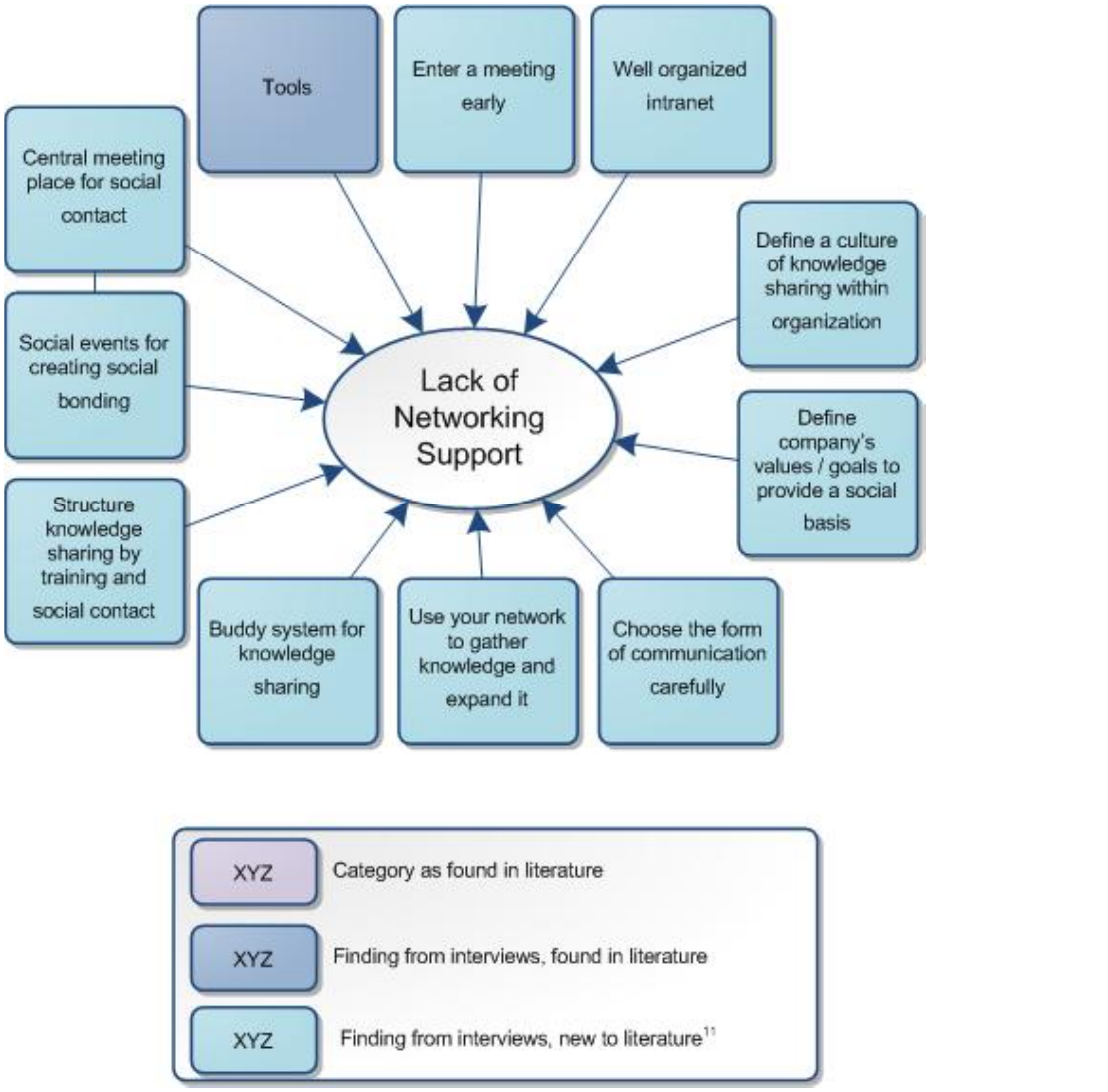

Figure 25 Cognitive map of countermeasures against Lack of Networking Support

9.5.6. Conclusion

Concluding, the results from our study where not as clear-cut as the results for Information Overload and Lack of Control over Information for the question whether or not Lack of Networking Support is a problem. There were voices suggesting that Lack of Networking Support is not a problem, but there were also strong voices suggesting that Lack of Networking Support is indeed a problem. In conclusion, we think that Lack of Networking Support is indeed a problem, but it is very dependent on your situation and your personality.

[11] 'New to literature' means that we have not found the item(s) in the literature studied. It does not mean that the item is not discussed elsewhere.

The results from our study also indicate an increase in Lack of Networking Support is perceived among interviewees, which partly can be explained by changes in tasks; when an individual moves from a technically oriented function towards a more socially oriented function the Lack of Networking Support can become of higher relevance to that individual.

9.5.6.1. Items not found in literature

The results from our study are to some extent consistent with literature: some causes of, effects of and countermeasures against Lack of Networking Support that were mentioned were also found in literature. On the other hand, we also found a number of causes, effects and countermeasures that were not found in literature. In Table 35 below the causes, effects and countermeasures are listed that were present in the results from our study, but could not be linked to existing literature. This does not mean that these items are not discussed in literature at all: the items cannot be directly linked to the literature consulted in this study and it may very well be possible that the items are indeed discussed in other literature.

Causes
Working worldwide
Compensation structures do not fit with current situation
Frequent changes in team membership
Externally oriented organization
Increased use of the Internet for communicating
Pressure
The amount of useless communication
Effects
Organizations become a group of individuals
Nuances in communication will be lost
Communication and collaboration become inefficient
Erroneous decisions
Lack of knowledge
Less opportunities to discuss shared problems
Innovation slows down
Organization's growth is tempered
Organization's image is damaged (problems with transparency influences image)
Quality of service lowered
Countermeasures
Social events for creating social bonding
Define company's values / goals to provide a social basis
Use your network to gather knowledge and expand it
Central meeting place for social contact
Structure knowledge sharing by training and social contact
Buddy system for knowledge gathering
Choose the form of communication carefully
Define a culture of knowledge sharing within organization
Enter meeting early
Well-organized intranet

Table 35 Lack of Networking Support: Causes, effects and countermeasures not found in consulted literature

9.5.6.2. Cognitive map

In Figure 26 we present a cognitive map of the findings on Lack of Networking Support. Causes, effects and countermeasures are depicted with their relations to each other. For sake of readability we did not include Lack of Networking Support in the diagram. In the outmost ring are the countermeasures against Lack of Networking Support. The innermost ring contains the causes of Lack of Networking Support. The ring in between contains

the effects of Lack of Networking Support. Relations are shown between causes and countermeasures, between causes and effects and between countermeasures and effects.

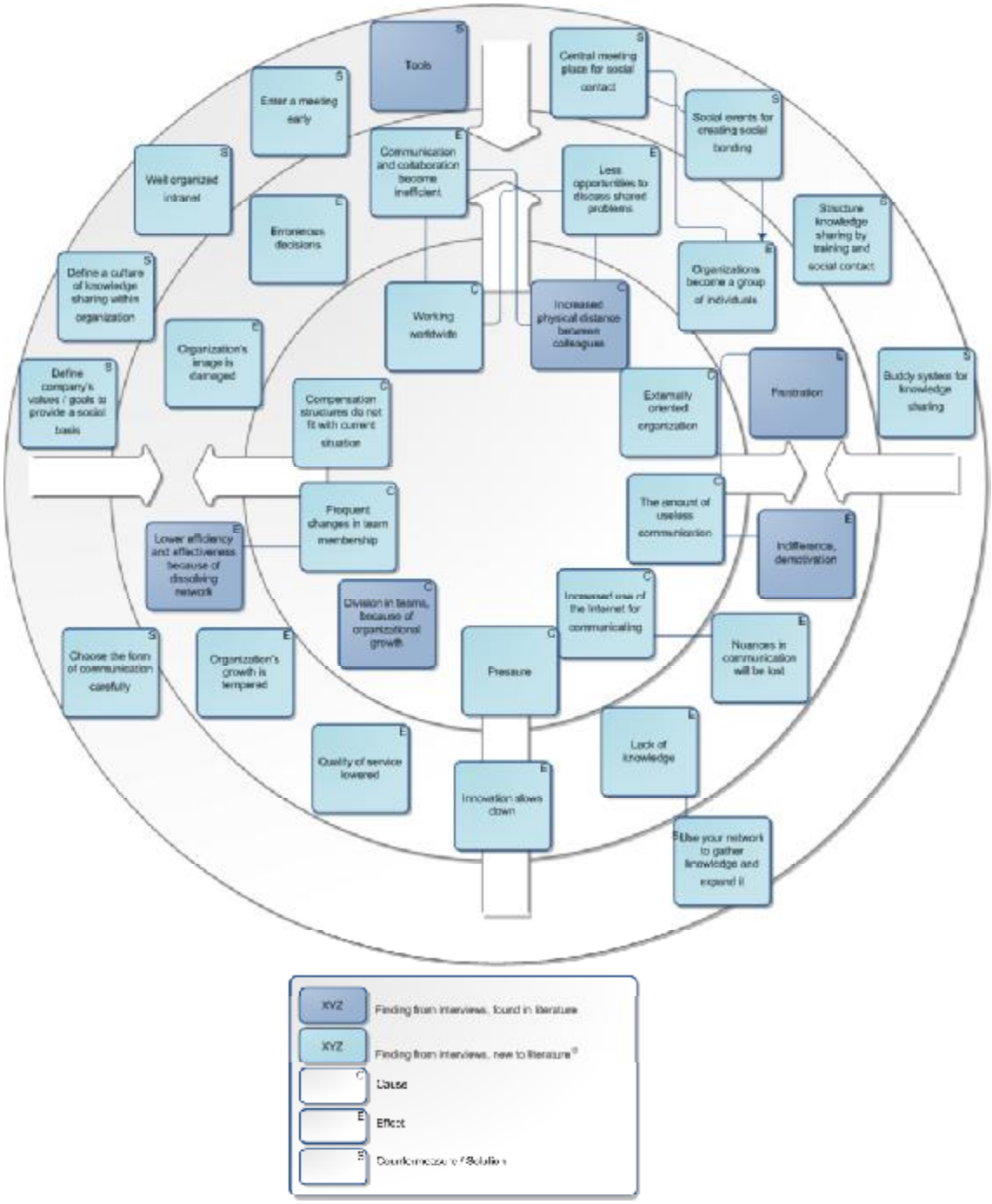

Figure 26 Cognitive map of Lack of Networking Support: Causes, effects and countermeasures combined

[12] 'New to literature' means that we have not found the item(s) in the literature studied. It does not mean that the item is not discussed elsewhere.

9.5.6.3. Overview

In Table 36 below we have merged the findings from literature on Lack of Networking Support, earlier presented in Table 7, with the findings on Lack of Networking Support originating from our study: the items not found in consulted literature, presented earlier in Table 35. Table 36 provides an overview of the causes, effects of and countermeasures against Lack of Networking Support originating from literature as well as our study, and thus provides the most complete overview possible in this study.

Causes
Working worldwide
Compensation structures do not fit with current situation
Frequent changes in team membership
Externally oriented organization
Increased use of the Internet for communicating
Pressure
The amount of useless communication
Teleworking / working in various locations
Variable office hours
(Virtual) Teams
Effects
Organizations become a group of individuals
Nuances in communication will be lost
Communication and collaboration become inefficient
Erroneous decisions
Lack of knowledge
Less opportunities to discuss shared problems
Innovation slows down
Organization's growth is tempered
Organization's image is damaged (problems with transparency influences image)
Quality of service lowered
Feelings of isolation
Frustration
Demotivation
Lower effectiveness
Short-term higher effectiveness
Countermeasures
Social events for creating social bonding
Define company's values / goals to provide a social basis
Use your network to gather knowledge and expand it
Central meeting place for social contact
Structure knowledge sharing by training and social contact
Buddy system for knowledge gathering
Choose the form of communication carefully
Define a culture of knowledge sharing within organization
Enter meeting early
Well-organized intranet
Usage of tools
Provide team psychological safety

Table 36 Lack of Networking Support: Causes, effects and countermeasures complete

9.5.6.4. The five most important causes, effects and countermeasures

We have developed a top-5 of the most important causes, effects of and countermeasures against Lack of Networking Support, which is an selection of the overview presented in Table 36. The top-5 for Lack of Networking Support is shown in Table 37 below.

Causes	
	The amount of useless communication
	Frequent changes in team membership
	Teleworking / working in various locations
	Variable office hours
	Increased use of the Internet for communicating
Effects	
	Nuances in communication will be lost
	Communication and collaboration become inefficient
	Organization's image is damaged (problems with transparency influence image)
	Demotivation
	Erroneous decisions
Countermeasures	
	Social events for creating social bonding
	Usage of tools
	Central meeting place for social contact
	Provide team psychological safety
	Define a culture of knowledge sharing within organization

Table 37 Lack of Networking Support: Top-5 causes, effects and countermeasures

In our opinion, the Top-5 as presented above provides management with an short overview of what are causes and effects of and countermeasures against Lack of Networking Support. It is based on our experience with the subject and is influenced both by literature and results from interviews. We have chosen these causes, effects and countermeasures for several reasons; either the chosen item fits the organization of Microsoft Services or we view it as very important, based on literature.

9.6. Tools

Our study investigated the tools that are available for Consultants in three dimensions, viz.: frequency of use, usefulness and ease of use. In addition to that, we investigated the familiarity with the tools. In this section we will discuss the results of this investigation.

9.6.1. Familiarity

Almost all tools were familiar to every interviewee, except for Internet Access Gateway (five interviewees not familiar), Knowledge Network (eleven interviewees not familiar) and Terminal Services Gateway (five interviewees not familiar), see Appendix 9 for a graphical representation of these results.

This result can be explained by the following. Knowledge Network is a pre-release tool from Office Labs, so it is not a tool that is deployed by default to every Consultant. Terminal Services Gateway is planned for Windows Server 2008, so it is also possible that less people will be familiar with that tool. Internet Access Gateway is a tool that is used quite a lot, but mostly invisible to the Consultants, as it makes it possible to publish internal websites to an externally available portal. Despite these facts, Consultants could use these tools.

9.6.2. Age

In this section we investigate the relation between the age of the interviewees and the score in every of the three dimensions (frequency of use, usefulness, ease of use).

9.6.2.1. Frequency of use – Age

In Figure 27 the relation between the frequency of use and the age of the interviewees is depicted. As is visible, the interviewees younger than 37 seem to use instant messaging (IM) applications more frequently than older interviewees (see the results for Office Communicator and Windows Live Messenger, both IM applications). This seems to match with the popular belief that the younger generation has more affinity with IM than the older generation. Interestingly, we also see another difference between the individuals younger than 37 and the individuals who are 37 or older: the latter indicate a much higher frequency of use of Office Groove, a tool that enables document sharing and collaboration on documents regardless of the individual's internet connection status. We do not see an explanation for this result.

The difference in scores for Knowledge Network also seem interesting, although one has to note that only few interviewees were familiar with this tool. As is visible from Figure 27 all the individuals that were familiar with Knowledge Network were younger than 37 and did not use the tool very often.

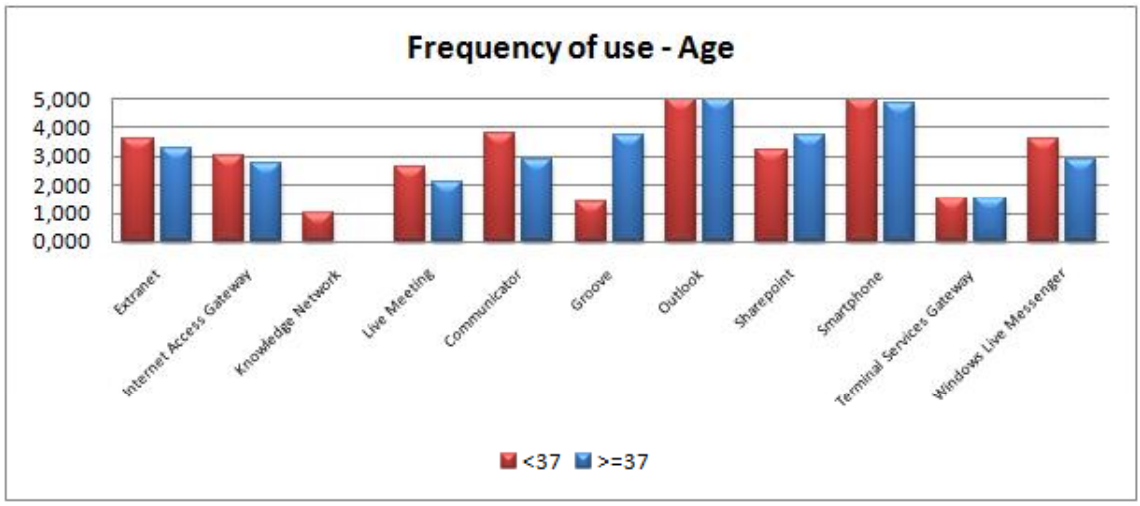

Figure 27 Frequency of use - Age

9.6.2.2. Usefulness – Age

In Figure 28 the relation between the perceived usefulness and the age of the interviewees is depicted. In agreement with the scores for frequency of use, the individuals younger than 37 indicate a higher perceived usefulness of Office Communicator, an IM application. Interestingly, the difference between the scores for perceived usefulness for Windows Live Messenger is less big.

In agreement with the scores for frequency of use, the older individuals (37 years or higher) indicated a significant higher perceived usefulness of Office Groove than the younger individuals.

The difference between the scores for perceived usefulness for Knowledge Network between the two categories is high, though, as has been explained above, one should note that only few interviewees were familiar with this tool. Those who were familiar with the tool ranked the perceived usefulness higher than for example Live Meeting, a tool everyone was familiar with.

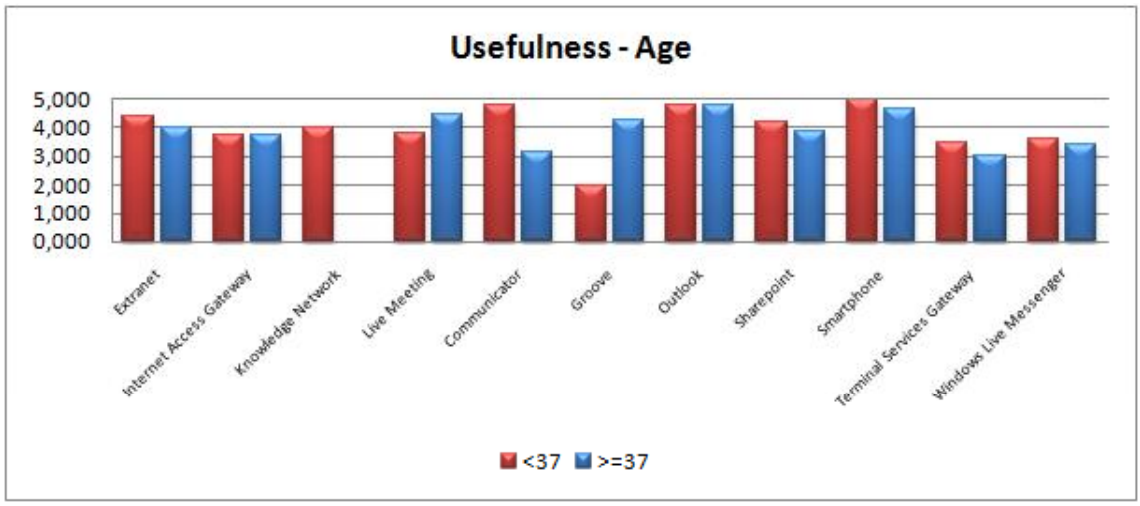

Figure 28 Usefulness – Age

9.6.2.3. Ease of use – Age

In Figure 29 the relation between the perceived ease of use and the age of the interviewees is depicted. In agreement with the scores for frequency of use, the individuals younger than 37 indicate a higher perceived ease of use of IM applications (Office Communicator and Windows Live Messenger).

In agreement with the scores for frequency of use and perceive usefulness, the older individuals (37 years or higher) indicated a significant higher perceived ease of use of Office Groove than the younger individuals.

The difference between the scores for perceived ease of use for Knowledge Network between the two categories is high, though, as has been explained above, one should note that only few interviewees were familiar with this tool. Those who were familiar with the tool ranked the perceived ease of use a little higher than Office Sharepoint.

Another significant difference can be found in the ease of use of Internet Access Gateway, where individuals of 37 of age or older indicated a higher ease of use of this tool than the individuals younger than 37. Also, the perceived ease of use of Extranet was significantly higher for the individuals younger than 37 than for the individuals 37 of age or older.

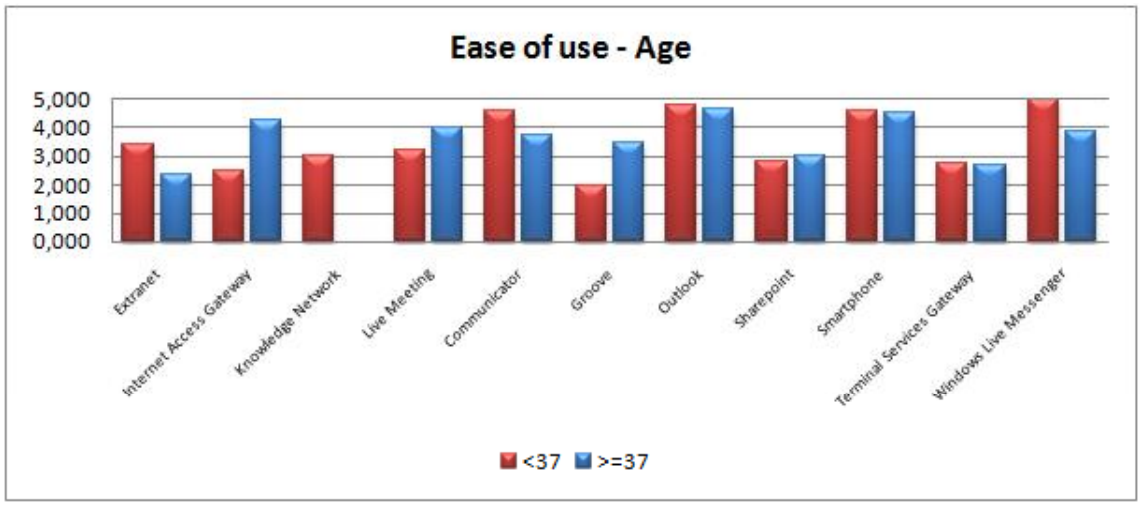

Figure 29 Ease of use - Age

9.6.3. Experience

In this section we investigate the relation between the working experience of the interviewees and the score in every of the three dimensions (frequency of use, usefulness, ease of use).

9.6.3.1. Frequency of use – Experience

In Figure 30 the relation between the frequency of use and the working experience of the interviewees is depicted. The differences here are less than the differences that were shown when investigating the relation between frequency of use and age (see above).

For Windows Live messenger, the individuals with more than six years of experience indicated a significantly higher frequency of use than the individuals with up to six years of experience. There is a small difference present for the frequency of use of Office Groove and Live Meeting: those with up to six years of experience indicated that they use the tools a little more frequent than those with more than six years of experience.

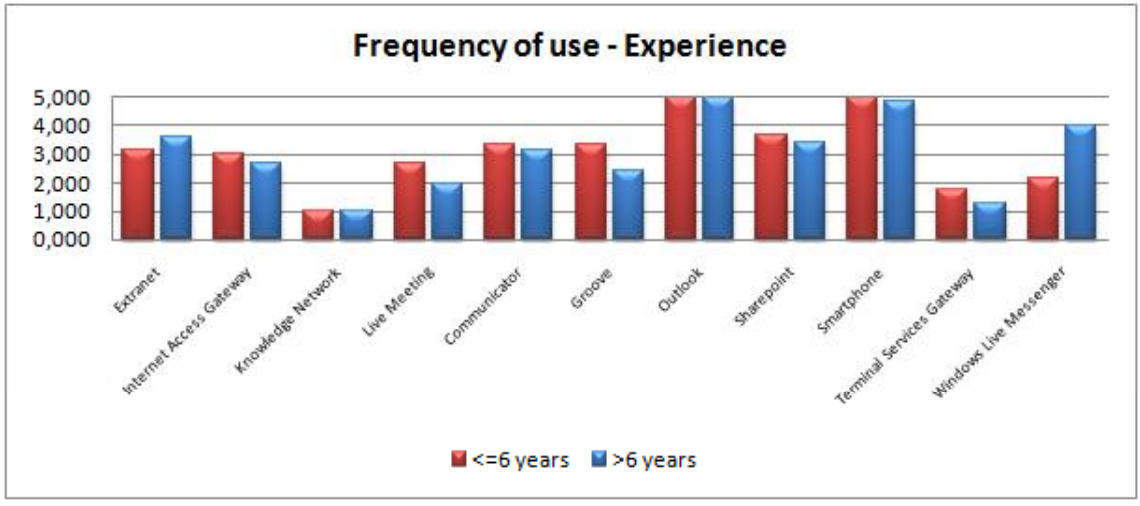

Figure 30 Frequency of use - Experience

9.6.3.2. Usefulness – Experience

In Figure 31 the relation between the perceived usefulness and the working experience of the interviewees is depicted. The differences here are less than the differences that were shown when investigating the relation between perceived usefulness and age (see above).

For Windows Live messenger, the individuals with more than six years of experience indicated a significantly higher perceived usefulness than the individuals with up to six years of experience. There is a small difference present for the perceived usefulness of Office Groove: those with up to six years of experience indicated that they find the tool a little more useful than those with more than six years of experience.

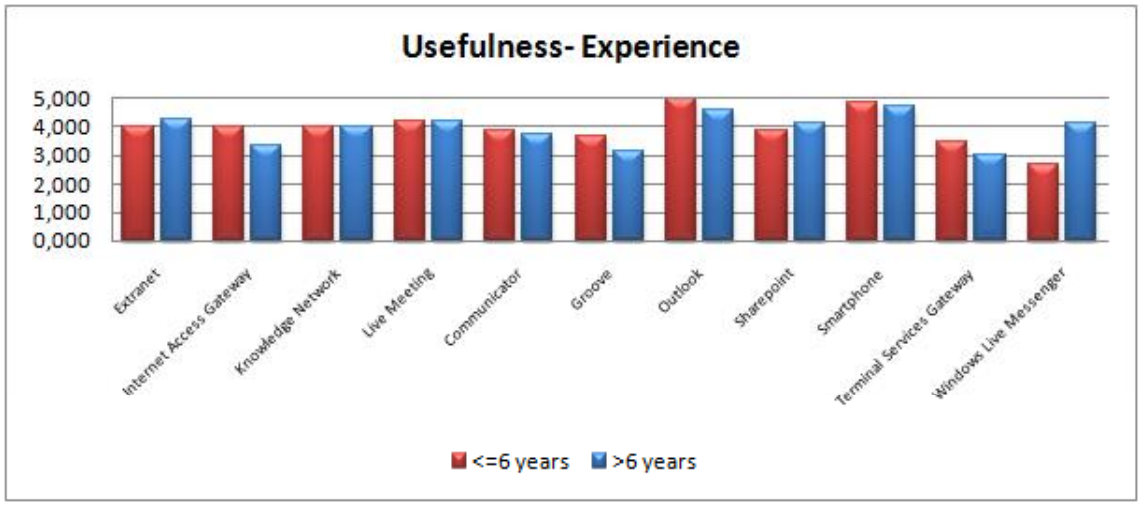

Figure 31 Usefulness - Experience

9.6.3.3. Ease of use – Experience

In Figure 32 the relation between the perceived ease of use and the working experience of the interviewees is depicted.

Interestingly, for Windows Live Messenger, there is only a small difference between the scores for ease of use for both groups. In contrast, those with more than six years of experience indicated a higher frequency of use and perceived usefulness than those with up to six years of experience.

Those with up to six years of working experience expressed a significantly higher ease of use of Internet Access Gateway and Knowledge Network than those with more than six years of working experience.

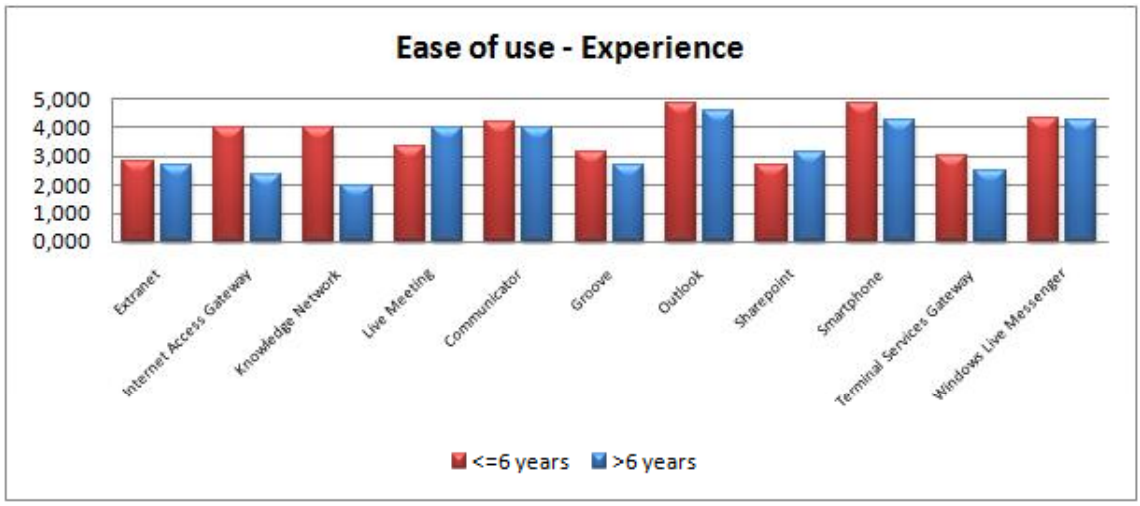

Figure 32 Ease of use – Experience

9.6.4. Characteristics of tools

In this section we will investigate some possible characteristics of tools, based on the results of our study and the analysis of the tools (see section 8.6.7).

9.6.4.1. Integration

One thing that is very apparent is that both Office Outlook and the Smartphone are winners; on average they score the highest in every dimension (use, usefulness, ease of use). One possible reason for this can be that this comparison is not a fair comparison, because Office Outlook and the Smartphone are both tools with many different functions. Office Outlook provides email, task lists, calendar and contact list. A Smartphone can do all that, complemented with calling others, taking notes, internet, taking pictures and some document editing for Office applications, such as Word, Excel and Powerpoint. By contrast Live Meeting is 'only' capable of setting up a virtual meeting, and showing others a presentation. Office Communicator is 'only' capable of seeing who is available for contact (presence information) and actually contacting them by instant messaging. Office Outlook and the Smartphone are more 'rich' tools, in the sense that they are capable of many tasks and useful in many different situations. This may mean that the Consultant's tools should be more 'rich'; i.e. a tool should incorporate more than one function and be versatile. For example, Office Outlook helps an individual to handle communication in many different ways by providing tools for structuring and classification of communication; in the situation of the Consultants Office Outlook is indeed the central communication tool, as Office Communicator, Live Meeting, Office Sharepoint and other applications cooperate with it. Because of this, a Consultant can choose to react to an email by sending an email, but can also choose to react by Instant Messaging or call the sender of the email via Office Communicator. In addition, Live Meetings and conference calls can be schedule and meeting spaces can be set up to share documents and minutes related to this meeting or conference call, directly in Outlook. Concluding, Office Outlook is moving towards becoming the starting point of all communication of a Consultant, as other tools extend the capabilities of Office Outlook. This combination provides a rich tool, which is valued by the Consultants.

9.6.4.2. Dynamic connectivity

In the discussion of Lack of Networking Support, Consultants indicated that the geographical distance between individuals is not really a problem, as long as there is connectivity between them. This can be generalized into

an interesting requirement for tools: a tool should always provide the best possible connectivity between communication partners. This connectivity is mostly determined by connection to Internet and upload and download speeds. We will use Windows Live messenger as an example to explain this idea. Windows Live Messenger provides Instant Messaging (IM) capabilities as well as audio and video conferencing. If the tool would monitor the upload and download speeds of the connection of the user, it could for example provide four levels of connectivity:

- ***Level 1: Basic connectivity***. IM is available, but no backgrounds or contact avatars can be used. Communication is text based.
- ***Level 2: Graphical IM***. Level 1, with backgrounds for instant messaging conversations, contact avatars and file transfer.
- ***Level 3: Audio conferencing***. Level 2, with added support for calling contacts; thus, communication is augmented with audio. Thus, users can hear each other.
- ***Level 4: Video conferencing***. Level 3, with added support for watching and showing video from webcams. Thus, users can also see each other.

Each level of connectivity could be enabled depending on upload and download speeds. For example, when one of the individuals in the conversation uses a telephone line connection, level 1 could be the maximum level available to all individuals in the conversation. If the slowest connection in the conversation would for example be ISDN, level 2 could be enabled to all individuals in the conversation, and so on up to enabling level 4 for all individuals in the conversation.

9.6.4.3. Smart use of resources

Most Consultants are unfamiliar with Knowledge Network, a situation which is problematic, for Knowledge Network could help Consultants to solve knowledge accessing and knowledge sharing related problems, as has been discussed in section 6.3.5. We believe that the value of Knowledge Network resides in the fact that it does analyze a person's communication at fixed moments. Some interviewees indicated that they like the possibilities provided by tools running as services on their laptops, but as soon as the tool uses too many resources of the laptop while running as a service, Consultants disable the service and thus choose not to use the possibilities provided by the automation. Generalizing, one could conclude that tools should indeed automatically perform their tasks, but should not continuously request system resources for this. Instead, a tool could just perform its tasks at a fixed moment in time, for example, every two weeks, as Knowledge Network does by default, and use minimum resources the rest of the time. This way, Knowledge Network is indeed running all the time, but only using a minimum amount of resources, except for the scheduled moment when it analyzes the person's communication and then reports on it, by displaying a message as an email in Office Outlook.

Even if an application only uses a relatively large amount of resources only at a fixed moment in time instead of always, it can still occur that this moment does not fit the user. For example, suppose a certain service needs to run for half an hour and requests a lot of processor time. The execution of this process is planned for running on day X at eleven o'clock. However, the application or operating system first checks the calendar of the user to determine whether the service can indeed run at the planned moment. If the user has planned a meeting and is running on battery power, the execution of the process could be postponed until well after the meeting and the user has connected the laptop to a more permanent source of power. Another situation could be that the execution of the process is postponed because of the user running programs that require a lot of resources already; imagine for example a video-editing application or an application for burning data onto a DVD; in these situations it could be better to postpone and reschedule the execution of the automatic process to a time the user is not using many resources or is not even actively using the laptop. In our opinion, the decisions about the

automatically rescheduling of processes would have to be presented to the user for notification, for example via Office Outlook by sending a status report, like Knowledge Network already does.

9.6.4.4. Synchronization

As individuals will be working on more than one location and virtual teams will become daily practice, robust synchronization functionality needs to be in place to ensure everyone is working on the same version and changes are not lost. This can be and has already been done by checking out documents from a shared repository (this function is for example available in Office Sharepoint). Still, in our opinion, the future lies in what Office Groove does: enabling offline editing transparently to the user, while publishing the changes to a central repository automatically when the user is online again.

Synchronization will not only be needed with a central place to store documents but also between devices, for example a desktop PC, a laptop, a Smartphone and possible future car systems or meeting room systems. Mechanisms will be needed to enable transparent and possibly automatic synchronization of documents between devices and locations.

9.6.5. Addressing challenges with tools

Respondents strongly indicate that tools can be used to address Lack of Networking Support. In addition the New World of Work poses some characteristics of future tools which were shown to help address Information Overload, Lack of Control over Information and Lack of Networking Support (see section 5.7.4). In this section we will take these ideas one step further; we will investigate how tools could address Information Overload, Lack of Control over Information and Lack of Networking Support.

Information Overload

Reducing Information Overload seems to start with filtering, either manually or automatically. The problem that then arises is: how will we filter? We focus on two types of filtering, namely "Incoming Communication Filtering" (mainly email) and "Results Filtering".

Incoming Communication Filtering

In this analysis we will focus on email, as this is a wide spread way of communicating in professional life. In our opinion, filtering incoming email is very difficult, if not impossible to do. An organization is constantly changing, with people moving within the organization, new people getting into the organization and people leaving the organization. Thus, it would be hard to filter incoming email based on sender. Consider the following example: employee E decides at $t=t_0$ that email from manager M is to be deleted on receipt because the information M sends is irrelevant to E, because E is not influenced directly by M. At $t=t_1$ M changes jobs and now moves closer to E, and the communication for M now is relevant for E. A problem arises if E is not aware of this change and does not update the filter: communication of M which is now indeed relevant to E is lost, because it is not shown to E.

Another possibility to filter incoming communication is to filter based on keywords. Consider the following example: employee A is a technically oriented employee and is an expert on product P. A decides to filter all communication that is not related to product P, the customers A is responsible for or the local branch of the organization A works for. When the tasks of A change, for example because product P is replaced by product Q, because A is assigned to different customers or because A is moving to a different branch of the organization, A has to update or reset the filters in order to ensure that relevant email arrives.

If an organization decides that email should be filtered for example based on local branch of the employee, these filtering rules could automatically by activated in the email client that is used within the organization. In

the situation of Microsoft, this means Office Outlook would have to be augmented with a filter that looks up the local branch of the user and then filters email according to this value.

So far, we have discussed reducing the number of information items flowing towards an individual by filtering and not by actually reducing the number of information items. We think that in order for an organization to be successful in reducing the amount of communication flowing towards an individual, both filtering and reducing the amount of communication has to be implemented. Reducing the amount of information flowing towards an individual can for example begin with using email only for professional communication. We do not opt for all private communication to be expelled from email communication, but for a reduction of it. An extreme, but real life example follows: employee A passes an important exam E. Colleague B sends an email with the following message: "A passed exam E, which was very important. Please help me to congratulate A. Congratulations A!" to the complete subsidiary of the organization A and B work in, which counts 3000 people, many of whom do not know A nor B. So, 3000 people receive an email of B congratulating A with passing exam E. We think this already results in a lot of useless communication. But, then A's direct colleagues C, D, F and G congratulate A by replying to B's email by using the reply to all function in their email clients. This result in 4x3000 = 12.000 emails. As a result, 15.000 emails have been sent to congratulate A on passing exam E and each employee within the subsidiary has received five of them.

Results Filtering
When a person starts to search in different information sources for information on a particular subject the possibility arises that a large amount of information is presented to the searcher, making it difficult to pick the information needed from the results. Tools could help the searcher to choose the information needed by filtering, for example on production date or on contents. For example, when searching information about a certain subject that is new and changing often, information older than a year will likely be irrelevant, because much has changed. A tool could detect that and present that information separated from the relevant results.

Lack of Control over Information
Tools could help in addressing Lack of Control over Information by providing a clearer insight in how information should be handled. A very basic example of such detection is the following: when a person tries to forward an email that contains the word 'confidential' to a person outside the organization, the email client can detect that and show a warning message to the user requesting confirmation of this action.

Lack of Networking Support
Tools should provide a lifeline to colleagues and the organization when an employee is separated. Tools should be able to provide connectivity to others, independent of the speed and quality of the connection (see section 9.6.4.2).

9.6.6. Conclusion

Consultants were familiar with almost all tools that were included in the questionnaire, except for Internet Access Gateway (five interviewees not familiar), Knowledge Network (eleven interviewees not familiar) and Terminal Services Gateway (five interviewees not familiar). A possible reason for this is, that Internet Access Gateway (IAG) and Terminal Services Gateway (TSG) are used invisibly to the Consultants; they use applications made available via IAG and TSG, but do not actively use the tools. Knowledge Network is a pre-release Office tool, which also could be a reason why Consultants are not familiar with it. In addition, Knowledge Network is not used frequently when compared to other tools, as our analysis shows. In our opinion, Knowledge Network is a tool that enables an important need in the New World of Work: sharing of information with minimal effort. As such, we believe that it is important that Consultants become more familiar with Knowledge Network or equivalent tools.

We did not find differences between the teams; there were no significant differences between the scores for the tools for the individuals in the various teams.

Our results indicate that (a) individuals younger than 37 tend to use instant messaging more often than individuals that were 37 years old or older. The latter category of individuals used Office Groove more often than the younger individuals. Our investigation of the relation between frequency of use and working experience revealed that (b) individuals with more than six years of experience used Windows Live Messenger more often than those with up to six years of experience. This seems to contradict the relation found between age and usage of instant messaging, as working experience could be related to age: an older person could have more relevant working experience than an younger person. Our analysis shows that the supposed relation between age and working experience is only weakly present in our data (see section 9.1.5). Thus, it may very well be that a relatively 'old' person has a relatively small number of years of working experience. Based on this notion, we conclude that the findings labeled (a) and (b) above do not necessarily contradict each other, because of the lack of correlation between age and working experience in our data.

Our results indicate that Office Outlook and the Smartphone are the 'killer' tools for Consultants: the tools score the highest in the three dimensions (frequency of use, ease of use and usefulness). Terminal Services Gateway is not a popular tool, as it scores lowest in all three dimensions.

We have developed four characteristics for tools, based on our analysis in the empirical study: integration, dynamic connectivity, smart use of resources and synchronization. In addition, we investigated how Information Overload, Lack of Control over Information and Lack of Networking Support can be addressed by using tools.

9.7. Lack of Networking Support is the most important phenomenon

In general, Lack of Networking Support is seen as the most important phenomenon because of the social aspects associated with it, but one interviewee indicated that all three problems have a clear 'human' component. Some interviewees suggested that Information Overload is the most important phenomenon, as it is something that has to be worked on every day by the individual too keep it under control. One interviewee found Lack of Control over Information to be the most important challenge, because:

> "We have to find a balance between what information to share and what information to keep. Sharing more is not always better; more efficient communication will lead to higher effectiveness"

This viewpoint is of course closely linked to the New World of Work, the goal of which is to enable people to work more efficiently and make better use of their time.

9.8. Causes for differences in results

In this section we will investigate what may be possible explanations for differences between the results from our study and existing literature by looking at the differences between our study and existing literature.

9.8.1. Research population

Differences may be caused by our interest in a very specific research population (which we can characterize as Consultants annex Information Workers in a large IT company). We have not found any other study

investigating this specific research population, and we believe that it is very well possible that the individuals in this research population will react differently to problems than others. For example, the individuals in our research population all have a very high affinity with IT, for most it is even their hobby. As such, they may have presented a more IT based view on the concepts, their causes, effects and solutions. We reckon that if this research would be repeated for a different group of Information Workers that have a lower affinity with IT the answers would be quite different and maybe would match better with the existing literature.

Differences can be seen in the fact that the usage of tools is mentioned often as a countermeasure against Lack of Networking Support and in the fact that Information Rights Management is mentioned as a countermeasure against Lack of Control over Information: we suspect that a research population with lower IT affinity would not mention these things so often.

9.8.2. Setting

Moreover, many investigations of for example Information Overload have been laboratory studies. For example studies have been performed on consumers having to make a decision on which product to buy (see (Jacoby, 1984) and (Malhotra, 1984) for a discussion on this subject), individuals moving to live in a city (see (Milgram, 1970)). Others were mere observations of a person and not a study (see (Denning, 1982)) and only some were actually performed in an organizational setting (see (O'Reilly III, 1980)). Even in the case of (O'Reilly III, 1980) the research population was very different, as the population existed of individuals assigned to three navy aviation units (O'Reilly III, 1980).

9.8.3. Time

Also the time factor seems to play an important role in this type of study. O'Reilly's study in 1980 was performed in a setting that was far less technically advanced than our study. (Eppler, 2004) is the last study dealing with Information Overload that we have found, and it served as an overview. Thus it seems that investigations on Information Overload in organizational settings were done before 2004, so at least three years ago. This notion, combined with Moore's law (stating that the number of transistors on integrated Circuits doubles every 18 months, because of technological innovation) and the rule of thumb in the IT business stating that the knowledge a person now possesses will be useless and outdated in approximately five years, leads us to believe that our study was performed in a very different setting, a New World of Work so-to-say.

This difference can for example been seen in the existence of Internet and email as a very common way of communicating that is integrated in people's lives. The same is true for cell phones. Email is mentioned as a cause of Information Overload. Also some effects of Information Overload that were mentioned are related to email (for example 'many emails mailboxes'). Moreover, some countermeasures against the same phenomenon are related to email, such as disabling notifications of new email.

9.8.4. Organization

Also, even compared to investigations of the three concepts (Information Overload, Lack of Control over Information and Lack of Networking Support) that were actually performed in an organizational setting, our study has taken place in a very unique organization: Microsoft. Microsoft is one of the largest IT companies in the world, placed number 66 on the 2007 Forbes 2000 List, the list with the 2000 biggest companies in the world. The 2007 Forbes 2000 List is created using a composite measure of four measures, viz. sales (Microsoft positioned 122), market value (Microsoft positioned 3), assets (Microsoft positioned 235) and profits (Microsoft positioned 19) and all kinds of companies are listed.

In addition, the possibilities and tooling given to employees can be called complete. We think the results of our study would have been very different if Consultants were not able to work anywhere, anytime or had to work with outdated hardware and software.

Moreover, the New World of Work in itself brings about a very specific working environment, with high levels of freedom, working at home (or anywhere for that matter) and also high levels of responsibility for employees.

9.9. Reflection on literature

We have investigated Information Overload, Lack of Control over Information and Lack of Networking Support both in literature and in practice. The results from the literature analysis were most thorough for Information Overload, possibly because that was a clear cut concept, which is discussed as such in literature. As for Lack of Control over Information and Lack of Networking Support, these concepts are not discussed as such in literature and related literature had to be searched among various disciplines, which resulted in a less complete body of knowledge for these concepts. The literature we found for Information Overload, Lack of Control over Information and Lack of Knowledge Support mostly originated from Computer Science, Organization and Management Science and some literature originated from Psychology and from the field Human Resources. For example, Information Overload, which in the context of this study associated with interaction with digital systems, could be traced back to the field of Psychology, where (Miller, 1956) introduced the concept of the Magical Number Seven, which provided a clever written description on the limits of the human information processing capabilities.

In contrast to the fact that we have found more relevant literature for the concept of Information Overload, in our empirical study we have specifically focused on giving all three concepts the same amount of attention, by asking the same set of questions for each challenge and keeping track of the time spent on each challenge during interviews

Our empirical study has added a number of causes, effects and countermeasures that were not found in literature, even to the already long list of causes, effects and countermeasures related to Information Overload. This result can be explained by the fact that we investigated a very specific situation and as such one could expect to find different causes, effects of and countermeasures against the three challenges. See also section 9.8 above for a discussion of possible causes for differences in results compared to literature.

10. Conclusions

In this section we will first answer our research questions, after which we will present some practical and theoretical implications.

The guiding research question for our study was:

> *What challenges do arise for Information Workers in the New World of Work and what are the causes of these challenges in the job of a Microsoft Services Consultant?*

Several research questions were developed to help answering the guiding research question. These research questions are listed in Table 38 below, together with an indication of in which section the research question is explored and answered.

Research question		Section in document	Section in conclusions
1.	**What is the New World of Work?**	4	10.1
2.	**What is an Information Worker?**	5.1	10.2
3.	**What are the most important challenges for Information Workers in the New World of Work and what are the causes, effects of and solutions for these challenges?**	5.7 and 6	10.3
4.	**What does the job of a Microsoft Services Consultant look like and how can Microsoft Services Consultants be related to Information Workers?**	5.6	10.2
5.	**How do the most important challenges for Information Workers in the New World of Work, as identified, relate to the job of a Microsoft Services Consultant?**	8 and 9	10.4
6.	**What are the causes of the most important challenges for Information Workers in the New World of Work, as identified, in the job of a Microsoft Services Consultant?**	8 and 9	10.4

Table 38 Research questions and sections

Where applicable we will give a short summary of the answers to the research questions.

10.1. New World of Work

The New World of Work is a vision articulated by Microsoft Corp, which describes and investigates three trends in the changing world (viz. globalization, demographic changes and technological innovation), investigates the challenges they present for workers, organizations and governments in the next ten years and describes how investments in technology and practices to empower Information Workers can lead to better results. The New World of Work vision thereby argues that Information Workers are to become the most important type of workers within an organization.

10.2. Information Workers

The next research question aimed at investigating Information Workers, which, according to the New World of Work, will become the most important type of workers within many organizations. An Information Worker is a person who uses information to assist in making decisions or taking actions, or a person who creates information that informs the decisions or actions of others. Based on the description of the job of Microsoft Services Consultants, we concluded that Microsoft Services Consultants do indeed fit into this definition of Information Workers, because Microsoft Services Consultants do use information to judge the situation of the

customer, investigate the possible actions and choose a course of action. They use their knowledge, the knowledge of colleagues and other experts to make decisions. This fits closely with the description of Information Workers: individuals that use information to assist in making decisions or taking actions.

10.3. Three challenges for Information Work

The most important possible challenges for Information Workers were identified as: Information Overload, Lack of Control over Information and Lack of Networking Support. Here we present a short definition of these concepts:

- *Information Overload*. The perception of the mismatch between information processing capacities and information processing requirements.
- *Lack of Control over Information*. A feeling of uncontrollability that appears because of information flowing more freely among various parties
- *Lack of Networking Support*. A need for increased connectivity, both outgoing and ingoing, both professionally and privately

10.4. Empirical study: findings

The empirical study aimed to answer the following question:

> *What are the specific characteristics of Information Overload, Lack of Control over Information and Lack of Networking Support for Microsoft Services Consultants within the New World of Work?*

Our study investigated the causes and effects of and countermeasures against Information Overload, Lack of Control over Information and Lack of Networking Support.

10.4.1. Working location

The primary working locations of Consultants are at home and at the customer. The office of Microsoft is mentioned the least as primary working location. The choice of working location is dependent on the tasks, the preferences of the customer and the private situation. Individuals younger than 37 work less at home than individuals aged 37 or older, but this does not indicate preference, as it presumably will be influenced by other factors. Choice of primary working location is not related to working experience.

10.4.2. New World of Work

The New World of Work is inevitable for organizations where it is possible. Whether or not the New World of Work is possible in an organization is dependent on the type of the organization, the type of work and the type of individuals. The New World of Work may not be as new as Microsoft poses it, but the fact that it is done in such a large corporation for all jobs, from Consultants to Financial Administration, seems to be new. Three factors that influence New World of Work implementation have been identified, viz.: stating clear goals of the implementation, having the right people and attitude and making agreements on where and when to work and how to communicate.

10.4.3. Information Overload

Information Overload is not a problem, but a perceived challenge for Consultants. The situation is perceived as unlikely to improve, although there are indications that the NetGen might be better able to handle the

challenge. This is however very debatable and it seems only future can tell. Over time, there has been no increase nor decrease in the number of times Information Overload occurs in the situation of Consultants. By contrast, popular belief in literature is that Information Overload has increased over time.

Several new effects and countermeasures were found in this study, summarized in Table 39 below. The information in this table was earlier shown in Table 23 (page 119).

Effects
Miss important information
Lack of concentration because of frequent interruptions
Huge structures of directories inside Inbox
Inability to participate in the community
Loss of power within organization. Those who can handle Information Overload will become the powerful persons in the organization
Many emails in mailboxes
Missed opportunities
Countermeasures
Ask others for information before trying to find it yourself
Disable notifications of new email
Stop searching information at some point and decide on the information available
Communicate clearly and make agreements about communication
Hire an information integrator
Improve infrastructure
Keep professional and private life separated
Only read communication when needed, not when it arrives
Organizations should delete outdated information more vigorously
Provide an alternative for email
Reserve time slots for email reading and only read your email during that time slots
Scan your email messages instead of reading them completely
Structure information hierarchically
Verify information with colleagues

Table 39 Information Overload: Effects and countermeasures not found in consulted literature

10.4.4. Lack of Control over Information

Lack of Control over Information is not a problem, but a challenge for Consultants. Trying to solve Lack of Control over Information by executing strict control over information may hinder a successful execution of New World of Work principles. Over time, the relevance of Lack of Control over Information has increased in the situation of Consultants.

Several new causes, effects and countermeasures were found in this study, summarized in Table 40 below. The information in this table was earlier shown in Table 29 (page 132).

Causes
Amount of information available has increased
Digitalization of information and easiness with which this is stored
A difference in knowledge is used to make money
Classification of data is difficult
Increased ignorance
The rules are not clear
World is becoming more transparent
Effects
Quality of service is lowered
Frustration
Losing competitive advantage
Organizations become confused
Need to change organization's culture
Countermeasures
Investigate, structure/classify and clean up information

Become transparent and stay that way
Make processes clear and clean them up
Add a 'feeling' to your products
Focus on the customer
Communicate more clearly
Make it easier to follow compliancy rules
Keep in touch with stakeholders that request information
Be strict: no errors allowed
Build trust

Table 40 Lack of Control over Information: Causes, effects and countermeasures not found in consulted literature

10.4.5. Lack of Networking Support

Lack of Networking Support is a problem for Consultants, but whether or not this is a problem for an individual is dependent on situation and personality. Over time, the relevance of Lack of Networking Support has increased in the situation of Consultants. Out of Information Overload, Lack of Control over Information and Lack of Networking Support, Lack of Networking Support is the most important phenomenon for the Consultants.

Several new causes, effects and countermeasures were found in this study, summarized in Table 41 below. The information in this table was earlier shown in Table 35Table 23 (page 143).

Causes
Working worldwide
Compensation structures do not fit with current situation
Frequent changes in team membership
Externally oriented organization
Increased use of the Internet for communicating
Pressure
The amount of useless communication
Effects
Organizations become a group of individuals
Nuances in communication will be lost
Communication and collaboration become inefficient
Erroneous decisions
Lack of knowledge
Less opportunities to discuss shared problems
Innovation slows down
Organization's growth is tempered
Organization's image is damaged (problems with transparency influences image)
Quality of service lowered
Countermeasures
Social events for creating social bonding
Define company's values / goals to provide a social basis
Use your network to gather knowledge and expand it
Central meeting place for social contact
Structure knowledge sharing by training and social contact
Buddy system for knowledge gathering
Choose the form of communication carefully
Define a culture of knowledge sharing within organization
Enter meeting early
Well-organized intranet

Table 41 Lack of Networking Support: Causes, effects and countermeasures not found in consulted literature

10.4.6. Tools

Our study has identified tools that support Consultants in communicating with others, listed in the Textbox 20, which is a replication of the information presented in Textbox 17.

- Extranet
- Internet Access Gateway
- Knowledge Network
- Live Meeting
- Office Communicator, including Office Communicator Web Access
- Office Groove
- Office Outlook, including Outlook Web Access
- Office Sharepoint
- Smartphone
- Terminal Services Gateway
- Windows Live Messenger

Textbox 20 List of tools

Our results indicate that Consultants are not familiar with Knowledge Network. In our opinion, this can become problem, as Knowledge Network seems a useful tool in solving at least part of the challenges related to Lack of Networking Support. No difference was found in the usage of tools across various organizational teams. People younger than 37 tend to use instant messaging more often than individuals aged 37 or older.

Office Outlook and the Smartphone are used most frequently, while those tools are also perceived as the most useful and easy to use. In addition, Windows Live Messenger has also received a high score for ease of use. Terminal Services Gateway and Knowledge Networking are used least frequent. Terminal Services Gateway and Office Groove are scoring the lowest on perceived usefulness, while the ease of use of Extranet, Internet Access Gateway, Knowledge Networking, Office Groove, Office Sharepoint and Terminal Services Gateway are perceived as the least easy to use.

Based on the characteristics of the tools and the results of our study, four characteristics for future tools have been developed, viz.:

- ***Integration***. Combining several tasks and uses in one tool.
- ***Dynamic connectivity***. Available features of tools need to be adapted on the quality of connection.
- ***Smart use of resources***. Run services only at a certain moment in time, for example partly based on the user's calendar
- ***Synchronization***. As information gets more mobile, a need for more robust synchronization features arises.

10.5. Practical implications

The investigation of whether or not Information Overload, Lack of Control over Information and Lack of Networking Support showed no abnormal results: opinions were opposite; some respondents experienced

problems, others did not. Despite this, the discussion of causes, effects and countermeasures was interesting, as it brought forward many new, personal and interesting items.

10.5.1. Ask for characteristics, not existence

For management, there is no need to ask questions about the existence of Information Overload, Lack of Control over Information and Lack of Networking Support, as our results show that opinions about whether or not Information Overload, Lack of Control over Information and Lack of Networking Support are problems differ. Management should focus on asking questions about the causes, effects and countermeasures of these three concepts directly as that will bring forward interesting and clear challenges and opportunities.

10.5.2. Not negative, still room for improvement

The opinions about whether or not Information Overload, Lack of Control over Information and Lack of Networking Support were different. This shows that people might not experience these concepts as something negative; indeed, not all respondents agreed that these concepts are a problem. Still, all respondents had suggestions for improvement, which were expressed by thinking about causes, effects of and countermeasures against the challenges. This shows that although the concepts were mostly not considered a problem, respondents had suggestions for improving the situation.

10.5.3. Effects are assumptions

Respondents that did not perceive Information Overload, Lack of Control over Information or Lack of Networking Support as a problem still brought forward possible effects of these problems. Thus, the effects of the three concepts as presented in this study are mostly based on assumptions by individuals not experiencing the problem.

10.5.4. Perceptions lead attitude

The results from our study are all perceptions, not fixed truth. This may seem to make our results less relevant, as it provides no guarantee or indication for the general opinion of Consultants on the subject. In our opinion, the fact that the results from our study are perceptions of existence, causes of, effects of and countermeasures against certain phenomena, makes them very important. A person's perception of a certain item (often) determines the person's attitude toward that item. Thus, when someone perceives a change as not beneficial or even harmful, that person will likely adopt a negative attitude towards the change, possibly leading to a lack of commitment, or frustration of the change process. See section 10.5.8 for an example of this mechanism that is visible in our results.

10.5.5. Tailor-made managerial actions

Our results present several countermeasures against Information Overload, Lack of Control over Information and Lack of Networking Support, that together provide a set of tailor-made future managerial actions for the

managers of the Microsoft Services Consultants. Possibly, these countermeasures could prove valuable for a broader group than the Consultants; it may very well be that these countermeasures are applicable to a larger part of the Microsoft B.V. organization and possibly to Microsoft worldwide. The larger the scale becomes, the less applicable the countermeasures will become, as other factors, such as cultural differences will start to play a role.

Table 42 below shows the Top-5 most important causes, effects of and countermeasures against Information Overload, Lack of Control over Information and Lack of Networking Support. The complete result tables listing all causes, effects and countermeasures that have been identified can be found elsewhere in this document.

Information Overload
Causes
Number of items of information rises
Pressure and distraction
E-mails
Senders screen outgoing information insufficiently
Too many inputs from the environment
Effects
Stress, confusion and cognitive strain
Missed opportunities
Decision accuracy/quality lowered
Inefficient work
Lack of critical evaluation (become too credulous) and superficial analysis
Countermeasures
Training programs to augment information literacy: information processing skills such as file handling, using email, classification of documents, etc.
Raise general quality of information (i.e. its usefulness, conciseness) by defining quality standards
Intelligent information management (prioritization)
Schedule uninterrupted blocks of time for completing critical work
Customization of information
Lack of Control over Information
Causes
Amount of information available has increased
Digitalization of information and the easiness with which this is stored
More demanding stakeholders
Classification of data is difficult
Increased internal / external transparency
Effects
Losing competitive advantage
Loss of image, status and trust
Quality of service is lowered
Frustration
Various negative effects, such as fines
Countermeasures
Information security awareness program
Investigate, structure/classify and clean up information
Make it easier to follow compliancy rules
Keep in touch with stakeholders that request information
Build trust
Lack of Networking Support
Causes
The amount of useless communication
Frequent changes in team membership
Teleworking / working in various locations
Variable office hours
Increased use of the Internet for communicating
Effects
Nuances in communication will be lost
Communication and collaboration become inefficient
Organization's image is damaged (problems with transparency influence image)
Demotivation
Erroneous decisions

Countermeasures
Social events for creating social bonding
Usage of tools
Central meeting place for social contact
Provide team psychological safety
Define a culture of knowledge sharing within organization

Table 42 Top-5 of most important causes, effects and countermeasures

10.5.6. Intensify social events

Respondents frequently mentioned social events as a way of addressing Lack of Networking Support. In our opinion, this has to be interpreted to a more general level: in general, organizations should provide more social events and provide more ways to stay in contact with colleagues. In our opinion, Microsoft B.V. already spends a lot of effort and money on social events, as a way of keeping employees in touch with each other and the company. As such, we think this recommendation is less applicable to Microsoft and more to other organizations. Still, we think this recommendation is an important one, as it came forward often in the discussion.

10.5.7. Provide integrating overview from various sources

When information is not structured, well organized or well presented, it is more difficult for the reader to consume it. Based on several remarks made during the interviews conducted for our empirical study, we recommend structuring and organizing data, as well as rethinking the way it is presented. We realize this is a difficult and very complex task that can even be impossible to complete. A recommendation with less impact which is perhaps easier to perform is to provide integrating overviews from various sources. For example, it is striking that information about customers is not well organized. It is difficult to find information about customers, their locations, contact individuals, previous and current projects and related documents, colleagues who were assigned to that customer. All this information is available somewhere, either via others, on the intranet, but there is a lack of an integrating overview: a central place to go to (for example an intranet site that is available outside the organization) where all information about customers is gathered and can be browsed from various viewpoints. For example, one could start from a financial point of view (for example based on an unpaid bill) to see to which customer it belongs and who in the organization has been working for this customer recently and one what projects. Another problem that could be solved by this integrating overview was mentioned by a respondent; Consultants arriving at the customer for the first time sometimes do not know what has been done before and what colleagues have been assigned to the customer before. A customer can very well refer to a promise that has been made by a colleague and it is possible the Consultant does not know anything about this. These kind of situations can and should be avoided. Partly this can be done by providing an integrating overview of information from various sources.

10.5.8. Clarify choices in New World of Work implementation

As has been discussed in section 9.2.2, some respondents did not perceive the New World of Work as 'new'. In that section we expressed to opinion that the New World of Work may at this moment not seem new for Consultants, as the New World of Work implementation currently underway at Microsoft B.V. is a company-wide implementation where everyone has to be brought to the same level first: Consultants are already at that level. We recommend explaining the reasons behind the choices in the New World of Work implementation to

the Consultants. If indeed the first implementation steps have been chosen to be very basic to bring everyone to the same level and future steps will also provide an interesting challenge to Consultants, then explain that to them, before they lose interest in the New World of Work implementation at a whole. Because, if the latter happens, the New World of Work implementation will be frustrated.

10.6. Theoretical implications

Our empirical study has augmented the findings from literature with several new causes, effects and countermeasures. Table 43 below shows the number of new causes, effects and countermeasures identified in relation to the number of causes, effects and countermeasures already found in literature. It should be noted however, that the situation our study was performed in could be so specific that the new causes, effects and countermeasures will not be generally applicable.

Challenge	Item	Existing literature	Our study	Total
Information Overload	Causes	55	0	55
	Effects	25	7	32
	Countermeasures	55	14	60
Lack of Control over Information	Causes	6	7	13
	Effects	2	5	7
	Countermeasures	3	10	13
Lack of Networking Support	Causes	3	7	10
	Effects	5	10	15
	Countermeasures	2	10	12

Table 43 Number of new and found causes, effects and countermeasures

In addition to identifying new causes, effects and countermeasures, we have expanded the overview of causes and effects of and countermeasures against Information Overload provided by (Eppler, 2004). We have added some new causes, effects and countermeasures and added extra support for the existing items, by adding more references to articles where the items are discussed.

Our empirical study has shown that there was overlap between the causes and effects of and countermeasures against the challenges identified by respondents and those found in literature. We view this as a theoretical implication: we have investigated the challenges in practice and our result shows that the causes, effecs and countermeasures discussed in literature to some extend match with the causes, effects and countermeasures in the situation of Microsoft Services Consultants.

Our empirical study can be seen as a start for investigating Information Workers and their challenges. In our situation, Information Overload, Lack of Control over Information and Lack of Networking Support were the most important challenges, but other studies investigating the challenges of Information Workers may very well identify other challenges and other related causes, effects and countermeasures.

Our qualitative way of working has helped us to give attention to all opinions on the subject that were heard. This, however, resulted in less generalization: it is difficult to generalize our results to all Microsoft Services Consultants or to Microsoft B.V. as a whole.

11. Future research

Our research population consisted of a very specific group of people, namely Consultants annex Information Workers in a large, multinational, IT company. As we have not found any other study investigating this specific group of people, comparison is not possible. Future research could investigate this specific group of people more, for example in a different company or country.

We have presented some factors that influence a New World of Work implementation in a company (see section 9.2.4). Future research could investigate whether these factors are indeed important factors in the successful implementation of the New World of Work and can try to discover other factors.

In addition, the need for clear agreements on how to work, collaborate and communicate that has been identified as a factor for a successful New World of Work implementation calls for an investigation on how to make those agreements, what should be the span of the agreements and what should be their content. In our opinion, the agreements to be made are again dependent on the organization, the employees and the type of work; it seems that there will be no "one-size-fits-all" solution for these agreements, although that is something that could be investigated further.

During interviews and in literature about the New World of Work the NetGen has been mentioned as a generation of employees that is different from every generation before. Moreover, it has been suggested that the NetGen will be better equipped to handle problems as Information Overload than previous generations of employees. Future research should investigate what exactly are the differences of the NetGen compared to other generations of employees, how the NetGen thrives in organizations and whether or not the NetGen indeed appears to be able to handle (future) challenges related to Information Work better.

Generally, our results could be tested with another research population, in another organization, in another setting. Specifically, it could be investigated whether or not the causes, effects of and countermeasures against Information Overload, Lack of Control over Information and Lack of Networking Support can be validated for a larger group of individuals and organizations. In addition, research could investigate whether these three concepts are indeed the most important future challenges or that there are other challenges to be identified.

Apart from changing the research population or the organization, one can also change the point in time (keeping the other factors equal). For example, our study could be repeated in one year. This could identify interesting differences.

The limitations of our study present some possibilities for future research. In our study, we have used a qualitative method and interviewed 15 people. Future research could change methods to quantitative and thus could interview more people, in order to be able to present conclusions relevant and representative for all Microsoft Services Consultants, or other groups.

We view it as important that other studies investigate the challenges of Information Work(ers); one could argue that Information Workers are becoming an important type of employee, and that little is known about what challenges they face. Investigating their challenges in various organizations and situations can be the first step to a better understanding of this type of employee and thus to even better management of this type of employees.

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Appendices

Appendix 1: Causes of Information Overload

The following table lists causes of Information Overload as found by (Eppler, 2004). The original references have been preserved, except if this document also references that article. In that case the original reference has been replaced by the reference used in this document. Also, additional causes of Information Overload, that were not included in the original table, have been added.

Category	Cause of Information Overload	Reference(s) from (Eppler, 2004)	Additional References found
Personal factors	• Limitations in the individual human information processing capacity	Herbig and Kramer, 1994	(Schick, 1990)
	• Decision scope and resulting documentation needs	Kock, 2001	
	• Motivation, attitude, satisfaction	Muller, 1984	
	• Personal traits (experience, skills, ideology, age)	(Owen, 1992); (Hiltz, 1985); Muller, 1984; Schneicer, 1987; (Swain, 2000)	
	• Personal situation (time of the day, noise, temperature, amount of sleep)	(Owen, 1992); (O'Reilly III, 1980)	
	• Senders screen outgoing information insufficiently	Van Zandt, 2001	
	• Users of computer adapt their way of interacting with computers too slowly with respect to the technological development	(Maes, 1994)	
	• Social communication barriers break down	(Schultze, 1998)	
Information characteristics	• Number of items of information rises	Bawden, 2001; Herbig and Kramer, 1994; Jacoby et al., 1974; Jacoby, 1977; (Jacoby, 1984); Malhotra, 1982	
	• Uncertainty of information (info needed vs. info available)	Schneider, 1987; (Tushman, 1978)	
	• Diversity of information and number of alternatives increase	Bawden, 2001; Iselin, 1988; Schroder et al., 1967;	(Malhotra, 1984); (Bawden, 1999); (Ho, 2001)
	• Ambiguity of information	Schneider, 1987; (Sparrow, 1999)	
	• Novelty of information	Schneider, 1987	
	• Complexity of information	Schneider, 1987	(Bawden, 1999)
	• Intensity of information	Schneider, 1987	
	• Dimensions of information increase	Schroder et al., 1967	
	• Information quality, value, half life	Sparrow, 1998; (Sparrow, 1999)	
	• Overabundance of irrelevant information	Ackoff, 1967	(Nelson, 1994)
Task and process parameters	• Tasks are less routine	Tushman and Nadler, 1978	
	• Complexity of tasks and task interdependencies	Tushman and Nadler, 1978	
	• Time pressure	(Schick, 1990)	
	• Task interruptions for complex tasks	(Speier, 1997)	
	• Too many, too detailed standards (in accounting)	(Schick, 1990)	
	• Simultaneous input of information into the process	(Grisé, 2000)	
	• Innovations evolve rapidly – shortened life cycle	Herbig and Kramer, 1994	
	• Interdisciplinary work	Bawden, 2001	
Organizational design	• Collaborative work	Wilson, 1996	
	• Centralization (bottlenecks' or disintermediation (information searching is done by end users rather than by information professionals)	Schneider, 1987	
	• Accumulation of information to demonstrate power	(Edmunds, 2000)	
	• Group heterogeneity	(Grisé, 2000)	
	• New information and communication technologies (e.g. groupware)	Bawden, 2001; (Schultze, 1998); (Speier, 1997)	
Information technology	• Push systems	Bawden, 2001	
	• E-mails	Bawden, 2001	

Category	Cause of Information Overload	Reference(s) from (Eppler, 2004)	Additional References found
	• Intranet, extranet, Internet	Bawden, 2001	
	• Rise in number of television channels	(Edmunds, 2000)	
	• Various distribution channels for the same content	(Edmunds, 2000)	
	• Vast storage capacity of the systems	(Schultze, 1998)	
	• Low duplication costs	(Schultze, 1998)	
	• Speed of access	(Schultze, 1998)	

In addition to the table above several other causes of Information Overload have been found. These findings are shown in the table below. One new category of causes is proposed, the other causes found can be added to categories as established by (Eppler, 2004).

Category	Cause of Information Overload	Reference(s)

Personal factors	• The person
	  • collects the information to show a commitment to rationalism and competence, because they believe that improves decision making;
	  • receives high amounts of unwanted or unrequested information;
	  • uses information to check information they already have;
	  • feels a need to justify their decision, and use information to do this;
	  • collects information, just in case it may prove useful;
	  • wants to play safe and use all information possible;
	  • uses information as a currency – not to get left behind.
		(Edmunds, 2000)

Information characteristics	• Incremental decreases in decision effectiveness due to additional information quantity are greater than the incremental increases in decision effectiveness due to additional information quality	(Hiltz, 1985)
Environment	• Too many inputs from the environment	(Milgram, 1970; Miller, 1956)
	• Inputs follow each other to fast to enable processing	(Milgram, 1970)
	• The quantity of information produced is too high	(Borchers, 1998; Denning, 1982; Nelson, 1994)
	• Failure to create 'high quality' information	(Simpson, 1995)
Task and process parameters	• Pursuing a number of tasks simultaneously, resulting in a tendency to ask for more information than strictly needed	(O'Reilly III, 1980)
	• Pressure and distraction	(O'Reilly III, 1980)
Information technology	• Computers communicate solely by graphical output, straining our visual sense	(Brewster, 1997)
	• Use and misuse of IT	(Bawden, 1999)

Appendix 2: Effects of Information Overload

The following table lists effects of Information Overload as found by (Eppler, 2004). In the table the original references have been preserved, except if this document also references that article. In that case the original reference has been replaced by the reference used in this document. Also, additional effects of Information Overload, that were not included in the original table, have been added.

Category	Effect of Information Overload	Reference(s) from (Eppler, 2004)	Additional References found
Limited information search and retrieval strategies	• Search strategies through information sets become less systematic (this is less true for more experienced searchers)	(Swain, 2000)	
	• Limited search directions	Cook, 1993	
	• Move from compensatory search patterns to noncompensatory search patterns	Cook, 1993	
	• Identification and selection of relevant information becomes increasingly difficult	Jacoby, 1977; Schneider, 1987	
	• Difficulties to reach target groups (sender perspective)	Herbig and Kramer, 1994	
Arbitrary information analysis and organization	• Overlapping and inconsistent information categories	Eppler, 1998	
	• Ignore information and be highly selective (omission)	Bawden, 2001; (Edmunds, 2000); Herbig and Kramer, 1994; (Hiltz, 1985); (Sparrow, 1999)	
	• Loss of control over information	Bawden, 2001; Wurman, 1990	
	• Lack of critical evaluation (become too credulous) and superficial analysis	Shenk, 1997; (Schick, 1990); (Schultze, 1998)	
	• Loss of differentiation	Schneider, 1987	
	• Relationship between details and overall perspective is weakened and peripheral cues get overestimated	(Owen, 1992); Schneider, 1987	
	• Higher time requirements for information handling and time delays	(Jacoby, 1984); (Hiltz, 1985)	
	• Abstraction and necessity to give meaning lead to misinterpretation	(Sparrow, 1999); Walsh, 1995	(Hiltz, 1985)
Suboptimal decisions	• Decision accuracy/quality lowered	Malhotra, 1982; (Jacoby, 1984); (Hwang, 1998)	
	• Decision effectiveness lowered	Schroder et al., 1967	
	• Inefficient work	Bawden, 2001	
	• Potential paralysis and delay of decisions	Bawden, 2001; (Schick, 1990)	
Strenuous personal situation	• Demotivation	Baldacchino et al, 2002	
	• Satisfaction negatively affected	(Jacoby, 1984); Jones, 1997;	
	• Stress, confusion, and cognitive strain	Jones, 1997; Malhotra, 1982; (Schick, 1990)	(Malhotra, 1984)
	• Lack of learning since too little time is at disposition	(Sparrow, 1999)	
	• Greater tolerance of error	(Sparrow, 1999)	
	• Lack of perspective	(Schick, 1990)	
	• Sense of loss of control leads to a breakdown in communication	Schneider, 1987	
	• False sense of security due to uncertainty reduction (overconfidence)	Meyer, 1998; (Jacoby, 1984); (O'Reilly III, 1980)	

In addition to the table above some other effects of Information Overload have been found. These findings are shown in the table below.

Category	Effect of Information Overload	Reference(s)
Strenuous personal situation	• Information anxiety / feelings of inability to cope	(Sparrow, 1999)
	• Ill health	(Stanley, 1997)
	• Desire or need to leave the job	(Stanley, 1997)
	• Feelings of inadequacy of knowledge	(Sparrow, 1999)

Appendix 3: Countermeasures against Information Overload

The following table lists countermeasures against Information Overload as found by (Eppler, 2004). In this table the original references have been preserved, except if this document also references that article. In that case the original reference has been replaced by the reference used in this document. Also, additional countermeasures against Information Overload, that were not included in the original table, have been added.

Category	Countermeasure	Reference(s) from (Eppler, 2004)	Additional References found
Personal factors	• Improve personal time management skills and techniques	Bawden, 2001	
	• Training programs to augment information literacy: information processing skills such as file handling, using email, classification of document, etc..	Bawden, 2001; Jones, 1997; (Schick, 1990); Koniger and Janowitz, 1995	
	• Improve personal information management	(Edmunds, 2000)	
	• Systematic priority setting	(Schick, 1990)	
	• Improve the screening skills for information	Van Zandt, 2001	
Information characteristics	• Raise general quality of information (i.e. its usefulness, conciseness) by defining quality standards	Allert, 2001; (Keller, 1987); Meglio and Keiner, 1990; (Simpson, 1995)	
	• Focus on creating value added information	(Simpson, 1995)	
	• Promulgation of rules for information and communication design (e.g. e mail etiquette)	Bawden, 2001	
	• Compress, aggregate, categorize, and structure information	Ackoff, 1967; (Gris, 2000); (Hiltz, 1985); Iselin, 1988; Koniger and Janowitz, 1995; Scammon, 1977	
	• Visualization, the use of graphs	Chan, 2001; Meyer, 1998	
	• Formalization of language	Galbraith, 1974	
	• Brandnames for information	(Berghel, 1997)	
	• Form must follow function must follow usability	Herbig and Kramer, 1994	
	• Simplify functionalities and design of products	Herbig and Kramer, 1994	
	• Customization of information	Ansari and Mela, 2003; (Berghel, 1997); Meglio and Kleiner, 1990	
	• Intelligent interfaces	Bawden, 2001	
	• Determine various versions of information with various levels of detail and elaborate additional information that serves as summaries	(Denning, 1982)	
	• Organize text with hypertext structures or gophers	(Nelson, 1994)	
	• Interlink various information types (as internal with external information)	Denton, 2001; Meglio and Kleiner, 1990	
Task and process parameters	• Standardize operating procedures	Bawden, 2001; Schneider, 1987; (Schick, 1990)	
	• Define decision modes developed for specific decision processes (e.g., decision rules)	Ackoff, 1967; Chewning and Harrell, 1990	
	• Install an exception reporting system	Ackoff, 1967	
	• Allow more time for task performance	(Schick, 1990)	
	• Schedule uninterrupted blocks of time for completing critical work	Sorohan, 1994	
	• Adequate selection of media for the task	(Schick, 1990)	
	• Handle incoming information at once	Sorohan, 1994	
	• Collaboration with information specialists within the teams	(Edmunds, 2000)	
	• Bring decisions to where information exists when this information is qualitative and ambiguous	Galbraith, 1974	
	• Install process enablers for cognitive support	(Gris, 2000)	
	• Use simpler information processing strategies	(Schick, 1990)	
	• Regulate the rate of information flow	(Gris, 2000)	
	• Search procedures and strategy	Ackoff, 1967; Bawden, 2001; Meyer, 1998; Olsen et al., 1998; Revsine, 1970	
	• Define specific, clear goals for the information in	Baldacchino et al., 2002; Denton,	

Category	Countermeasure	Reference(s) from (Eppler, 2004)	Additional References found
	order to contextualize it and turn it meaningful	2001; Meglio and Kleiner, 1990	
	• Communicate information needs to providers	Meglio and Kleiner, 1990	
	• Provide incentives that are directly related with decisions in order to make decision relevant information be processed more effectively	Tuttle and Burton, 1999	
	• Install a measurement system for information quality	Denlun, 2001	
Organizational design	• Coordination through interlinked units	(Tushman, 1978)	
	• Augment info processing capacity through changes in organizational design	Galbraith, 1974; (Schick, 1990); (Tushman, 1978)	
	• Creation of lateral relationships (integrate roles, create liaisons between roles, teamwork, etc.)	Galbraith, 1974	
	• Coordination by goal setting, hierarchy, and rules depending on frequency of exceptions (uncertainty)	Galbraith, 1974	
	• Creation of self-contained tasks (reduced division of labor, authority structures based on output categories)→ autonomous groups	Galbraith, 1974	
	• Reduce divergence among people (e.g., with regard to expectations) through socialization (e.g., frequent face to face interactions)	Schneider, 1987	
	• Install appropriate measures of performance	Ackoff, 1967	
	• Hire additional employees	(Schick, 1990)	
	• Create slack resources	Galbraith, 1974	
Information technology application	• Intelligent information management (prioritization)	Bawden, 2001; Meyer, 1998; (Schick, 1990)	
	• Install voting structures to make users evaluate the information	(Denning, 1982); (Hiltz, 1985)	
	• Prefer push to pull technologies	(Edmunds, 2000); (Denning, 1982); Friedmann, 1977; Herbig and Kramer, 1994	(Hiltz, 1985)
	• Facilitator support through (e.g.tools	(Grise, 2000)	
	• Decision support systems should reduce a large set of alternatives to a manageable size	Cook, 1993	
	• Use natural language processing systems (search with artificial intelligence)	(Nelson, 1994)	
	• Information quality filters	Ackoff, 1967; Bawden, 2001; (Denning, 1982); (Edmunds, 2000); (Grise, 2000); (Hiltz, 1985); Jones, 1997	
	• Intelligent data selectors (intelligent agents)	(Berghel, 1997); (Edmunds, 2000); (Maes, 1994)	
	• Use systems that offer various information organization options (e.g. filing systems)	(Hiltz, 1985); Sorohan, 1994	

In addition to the table above one other countermeasures against Information Overload has been found; (Brewster, 1997) proposes multimodal interfaces as a solution to Information Overload.

Appendix 4: Interview protocol (Dutch)

Hieronder volgt het interview protocol. Acties die uitgevoerd moeten worden tijdens het afnemen van het interview zijn als volgt aangegeven: [**Beschrijving van actie**]. Notities voor de interviewer staan als volgt aangegeven: *[Notitie]*.

1. Inleiding

- Interview is onderdeel van mijn afstudeeropdracht [**Beschrijf afstudeeropdracht kort**].
- Doel van de interview serie is achterhalen van de mening van Consultants over de problemen van Information Workers
- Tijdens vooronderzoek zijn er drie centrale problemen geïdentificeerd
- In deze interview serie bekijken we de specifieke karakteristieken van deze problemen voor Consultants
- In totaal worden 15 Consultants geïnterviewd
- Opzet van het interview: algemene informatie, New World of Work, Information Overload, Lack of Control over Information, Lack of Networking Support.
- We willen graag uw mening horen.
- De opzet van het interview is een leidraad voor het gesprek, maar we proberen om overal even veel aandacht voor te krijgen.
- Het gehele interview zal worden opgenomen op de laptop, indien u daarmee instemt. De opname begint in dat geval direct na de inleiding.
- Het gehele interview is verder anoniem, eventuele publicatie van delen van het interview zullen op basis van een nickname gedaan worden. [**Stel nickname vast**]
- De transcriptie van het interview zal ik u op verzoek toesturen.

[Start opname]

2. Algemene Informatie

a. Wat is uw functie / rol binnen Microsoft?
b. Hoeveel jaar werkervaring heeft u in deze functie of vergelijkbare functies?
c. In welk jaar bent u geboren?
d. Wat voor vooropleiding(en) heeft u gevolgd?
e. Kunt u in drie minuten uw werk en de situatie waarin u uw werk doet beschrijven?
[balans werk en privé, familie, werklocaties]

3. New World of Work

[Beschrijf New World of Work in het kort, indien nodig]

a. Kunt u de New World of Work beschrijven?
b. Wat is uw mening over de New World of Work?
c. Welke onderdelen van de New World of Work hebben het meeste invloed op u? Voorbeelden?
d. Vindt u de communicatie omtrent de New World of Work voldoende? Waarom?
e. In hoeverre bent u klaar voor de New World of Work?

4. Information Overload (IO)

[Beschrijf Information Overload]

a. Herkent u het fenomeen zoals zojuist beschreven bij uzelf of in uw omgeving?
b. Vindt u Information Overload een probleem? Waarom?
c. Ervaart u zelf Information Overload? Voorbeeld?
d. Wat is uw mening over Information Overload?
e. Kunt u oorzaken van Information Overload beschrijven vanuit uw ervaring?
f. Kunt u deze oorzaken van Information Overload scoren op een vijf-punts schaal, waarbij vijf betekent dat u de oorzaak zeer belangrijk vindt, en één dat u de oorzaak niet zo belangrijk vindt?
g. Ervaart u een toename van Information Overload of voorziet u deze in de New World of Work?
h. Wat zijn volgens u de effecten van Information Overload op individuen en organisaties?
i. Kunt u deze effecten van Information Overload scoren op een vijf-punts schaal, waarbij vijf betekent dat u het effect zeer belangrijk vindt, en één dat u het effect onbelangrijk vindt?
j. Welke oplossingen ziet u voor Information Overload? In hoeverre is hierin al voorzien? Door wie? Waarom?
k. Kunt u deze oplossingen voor Information Overload scoren op een vijf-punts schaal, waarbij vijf betekent dat u de oplossing als zeer geschikt acht, en één dat u de oplossing als ongeschikt acht? Hoe zou de situatie eruit zien in de New World of Work?

5. Lack of Control over Information (LCI)

[Beschrijf Lack of Control over Information]

a. Herkent u het fenomeen zoals zojuist beschreven bij uzelf of in uw omgeving?
b. Vindt u Lack of Control over Information een probleem? Waarom?
c. Ervaart u Lack of Control over Information zelf? Voorbeeld?
d. Wat is uw mening over Lack of Control over Information?
e. Kunt u oorzaken van Lack of Control over Information beschrijven vanuit uw ervaring?
f. Kunt u deze oorzaken van Lack of Control over Information scoren op een vijf-punts schaal, waarbij vijf betekent dat u de oorzaak zeer belangrijk vindt, en één dat u de oorzaak niet zo belangrijk vindt?
g. Ervaart u een toename van Lack of Control over Information of voorziet u deze in de New World of Work?
h. Wat zijn volgens u de effecten van Lack of Control over Information op individuen en organisaties? Voorbeelden?
i. Kunt u deze effecten van Lack of Control over Information scoren op een vijf-punts schaal, waarbij vijf betekent dat u het effect zeer belangrijk vindt, en één dat u het effect onbelangrijk vindt?
j. Welke oplossingen ziet u voor Lack of Control over Information? In hoeverre is hierin al voorzien? Door wie? Waarom?
k. Kunt u deze oplossingen voor Lack of Control over Information scoren op een vijf-punts schaal, waarbij vijf betekent dat u de oplossing als zeer geschikt acht, en één dat u de oplossing als ongeschikt acht?
l. Hoe zou de situatie eruit zien in de New World of Work?

6. Lack of Networking Support

[Beschrijf Lack of Networking Support]

a. Herkent u het fenomeen zoals zojuist beschreven bij uzelf of in uw omgeving?
b. Vindt u Lack of Networking Support een probleem? Waarom?
c. Ervaart u Lack of Networking Support zelf? Voorbeeld?
d. Wat is uw mening over Lack of Networking Support?

e. Kunt u oorzaken van Lack of Networking Support beschrijven vanuit uw ervaring?
f. Kunt u deze oorzaken van Lack of Control over Information scoren op een vijf-punts schaal, waarbij vijf betekent dat u de oorzaak zeer belangrijk vindt, en één dat u de oorzaak niet zo belangrijk vindt?
g. Ervaart u een toename van Lack of Networking Support of voorziet u deze in de New World of Work?
h. Wat zijn volgens u de effecten van Lack of Networking Support op individuen en organisaties? Voorbeelden?
i. Kunt u deze effecten van Lack of Networking Support scoren op een vijf-punts schaal, waarbij vijf betekent dat u het effect zeer belangrijk vindt, en één dat u het effect onbelangrijk vindt?
j. Welke oplossingen ziet u voor Lack of Networking Support? In hoeverre is hierin al voorzien? Door wie? Waarom?
   [Reik lijstje met tools uit, zie appendix 7]
   i. Kunt u van deze tools aangeven of en waarvoor u ze gebruikt en in welke mate? Waarom?
   ii. Kunt u van deze tools aangeven in hoeverre u ze nuttig vindt? Waarom?
   iii. Kunt u van deze tools aangeven in hoeverre u ze ervaart als gemakkelijk in gebruik? Waarom?
k. Hoe zou de situatie eruit zien in de New World of Work?

7. Welke van de drie fenomenen die besproken zijn vind u het meest belangrijk? Waarom is dit fenomeen het meest belangrijk?

[Stop opname]

8. Afsluiting

a. Dank u wel.
b. Mocht u nog verdere opmerkingen hebben of vragen kunt u altijd contact met me opnemen.
c. Wilt u de transcriptie van het interview inzien?
d. Wilt u verder op de hoogte gehouden worden van de voortgang van het onderzoek?

Appendix 5: Interview protocol (English)

The following is the interview protocol as used in the interviews. Actions that had to be done during the interview are indicated as follows: **[Description of action]**. Notes for the interviewer are indicated as: *[Note]*.

1. Introduction

- The interview is conducted as part of my final project. **[Give brief description of final project].**
- The goal of the interview series is to investigate the opinion of Consultants on the possible problems of Information Workers, as identified within this study so far.
- During this study, three central possible problems were identified.
- In this interview series we investigate the specific characteristics of these problems for Consultants.
- In total, fifteen Consultants will be interviewed.
- The structure of this interview is as follows: general information, New World of Work, Information Overload, Lack of Control over Information and Lack of Networking Support.
- It is important to note that we are looking for your opinion on the subject.
- The structure of this interview will serve as a guidance, as we strive to give every subject the same attention.
- If you agree, the complete interview will be record on the laptop. The recording will start directly after this introduction.
- The rest of the interview will be conducted and handled anonymously. Possible publication of parts of the interview will be done based on a nickname. **[Choose a nickname]**
- The transcriptions of the interview will be sent to you on request.

[Start recording]

2. General information

a. What is your function / role within Microsoft?
b. How many years of experience do you have in this function or comparable functions?
c. In which year were you born?
d. What is your educational background?
e. Please describe your work and the situation in which you do your work.
[balance between work and private life, family, working locations]

3. New World of Work

[Briefly describe the New World of Work, if needed]

a. Please describe the New World of Work
b. What is your opinion about the New World of Work?
c. What parts of the New World of Work will have the most impact on you? Examples?
d. What is your opinion about the communication about the New World of Work? Is it enough for you? Why?
e. To what extent are you ready for the New World of Work?

4. Information Overload (IO)

[Describe Information Overload]

a. Do you recognize the phenomenon just described in your own situation or your environment?

b. Do you consider Information Overload to be a problem? Why?
c. Do you experience Information Overload? Example?
d. What is your opinion about Information Overload?
e. Please describe causes of Information Overload from your experience.
f. Please rank these causes of Information Overload based on relevance.
g. Do you experience an increase of Information Overload or do you foresee an increase in the New World of Work?
h. Please describe effects of Information Overload on individuals and organizations.
i. Please rank these effects of Information Overload based on relevance.
j. Please describe solutions for Information Overload. To what extent have these solutions already been implemented? By whom? Why?
k. Please rank these solutions to Information Overload based on relevance.
l. Please describe what this situation will look like in the New World of Work.

5. Lack of Control over Information (LCI)

[Describe Lack of Control over Information]

a. Do you recognize the phenomenon just described in your own situation or your environment?
b. Do you consider Information Overload to be a problem? Why?
c. Do you experience Information Overload? Example?
d. What is your opinion about Information Overload?
e. Please describe causes of Information Overload from your experience.
f. Please rank these causes of Information Overload based on relevance.
g. Do you experience an increase of Information Overload or do you foresee an increase in the New World of Work?
h. Please describe effects of Information Overload on individuals and organizations.
i. Please rank these effects of Information Overload based on relevance.
j. Please describe solutions for Information Overload. To what extent have these solutions already been implemented? By whom? Why?
k. Please rank these solutions to Information Overload based on relevance.
l. Please describe what this situation will look like in the New World of Work.

6. Lack of Networking Support

[Describe Lack of Networking Support]

a. Do you recognize the phenomenon just described in your own situation or your environment?
b. Do you consider Information Overload to be a problem? Why?
c. Do you experience Information Overload? Example?
d. What is your opinion about Information Overload?
e. Please describe causes of Information Overload from your experience.
f. Please rank these causes of Information Overload based on relevance.
g. Do you experience an increase of Information Overload or do you foresee an increase in the New World of Work?
h. Please describe effects of Information Overload on individuals and organizations.
i. Please rank these effects of Information Overload based on relevance.
j. Please describe solutions for Information Overload. To what extent have these solutions already been implemented? By whom? Why?
l. **[Hand out list of tools, see appendix 7]**

i. Please indicate for each tool if and wherefore you use the tool and to what extent. Why?
ii. Please indicate to what extent you find these tools useful. Why?
iii. Please indicate to what extent you find these tools easy to use. Why?

m. Please describe this situation in the New World of Work.

7. Of the three phenomenons discussed, which one is the most important to you? Why?

[Stop recording]

8. Wrapping up

e. Thank you very much.
f. If you have any further questions or remarks, please do not hesitate to contact me.
g. Would you like to receive the transcription of this interview?
h. Would you like to be kept informed about the progress of this study?

Appendix 6: List of tools as used in interviews

Below a short questionnaire about tools is shown, as used in the interviews. Interviewees were asked to indicate whether or not they are familiar with the tool or its name. If they were familiar, they were asked to give a score on a scale (one to five) in the dimensions (volume of) use, usefulness and ease of use.

Tool	Not familiar	(Volume of) Use					Usefulness					Ease of use				
		1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Extranet	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Internet Access Gateway	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Knowledge Network	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Live Meeting	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Office Communicator, including Office Communicator Web Access	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Office Groove	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Office Outlook, including Outlook Web Access	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Office Sharepoint	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Smartphone	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Terminal Services Gateway	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Windows Live Messenger	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

Appendix 7: Interview results

Part	Question	Interviewee: Newbie	Motornut	Arjan	Willem	Ruud	Mister M	Henk	Kees	Sonja	Dave	Peter	Sjaak	Albert	Lorenzo	Paul
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Part	Question	Interviewee													
		Newble	Motormuls	Arjen	Willem	Ruud	Mister M	Henk	Kees	Sonja	Dave	Peter	Sjaak	Albert	Lorenzo	Paul
New World of Work																
	Description New World of Work															

Part	Question	Interviewee														
		Newbie	Motormuis	Arjen	Willem	Ruud	Mister M	Henk	Kees	Sonja	Dave	Peter	Sjaak	Albert	Lorenzo	Paul
New World of Work																
	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]			[illegible]			
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	Yes	[illegible]	Yes	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	

Part	Question	Interviewee														
		Newble	Motormuis	Arjen	Willem	Ruud	Mister M	Henk	Kees	Sonja	Dave	Peter	Sjaak	Albert	Lorenzo	Paul
Information Overload																
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	

Part	Question	Interviewee														
		Neuble	Motormuis	Arjen	Willem	Ruud	Mister M	Henk	Kees	Sonja	Dave	Peter	Sjaak	Albert	Lorenzo	Paul
Information Overload																

Part	Question	Neville	Mohammad	Arjen	Willem	Ruud	Mister M	Henk	Kees	Sonja	Dave	Peter	Sjaak	Albert	Lorenzo	Paul
Information Overload	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
	[illegible]	[illegible]						[illegible]	[illegible]	[illegible]			[illegible]			

Part	Question	Interviewee: Newbie	Motormuis	Arjen	Willem	Ruud	Mister M	Henk	Kees	Sonja	Dave	Peter	Sjaak	Albert	Lorenzo	Paul
Lack of Control Over Information	[illegible]	Yes [illegible]	Yes	Yes [illegible] requested, but [illegible] working.	Yes	Yes but [illegible]	Yes [illegible] subject.	Yes	No, not [illegible] systems.	Yes [illegible]	Yes	Yes	Yes	No, not really [illegible]	Sometimes I [illegible] information, [illegible]	
	[illegible]	Yes [illegible]	No [illegible] challenge [illegible]	A [illegible]	Yes [illegible]	No [illegible]	No [illegible] our job.	Yes [illegible]	No, there [illegible] enough [illegible]		No [illegible]	It [illegible] problem. [illegible]	No [illegible]	No	No.	

Part	Question	Interviewee: Newbie	Motormuis	Arjen	Willem	Ruud	Mieke M	Henk	Kees	Sonja	Dave	Peter	Sjaak	Albert	Lorenzo	Paul
Lack of Control Over Information	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
			[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	
	[illegible]															
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	

Part	Question	Interviewee														
		Newbie	Mahmut	Arjan	Willem	Ruud	Mister V	Henk	Kees	Sonja	Dave	Peter	Sjaak	Albert	Lorenzo	Paul
[illegible]																
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]		[illegible]	[illegible]			[illegible]			[illegible]	

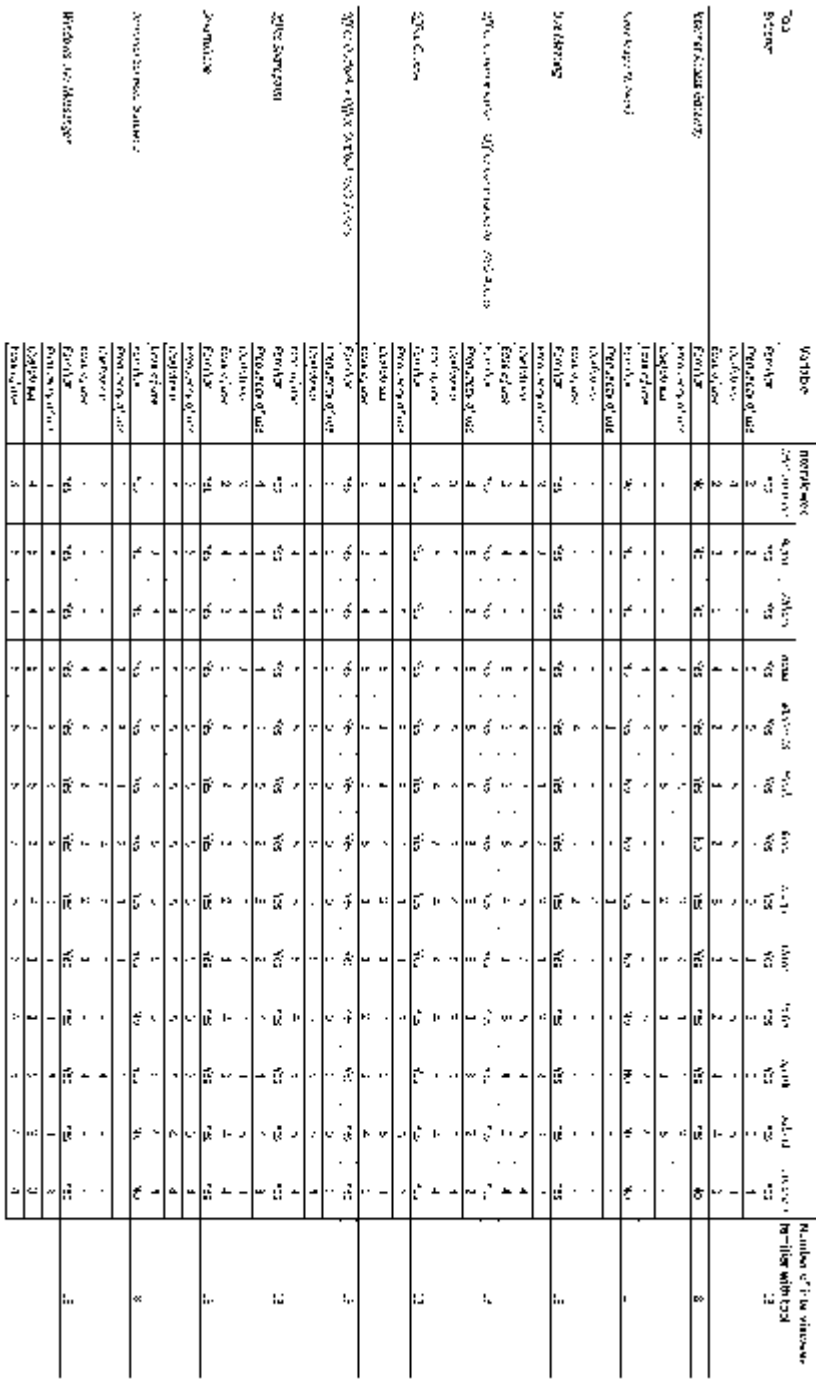
Part	Question	Interviewee														
		Newbie	Mccormick	Arjen	Willem	Ruud	Mitchell	Henk	Kees	Sonja	Dave	Peter	Sjaak	Albert	Lorenzo	Paul
[illegible]																
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
	[illegible]	[illegible]	[illegible]			[illegible]						[illegible]	[illegible]	[illegible]	[illegible]	

Part	Question	Interviewee														
		Vaubie	Mosermuis	Arjen	Willem	Ruud	Mirjam M	Henk	Kees	Sonja	Dave	Peter	Sjaak	Albert	Lorenzo	Paul
[illegible]							[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			[illegible]	[illegible]	
	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
	[illegible]		[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	

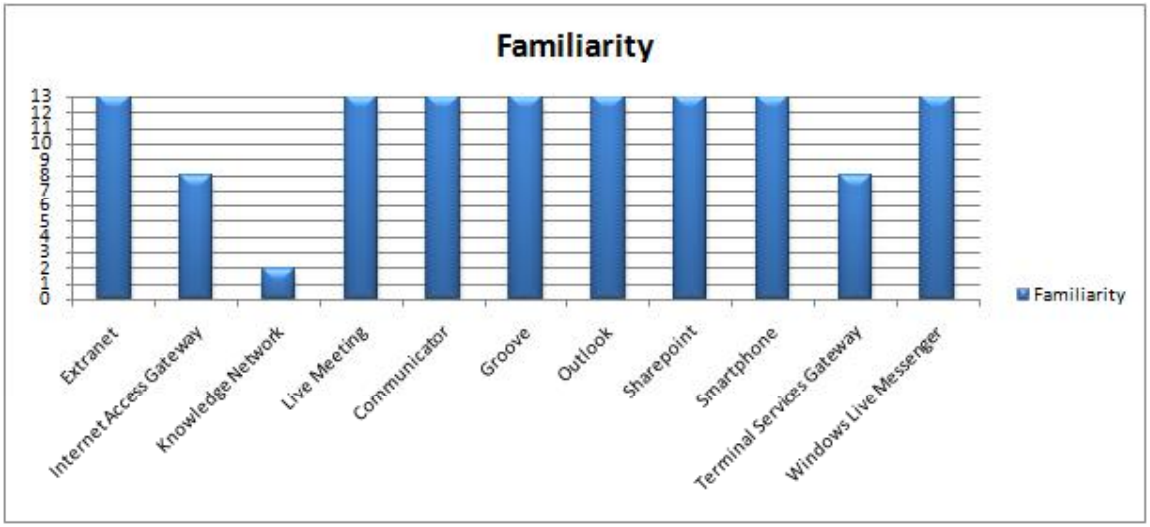
Part	Question	Interviewee													
		Newbie	Motormuis	Arjen	Willem	Ruud	Mister M	Henk	Kees	Sonja	Dave	Peter	Sjaak	Albert	Lorenzo	Paul
Lack of Networking Support	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
	[illegible]			[illegible]				[illegible]	[illegible]			[illegible]				

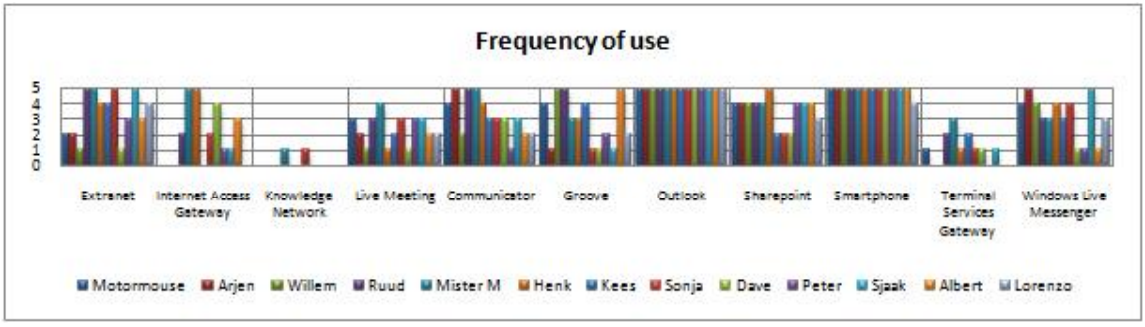
Part	Question	Interviewee Newble	Motormuis	Arjen	Willem	Ruud	Mister M	Henk	Kees	Sonja	Dave	Peter	Sjaak	Albert	Lorenzo	Paul
Wrapping up																
	[illegible] phenomena [illegible] discussed?	Social Lack of Networking Support is the biggest challenge	Lack of Networking Support, because of the social aspects.	Lack of Networking Support provides the bigger challenge	Lack of Networking Support	Information Overload and Lack of Networking Support are equally important.	Lack of Networking Support is the most important, [illegible] Information Overload [illegible] information. We can get the most from Information Overload [illegible]	Lack of Networking Support provides the [illegible]	Lack of Networking Support	[illegible]	Information Overload is the biggest problem. Lack of Networking Support is something [illegible] Information is not a problem for me.	Lack of Networking Support, because our organization is growing fast	All three problems have a clear 'human' component. Lack of Networking Support is the biggest issue in organizations. The power is inside the people, not inside tools.	Information Overload is the biggest challenge for me, every day I am working [illegible]	Information Overload because you [illegible] information [illegible]	

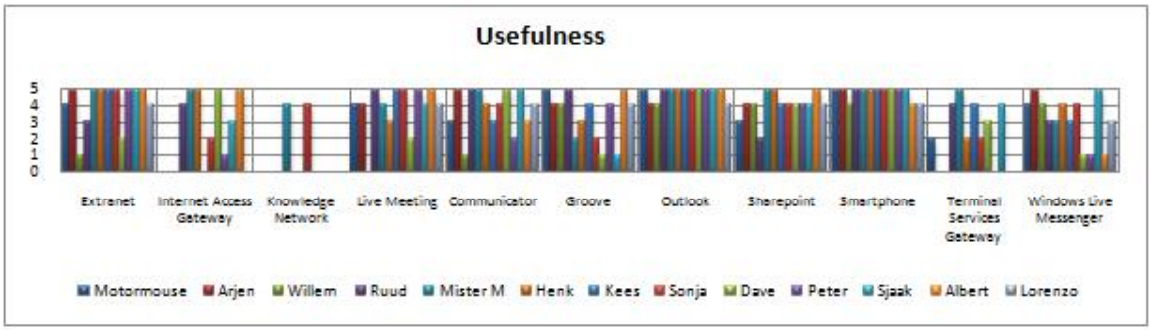
Appendix 8: Results of questionnaire about tools

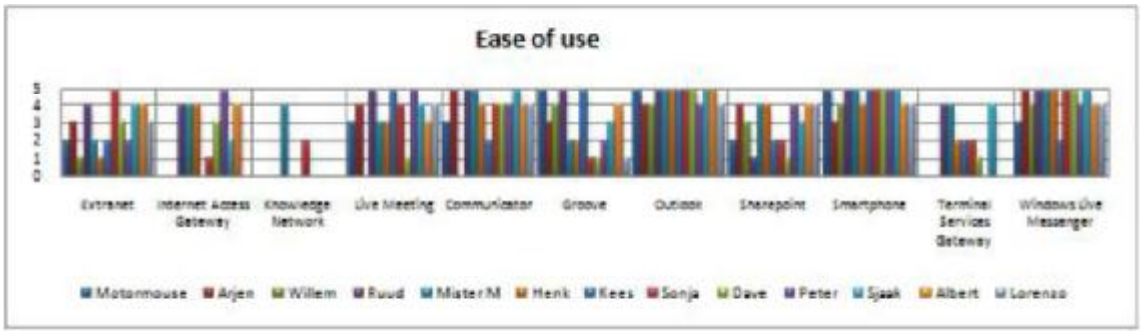


Appendix 9: Charts of results of questionnaire about tools

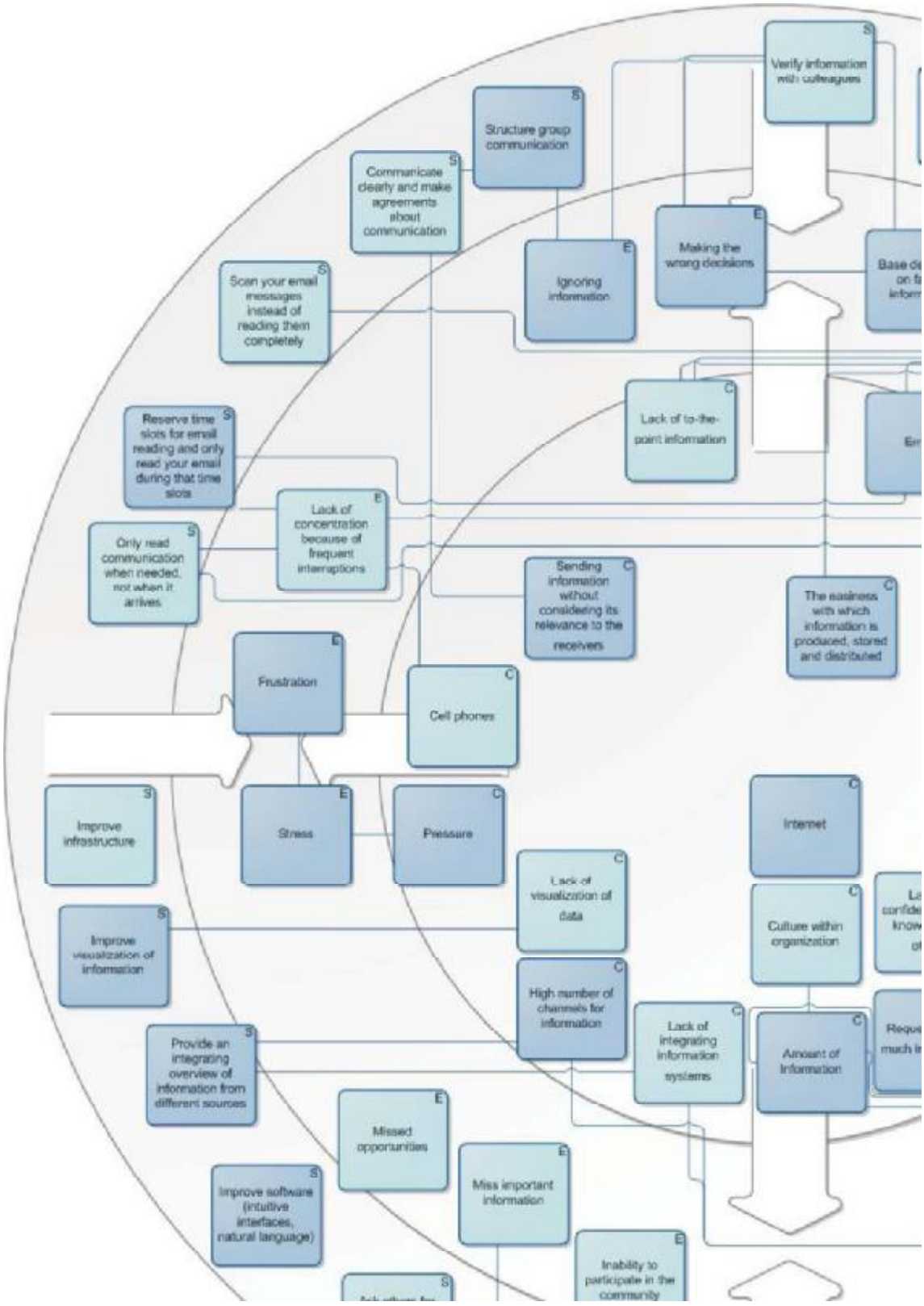


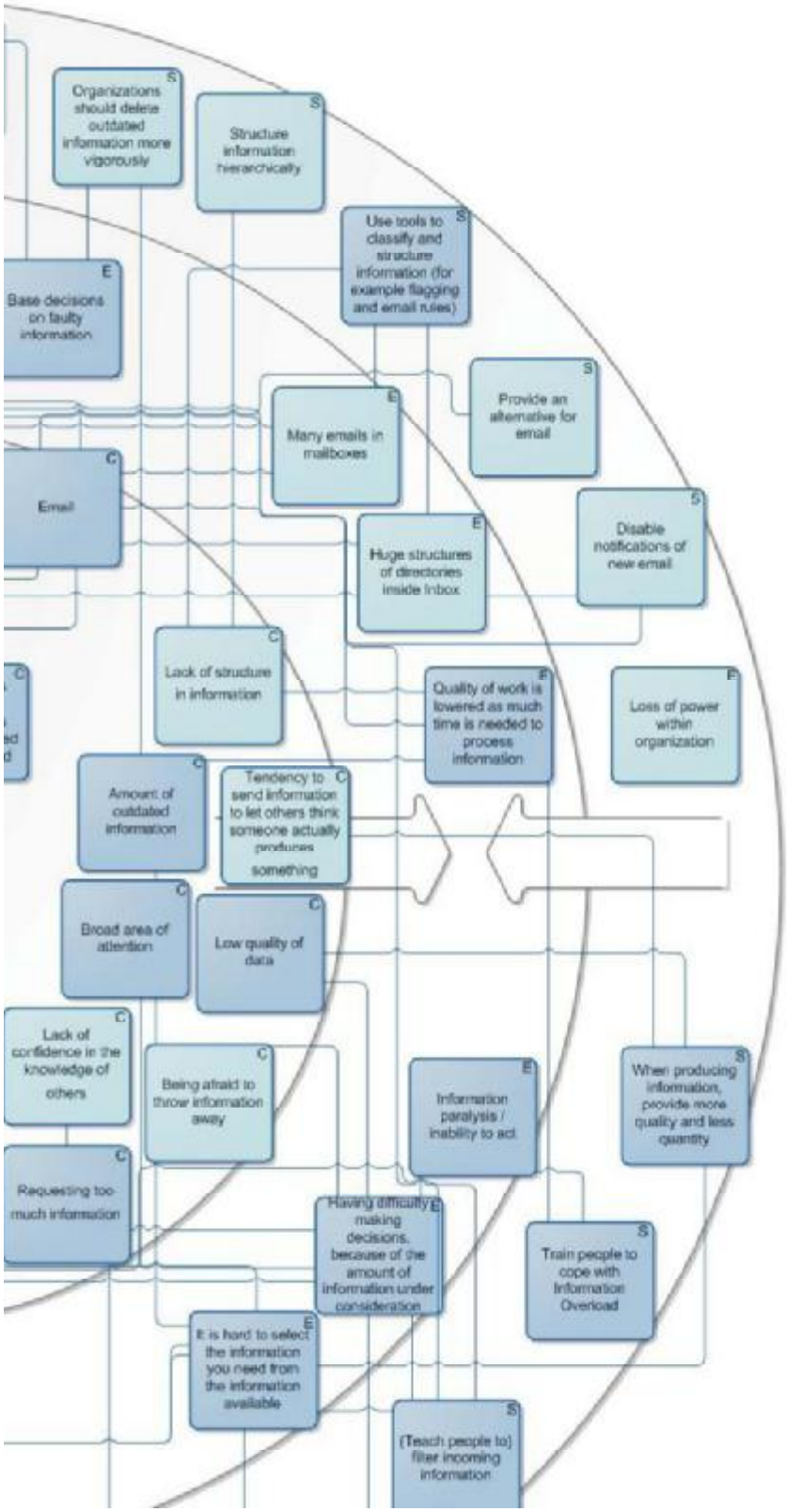


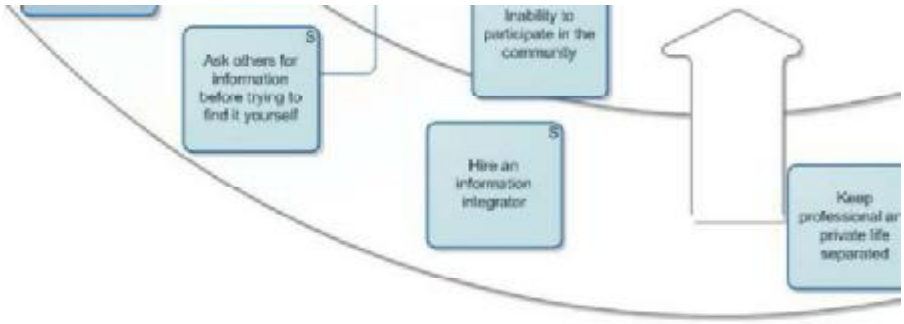


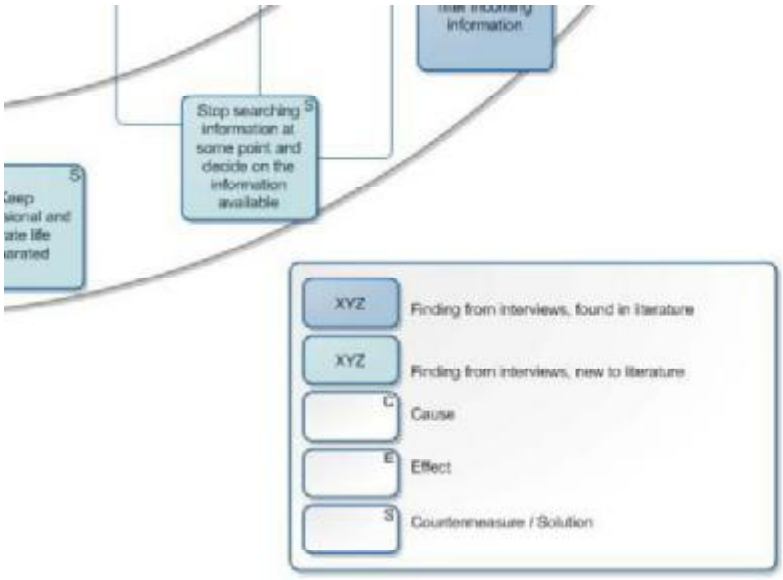


Appendix 10: Cognitive map of Information Overload (large)




Organizations should delete outdated information more vigorously
Structure information hierarchically
Use tools to classify and structure information (for example flagging and email rules)
Base decisions on faulty information
Provide an alternative for email
Many emails in mailboxes
Email
Disable notifications of new email
Huge structures of directories inside Inbox
Lack of structure in information
Quality of work is lowered as much time is needed to process information
Loss of power within organization
Amount of outdated information
Tendency to send information to let others think someone actually produces something
Broad area of attention
Low quality of data
Lack of confidence in the knowledge of others
Being afraid to throw information away
Information paralysis / inability to act
When producing information, provide more quality and less quantity
Requesting too much information
Having difficulty making decisions, because of the amount of information under consideration
Train people to cope with Information Overload
It is hard to select the information you need from the information available
(Teach people to) filter incoming information


Inability to participate in the community
Ask others for information before trying to find it yourself
S
Hire an information integrator
S
Keep professional ar private life separated


information
Stop searching information at some point and decide on the information available
XYZ
Finding from interviews, found in literature
XYZ
Finding from interviews, new to literature
C
Cause
E
Effect
S
Countermeasure / Solution