

A flash foresight into the future

ICT integrated organizational learning and knowledge sharing

30-05-2012

Annette Dalsgaard Vilain, studienr. 20104932,

Jacob Bergmann Theilgaard, studienr. 20101815

Vejleder: Lars Birch Andreasen

Omfang og anslag: 78 sider og 182.053 (76 norm sider)

Masterprojekt MIL 2012

4. semester



Copenhagen
Business School
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Master i IKT
og Læring

Title page

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Supervisor:

Lars Birch Andreasen



Universitet (Aalborg Universitet i samarbejde med Aarhus Universitet, Copenhagen Business School, Danmarks Universitetsskole, Roskilde Universitet - under IT-Vest-samarbejdet)

Abstract

The aim of the thesis is to try to make a flash foresight into the future in relation to ICT integrated organizational learning and knowledge sharing. In a literature study change drivers are localized from the megatrends in learning and working, knowledge managing and organizing from the perspective of the ICT connected reality of web 2.0. A number of scenarios with hypothesis are established about the future in regard to how we create, distribute, share, apply and organize knowledge and skills through ICT, and how this will affect the way we organize and lead knowledge based work the future of work. These scenarios and hypothesis are empirically explored in qualitative interviews with selected key informants internationally as scientists in relation to ICT and learning in cooperation and learning in organizations, and Humane Resource directors or managers in relation learning and development in organizations in large enterprises. The scenarios and hypothesis is presented to the informants and they are asked to reflect and comment on them. On the following analyse and discussions of the findings the theses pose a number of concluding statements about the nature of working, learning, knowledge sharing and organizations that would promote a learning and innovative learning environment.

Content

Abstract.....	2
The virtual master project.....	5
Prologue: Idea and intention.....	6
The emergence of ICT in organizations as innovation capabilities.....	6
The art of collaborative innovation - the creation of collaborative knowledge.....	8
Future trajectories	9
Problem formulation	10
Concept clarification	10
Structure of the thesis.....	10
The method in the thesis	11
Approach to philosophy of science and learning	11
Futures Studies	11
Futures studies methodology in the thesis	13
Literature studies	13
Qualitative interview method.....	14
Analytical approaches	16
Localizing change drivers	18
Work as learning.....	18
The socio psychological process of learning and innovation.....	18
Learning and innovation in organizations	21
Learning in distributed communities of practice and learning in networks.....	23
Summary and focusing on change drivers.....	26
Knowledge flow in organizations.....	27
Organizations as knowledge systems.....	27
The formal knowledge flow – knowledge management system	28
Knowledge ecology	29
Summary and focusing on change drivers.....	31
Knowledge ecological organizations.....	32
Interaction and communication	32
Collaborative structures	32
Interactivity.....	33
Culture	34

The knowledge based organization	35
Designing the emergent flexible knowledge based organization.....	36
Summary and focusing on the change drivers.....	40
Case example: The Virtual International Day of the Midwife 5 th May 2012	41
Exploration of the future trajectories and trends through key informant interviews	42
The set up for the qualitative key informant interviews	42
The performance of the qualitative key informant interviews	43
Qualitative Interviews Analyses.....	45
Learning is created through connections – interactivity and collectivity leads to networked learning .	45
Knowledge flow transcends the organizational context and operates in knowledge ecology, associated with new ways of learning and innovating.....	47
Knowledge organizations focus on learning and innovation by a strong focus on openness to its knowledge ecology.....	50
Reflections on and discussion of the method of the thesis	52
Futures studies	52
Literature study	53
Key informant interviews.....	53
Discussion.....	54
What are the impacts of new ways of learning on the future of work?	55
What are the impacts of the growing and accelerated knowledge ecology on the organizations?	56
What are the impacts of these two aspects on knowledge based organization?	58
Conclusion	59
References.....	61
Annex list.....	67
Annex 1: Links to the video recordings of The Key Informant Interviews	68
Annex 2: The power point slides used in the interviews	69
Annex 3: Interviews	73

The virtual master project

The working process in relation to the thesis has been collaborative by using different ICT tools without any face-to-face meetings. Skype and Adobe Connect have been used for synchronous online chats and discussions in speak, audio and video between us about our understanding of the theory and analyses of the empirical material. We have used tools for file sharing and collaboration as Google docs and Dropbox. Adobe Connect has been used for making qualitative interviews. The share point system Microsoft Office 365 has been used for sharing documents for the thesis and for writing the thesis together collaboratively in a shared Word document with the possibility of writing together synchronously.

The master project in itself has been a virtual collaboration, representing the networked temporary organization, gathered through purpose and meaning.

Prologue: Idea and intention

The emergence of ICT in organizations as innovation capabilities

Knowledge" ... has become **the** resource, rather than **a** resource... .." (Drucker, 1993:45, emphasis added), which means that knowledge will be the primary resource and knowledge workers, will be the lead social group. This has implications for both the development of the society and the way you handle knowledge and knowledge sharing.

Castells gives in 1996 a numbers of trajectories into the future. In his 2010 preface to the book he writes: "In sum, the occupational structures of our societies have indeed been transformed by new technologies." (Castells, 2010: xxiv).

The development of the working structure has gone through some radical shifts during the last 100 years. Castells points out two major shifts, as posed by other researchers. First is the shift from agriculture to industry (1920-1970), and second is the shift from industry to services (1970-1995). Both shifts show a major change in how we produce, and following that the impact on how we structure society. He agrees on the definitions of the shifts, but criticizes them for failing on three accounts (Castells, 2010):

1. The shifts assumes there is a homogeneity between the different shifts, which in essence falls short, due to ambiguity and diversity in the activities labelled as 'services'.
2. It does not stress the truly revolutionary nature of the new technologies as information and communication technologies (ICT), which allows a fast and direct response between activities involved in a value chain. This creates a close structural connection between all aspects of the organization.
3. The shift does not include the perspective of the interdependent global economy and its effect on the diverse cultural, historical and institutional trajectories. The shift to the socio-technical paradigm of informational production creates a big diversity of employment and occupational structures.

The massive diffusion of ICT in the 1990ies caused a lot of radical changes to the work structure and work processes. Several factors contributed to these changes: 1. Distribution and access to ICT: computers getting integrated, network development, the Internet and its applications, and its cost getting cheaper and more accessible. 2. Increased global completion, through more networking and more integrated communication lines. 3. Organizations evolved due to implementing and wanting to benefit fully from new ICT (ibid.).

Technology was per se not the cause of the changes to organization, production and work structure and the impact of technology can only be understood in a complex interaction with a social system. One of the major impacts on the social system was the changes in the work situation. The effect on the integrating advanced technology triggered a need for the educated worker for being able to program and decide the entire sequences of work. Former ways of production, like the Taylor assembly line, faded to be replaced by other types of work. Basically work, which can be encoded in a programmable sequence, gave into work that required analyses, decision and reprogramming in real time. Castells argues that the informational work processes is determined by the characteristics of the informational production process and the

informational production process calls for better informed workers with greater degree of freedom to deliver fully on their and the production process' potential (ibid.).

Castells make a summary of trends which he believes to characterise the future of labour and organization:

1. Value added is mainly generated by innovation¹ in processes and products
2. Innovation is dependent on research potential and specifications potential, which is generating new knowledge and applying it.
3. Task execution is more efficient, when organizations reserve the human potential to adaption and feedback processes in the production.
4. Organizational production is prone to internal adaptability and external flexibility, illustrated by the agile organization, which is able to balance flexible decision making and organizational integration.
5. ICT is the **critical** component because it addresses all the above:
 - a. It determines innovation capability
 - b. It enhances the corrections of errors and feedback loops and the execution level
 - c. It creates and provides the infrastructure for flexibility and adaptability throughout the organization.

The emergence of the informational paradigm in production processes, represents a new way of perceiving, dividing and structuring work, the first being the way production add value, second being how the organizations connects to its environment and the third to the relationship between management and worker (ibid.).

Castells points out some of the societal trends and how the emergence and integration of ICT can vast effects on how we work and produce. Many of his predictions are valid and are present today. His work was written in a time, where the Internet primarily was a source of information known as web 1.0, and one of the things he does not predict and explore is the emergence of the web 2.0, the whole integration of interactivity and social networks in work and organizations.

Central to Castells' argument is *innovation as the primary value* creator in both products and processes. This marks a 'game changing' shift in our understanding of work processes and products with a profound effect on all levels. Castells defines innovation as dependent on research potential and specification capability, that is to discover new knowledge and applied to specific purposes in a social/organizational context (Castells, 2010). Innovation is a concept that has been explored and developed further in the last decades and innovation can define in many ways². Darsø uses Schumpeter's³ widely used definition on innovation: "an innovation, that brings economic value" (Schumpeter in Darsø, 2011:25), but implicit in his definition is the assumption of an innovation chain: new, useful and implemented. According to Darsø innovation can be both incremental defined as improving processes, products and methods, and radical defined as new surprising approaches, connections or compositions (Darsø, 2011).

¹ Castells equates innovation and learning. We know that there is an ongoing debate among others if it is possible to make this equation. In this thesis we recognize the equal sign as Castells puts between learning and innovation and take it in as a premise in the thesis.

² If you google innovation you get approx. 410 million hits.

³ Schumpeter, J.A. (1934): The Theory of Economic Development. Cambridge, M.A: Harvard University Press

This contributes with ways of defining and understanding innovation, but it does not give a deeper understanding of the socio psychological processes behind innovation. If innovation can involve both incremental processes and radical processes, the innovative process can be based on both improving the existing, and connecting and combining the existing in new and novel ways, this resembles learning. Organizational learning can be defined as “the intentional use of learning processes at the individual, group and system level to continuously transform the organization...” (Dixon, 1999:6), i.e. to adapt to environment, to learn from mistakes and innovate new knowledge. Studies have indicated that the presence of organizational learning processes strongly influences innovation performance and incorporating new knowledge and using it leads to more innovation (Therin, 2003).

Innovation is according to Nonaka the main approach to knowledge creation. Innovation is his perspective the process, whereby an organization creates and defines its challenges and then actively develops new knowledge to solve them (Nonaka, 1994), and it may be considered as Nonakas understanding of the development of organizational knowledge and learning.

The art of collaborative innovation - the creation of collaborative knowledge

The distribution of the Internet has accelerated the distribution of information and knowledge in a pace not seen before. In comparison it took the radio 38 years to reach 50 mill listeners, the Television to 13 years 50 million viewers. The Internet reached 50 million users in 4 years and Facebook reached 100 million users in 9 months (Bøtter, 2010). In the same way Gutenberg's invention of the printing press did create a mean of mass communication and triggered a scientific revolution and democratization of knowledge, has the Internet created the same type of knowledge revolution. Common for both is the rapidity and low cost of production pr. unit of information and a new way of circulating ideas, given many fast instant free access to lots of information and sharing their own.

The structure of the Internet has gone through some phases, which describe the conceptual changes of the Internet. The web 1.0 was the introduction of the World Wide Web around 1994 and it is based on a top-down approach to knowledge and information sharing, where the users are ‘readers’ and the Internet is used as a big encyclopaedia. In 1999 the concept of web 2.0 began, gaining momentum in 2004 (O’Reilly, 2005). The big change was the emergence of facilitated participatory information sharing, interoperability, user-centred design, and collaboration on the World Wide Web, signalling the birth of the prosumer, the merging of producer and consumer.

In the new preface of the book Castells highlights the game changing nature of the emergence of the social interactive media as network creating and supporting:

“The shift from traditional mass media to a system of horizontal communication networks organized around the Internet and wireless communication has introduced a multiplicity of communication patterns, at the source of a fundamental cultural transformation, as virtuality becomes an essential dimension of our reality.”(Castell, 2010:xviii)

The emergence of the web 2.0 has created a major shift in the way information and knowledge is accessed and shared. Tapscott tries to describe the effect of the web 2.0 and points out 5 basic principles of the age of the networked intelligence (Tapscott, 2010):

1. *Collaboration*. The web 2.0 fosters collaboration in a flat and networked way, crossing traditional hierarchical structures and hence promoting a networked information structure.
2. *Openness*. As information flows more free - "Information want to be free"⁴ - openness and transparency grows, and everyone can gain access to most information without informational 'gatekeepers'.
3. *Sharing*. With a free and open flow of information, sharing becomes natural to gain access to the cognitive surplus of online collaboration.
4. *Integrity*. With transparency, openness and sharing, you gain 'followership' through you values and being honest, considerate and accountable.
5. *Interdependence*. As we get more connected through flows of information, our global interdependence is growing.

Shirky describes in relation to the web 2.0 the concept cognitive surplus which means the ability of the World's population to volunteer, and contribute and collaborate on large and sometimes global projects. The cognitive surplus is made of two things 1. the World's 'free time' and talent and 2. media tools to create and to share. Both Shirky and Bøtter point out the use of the web 2.0 for creating and sharing with others in networks as being a potential for collaborative knowledge creation. The phenomenon called 'crowdsourcing' is a way of using the sources in your web 2.0 networks for solving a problem or challenge (Shirky 2010; Bøtter, 2011). Bøtter underlines the value of web 2.0 networks by moving the focus from the awareness of ones IQ to ones NQ (Networking Quotient) in relation to knowledge creation (Bøtter, 2010).

According to Christensen there are two purposes with knowledge sharing: 1. the wish for creating new knowledge and 2. the desire for being better in exploiting existing knowledge. Knowledge sharing is dealing with identification of already existing and accessible knowledge to share, exploit and perhaps to store this knowledge to solve actual activities faster, better and more secure than they would have been solved. New knowledge is created e.g. by knowledge from different proficiencies or expert groups are combined in ways they haven't been combined in before (Christensen, 2004).

Future trajectories

At the core of social change is the emergence of collaborative knowledge and innovation as the primary value creator and 'crowdsourcing' as a way of sharing and open way of creating new knowledge. But what is the impact of these two trajectories in organizations. A number of questions emerge:

1. If work is innovation and the primary value creator, how do we create an organizational learning environment that cultivates innovation?
2. If innovation is collaborative, what are the impact on the creation, distribution and application of knowledge i.e. the knowledge flow in the organization?
3. What type of organization suits an innovative, knowledge based and collaborative organization?

⁴ A quotation most attributed to Stewart Brand, which he said to Steve Wozniak at First Hackers' Conference in 1984.

4. What is the role of ICT in this? How can the integration and saturation of ICT drive and support innovation?

One of central things Castells (2010) does not predict and explore is the emergence of the web 2.0, the whole integration of interactivity and social networks in work and organizations. The purpose of the thesis is in a futuristic perspective to investigate the implications that the societal changes and integrate use of ICT creates in relation to needs and opportunities in relation to organizational learning and knowledge creation, knowledge sharing and knowledge management.

Problem formulation

How do we create learning environments for organizational learning that cultivates innovation in organizations? How can integrate use of ICT in organizations support knowledge creation, knowledge sharing and knowledge management?

Concept clarification

ICT is in this thesis defined by a broad definition as any use of information- and communication technologies in the organization that support sharing and cooperation between people e.g. web conferencing, teleconferencing, Skype, chat forums, learning management systems, sharepoints and social media i.e. Facebook, Google+, Twitter, blogs etc..

Structure of the thesis

The thesis is a futures study project, which means that the thesis is trying to localize change drivers from the megatrends in learning and working, knowledge managing and organizing from the perspective of the ICT connected reality of web 2.0. The thesis is divided into 4 parts:

Method of the thesis: The aim of the thesis is to identify possible futures for ICT integrated organizational learning and knowledge sharing. In a futures studies approach a literature study will be performed to create some scenarios of possible futures. These scenarios will be challenged from key informant interviews with 'stakeholders' of ICT and organizational learning from two perspectives: the scientific researchers and from decision makers in larger national and international enterprises.

Localizing change drivers: In a thorough literature studies, based both on systematic and consciously random search into present studies and literature of learning, working knowledge managing and organizing change drivers of learning and working, knowledge managing and organizing will be investigated. The localized change drivers will be formulated into hypotheses and the hypotheses are used to construct scenarios with the trends of possible futures.

Key informant qualitative interviews: In online interviews with the 'stakeholders' the purpose is to explore and elaborate on the assumptions and hypotheses in the scenarios about the future of learning, working, knowledge managing and organizing, with international researchers in ICT and learning in groups or organizations and strategic directors in learning and development in large enterprises the scenarios will be used to get their reflections and comments on trends of possible futures. The interviews are conducted as open ended qualitative interviews.

Analysing, discussion and conclusion: Based on the prior parts of the thesis, we will critically analyse the explorations and elaborations from the interviews. The purpose is to formulate a number for future drive changers, propose a number of considerations and perspectives on organizational learning and knowledge management, which can be useful and applied in the future of designing and managing a knowledge enterprise.

The method in the thesis

Approach to philosophy of science and learning

The presented thesis is created from an epistemology and ontological foundation based on pragmatic approach to constructivism and social constructionism. This means we see learning, knowledge and science as pragmatically created in continuously interaction between a social constructed outer world and an inner constructed world.

“It is words and language that things first come into being and are.” (Heidegger, 1959), stating the foundation of the social constructionist point of view. It is the assumption the world is a social construction mediated through language, but that language is not a direct representation or mirror of things, as proposed by Wittgenstein in “Philosophical Investigations” (Wittgenstein, 1994).

The constructivist stance proposes that we as humans create our own meaning about the world through the filter of our perceptions and personal constructs. The constructivist argues that our knowledge about the reality is a construction and one cannot distinguish between genuine knowledge and what in a given society or community can be counted as knowledge (Collin, 2003).

In relation to education we think that “... knowledge is not passively received but actively built up by up by the cognizing subject” (Glaserfeld, 1989:182), through active interaction between the social constructed world and inner constructed world, but stressing there is no direct causal relationship between those. This means that the thesis will not promote a positivistic ‘truth’ assumption but approach the subject from a pragmatic viewpoint.

Futures Studies

The thesis is based on desire to create a *flash foresight* into the future of organizational learning and knowledge creation, knowledge sharing and knowledge management in organizations. A flash foresight: “...is a blinding flash of the future obvious. It is an intuitive grasp of the foreseeable future that, once you see it, reveals hidden opportunities and allows you to solve your biggest problems – *before* they happen. Flash foresight will allow *anyone* to both see and shape his or her future.” (Burrus, 2011:xi). Burrus is one of the leading forecasters, corporate strategist and visionaries in the World and he has made quite a number of forecasts about the future that came through. For example in 1983: ‘The 1990s will see a digital revolution’; in 1984: ‘By 1990 all computers will use an icon interface’; in 1986: ‘By the late 1990s we will use GPS to pinpoint location with applications ranging from agriculture to trucking’; in 1996: ‘In less than 10 years, people will have web browser on their smartphones’; in 2008: ‘Social media and social-media marketing will go mobile and will be standard on smartphones by 2010’ and many other forecasts (Burrus, 2011). Burrus’ purpose for constructing flash foresights is on a strategic level in a commercial context to create the direction for developing enterprises in relation to business. The focus in this thesis is very

different because the intention is on a research based foundation to create a flash foresight with different possible futures for ICT integrated organizational learning and knowledge sharing.

Futures studies offer a research approach for studying possible futures. “Futures studies includes an orientation to action and can be considered an action science in the fullest sense of the term.” (Bell, 2003:182). Epistemological and ontological, the foundation of futures studies is critical realism, defined as a constructivist position in a critical discourse. Which means a proposition cannot be justified as being true, but the belief in the truth of a proposition can be justified as being reasonable. A condition for future studies is that the results must be open to critique to be accepted (Bell, 2003). Among the causes you will be content to find, the causes that seem to make the difference (Poulsen, 2005).

Futures studies are a transdisciplinary field of study, which draw from many different scientific fields. This means the futures studies also use and apply many different scientific methods to extrapolate futures trajectories (Slaughter, 1996; Slaughter, 2001). The different methods can be classified on 2 interlinked continuums between: qualitative and quantitative methods, and plausible (exploratory) and desirable (normative) approach. Most futures researchers argue that futures research always will contain a desirable, based on the researcher’s intent with the study (Slaughter, 2001; Bell, 2003; Poulsen, 2005). “Despite such methodological diversity and preferences, any fair-minded assessment of futures research methods can only reach one conclusion: *No method has a monopoly on producing good-or bad-work.*” (Bell, 2003: 241).

Futures studies is about creating a forecast of events, like the weather report. To do so we need learn from earlier weather pattern, to create a likely trajectory of the future weather. Methodologically futures studies applies the same method, with a twist (Bell, 2003):

What is: To forecast the future you rest on a reasonable picture of the past and present, with it you get a false start.

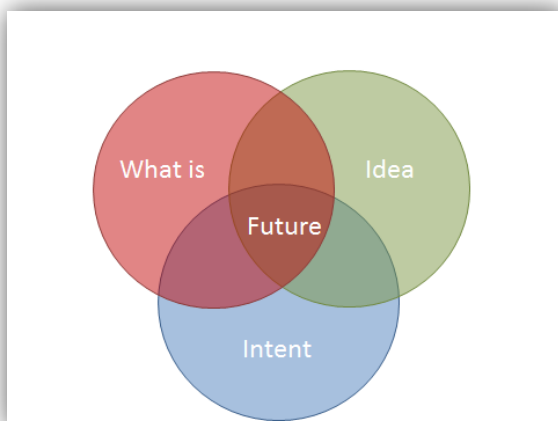


Figure 1 Future research (inspired from Nielsen, 2011)

Idea: Combining what is, with megatrends⁵ (change drivers), to create ideas.

Intent/value: What values and intentions does the future research bring into the study? What does the research is the future? Which change drivers are the researcher focusing on?

It is in the intersection of these the methods that futures trajectories emerge, pointing toward our event horizon⁶.

⁵ Change drivers are large scale forces, like economic, demographic, technological etc. That produce change at lower levels, there are environmental and internal change drivers.

⁶ Event horizon is a boundary in space-time beyond which you cannot see or predict.

In futures studies there are some caution that needs to be addressed:

- Forecast can be very precise but quite inaccurate.
- Extrapolations bound to be wrong eventually.
- Forecasts are almost incomplete
- Forecast, planning and human interact and affect each other.
- Forecast is not value free.

As a futures study, the thesis seek to analyse, conceptualise, and develop alternative futures and future trajectories, likely and unlikely, trying to create space for learning on reflexive foundations to decide and act for a desired future. This thesis cannot as a futures study find a complete explanation or a complete prediction since there will always be yet-to-be-identified causes and incomplete descriptions of the state of the object, which is being studied. The purpose of this future study is to create a number hypotheses about learning, working, knowledge management and organizations, building for the research of the impact of ICT in the ways learning is taking place in organizations, we have chosen to cross-fertilize two distinct domains of knowledge: the scientific and the practical, moving from a literature study to key informant interviews.

Futures studies methodology in the thesis

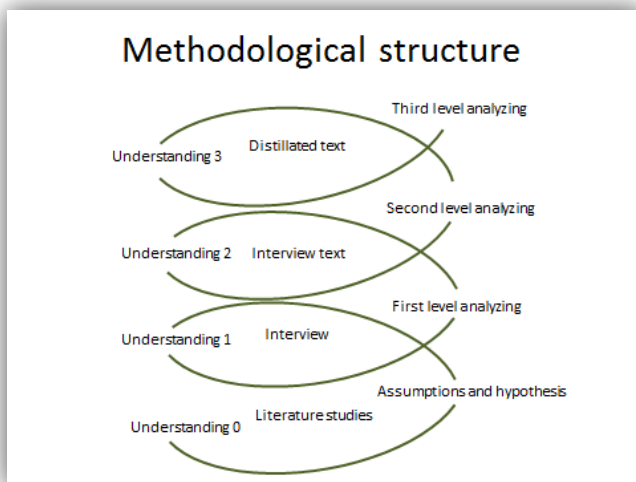


Figure 2 Methodological structure in the thesis

We will explore and elaborate on our intentions and ideas in the prologue of the thesis, and we will in the following we elaborate on our methodology. We will approach the futures study from a constructivist and social constructionist position with and interactional hermeneutical qualitative methods, where our findings are created in interaction and dialog with both text and informants.

Literature studies

To determine 'what is', we have embarked on an explorative journey into the literature about working and learning, knowledge management and organizations. The literature study is not to be understood in a traditional way of providing a theoretical framework for analysing the empirical material; instead the literature study through the analyses will localize the change drivers for the scenarios. This will be done in three chapters where the first chapter concerns *work as learning* and will unfold the themes regarding to the socio psychological process of learning and innovation, learning and innovation in organization, learning in communities of practice, collaboration and collaborative learning, networked learning and knowledge

sharing. The second concerns *knowledge flow and knowledge management*, and will unfold these themes regarding the codification of learning, storage and systematization, and the creating of an organizational structure where learning and knowledge is embedded in organisational structures. The third part concerns *knowledge based organizational structures*, analysing the basic part of the organization and from that, construct an ideal organization building the premises of knowledge work, reflecting in the new way or learning and knowledge sharing. The purpose of this part of study is three folded. First to create conceptual clarification, secondly to localize drive changes from the scientific field and thirdly to derive a number of assumptions and hypothesizes about the future of learning, working, knowledge managing and how knowledge based organizations is structured.

The search strategy for thesis has been searching for literature that could help us localising knowledge and perspectives to identifying the change drivers in relation to ICT integrated organizational learning and knowledge sharing. We have done both *systematic search*, *chain search* and *deliberately random search* (Rienicker & Jørgensen; 2005: 208). For the systematic search we have used Google Scholar linked up to Aalborg University Library for doing the search. The keywords have been: information and communication technologies or ICT combined with respectively organizational learning, knowledge creation, knowledge sharing, knowledge management and innovation. We have been searching for research in relation to organizational learning and knowledge sharing with an integrated use of ICT. We have read the abstracts and chosen four studies for further reading but realized that they are in the periphery of the subject studied in this thesis. The main concern of these studies are: organizational learning with the use of ICT for knowledge storing and communication (Pemberton et.al, 2000), knowledge transfer (Syed-Ikhsan et. al., 2004), recording and sharing strategic data and information (Martin et. al., 2003) and motivation for knowledge sharing (Hendricks, 1999). We have also been searching for literature in the chain search using reference list in the literature and research blogs and in the deliberately random search we have used Google Scholar and Google with a single keyword e.g. Computer Supported Collaborative Learning, networked learning and connectivism.

Qualitative interview method

Based on our findings in the literature study we have made qualitative key informant interviews, with the purpose of critical analyses the prosed trajectories of the future.

We have selected the *key informant interview* as format to access informants at the core within the field of ICT and organizational learning. Key informant interviews are qualitative in-depth interviews with experts. The purpose of key informant interviews is to collect information that has first-hand knowledge about the subject. Choosing key informants is essential for the quality of the future research, and should ideally match following criteria (Tremblay, 1957):

1. *Role in community*. Their formal role should expose them to the kind of information being sought by the researcher.
2. *Knowledge*. In addition to having access to the information desired, the informant should have absorbed the information meaningfully.
3. *Willingness*. The informant should be willing to communicate their knowledge to the interviewer and to cooperate as fully as possible.
4. *Communicability*. They should be able to communicate their knowledge in a manner that is intelligible to the interviewer.

5. *Impartiality.* Key informants should be objective and unbiased. Any relevant biases should be known to the interviewer.

We have contacted the researchers personally by e-mail to get in connection with the key informants in relation to research in ICT based learning in groups, collectives or organizations. The key informants are: *Senior Researcher Stephen Downes* is affiliated in the Learning and Collaborative Technologies Group, Institute for Information Technology at the National Research Council of Canada. Stephen is doing research in the fields of online learning, new media, pedagogy and philosophy and is especially known for his work in relation to connectivism and learning in networks (Downes, 2007; Downes, 2010). *Professor Allison Littlejohn* is Chair of Learning Technology and Director of the Caledonian Academy at Glasgow Caledonian University. Allison is researching in relation to learning innovation and she has been doing research exploring new approaches to work based and collective learning (Littlejohn, 2009a; Littlejohn, 2009ab; Littlejohn, 2008). *Professor of Learning Innovation Gráinne Conole* is Director of Beyond Distance Research Alliance at University of Leicester, England. Gráinne is researching in the use, integration and evaluation of Information and Communication Technologies and e-learning and impact on organisational change (Conole, 2002; Conole et. al, 2007).

At the starting point we have tried to contact by e-mail directors in relation to human resources and development at a strategic level in different multinational enterprises and we have had no replies. We have moved on to using our own personal networks into management and leadership to get access to key informants in relation to learning and development in organizations. We have aimed for key informants at a strategic level in large enterprises directing humane resources, learning and development in organizations. The key informants are:

Director of Human Resources Susanne Spang has 750 employees under her directorship in Denmark, Norway & Sweden at Thermo Fisher Scientific. Thermo Fisher Scientific has 39.000 employees internationally and serves customers within pharmaceutical and biotech companies, hospitals and clinical diagnostic labs, universities, research institutions and government agencies, as well as in environmental and process control industries. Susanne works with HR as strategic partner for the management and development of the company and its employees.

Executive of Human Resources Simon Riis-Hansen is Senior Vice President at Lego. Simon works with HR as strategic partner for the management and development of the company and its employees in an international setting with 10.000 globally dispersed employee. Lego is the third largest toy manufacturer in the World.

Organization & Talent Development Manager Bela Tisoczki, General Electrics, Germany. We have been introduced to Bela through a network from Simon Riis-Hansen, Lego.

The interviews are conducted as an open-ended semi structured ethnographical interview. The method is based on ethnographic futures research, also known as *anticipatory anthropology* (Bell, 2003). At the core of this method is a lengthy detailed loose structured interview, where the interviewer acts non-directive simulation explorations and elaborations. Through the questions the interviewer seeks to create clarity, comprehensiveness, contextualisation and coherence in the interview, with the purpose of uncovering trajectories for a future scenario. (ibid.)

The way the interviews are conducted resembles the ethnographical interview, which is a speech event that shares many features with the friendly conversation. The ethnographical interview distinguishes it by 3 things (Spradley, 1979):

- *The explicit purpose* – the interviewer should be very explicit in explaining the purpose of the interview
- *Ethnographic explanations* – clearly explaining the actions, questions and how it is recorded and applied.
- *Ethnographic questions* – using descriptive, structural and contrast questions

The application of these methods in thesis has the explicit purpose of creating a dialogue, from which we can extrapolate essential trajectories and trends into the future. We create a setting in the webconferencing system Adobe Connect, where we present the scenarios and hypothesis for each of the selected themes, learning and work, knowledge management and organizations in relation to ICT integrated organizational learning and knowledge sharing in organizations. The scenarios are presented as Power Point slides and we will use the ethnographical interview method to explore and elaborate on the reflections, thoughts and ideas, the key informants present.

Analytical approaches

Based on our social constructionist and constructivist foundation, the gathered information's from the interviews will be analyzed from an interactional approach including hermeneutics.

An interactional approach is based on constructivism and social constructionism and at the core is that meaning is produced through actual social interaction. Focus is on what is constructed in our shared reality and hence on the unstable and changeable in the studied phenomena. In relation to the empirical material focus is on its ambiguity, context dependency and productivity. Meaning is created through the research design and through the actual interaction between the interviewer and the interviewee⁷. In the social interaction meaning is continuously reinterpreted (Mik-Meyer & Järvinen, 2005). The interviewer is co-producer of knowledge because the material from the interview is a result of the meeting between the interviewer and the informant. In the analyses of the interview the language both reflects and creates the social reality: "description becomes inscription" (Denzin, 1999:312-313 in Järvinen, 2005:39). A central prerequisite in the interactional interview is the ability to be surprised or the possibility to find knowledge that was not announced of ones starting paradigm (Järvinen, 2005).

Seeing the language as powerful and productive and the emphasizing of that empirical material is constructed sets the stage for a combination of interpretive and poststructuralist principles can be suitable in the analyses. This gives an element of hermeneutic oriented interpretation (Alvesson & Kärreman, 2005). The purpose of hermeneutics is analysing texts beyond the surface and second verifying the analyses (Wallace, 2003). For this purpose Heidegger posed the hermeneutical circle moving back and forth between presumption and understanding, hence the assumption of the part-whole dialectics, where each part builds on the prior. The interpreter enter a dialogue with the presented material with his or her own presumption

⁷ We choose to refer to the key informants as interviewees because we see the knowledge created in the interaction as co-produced between the interviewer and the interviewee. See below.

and interpretations, and in that dialogue, moving back and forth part and whole, create a coherent meaning of the presented material.

The key elements in the interactional methodology consist of finding ways to meet collapse and create mysteries and stigmas. By mysteries and stigmas the method intends to uncover the unexpected, how it challenges the assumptions and this evolves into new knowledge and insights. A methodology for analysing is in an interactional approach (Alvesson & Kärreman, 2005):

1. A grazing of interest field and a first and rather broad focus of the study where you get *familiar with the area studied* and ask open questions. The art is to balance between having a direction and openness to the unexpected.
2. *Meeting with and/or construction of the comprehensive collapse*. Empirical material that does not match the expected requires a sophisticated and reflexive understanding. A gradual theoretical development of one's preconceptions perusal of relevant literature is important in this context.
3. *From collapse to mystery or stigma*. From the unexpected finding to the formulation of preliminary interpretations that can lead to theoretical contributes through pointing of a broader relevance of the empirical finding.
4. *Involvement in more systematic work* on the development of new knowledge / theory inspired by 'negative findings'.
5. *Solution or reformulation of the mystery or stigma* by developing a new theoretical perspective or new metaphors. This is done by an interaction between the various theories that are problematized by the empirical input.
6. *Development of the mystery or stigma dissolution/solution* so it can provide a broader relevance in a specific area and *a clearer positioning in relation to other theories*.

According to Alvesson et. al. this list is not meant to be a manual or model for or how this type of research can be carried out. It is more to be seen as a broad description of the elements in the research process there in the field research can give focus to understanding and the development of theoretical knowledge (ibid.). We see this approach as an integrated part of how we will perform the interviews and do the analysis afterwards, which means it will be an integrated part of the process with the interpretation.

For the purpose of creating meaning and looking beyond our own perspective in the interview, we have applied a number of tactics for generating meaning from our interviews (Robson, 2002):

1. What is the key message?
2. What is essential and what is inconsequential?
3. What are the patterns, themes and trends?
4. Seeming plausible? – does it make sense?
5. Is the information coherent?
6. What is typical and /or frequent?
7. What is not fitting in?
8. Making contrasts and comparison – are there similarities and difference?
9. What are we learning from this?
10. What challenges our assumption?

The purpose of the interpreter's dialogue with the material is to come behind the immediate features and meaning of the material and through that move the statements in the material beyond the immediate and hence unfold the deeper meaning. The validity of such an approach is based on the interpreter ability to interpret, by upholding a set of standards for interpretation of the material e.g. entering a scientific discourse and applying a critical analytical mind-set.

Localizing change drivers

Work as learning

If work becomes learning, it requires us to understand learning as a process and product created and constructed within the framework of a purposeful work. From this point we need to understand what learning is, and how it is created in an organizational setting.

The socio psychological process of learning and innovation

Wahlgren points to a unifying definition of adult learning as being: "...the process which develops the learner's capabilities - the potential to act" (Wahlgren, 2010:44). His understanding gives rise to 3 major concerns: firstly a strong emphasis on learning as something that takes place everywhere, secondly that the concept of learning describes both a process and a product, and thirdly learning embraces both intentional and incidental learning, including informal and formal learning (Wahlgren, 2010). Wahlgren's definition of the concept of learning means that 2 problems arise. Firstly, he defines a learning paradigm that is so broad, it dilutes itself. Everything is learning, and it becomes almost impossible not to learn and many concepts in the vicinity of this will be included such as 'exercise'. Secondly, the concept of learning becomes very impractical and difficult in a pragmatic working and organizational context. All work (no matter what you do) becomes learning.

In Wahlgren's definition of learning there is no longer a sufficiently sharp definition to observe and describe the learning phenomena as separate and different from other organizational phenomena, like routine work. One can argue that Wahlgren definition is a quantitative concept of learning, which is about developing competence by increasing the amount of potential actions.

In 1963, Bateson proposed a qualitative graduation of the learning concept and ways of learning. He presents three types of learning, which is characterized by qualitative differences i.e. the claim is that each learning process makes different demands on the learning methods and prerequisites (Bateson, 2000):

- Zero-learning is the term for the immediate basis for actions that are not subject to correction through trials. That is, under the same contextual conditions you chose the same choice again and again.
- First-order learning is the term for reviewing the choices made within a set of unchanging alternatives. That is, under the same contextual conditions you choose a different choice.
- Second-order learning is the term for review of the set of choices, from which the choice is made. That you change the contextual conditions by changing the set of choices from which you choose.

Bateson supplements Wahlgren's understanding of learning to distinguish between different learning levels. He points to two factors and levels for learning to occur. Firstly, there are now made a different choice than

the original choice and that the set of choices is subject of learning and change. Argyris support this distinction between learning levels by pointing out that there is a single loop (learning) and double loop learning (learning to learn) (Argyris & Schön, 1996).

Both Wahlgren and Bateson's definitions of learning can be criticized for being individualistic and that they do not include interaction with the environment in which learning takes place. Wahlgren and Bateson describe the choices and the action potential the individual have in relation to and thus affecting the environment. They do not describe how the environment affects individual choices and opportunity for learning. Assuming that learning increases one's capabilities and action potential to make a choice and thought that change the context (the set of choices), learning is closely linked to action and through action a change of action preconditions, i.e. the context. With this understanding the learning concept takes a more dynamic relation to its context in the learning process and changes the contextual conditions for the action.

Kolb's explores the relationship between action and learning, and he describes on an individualistic level the dynamics and the process between action and learning and builds on a pragmatic approach to the experience and learning from J. Dewey, K. Lewin and Piaget's cognitive learning approach. Kolb defines learning as "... learning is the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping experience and transforming it ". (Kolb, 1984:41) Kolb points to the structural dynamics underlying the transformation of experience to learning.

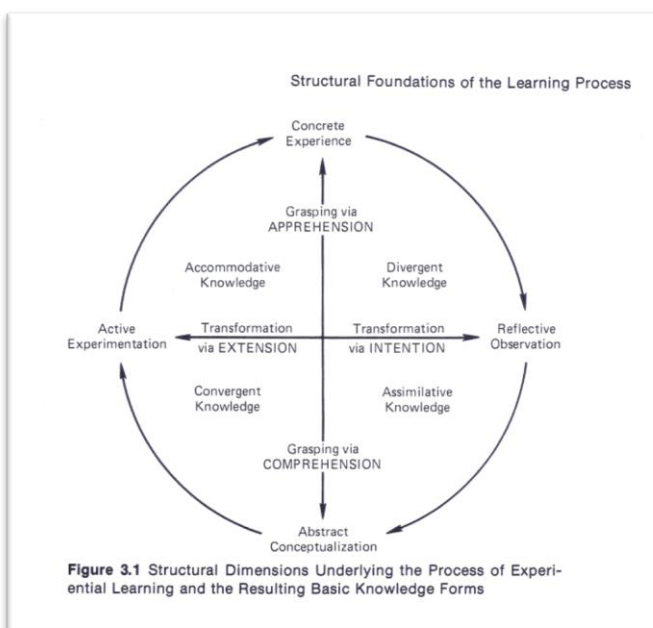


Figure 3: Kolb's Circle of the learning process (Kolb, 1984:42)

Experiential learning is based on one of 4 sub-processes, and that experience becomes knowledge through a cyclic process consisting of 4 sub-processes:

Firstly, concrete experience - direct experience sensed or felt

Secondly, Reflection - reflection and observation of the learned

Thirdly, Abstraction - abstract conceptual understanding and generalization of learned

Fourthly, Active experimentation - handling the new situation in the outside world.

Kolb's model is both a definition and process

description of learning and thus resembles the Wahlgren learning concept. His model describes the process by which experience through learning becomes knowledge and how knowledge can be used as a basis for further action and thus more experience. Experience as defined by a causal relationship between action and outcome of action and thus an experience associated with the specific action. (Wahlgren, 2010) Based on this knowledge becomes the systematic and communicated experience (Wahlgren, 2010), which is consistent with Kolb definition.

Kobls model has been criticized by Jarvis to provide a simplified and idealized model of learning that does not include the social and societal (Jarvis, 2007). Common to both Jarvis and Kobl is their understanding of reflection as "... the way towards greater understanding." (Wahlgren 2010: 64). Jarvis adds a number of essential elements for Kobls simple model that complements Kobls thinking and offers a number of central issues related to adult learning. Jarvis distinguishes between three main categories of learning: 1) non-learning, 2) non-reflective learning, and 3) reflective learning. This gives the basis of three concerns learning in at working context. The first is that adults meet learning situations with a biography / history, and secondly that there are many different ways to undergo a learning process and thirdly, that many meet the outside world without learning anything (non-learning). Non-learning, which is also often referred to as resistance. Firstly, there are individual circumstances and then social factors, including motivation. The conditions are closely related in an interaction.

Malcolm S. Knowles has formulated four assumptions about the specific nature of adult learning, which points out that in connection with a person develops, then will:

1. The person's way of understanding moves from an understanding of himself as a depended person to an understanding of himself as an autonomous human being (*self-directedness*).
2. The person is accumulating a growing amount of experience that is increasingly in becoming a resource for learning i.e. learning must relate to the learner's *experience*.
3. The person's readiness to learn will be increasingly oriented towards the development in relation to the person's social roles i.e. adults' need for learning arises from tasks or problems in their current life situation (*life application*)
4. The perspective changes from being oriented towards future use of the knowledge acquired for immediate use (*performance-centred*) and corresponding changes its orientation towards learning from one subject orientation to a *problem orientation*. (Knowles, 2005)

Knowles' 4 assumptions for adult learning can be used as a summary based on adult learning. It is our experience that the presented approaches and understandings of this chapter supports, extends and complements these assumptions. Knowles' assumptions can serve as good guidelines which may be considered in the organization of ICT supported adult learning, but they remain at a descriptive level. In our view, should be a pragmatic adult learning paradigm that can be directly used for the organization of ICT supported adult learning; contain some deeper learning considerations and understandings.

With Wahlgren and Bateson learning are the concept of a description of the power to do something else than what we could in advance. To repeat an action one can in advance, is practicing and not learning. For practicing to become learning, there must be something else than the expected for a given action i.e. a broken predicted causal relationship and that this experience becomes learning presupposes a process of reflection. This leads to the construction of new causal factors that can be described and disseminated (as knowledge). Bateson and Argyris points respectively second order learning and double loop learning, the reflexive construction of knowledge through the construction of new causal relationship and thus the ability to change the present set of circumstances from which to learn and choose.

The construction of knowledge over time means that you build a significant personal history and experience base. For adult learning, this means two important things. Firstly, many everyday events, repetition of known causal relationship where there is no learning cf. Jarvis, second, to adults do not readily

give up designed causal relation cf. Argyris and / or reconstruct new causal factors and thus build new knowledge.

The understanding of adult learning can be summarized to the following statements:

1. Learning is the power to do something else than you could before.
2. Action experiences is learning through a proven process of reflection, which runs through 4 sub processes
3. Learning of 2. order is the reflexive construction of knowledge through the construction of new causal factors that change the available contextual premises, including the teaching and learning context
4. Learning builds on the already existing cognitive structure of knowledge
5. Learning is supported by learning environments which contribute to the abandonment of existing cognitive structures of knowledge, reconstruction of existing cognitive structures of knowledge and the development of new cognitive structures of knowledge.

The above present a general view of adult learning and innovation from an individualistic point of view. The question is how do these assumptions affect our understanding of work, when we learn with others and especially in a structured task oriented environment like in an organizational setting?

Learning and innovation in organizations

Collaboration is essential part of humanity, and as Wittgenstein thinks, the foundation of language (language games) as we use language to collaborate on task, which makes it possible to create things that would be impossible to do alone (Wittgenstein, 1999). The moment we use language to collaborate and coordinate we transfer knowledge between each other, and based on those communicative interactions a more stable pattern and structure emerges (Watzlawick, 1968). Organizations and agencies⁸ can be seen as entities of communicative patterns in and by which we structure and restructure our communication and collaboration.

Argyris & Schön points out that organizational learning can be understood as a collective of individuals and they learn something, when they are individual members or a substantial part of them learn it. Organizational learning is reflected in organizational action as learning is an action in itself, and because an observational change in action is the most decisive test of learning (Argyris & Schön, 1996). Learning in organizations is an extension of individual learning and to understand organizational learning, it requires an understanding of the dynamic of collaborative learning between individuals and the group and how individual learning becomes organizational learning.

According to Argyris & Schön (1996) organizations and agencies are social structures that emerge from structured interactive patterns in a mediated or physical gathering of individuals. The participants of the interaction must at a certain point in time decide to create a certain level of agreement and uniformity in regard to:

1. Make procedures for making collective decisions

⁸ A preliminary definition, to explore this see chapter on Organizations as knowledge systems

2. Delegate authority to participants to act on behalf of the gathering individuals
3. Create boundaries between the gathering of individuals and the rest

By creating an implicit and/or explicit '*set of rules*' among the gathering of people, it becomes an organization and/or agency capable of acting as an entity and its members able to act on its behalf.

When a member is able to act and learn on behalf on the organization, the members is able to instigate and create a process of inquiry, as defined by Dewey (Brinkman, 2006). It is the intertwining of thought and action that proceeds from doubt to resolution of doubt is triggered by a mismatch between expected result of an action and the real result of the that action. The process of inquiry becomes organizational learning, when it is done by an individual acting as *an influential agent* on behalf of the organization. Based on this assumption Argyris and Schön defines organizational learning as:

“Organizational learning occurs when individuals within an organization experience a problematic situation and inquire into it on the organizations behalf. They experience a surprising mismatch between expected and actual results of action and respond to that mismatch through a process of thought and further action that leads them to modify their images of the organization or their understandings of organizational phenomena and restructure their activities so as to bring outcomes and expectations into line, thereby changing organizational theory-in-use. In order to become organizational, the learning that result from organizational inquiry must become embedded in the images of organization held in its members minds and/or in the epistemological artifacts (the maps, memories and programs) embedded in the organizational environment.”(Argyris & Schön, 1996:16)

Argyris and Schön definition of learning can be criticized for on two major points. Firstly, it stills puts a strong emphasis on the ability of the individual to learn and transform this to organizational learning. It requires that the individual has the right and privileges as an agent, meaning that the individual has a mandate of organizational influence to implement the learning. Secondly, organizational learning occurs when there is a mismatch between expectation, action and result. This implies that organizational learning is reactive based on problem solving rather that development. In the words of John Kotter you could say Argyris and Schön’s idea of organizational learning is based on a ‘sense of urgency’ (Kotter, 1996) rather that the wish of a desired future, hence they do not describing innovation defined as creating something new.

Dixon defines organizational learning with both a problem solving focus and a developmental focus: “The intentional use of learning processes at the individual, group and system level to continuously transform the organization in a direction that is increasingly satisfying to its stakeholders”. (Dixon, 1999:6)

This definition emphasizes the intentional learning, because all organizations learn to a some extent; they adapt to changes in their environments, correct past mistakes and generate new ideas, but in most cases accidental rather that intentional. According to Dixon organizational learning occurs in the ‘hallways’ of the organization. Organizations is defined as collective of individuals who has developed and stored meaning structures, that can create new meaning through the interaction with the environment and others. To understand how learning moves between individual and become organizational learning there are three levels of meaning:

1. *Private meaning*: Is the meaning each person holds, but do not make accessible to the others in the organization
2. *Accessible meaning*: Is the meaning that individuals make accessible to others in the organizations through communication and interaction.
3. *Collective meaning*: Is the meaning all members have in common.

Accessible meaning is exchanged in the 'hallways' and where collective meaning is constructed in dialogue between the organization's members. Hallways are the metaphor for the intentional processes organizations use to facilitate the construction of collective meaning.

Accessible meaning by interaction and communication between organizational members is not sufficient to create organizational learning e.g. sharing experiences is not learning in itself⁹. The organization must actively facilitate collective learning, which accordingly to Dixon, can be done in a 4 process model based on of Kolbs' learning cycle:

1. Wide spread generation of information
2. Integration of new/local information into the organizational context
3. Collective interpretation of information
4. Having authority to take responsible action based on the interpreted meaning

Dixon's understanding of organizational learning builds on the individual learning processes and stresses the importance of collective meaning sharing and development. The notion of collective meaning sharing and development make it possible for our understanding of organization learning to move from a reactive problem correcting process cf. Argyris & Schön to a proactive developmental process, based on intention. Building the notion of shared meaning and learning, on an individual learning process understanding, simplifies the complexity and significance of accessing shared meaning, and the importance of the 'hallway'.

If the key to organizational learning is in the hallways of shared meaning, we need a deeper look at what is going on in the 'hallways'.

Learning in distributed communities of practice and learning in networks

Learning is according to Lave and Wenger participation in communities of practice and is situated in practice. Participation is based on situated negotiation and renegotiation of meaning, which means that understanding and experience is constantly in interaction and of highly significance to each other. Learning embraces the whole person, acting and co-acting in the world. The mastery of knowledge and skills requires that the newcomer moves from legitimate peripheral participation towards full participation in the community of practice (Lave & Wenger, 1991). Technology reframes and extends how communities articulate and organize boundaries and relationships and this change the dynamics of participation, peripherally and legitimacy. The communities offer learning opportunities to newcomers in the periphery of the communities through the process of the legitimate peripheral participation. In a technology

⁹ See chapter on The socio psychological process of learning and innovation

mediated learning context lurking¹⁰ can be interpreted as legitimate peripheral participation in a community of practice (Wenger et. al., 2009). Participation in a community of practice refers to the process of 'taking part in' and doing it together with others in a common project and includes both action and connection with others (Wenger, 1998).

According to Wenger communities of practice build on three central dimensions of practice as characteristic of a community, which are *mutual engagement*, *a joint enterprise* and *a shared repertoire*. Practice resides in a community of people and the relations of *mutual engagement* by which they can do what they are doing. Membership of a community of practice is a matter of mutual engagement, and it is it, that defines the community of practice. Mutual engagement is about enabling engagement, containing diversity and partiality and creating mutual relationships. Mutual engagement involves not only our own competences but also others' competences (ibid.). Mutual engagement means committing each other to participation in the community of practice and the commitment of the participants to engage is a key factor.

In order to achieve a *joint enterprise*, Wenger points out that the enterprise is created in a collective process of negotiation and it is defined by the participants in the very process of pursuing it. A joint enterprise creates relations of mutual accountability among those involved, expressed as the participants' possibility of negotiating meaning and actions. A shared repertoire includes e.g. routines, words, tools, ways of doing things, stories, gestures, concepts and symbols that the community has produced or co-opted as a special part of the practice in the community. It includes the discourse by which members create meaningful statements about the world and the styles by which the members express their forms of membership and their identities as members in the community of practice (ibid.).

This means that learning in communities of practice includes three processes:

1. evolving forms of mutual engagement e.g. discovering how to engage, what helps and what hinders, and developing mutual relationships,
2. understanding and tuning their enterprise e.g. aligning their engagement with it, and learning to become and hold each other accountable to it
3. developing their repertoire, styles and discourses e.g. negotiating the meaning of various elements and inventing new terms and redefining or abandoning old ones.

Distributed communities are a way of organizing communities of practice that cannot rely on face-to-face meetings and interactions for connecting members. Distributed communities requires four key development activities designing the distributed communities so they can overcome the barriers of time, size, affiliation and culture: 1. achieve stakeholder alignment, 2. create a structure that promotes both local variations and global connections, 3. build a rhythm strong enough to maintain community visibility, and 4. develop more systematically private space of the community. Wenger et. al. points out in relation to knowledge and knowledge sharing that the structural characteristics of a community of practice are again redefined to a domain of knowledge, a notion of community and a practice (Wenger et. al., 2002). A domain of knowledge creates common ground, inspires members to participate, guides their learning and

¹⁰ Lurkers are defined as: "One of the 'silent majority' in an electronic forum; one who posts occasionally or not at all but is known to read the group's posting regularly." (Nonnecke & Preece, 2000).

gives meaning to their actions. A robust community fosters interactions and encourages a willingness to share ideas. The practice is the specific focus around which the community develops shares and maintains its core of knowledge, while the domain provides the general area of interest for the community.

Computer supported collaborative learning (CSCL) builds on the concept of distributed communities of practice. In collaborative learning interaction is vital. The learner is an active participant in the collaborative community and active participation is very central in the individual development of cognition. (Sorensen, 2002). Collaborative learning encompasses: "...joint construction of meaning through interaction with others and can be characterised by joint commitment to a shared goal." (Hron & Freidrich, 2003: 70). Collaborative learning involves individuals as group members in a community of practice with participation and mutual engagement in situated negotiation of meaning. The learners contribute through interaction to distributed collaborative knowledge building (Sorensen, 2005).

In relation to collaborative learning Bang & Dalsgaard points to that knowledge sharing is essential for a collaborative cooperation, since the participants must share everything with each other. Knowledge is not a question of "exchange with each other" but to "be in common on". Hence, knowledge sharing consists primarily of participation in the same processes. It is possible to have different roles in a collaborative cooperation, but participants will always be common on the goal (Bang & Dalsgaard, 2005).

Roschelle & Teasley make a distinction between collaborative and cooperative work, thus cooperative work is accomplished by the division of labour among participants, as an activity where each person is responsible for a part of the problem solving, whereas collaboration is the mutual engagement of participants in a coordinated effort to solve the problem together (Roschelle & Teasley, 1995).

Jones et. al. argue that the concept of communities of practice and tradition of CSCL have a strong emphasis on a certain closeness and unity of purpose and are not able to describe the kinds of relations that exists within learning environments. They point out that networked learning allows the possibility of *weak ties*¹¹ and looser and less focused groupings (Jones et. al., 2008). Networked learning is defined as: "...learning in which information and communication technology ... is used to promote connections between one learner and other learners, between learners and tutors; between a learning community and its learning resources" (Goodyear et. al., 2004: 1). It is the interactions that connectivity allows enabled through digital and networked technologies that are the key to networked learning. A learning environment based on networked learning is both concerned with establishing connections and defined relationships whereas a community of practice based learning environment is concerned with the establishment of a shared practice (Jones & Dirckinck-Holmfeld, 2009).

Connectivism is presented as a learning theory that concerns learning in networks in the digital age and network is defined as connections between entities. "Learning (defined as actionable knowledge) can reside outside of ourselves (within an organization or a database), is focused on connecting specialized information sets, and the connections that enable us to learn more are more important than our current state of knowing." (Siemens, 2005). Short connections between information are allowed from links or bridges referred as *weak ties*.

¹¹ Mark S. Granovetter (1983): The Strength of Weak Ties: A Network Theory Revisited, *Sociological Theory*. Vol.1 (1983), pp.201-233

The principles of connectivism are (Siemens, 2005):

- Learning and knowledge rests in diversity of opinions.
- Learning is a process of connecting specialized nodes or information sources.
- Learning may reside in non-human appliances.
- Capacity to know more is more critical than what is currently known
- Nurturing and maintaining connections is needed to facilitate continual learning.
- Ability to see connections between fields, ideas, and concepts is a core skill.
- Currency (accurate, up-to-date knowledge) is the intent of all connectivist learning activities.
- Decision-making is itself a learning process. Choosing what to learn and the meaning of incoming information is seen through the lens of a shifting reality. While there is a right answer now, it may be wrong tomorrow due to alterations in the information climate affecting the decision.

The individual is the foundation of connectivism. According to Siemens is personal knowledge encompassed of a network that feeds into organizations and institutions, which gives feed back into the network, and then continue to provide learning to the individual (ibid.). Learners are allowed to remain current in their field through the connections they have formed in this cycle of knowledge development from personal to network to organization.

Kop & Hill have analysed connectivism as a learning theory and conclude that: "...it does not seem that connectivism's contribution to the new paradigm warrant being treated as a separate learning theory in and of its own right. Connectivism however, continues to play an important role in the development and emergence of new pedagogies, where control is shifting from the tutor to an increasingly more autonomous learner" (Kop et. Hill, 2008). Connectivism contributes to an understanding of how learning and knowledge creation and sharing is supported by connecting people in networks.

Summary and focusing on change drivers

The chapter above explores the concept of learning through adult learning theory and research. Through a concept clarification of adult learning and trying to grasp a sharp definition of learning, the chapter moves toward an understanding of adult learning in organizational settings pointing toward the cooperative/collaborative aspect of learning as a core element of learning. With the emergence of ICT and web 2.0 the cooperative and collaborative learning takes new forms and escape the physical local bound learning environment and move into a global connected, supporting new ways of learning.

Based on this development we pose the first scenario: *Work = Learning = Innovation*, from the following assumptions: *Learning is moving from the corrective (right/wrong) to the innovative (harvesting & creation)*, meaning that learning is not reproducing existing knowledge but creating new knowledge through negotiation of meaning. *3 levels of meaning: (less) private, (more) accessible and collective negotiation of meaning*, meaning that learning is moving from the private space to a distributed accessible and collective space. *Learning is collaborative – negotiation and sharing of meaning*, meaning that learning is accelerated through ICT to being much more cooperative, collaborative and collective negotiation of meaning.

We pose the following hypothesis about the future of learning based : *Learning is created through connections – interactivity and collectively leads to networked learning*, meaning that the future of learning is connected through the web 2.0, hence promoting interactivity and collaboration, which is used to create and negotiate new meaning.

Knowledge flow in organizations

Organizations as knowledge systems

At the heart of the new knowledge economy is managing the intellectual capital of organizations and the knowledge flow involved in organizational learning, defined as processes that deal with the creation, distribution, use and exchange of meaning for purposes of value creation (Shrivastava, 1998).

Organizations function in several ways as holding environment for knowledge and directly represent knowledge in the way that organizations embody strategies for performing one or several complex tasks, toward reaching a goal. The knowledge can be implicit in form of tacit knowledge and referred to as theory-in-use (Argyris & Schön, 1996), and learned through participation in communities of practice (Wenger, 1998; Wenger et.al, 2002). Knowledge is also explicit in form of described knowledge to as referred to as theory-of-action (Argyris & Schön, 1996), and can be taught formal.

A knowledge system in its broadest term is a system designed to handle, manage and support the sharing of data, information and knowledge, and is here used to describe any sort of distribution of data, information and knowledge, making communication and language the primary knowledge management systems for humans.

Organizations are collective knowledge systems, which are defined by and redefined by sharing a common knowledge management system represented by language and communication aka shared language games cf. Wittgenstein, and through this process creating a community of practice.

A knowledge system builds on 4 intertwined sub processes to create knowledge (Alavi & Leidner, 2001).

1. *Creation/construction*: Knowledge creation involves development of new content, which means learning through an interaction between individual and social collaborative learning processes.
2. *Storage/retrieval* is referred to as organizational memory, which is the processes and organizations creates to avoid organizational loss of knowledge. Organizational memory is either semantic, embedded in explicit /articulated knowledge (Theory-in-use) or episodic, referring to context specific/situated knowledge (Theory-of-action).
3. *Transfer*. Knowledge is transferred on different levels: between individuals, from individual to explicit sources, and from individual to groups, between and across groups and from group to organization. Communication and information flows drive knowledge transfer through different channels: informal, formal, personal and impersonal.
4. *Application*. For survival and development knowledge need to be applied and turned into action based on 3 parameters a) directives – creating a direction and purpose for action, b) routines – creating a shared configuration for repeated action, reducing allocating resources to coordination and c) self-contained task team – problem-solving for the unexpected situation.

Knowledge systems are essentially designed to support and enhance the four processes with the purpose of complement and enhance the management of knowledge and knowledge activities of individuals and communities in an organization. Therefore a knowledge system reflects its fundamental understanding of the nature and type of information and knowledge an organization needs to fulfil a task or a purpose. Dynamically the knowledge system is reflected in the organization's structure, processes and culture and the other way around. Furthermore the organizations knowledge is embedded in its production processes (both technical and human) and its products. This applies from survival of an ancient human tribe to modern complex technological production.

The knowledge based perspective of organizations, argue that services and products is created and crafted by the combination and application of the organizational knowledge. Central for this perspective is the assumption of work being learning and innovation and that all organizations can be seen as a flow of knowledge connected internally and externally (Alavi & Leidner, 2001). Whether, it is in a formal or informal format.

The formal knowledge flow – knowledge management system

The formal knowledge flow in an organization is the organizational KMS and is designed to support organizational processes that create knowledge, knowledge storage and retrieval, knowledge transfer and application within the limits of an organization (Alavi & Leidner, 2001), this makes the KMS a central part of an organization's structure, and the way knowledge is created, organized, stored, retrieved, transferred and applied (internally and externally) is a core process.

The concept of an organizational formal knowledge management system is not new: training and employee development programs, organizational policies, routines, procedures, reports, and manuals have served this function for years. ICT is now the primary tool in a formal knowledge management system, beacuse ICT can lead to a greater breadth and depth in knowledge creation, storage, transfer and application in organizations.

The challenge with a formal KMS is that it is built to 'capture', organize and systematize knowledge that has moved from implicit to explicit through a transformation process of codification. The process makes it possible to move from 'theory-in-action' to 'theory-in-use' and through semantics place it in the organizational memory. This process poses two problems for the KMS. The first is that a KMS only represent the formal knowledge in an organization and many studies have shown the importance and value of 'hidden work' (Nardi & Engeström, 1999). The second is, when knowledge becomes a part of the organizational memory it can become **the** way to do things, leading to organizational status quo, promoting conservative and stable knowledge structures. KMS has inborn to be stable and conservative, with a strong orientation towards knowledge storage and retrieval at the expense of knowledge creation, knowledge transfer and application.

The consequence of the stronger focus on knowledge storage and retrieval questions whether the process inhibits or facilitates creation and application of knowledge. Three major concerns are addressed: Firstly it is argued that capturing knowledge inhibits learning and flexibility, leading to applying the same knowledge over again, regardless of situation. Secondly the structure in itself of a KMS system can make it hard to keep pace the dynamic need of knowledge creation. Thirdly the efficiency of any KMS is dependent on the quality of the system, the information quality and its usefulness. Studies indicate that the success of KMS

maybe mostly related to organizational culture and the users willingness to apply the KMS (Alavi & Leidner, 1999).

The purpose of KMS is central to understand the usefulness and application of a given KMS. The overall purpose of a KMS is to acquire, communicate and interpret organizationally relevant knowledge for use in organizational decision-making on all levels (Shrivastava, 1983). The evolution of a KMS in an organization can take two paths: the emergent and (perhaps) implicit or the intentionally and systematic designed and explicit. In both cases the KMS is rooted in organizational practises both related to producing processes and organizing processes. From this perspective it can argued that organization knowledge is imbedded in the structure of the organization (Shrivastava, 1983), and mirrors the distribution and coordination of tasks and influence.

The influence locus of an organization (normally the management) defines a perceived link between relevant knowledge domains and its related strategy. From this the organization decides, what relevant knowledge is in regard to fulfil the intention of creating value. Hence is knowledge temporarily perceived as irrelevant in the organizational context sorted from or left out, thus the organizational KMS is becoming a disciplined way for the organization to manage and describe the knowledge of production processes and products. Following the line of the above arguments it is our understanding that many designed KMS reflect organizational structures of industrial mass production, not suited for organizations that cultivate learning and innovations as a prime value creator. Many industrial designed KMS naturally evolved into formal bureaucratic learning systems with a focus on knowledge storage and retrieval, due to need of control and description of existing knowledge, with the purpose of efficiency in a relatively predictable production line. One could argue that the intentional design of a KMS focusing on stable efficiency, in itself creates the tidal wave that ends up with becoming a designed KMS counteracting agility.

Knowledge ecology

The web 2.0 and the networked communities move meaning from the private to more accessible and collective, which permeates the boundaries and influence the hierarchies of the traditional organizational structure. With this emergence of new knowledge flows and new ways of accessing, harvesting and collectively creating data, information and knowledge, the traditional organizational KMS is changing and organizations are challenged to find a framework for knowledge management that meets these new requirements (Shrivastava, 1983).

This shift is a game changer, which challenges the whole purpose of the KMS. The KMS as a gatherer and distributor of knowledge with the purpose of improving efficiency need to shift to the purpose of improving learning and innovations and hence improve the organizational agility and responsiveness to an ever-changing marked. Shrivastava proposes that the KMS better can be compared to an ecosystem rather than a management system. The knowledge flows, like ecosystems, have inputs, throughputs and outputs and operates in an open exchange relationship with their environments. The whole ecosystem operates with inner and outer sub-ecosystems, and multiple layers and levels of ecosystems. The ecosystem consists of interlinked knowledge resources, databases, experts, and artificial knowledge agents that collectively provide an online flow of knowledge for anywhere anytime. (Shrivastava, 1998) Shrivastava points to 4 core elements in the ecosystem.

1. *Core technologies*, which consist of two. The first for codifications and documentation of the knowledge, and second for communication and putting the knowledge into the ecosystem.
2. *Critical Interdependencies*: Organizational knowledge resides in a complex network of individuals, systems and procedures both inside and outside the organization in a symbiotic social and technological relationship.
3. *Knowledge engines and agents*: The system of knowledge creating including the research and development processes, experts, operational managers/administrators, software systems, archival knowledge resources and databases.
4. *Performative actions*: Organizational knowledge is converted into economic value through linked action in physical spaces, electronic spaces, economic transactions, and communicative exchanges of knowledge.

The conceptual frame of networked ecological knowledge system has been explored further to understand the dynamic of knowledge creation inside and between enterprises and e.g. the Universities. Bahrami and Evans (2005) have made a long term study of knowledge enterprises in Silicon Valley, Palo Alto, CA. Based on their study they regard the knowledge ecology as central for the birth, life and death of innovation and emerging enterprises. They define the knowledge ecology from a Darwinian perspective as a "community of individual dependent players, that operates inter-dependently, that feed off, compete and collaborate with each other, and that operate within a common climate" (Bahrami & Evans, 2005: 26). Enterprises are here embedded in a symbiotic and interdependent relationship in a broader ecological system, in a flow of ideas, information, knowledge and agents, where the organizational boundaries are blurred and permeable. Bahrami and Evans, as Shivastava, also point to 4 core elements as central element of the ecological climate of Silicon Valley. (Bahrami & Evans, 2005):

1. *Knowledge originators* - talent developers and cultivators. These are mostly situated around training and learning entities in the ecosystem, supporting diversity, network relationships and openness toward information exchange.
2. *Knowledge hatcheries* - prototype sponsors, financing new innovations and provide early feedback on prototype (seed funding).
3. *Knowledge generators* - emergent pools of resources for creating initial first action, by bringing together talents and ideas, founding a team to development plan of action, recalibrating the prototype for viability.
4. *Knowledge lubricants* - service and support provides a sophisticated service infrastructure of complementary specialists.

The above building blocks share and create the anatomy of the knowledge ecosystems, the climate referer to the operating norms and ground rules that governs the common practices within that eco system. The climate of Silicon Valley is by Bahrama and Evans described as:

- Pioneering spirit and relentless work ethic, with both financial, intellectual and emotional drivers
- Enteral optimism
- Survival of the fit with a limited "Safety Net"
- Strong focus on pragmatism (what works) rather than idealism (what should work)
- Minimal life support system and willingness to leave ideas behind

- Collaborative partnerships with inter-linked specialists and complementary capabilities
- Recombinant innovations

The two descriptions represent an understanding of knowledge flow from an ecological perspective. The two understandings complement each other with the first having a more process focus and the second a more structural focus. Both are stressing the permeability and openness of the organizational boundaries, making it harder to distinct between the inside and outside of the organization. Merging the two models in

to one you get the following figure:

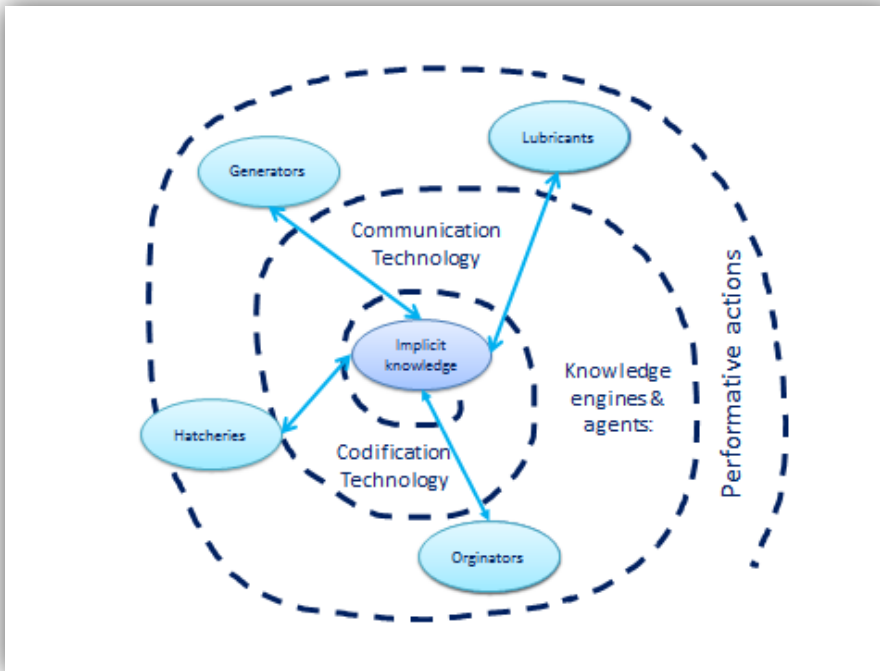


Figure 4. The elemental structures and processes of knowledge ecology

The model illustrates the elemental structures and processes of knowledge ecology.

If we accept the premise that knowledge flow in organizations is mirrored in their processes and structure, and we accept the assumption of knowledge flow, has assumed a process and structure that resembles the ecological system, (with the purpose of being able to achieve the agility and flexibility required to value in the new web 2.0 economy).

Then should the processes and structures of the organizations be based on producing value in a knowledge based economy also mirror the processes and structures of knowledge flows in the web 2.0, hence reflect the knowledge ecological approach.

Summary and focusing on change drivers

Social systems need a memory to preserve knowledge, which transcends the individual memory to prosper and develop. To be able to that, the social system needs to develop a codification system that describes and conveys the experiences of the individual to others. Language – both verbal and written – is such a knowledge management system, used to create, store, transfer and apply knowledge. It is argued that the codification process is a preserving function reducing flexibility, simplifying the knowledge flow to a pragmatic and tangible entity. Social systems as organizations become holding environments for the knowledge, which is defined as relevant for the systems purpose, reducing permeability by defining relevant and irrelevant information, leaving out certain knowledge flows.

With the emergence of ICT and web 2.0 and connected learning, the organizational knowledge flow permeates the organizational boundaries.

Based on this development we pose scenario 2: *Organizational knowledge flow*, from the following assumptions: *Organizations function as holding environments for knowledge*, meaning there is an inside and outside leaving out knowledge. *Organizations 'capture', organize and systematize knowledge through codification*, meaning that the codification tends to focus on storage and systematization of knowledge, reducing flexibility. *The organizational context defines temporarily relevant/irrelevant knowledge flows*, defined by manager's perception of the organizational environment, limiting and simplifying the organizations complex knowledge ecology.

We pose the following hypotheses: *Knowledge flow transcends the organizational context and operates in knowledge ecology, associated with new ways of learning and innovating*, meaning that the future of organizational knowledge is to be connected with its knowledge ecology, reducing the meaning of the organization as a distinct knowledge holding environment.

Knowledge ecological organizations

Interaction and communication

Human communicative interaction and coordination of interaction is the backdrop for the emergent organization. The communicative approach to understanding the constitution of social structures and societies has been addressed by many researchers¹². At the core of this approach is the understanding of communication in relations. Watzlawick et.al in their research into communicative behaviours pointed toward three central aspects of communication as the hatchery of communicative patterns and structures. Firstly, recursive communicative interactions evolve into a pattern over time. Secondly, communications both contain content and a relation aspect e.g. if I attach you, the content triggers a certain type of reaction from you – fight/flight, and thereby defining a certain type of relationship between us. Thirdly, communicative interactions can be used as transport of information and knowledge, but also to communicate about communication – hence meta-communication. (Watzlawick et.al., 1967) Based on these assumptions you could argue, that med moment we begin communicating over a period of time, we begin to create pattern and structures. Communicative patterns and structures emerging in to primitive 'organizations', from the premise that collaboration and coordination of collaboration in necessary for human survival, and that many of our needs cannot be meet without help from others (Schein, 1990).

Collaborative structures

The organization of collaboration in order to solve a common problem, challenge or goal (cf. collaborative learning) can be described in many ways. The foundation of the organization is the acceptance of common or shared goal, a certain level of agreement about these goals and the need to collaborate to meet these goals (Schein, 1990). This trigger two fundamental activities: the differentiation of tasks and functions and integration of and coordination between them (Mintzberg, 1979). An organization's formal structure is the sum of the ways in which organization ensures a differentiation and integration of functions and ensures coordination. As the size and complexity of collaboration increases, a function of coordination emergences as independent function and leadership/management emerges and a primitive hierarchal structure forms.

¹² Giddens (1984): The constitution of society; Foucault (1972): The Archaeology of Knowledge; Taylor & Every (2000: The Emergent Organization); Pearce (2007): Communication and creation of social worlds & (Gergen, 1997): Reality and Relationships

The coordination function (leadership/management) has the primary task of coordination and is in itself, not a directly contributing to reaching the fundamental organizational task. Which means a coordination function is a resource cost on the organization (Coarse, 1937), which requires the participants of the collaborative process to accept this cost.

The emergence of the Coordinator in a collaborative organization creates asymmetrical relations, where one coordinating function takes authority over another function. The acceptance of this type of relationship requires both parties – the Coordinator and the Coordinated - to accept each other's function and from both perspectives must be accepted as a premise for solving the collaborative problem, challenge or goal (Kirkeby, 1995). If the asymmetrical relationship is not accepted, it evolves back into a symmetrical relation. Recursive patterns of asymmetrical relations creates a hierarchical structure, which by Coarse has been argued as the most resource efficient form of structuring collaboration (Coarse, 1937), because it simplifies communication and responsibilities by making large collaboration manageable (Shirky, 2008).

The above describes the four core structural element in the organization:

1. Sharing a common problem, challenge or goal
2. Differentiation of functions
3. Integration of functions
4. Emergence of the Coordinator

The structural understanding of the formal organization describes the organizations from relatively stationary perspective. And in this description the organization assembles more the roles on the football field than the dynamics of the football game.

Interactivity

From an evolutionary point of view, the argument is that the individual has a better chance of survival as a participant of collaboration than without. From collaboration the above structures emerge, while the primitive 'organization' solves their common problem, challenge or goal and reach a solution. For a collaborative structure to be proven viable it must be able to create results or meaning for those who collaborate, which means that the different collaborative parts in the 'organization' must be a part of a progressing network of tasks which interlocks to create results. This process is the workflow which in modern history is mainly contributed to F. Taylor (Morgan, 2006). The basic elements of a workflow are:

1. Input – the raw materials
2. Transformation – the processes to create something out of the raw materials
3. Output – the result of the transformation

Taylor approached the workflow with a modern scientific and mechanistic method, focusing on optimizing the different elements in the structure of the workflow with the purpose of creating a clear structure and optimal workflow like a machine. Taylor adopts a scientific method to create the most effective way to optimize workflow and moves all responsibilities to the Coordinator (manager) and expand the view toward optimize selection, training and monitoring. Porter builds on Taylor's assumptions and develops the concept of further and regards it as a value chain. The value chain optimizes the workflow from a 'pull' perspective, based on what the organization does to deliver value to its customers (Porter, 1985). This

means that assessing the organizational units and workflows is based on how they add value to the product.

The mechanical approach to understanding workflows perceived human and human interaction as an integral part of the machinery. The Hawthorne studies in 1920's & 1930's indicated strongly, that this approach faced problems and issues like motivation and work group behaviour, it could not explain (Morgan, 2006). The need for integrating individual needs with organizational workflows became a major focus of attention to improve workflow optimization, and workflows are best understood as a 'sociotechnical systems' merging human and technical aspects of collaboration in the workflow. The workflow perspective contributes by giving a picture of the dynamic side of the football game by describing how the ball should be played between the different roles on the football field, so the team scores.

Culture

Within the domain of workflows communicative collaborative structures and flows are used to coordinate and solve common problems, challenges, reach goals or create values but communicative collaborative structures and flows also reside in the informal side of the organization.

Schein applies a functionalist view on culture to describe the informal side of an organization. Culture can be defined as the common basic assumptions the group has learned as it solved its problems with external adaptation and internal integration, which has worked well enough to be considered valid and therefore learned on to new team members as the correct way to perceive, think and feel in relation to these problems. Organizational culture is created and taught through a variety of mechanisms dealing with beliefs, values and assumptions based on the organization's vision and mission, new beliefs, values and assumptions of the accepted members what leaders pay attention to what they measure and monitor, who they recruit and promote and the organizational structures and processes and workflows (Schein, 1985). Schein nuances his own cultural understanding by pointing out there are cultures within cultures – subcultures. In organizations he distinguishes between 3 typical subcultures formed around task and specialization (Schein, 1985):

- *Operations*: Formed among the staff directly involved in production and operation of the organization
- *Expert*: Formed among the employees who design products, technology and systems
- *Management*: Formed among the organization's top management and middle managers

Schein believes these cultures are socially constructed and formed locally through collaboration and this understanding connects with Wenger's idea of communities of practice, where learning and the negotiation of meaning is an ongoing process within the various localities of engagement and this process continually creates locally shared histories (Wenger, 1998). These perspectives argue that culture is a layered and is a continuous story creation and recreation process, imbedded in communications, structures and processes of collaboration, and that this is a locally negotiated social 'reality'. The concept of culture contributes to describe the underlying dynamic mechanisms that are used to create the right atmosphere and team spirit on the football team, so they can win.

Communicative collaboration can be described as a dynamic coupling between the structure, processes and culture and the organization emerges in order to solve a shared problem, challenge, and goal or wish for

creating value. The organization as a social entity is delineated by that shared problem, challenge, and goal or wish for creating value. The organization is built in layers and networks of local negotiated meanings, creating subcultures around derivative shared problems, challenges, and goals or wish for creating values.

In the production of physical products the organization's knowledge and application of knowledge is implicitly present in the product. This means that the organization uses the knowledge in its structure, processes and culture and its members to create a product. In the knowledge based organization, knowledge is both present in its structure, processes and culture and members and knowledge is used to 'create the product' and 'is the product'.

The way a collaborative system is organized can be seen as how structures, processes and culture are combined and designed. The design configuration of an organization can be seen as the way a collaborative systems handle coordination and creating value while it grows in size and complexity. There are many ways of resolving the design issue addressing both traditional production and service production (Morgan, 2006), but few organizational designs are addressing the challenges of the web 2.0 age (Bahrami & Evans, 2005).

If work is learning, knowledge production and innovation, what are the special factors and organizational design configuration that characterizes a knowledge based producing organization? How does the knowledge production influence structures, processes and culture, and how they interconnect?

The knowledge based organization

Nonaka et. al.'s understanding of a knowledge based organization is founded on two basic elements: Firstly, a perspective on humanity and secondly, the organizational knowledge creation process (Nonaka & Toyama, 2007).

According to Nonaka et. al. *ba* is the basic concept for the creation of organizational knowledge, where people in the organization meet, interact and create knowledge that transcends their own borders and as a result alter themselves, others, the organization and environment. Nonaka et. al.'s knowledge creating organization is described as an organic structure consisting of many layers of *ba*¹³, which is the synthesis of an economic structure and a meaning creating process which extends beyond the organization's economic boundaries (Nonaka & Konno, 1998; Nonaka & Toyama, 2007).

Nonaka et. al understand knowledge based organizations as a process , where knowledge is an extra 'layer' imbedded in the organizational structure and does not advocate for a particular organizational structure or shape as special for knowledge creating organizations. They believe knowledge creating organizations 'burst ' the organizational boundaries and interact extensively with their knowledge environments and must be described with an ecological perspective. Organizations exist in a knowledge ecology that is no longer to be defined through simple ownership (Nonaka & Toyama, 2007).

¹³ There are four types of *ba* corresponding to the four stages of knowledge transformation process of the dynamic of tacit and explicit knowledge processes, Nonaka et. al. describe in SECI model. Each category describes a *ba* particularly appropriate for one of the four knowledge transformation types, wherein each *ba* knowledge creation can speed the process up. The four stages are: 1) origin *ba*, which is the primary *ba* from which knowledge creation process starts, 2) interacting *ba* is the place where tacit knowledge becomes explicit, 3) training-*ba* facilitates the conversion of explicit to tacit knowledge and 4) cyber *ba* as an interaction point in a virtual world instead of 'real space and time'. (Nonaka & Konno, 1998; Nonaka & Toyama, 2007)

Peter Senge proposes the concept of the learning organization (Senge, 1990) as a description of the knowledge based organization. The argument is that as collaborations grow to become complex organization the ability to learn diminished. The learning organization is a way of creating a continuously learning environment where the organization on-going transform itself. Senge points out 5 distinctive traits of the learning organization (ibid.):

1. *Systems thinking*. Adopting a holistic perspective on the organizations, where each member has access to all information.
2. *Personal mastery*. Each member is committed to continuously learning process.
3. *Mental models*. The will to openly and constructively confront own and others mental models.
4. *Shared vision*. Members are sharing a vision of learning and a focus for creating value, triggering a decentralized organizational structure.
5. *Team learning*. The learning organization facilitates team learning through a spirit of openness, sharing and collaboration.

Peter Senge and Nonaka et. al. appear not to have a specific organizational understanding or description, but rather perspectives on the underlying knowledge creation processes and a pragmatic idealist framework to contextualize the processes and some principle which should govern a learning knowledge based organization.

The above perspectives can be criticised for being derived from analysing a certain type of production, which promotes certain set for conditions for communicative collaborative knowledge creation structures. From this certain organizational structures emerge by focusing certain types of knowledge flows and rejecting others, which are reflected in those same organizational structures required to solve that type of production. In short: what and how we produce is reflected in our communication, collaboration and learning, which again is reflected in the structures, processes and culture of the organizations. If this is the case what are the conditions for knowledge based and knowledge creating organizations, and how is this reflected in their organizational structures, processes and culture?

Designing the emergent flexible knowledge based organization

Morgan suggests that organizations working with learning and knowledge should adopt an appropriate organization structure and managerial style. He applies the metaphor of the 'holographic organizations' referring to the design principle that each part is a representation of the whole, building on a brain metaphor (Morgan, 2006). This also suggests the idea that the qualities of the whole are in its parts, making the systems able to self-organize and regenerate itself on a continuous basis. The holographic organization is built on 5 principles, based on the learning and innovation theories cf. Argyris & Schön, Nonaka & Senge et.al. as the foundation of the organizational production.

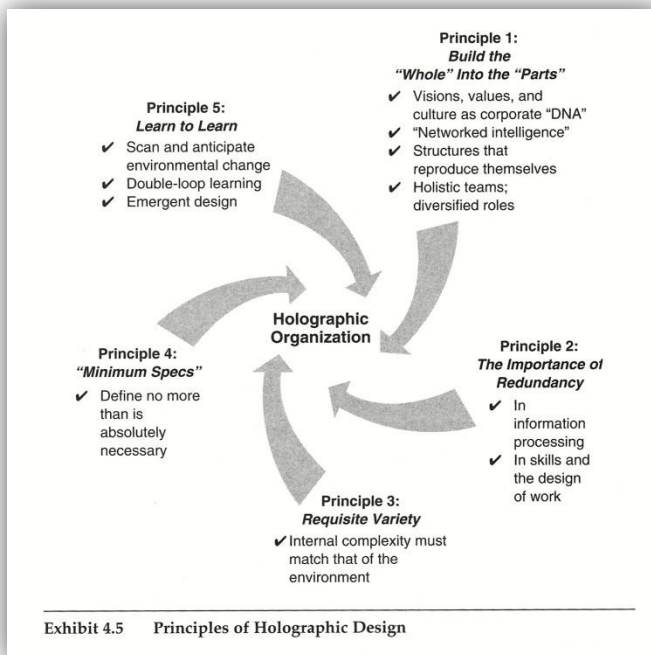


Figure 5. Principles of Holographic Design (Morgan; 2006:100)

Principle 1: Build the whole into its part, by focusing on the culture, information flows and systems, structure and roles.

Principle 2: The importance of Redundancy, create excess capacity that can create room for innovation and development and development to occur.

Principle 3: Requisite Variety, to match the variety and complexity of the environment

Principle 4: Minimum Specs, create a degree of freedom or autonomy for allow appropriate innovation to occur.

Principle 5: Learning to Learn, cultivate double loop learning capacity.

Morgan presents a set of design principles, which does not offer a blueprint or a recipe for creating a flexible knowledge based organization. Based on their 25 years of study and experience with work in Silicon Valley Bahrami and Evan describe a super flexible organizational architecture aimed specifically at knowledge-creating organizations (Bahrami & Evans, 2005). In their study they regard Silicon Valley as part of a knowledge ecology with a certain climate, which fosters the knowledge based organization. They describe 3 central features of the climate to promote the agile super flexible knowledge enterprise, in order to 'survive': 1) goal-driven ethics and eternal optimism, 2) limited safety net and minimal life support system, 3) collaborative partnership and recombinant innovations. This climate creates hyper turbulent knowledge ecology, where survival of the fit idea or enterprise promotes the enterprises ability to create, respond and adapt to environmental changes fast.

Knowledge based enterprises interact with this versatile knowledge ecology through recycling, the reuse, re-configuration, blended and redesigned of knowledge and ideas in key ideas. Recycling is a meta principle for understanding the adaptive capacity of the enterprise. Operating in this environment requires that the enterprise can act without perfect information and no pre-existing knowledge, which means creation of new knowledge and ideas need to be tested on the ground in an action learning approach, with fast experimentation and early prototyping. In their view the recycling consists of 4 dynamic mechanisms:

1. Re-creating, based on high 'birth rate' of knowledge, followed by 're-starts' and idea spin-offs
2. Cross-pollinating, talent redeployment and information diffusion, through informal networks
3. Recursive learning, exploring, prototyping and failing, with positive tolerance
4. Re-Inventing, Re-financing, re-packaging and recombining old knowledge and ideas

Bahrami and Evans point toward local proximity as a central ingredient in the creating of this particular ecological climate, but it could be contested that this is in essence very similar to the ecological climate that govern the web 2.0. Is web 2.0 the global Silicon Valley?

To create an organizational design that can be flexible and adapt, yet retain a sense of cohesion, purpose and identity, they propose a nodal organizational architecture. Bahrami and Evans regard knowledge based organizations as organic in their essence and built around a series of 'clusters' to resolve the relationship of communicative collaborative dilemmas concerning differentiation of function division and creating integration, evolving the culture and the emergence of coordination in form of leadership. Flexible architectures are critical for execution, where there are little time lags between decisions, actions and consequences (Bahrami & Evans, 2005).

The nodal organizational architecture consists of 3 basic processes and elements (Bahrami & Evans, 2011):

Clustering. Clustering is the basic anatomy of the organization and the structure of tasks and nodes, consisting of teams, projects and units. Nodes may be focused and semi- autonomous units. This is the differentiation of functions within the organization, categorising them after the frequency of change and whether they have an on-going assignment or temporary assignment. These core units will provide resilience and stability to the organization, and they focus on specific tasks and functions and function as a result and financial accountable unit. Clustering is the balancing between creating stability and contexts, and speed and agility.

Connective. Connective is the circulation and coordination between the different nodes. This is the integration of functions. Here is the coordination of explicit knowledge by means of core processes, infrastructure, communication and sharing of knowledge through linking, that the informal networking takes place. The connections are a typical blend of virtual, organizational and personal links:

- ICT tools – centrally the codification aggregation and diffusion of information and knowledge.
- Core business processes – effective design of core-processes creates organizational transparency, counteracting silo thinking.
- Cross-Silo functions – with reviews and coordination
- Operational hub's at critical intersections - a managerial responsible body, which will act to ensure horizontal links.

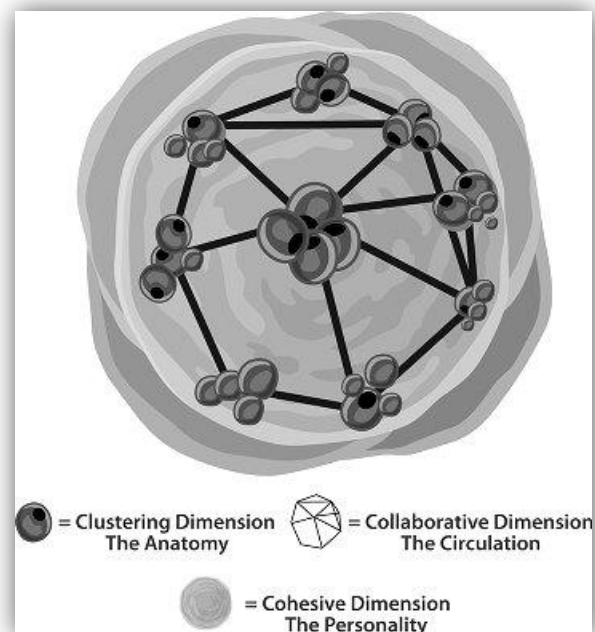


Figure 6. The Nodal Architecture (Bahrami & Evans, 2011:31)

The connections are both vertical and horizontal, and they meet at intersections where different stakeholders converge. With the increasingly sharing and open access to information and knowledge there is a continuously adding to the horizontal dimension.

Cohesive. Cohesive is the 'personality of the architecture', represented by culture and values. It creates a sense of common spirit and goal, which is a unique organizational identity and is central to creating and maintaining unifying core that is essential to preventing disintegration of an else distributed organization. It is about linking the values expectations of the knowledge workers to the organizational context and purpose, and the outside perception of the organization creating a motivational 'soft glue'; guiding principle to project a distinct personality, anchors of stability to create resilience and leadership pillars to create followership. The build this there are four people practises that need to be adopted:

1. *Screening and recruiting* for a 'fit' between personal values, expectations and competencies and the organizational context.
2. *Performance management* and compensations system, giving feedback and reinforcing desired behaviours.
3. *Visible signals* for fast scanning and observation to reinforce desired behaviours.
4. *Campus design* of virtual and physical workplace to promote norms

The cohesive element is critical in creating the nodal organizational structure, which a continuous reinforcement of appropriate behaviour, and clarify and communicate non-negotiable behaviours. (Bahrami & Evan, 2005; Bahrami & Evan, 2011)

The architecture for super flexible knowledge based organization is built from the three basic processes: structures, processes and culture, as described earlier, but differs by its emphasis on knowledge both in production and product and on focusing on organizational flexibility i.e. ability to gather, integrate and develop knowledge.

This form of organization is characterized by focusing on continuous trade-offs rather than clear boundaries in terms of either/or decisions and creating a clear "federal/state" tension, where the federal mandate is the non-negotiable ground rules that apply for all but with a great built in freedom for flexible action. The federal mandate is the 'go/no-go' areas and clear expectations.

The architecture is characterized by (Bahrami & Evans, 2011):

- 1) clear, clearly communicated and action-oriented federal mandates
- 2) efficient 'hubs' located at critical intersections organizational secured by placing competence at local critical intersections, and
- 3) Emphasis on horizontal cooperation by deliberately counteracting silo thinking

This networked form of organizations has important similarities with the thinking behind multinational organizational and leadership thinking called heterarchy¹⁴ and can appear as an organizational version of

¹⁴ Heterarchy is an organization understanding that describes the way in modern multinationals firms in 1980 was organized and managed. The companies were expected to show increasing differentiation, fluid and egalitarian network of international dispersed subsidiaries and affiliates. Supported by coordination through more prescriptive,

connectivisme. The idea of moving from a hierarchy to heterarchy is also supported by the requirements for knowledge worker, referred to as knowledge artisans, which is stressing the peer- to-peer approach (Bahrami & Evans, 2005), supporting a horizontal leadership style building on informal power and followership (Kirkeby, 1995). The knowledge based super flexible organizations is a dynamic loosely coupled organization, that indicate a paradigm shift from football to Calvinball¹⁵, where both players, rules of engagement and the playing field is ever-changing.

Knowledge based organizations are like heterarchies with a flat network-based architecture. This type of organization requires a knowledge management approach that reflects the flexible and dynamic of the knowledge ecological climate in which the organization operates. For the organization to survive, it needs to develop a 'fit' with its knowledge ecology, which is based on being a part of the recycling process, through being open and sharing towards its environment to evolve a d fast responsiveness and adaptability. This means a greater focus on knowledge creation and application, and it is also required for any knowledge management system to proactively contribute effectively and prospectively to knowledge creation and delivery and not solely be an administrative system. According to Sanchez there are three basic and essential organizational processes that must function well in relation to knowledge management can be effective: 1) maintaining 'learning loops' in all organizational processes, 2) systematic dissemination of new and existing knowledge throughout the organization, and 3) application of knowledge, where it can be used in the organization (Sanchez, 2005). This means that knowledge management in a heterarchy similar knowledge based organization must continuously work to integrate the 3 organizational processes, organizational knowledge creation process, decentralized organizational nodes and develop operational 'hubs' that can support this process.

Summary and focusing on the change drivers

From communicative collaborative interactions emerge the social system as an organization. The organization can be described with 3 basic elements: the structure, the processes and the culture. It is argued that the 3 elements reflects the communication and knowledge flows with the organization as required by the defining idea of solving a shared problem, challenge and goal or wish for creating value. In short: certain organizational purposes give birth to certain types of organizations that are reflected in the way they combine structure, develop processes and create culture. With the emergence of the knowledge economy the organization changes purpose from producing goods to creating knowledge through learning and innovation, hence is triggering a change in the dynamic couplings between structure, processes and culture. With the development in the way we learn and innovative through connecting to the accelerated knowledge flows of the web 2.0, organizations need to connect more agile and flexible to benefit and survive.

With the emergence of ICT and web 2.0 and the following development of the new connected learning and the more permeable accelerated knowledge flows the knowledge organization need to change. We pose

than accountable control and bureaucratic governance, the strategy formulation and innovation processes should to a greater extent be delegated into the hands of the capable and related units in the multinational network (Hedlund, 1986).

¹⁵ Calvinball is a ball game from Calvin and Hobbes, where the rules are constantly negotiated and evolves.

scenario 3: Knowledge Organizations, based on the following assumption: *Production = Value by learning and innovation*, meaning the future of production is in learning and innovation of processes and products. *Organization = dynamic coupling between: Structure, process and culture, balancing being robust (boundaries) and flexible (openness)*, meaning that the organization need to define the dynamic coupling between those elements to reflect the accelerated and flexible knowledge ecology. *Learning and innovation transcends organizational boundaries and operates in knowledge ecology*, meaning that the organizational design need to closely connected and integrated with its ecological environment, redefining the concept of organizational boundaries.

We pose the following hypothesis: *Knowledge organizations focus on learning and innovation by a strong focus on openness to its knowledge ecology*, meaning that organizations with the purpose of learning and innovation need to opens it border toward its ecology, and creating resilience thou attracting followers by a clear communicated purpose.

Case example: The Virtual International Day of the Midwife 5th May 2012

- A network-based organization



Figure 7. An example of a network-based organization

As a part of presenting the assumptions and hypothesis it is a concern that it will maybe be too abstract and theoretical. We have decided to illustrate our assumption and hypothesis of a possible future structure of an organization through a case example we have been a part of.

To exemplify we use an example of an organization with flat network based architecture. This is The Virtual Day of the Midwife (VIDM)¹⁶ which works for a year at the time for organizing a free international online conference for midwives and other interested to be held for 24 hours on May 5th for sharing knowledge from

research and development projects about midwifery

and maternity care. The conference takes place in the web conferencing system Adobe Connect and for every hour a new speaker starts a presentation. The presentations are recorded on video and shared openly on the wiki conference homepage. The participation in the conference is open and free.

VIDM is a temporary and non-profit organization. We have both this year been members of the VIDM Committee and served as master facilitators during the conference together with 6 other persons from respectively New Zealand, Australia, Canada and England. The members of the VIDM Committee are

¹⁶ The Virtual Day of the Midwife is started as an open online 24 hours conference in 2009 by Sarah Stewart in New Zealand, who is a midwife and facilitator, researcher, educator, project manager and consultant specializing in eLearning, social media, networked learning, and professional development and mentoring. The wiki homepage of The Virtual Day of the Midwife: <http://internationaldayofthemidwife.wikispaces.com/home>

volunteers. During the year before the conference the VIDM Committee organizes and coordinates by communicating in e-mails, on an open wiki conference homepage, in an open Facebook group, in chats and video calls on Skype and in synchronous meetings the web conference Adobe Connect.

The virtual organization is based on voluntary work and functions as a gathering of people who joins the virtual organization based on its purpose and meaning. It is a loosely connected network which solves a complex task in connecting people and technologies across space and time zones. It requires a lot of communication and coordination and a common sense of responsibility.

It is a concern that the interviewees might respond more to the interviewers, as they have been a part of the virtual organization as facilitators, so it will be a challenge in the interviews to disconnect the interviewers from the case example.

Exploration of the future trajectories and trends through key informant interviews

The set up for the qualitative key informant interviews

At the starting point of this project, we began to make contact persons to be key informants, who we thought had knowledge to share with us about the field researched in the thesis and could contribute with perspectives into the future about ICT integrated organizational learning and knowledge sharing. We initiated a search process for key informants among scientists who investigate ICT based learning and innovation especially in regard to learning in groups, collectives or organizations, but also on our networks into large organizations and organizational learning. We chose to invite key informants from the scientific domain and HR domain, due to our assumption that the interviewees from both domains would see the subject from different perspectives, and hence be biased in a certain way. We met a great interest among the invited persons to participate as key informants though there initially were some challenges with getting in contact with the HR directors.

The key informants among scientists in ICT and learning in groups, collective and organizations are:

- Senior Researcher Stephen Downes, Institute for Information Technology at the National Research Council, Canada interviewed on 4th May 2012 at 3 p.m.¹⁷
- Professor Allison Littlejohn, Glasgow Caledonian University, Scotland interviewed on 10th May at 3.30 p.m.
- Professor of Learning Innovation Gráinne Conole, University of Leicester, England on 11th May at 5 p.m.

The key informants among Directors in Human Resources (HR) in large international enterprises:

- HR Director Susanne Spang at Thermo Fisher Scientific in Denmark, Norway & Sweden interviewed on 7th May 2012 at 8 p.m.
- Executive HR and Senior Vice President Simon Riis-Hansen at Lego, Denmark interviewed on 15th May 2012 at 5 p.m.

¹⁷ The interviewees are from different time zones. The specified times are from the Danish time zone.

- Organization & Talent Development Manager Bela Tisoczki at General Electric Deutschland Holding, Germany interviewed 24th May 2012 at 4.30 p.m.

The interviews were performed in the web conferencing system Adobe Connect and were recorded as videos (Annex 1). Using Adobe Connect for the interviews has given us the opportunity of making synchronous live video based interviews internationally across borders and time zones, and we could use the facility of sharing documents with the key informants.

The performance of the qualitative key informant interviews

Our preconceptions to the subject explored are based on our analyses in the literature study form which we formulated the assumptions and hypotheses presented in the scenarios. We perceive *work as equal with learning that is equal to innovation*. We assumed that learning is moving from the corrective (right/wrong) to the innovative (harvesting & creation) and that there are three levels of meaning: (less) private, (more) accessible and collective negotiation of meaning. We see learning as being collaborative with the negotiation and sharing of meaning and that learning is created through connections and that interactivity and collectivity leads to networked learning. In relation to *organizational knowledge flow* we assume that organizations function as holding environments for knowledge (inside/ outside knowledge) and that organizations 'capture', organize and systematize knowledge through codification. We think the organizational context defines temporarily relevant/irrelevant knowledge flows and that knowledge flow transcends the organizational context and operates in a knowledge ecology, associated with new ways of learning and innovating. Concerning *knowledge organizations* we assume that production is the same a value created by learning and innovation and that organizations are dynamic coupling between structure, process and culture, balancing being robust (boundaries) and flexible (openness). We think learning and innovation transcends organizational boundaries and operates in a knowledge ecology and that knowledge organizations focus on learning and innovation by a strong focus on openness to its knowledge ecology.

Our preconceptions were challenged, explored and elaborated by the reflections and comments from interviewees and in the analyses of the interviews afterwards.

To create a structure in the interviews we divided the interview into different phases with a prologue, 3 scenarios with themes to be explored, a case example of VIDM as a networked organization and at the end of the interview an open question for eventualities. We used a Power Point slide presentation, which were uploaded and shared with the interviewees in Adobe Connect for them with the scenarios to reflect and comment on (Annex 2).

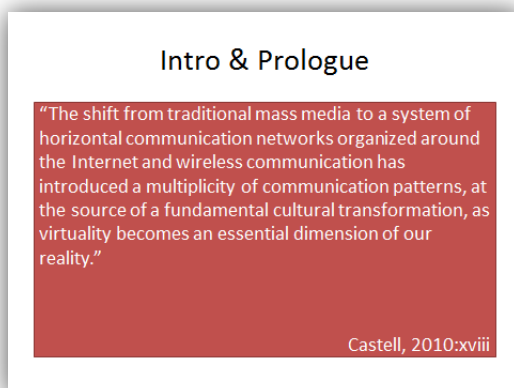


Figure 8. Prologue to the Key Informant Interviews

The prologue was a quotation from Castell, which was supposed to function as a summary of our own prologue and to set the frame and guide the mind-set of the interviewees in a certain direction.

In relation to this slide we stressed that the emergent of horizontal internet and wireless communication is a fundamental game change on the level of invention of the printing press. (See figure 8)

At the end of the interview an open ended question is asked to give the interviewees the option of coming with their own ideas and input.

6 interviews were performed with the 6 key informants and the interviews lasted for app. an hour each in time ranges from 47 min. to 1 hour and 20 min. The interviews were conducted with two interviewers and one interviewee in Adobe Connect.

To avoid problems with interferences in the audio transmission with the risk of echoes one of the interviewers had muted the microphone most of the time and functioned primary as an observer asking supplementary questions and taking notes during the interviews, while the other interviewer was interactively participating in the interview, posing the questions and taking notes.

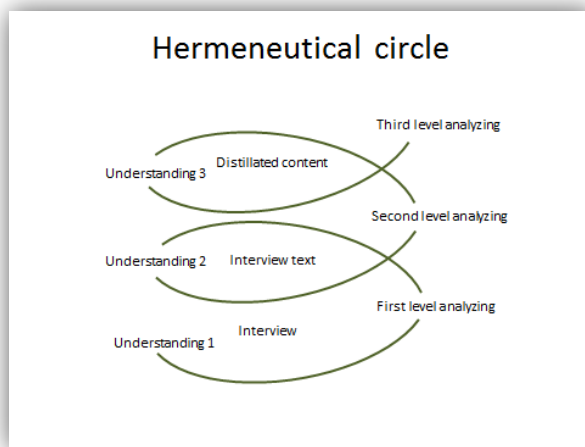


Figure 10. Hermeutical cicle – the process of interpretation

The interviews were transcribed from the videos. This has been done through watching and listening of the recordings of the interview supported by the notes made during the interview. To take an interactional and hermeneutical analytical approach to extrapolate the information from the perspectives presented by the interviewees each interview has been divided in the response to the different themes presented on the slides in the interviews. After the interviews has been reviewed and gone through an analytical process as described in the method section.

The notes made of the interviewers during the interviews have been used together with the transcriptions in the analyses. The process of the analyses has been as the hermeneutical circle moving back and forth between presumption and understanding. In a dialogue between the understanding and the material moving back and forth part and whole and create a coherent meaning of the presented material.

The first level of the analyses was cf. the hermeneutical questions in the method to identify the key messages, to look for what was essential and inconsequential and to look for the patterns, themes and trends in each interview. In this process we have been looking for mysteries and stigmas that differed from our notions (Annex 3). The second level in the analyses has been to extrapolate the underlying themes from each interview in relation to the explored overarching themes to make a thematic structure from each interview. The third level in the analyses has been to distillate and analyse the content of the interviews indexed by the themes presented in change driver presentations to make analysis across the content of the 6 interviews.

Qualitative Interviews Analyses

Learning is created through connections – interactivity and collectivity leads to networked learning

The key messages from the interviews related to Work equal to learning equal to innovation

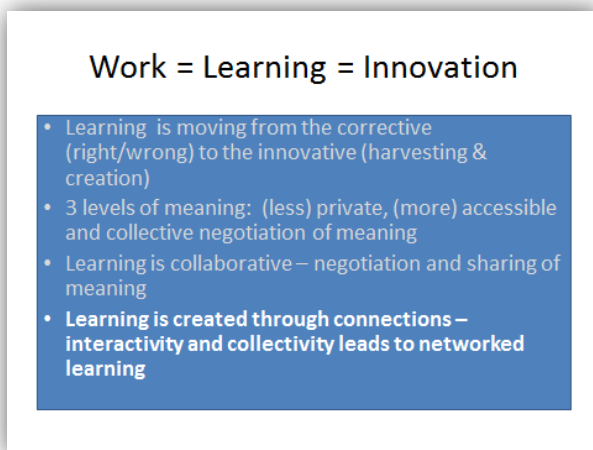


Figure 11. Scenario – Work=Learning=Innovation

The interviewee stresses that learning happens in connections, and during the interview he underpins his perception of learning as being closely related to connections in the brain, in his view meaning is created or negotiated outside the person, but resides within the person's neurological structure. The interviewee regards learning as cooperation not collaboration and believes that meaning is something that is bound to the person. The interviewee thinks that collaboration cultivates uniformity, which in itself limits learning and innovation. The interviewee builds from ideas of

learning to an organizational thinking, which stresses

the network as a future organizational structure that is more effective than the classical hierarchical organization, basically because many people can better process the emergent complexities of the world compares to one person, like the CEO in a classical organization.

The interviewee sees learning as a horizontal, connected and peer-to-peer building on social and participatory media and technologies. The openness and sharing of knowledge is changing the traditional set up for learning by moving from the asymmetrical relation, teacher-learner to much a more open approach to learning, where you constantly are in a learning environment cultivating formal and informal learning. The interviewee has a strong emphasis on a just-in-time learning idea based on how learning is constantly adjusted to particular situations and needs. This is also based on the assumption, that people in the future will change career more often. Organizations need to embrace this change in learning and evolve into a learning organization to rapidly become more agile and adaptable.

The interviewee thinks our understanding of the future of work and learning is very depending on what type of work we are looking at. In knowledge based organizations learning is becoming much more innovative and the focus is about harvesting but in many cases in the organizations there will still be an approach to learning that focuses on a right and wrong approach to learning. Learning is social and collaborative with the negotiation and sharing of meaning. Connections are an important part of learning and to support people in connecting to existing knowledge. Learning is moving in the direction of non-formal learning through collaborative communities which is dispersed and connected through ICT systems, mind-sets, cultures, processes and structures in a non-formal ways, creating informal networked learning.

The interviewee regards learning primary as on-the-job training activity, where there needs to be a common understanding of the content of the shared knowledge. From that perspective of the interviewee

sees learning as also a question of right and wrong. Much of the new learning in organizations is supported by ICT, but also limited by both the culture and structure, such as IT policy decisions. For the interviewee it is central that learning also addresses the virtual distance management aspect and how to handle remote management. The organizational need for learning is counterweighted by economic concerns as reflected in performance management systems.

The interviewee believes that the concept of media connectedness will be challenged by basic psychological needs, where people will still need to be together in a physical space, and connecting that to learning our previous conceptions is blocking us for embracing the new ways of learning. The challenge in collective learning is that the collective learning might lower the quality of individual learning. This is reflected in the challenge of getting people to collaborate mutually about a problem and constructively solve it. ICT might be an enabler to do it, but not the solution. Collaborative and cooperative learning requires that you can enter a symmetrical relation, building on an ethical transparency and standard, and also that you invest in the collaboration; you need to have something at stake. Learning is not about right and wrong, but it is about what works, which is a test on reality.

The interviewee points to learning as a process moving from gathering information to making it into knowledge. He argues that the understanding of right and wrong depends on the concept, but also the way we are getting to that answer is now moving from a single expert perspective to a network of experts. He sees this movement on the cost of the depth in learning. This is also based on the willingness of the newer generations to share openly on the web, but he also experiences that building communities is harder and most learning communities die. Learning is much about the purpose and many companies are very performance oriented in their management approach limiting creative problem solution and decision-making.

Extrapolation of insights

The interviews point toward a number of central themes and key messages. The understanding of learning is central among the interviewees but it is approached from different angles. There is a consensus about the way we learn is changing but not on how, what it means and what the consequences should be in regard to learning. Most of the interviewees do not emphasize the perspective of meaning negotiation and focus more strongly on learning as a process. There is a difference in the way the interviewees perceive the learning process in groups or organizations varying from a process only going on in the neurological structure in the individual to a more cooperative, collaborative and connected learning process. One interviewee stresses that meaning and knowledge is created and resides inside persons and cannot be transmitted through connections, where most of the others both see how knowledge is constructed collectively in cooperation with others but also are defined by others in asymmetrical relations.

The interviewees regard and define the concept of collaboration and its consequences to learning differently, where the nuances in the definition have different effects on learning. From the perspective of learning being enhanced by collaborative cooperation, to a perspective on creating a collaboration and collective learning are in itself limiting innovations and learning, due to the need for conformity in the collaborative community.

Several of the interviewees point toward the movement away from the formal learning build on a teacher – learner relation context to the informal learning, both in an on the job training but also as mediated

through cooperative networks. This movement also has effect on the dynamics of symmetrical and asymmetrical relations, where all the HR practitioners maintain a need for the organizational asymmetrical relation based on an economic logic, stressing the management's position as defining right and wrong from a pragmatic perspective. Here the differences are most clear between then scientific interviewees and HR practitioners, where the assumption of right and wrong is being perceived very differently. Most of the interviewees point to the necessity of regarding learning and work in a certain context, where different working context set the frames for different types of learning, implying that not one definition of learning fit all.

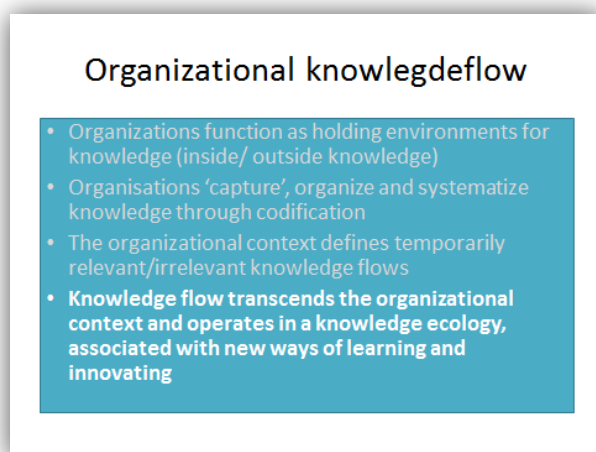
The majority of the HR practitioners see much of the potential of the future of learning and innovation in organization limited by both economical and beneficial concerns, but just as much mind-set and cultural challenges, where past conceptions hinder organization to embrace new ways of learning It is argued that many connected ways of learning do not address human basic psychological needs, while others point toward the new generations embracing new ways of learning through more openness and sharing, and moving away from seeking answer from one expert to using a network.

The most important learning from these interviews is the differences in perception of learning. There are several currents in the flow, but the biggest difference was between the scientist and HR practitioners, where we were seeing a strong emphasis on the organizational hierarchy as an organizational necessity, as a context for learning. Furthermore we have learned a more nuanced distinction between different layers of cooperation, collaboration and the collective learning, where it is stressed that the more tightly knit a collaboration is, the stronger the influence will be on innovation and learning. We also have learned that learning is always taking place in a certain context and that context is reflected in the learning supported and hence reflected in the organizational structure, as we will explore further later in the thesis.

Our assumptions are most challenged on two points. First on the concept of collaboration, and how collaboration might lead to diminished learning and innovation, due to the need for creating a certain degree of uniformity to collaborate. Second on the organizational need for a defining a right a wrong, which points toward the next set of assumptions?

Knowledge flow transcends the organizational context and operates in knowledge ecology, associated with new ways of learning and innovating

The key messages from the interviews related Organizational knowledge flow



The interviewee refutes the concept of knowledge flows from the notion that knowledge and meaning resided in a person's neurological structure and organization. Knowledge management is about storing knowledge, but not about creating knowledge, and organizational knowledge is created through the connections in the organization. Knowledge flows in organizations are about creating communications and relation inside the parts of the organization.

Figur 12 Scenario - Organizational Knowledge flow

The interviewee states that technology will change the way we learn and work, and the concept of codification of knowledge does not go with the idea of fluid knowledge, because connections and networks can build rise, build up, change and move on, in a pace that make the codification obsolete the moment it's made. To harness this flow of knowledge, an organization needs to adapt the idea of knowledge ecology, by changing the structure, culture and processes.

The interviewee thinks that different types of organizations are changing in terms of their purpose, even if they do not understand or know how organizations are changing from being a part of that knowledge flow. But that challenges the concept of intellectual properties, also when it comes to codification, because how to transport the information from outside to inside of the organization. Many attempts have failed, because much expertise and knowledge cannot be codified, and it is very hard to define the relevant knowledge flow from the irrelevant ones. Focusing on too narrow a range of flows, might block learning and innovation, on the other hand accessing too many without guidance create knowledge flow constipation.

The interviewee's biggest concern with the permeability of organization, is how we verify the information we bring into the organizational knowledge flow. The interviewee points to the reflective and critical skills of the individual employee as a key element. We will harvest more information on the web than before, but it is primarily a cultural problem in relation to how the organization applies in and if it chooses to do so.

The interviewee thinks that organizations need to define what knowledge is important for the organization and what is not. The biggest danger to the organization is to die of information constipation and to avoid that the management has a coherence premium to define what knowledge flow is important and what is not, and at the same time adapt a viral approach to learning, connecting to the knowledge flows outside the organization.

The interviewee thinks that knowledge is made much more available and accessible through ICT tools, both inside and outside the organization, but there is a cultural cleft between making it available and getting employee to pick it up. Much information and knowledge is not picked up and applied, because it is not perceived directly as effective or useful toward our goals. The ability to harvest information outside your immediate organization most likely belongs to certain innovation companies.

Extrapolation of insights

The interviewees have very diverse views on the concept of knowledge flow. This theme in the interview has the most different views but also the theme with the least input and answers in the interviews. The most radical perspective was the interviewee who refutes the concept based on notion that knowledge cannot flow, only information can. Knowledge is inside someone's head and is embedded in his or her neurological structure. Others point toward that the knowledge flows are so fast changing and fluid in that the concept of capturing and storing knowledge like in knowledge management systems is an obsolete exercise, they point toward the many unsuccessfully attempt to create an apply knowledge management systems, which could have been used to learn and innovate instead. Most interviewees did not go in depth with the concept of knowledge management systems.

There is a great consensus on the concept on knowledge ecology, but there are also big concerns and many different views about the consequences for organizations. One interviewee points out that organizations

change purpose, and hence need to rethink how they access knowledge flows and transport information from the knowledge ecology into their organization. One interviewee argues that knowledge management is in the relations and communication within the organisation, because of knowledge is made by the connections in the organization. Others point out that organizational structures, processes and culture need to change to harness the knowledge flows.

The HR practitioners are primarily concerned with the practical aspect of knowledge ecology and how the organization harvests and controls the flows. They approach this by pointing to how important it is for an organization to define the knowledge it requires, and thereby defining the in and out of the organizational knowledge flow.

Another perspective is the concept of permeability of knowledge, where one interviewee is concerned with how you decipher the knowledge in terms of correct or incorrect, which requires that the employees are able to be critical and reflective. In connection with that, an interviewee points toward the cleft between availability and the ability to use it, because it is not perceived as immediately useful in value creation.

Most of the interviewees point out challenge of managing the knowledge flows, and balancing between narrowing the scope to much or broadened it too much, leading to either much shutting learning or innovation out or create organizational knowledge flow constipation. One interviewee solves that challenge by letting the management define which knowledge flows to connect to and which not to.

The most important learning from the interviewees' responses on this theme is how knowledge flows are perceived. The interviewees concur with the notion of knowledge flow and knowledge ecology, but see them in very different perspectives, depending on their point of reference. The scientists have a strong focus on the dynamic interactions between the inner and outer knowledge flows, and how the accelerated pace change the nature of the knowledge flows. We have learned that the HR practitioners are concerned about how the organization handles this and that they do not have clear answers on this challenge and have a tendency to look to old solutions to new problems. But the lack of focus on knowledge management systems and directly point out the lack of its success, have taught us that this might be fading out. The organizational knowledge flows, structures, processes and culture need to mirror the new knowledge flow ecology.

The interviewees' responses have challenged our concept and understanding of learning and whether we can use the term knowledge flow or it is just a flow of information. Furthermore our positive connotation of knowledge flow was challenged, because it is clear that it creates concerns in organizations and they are not sure how to respond to this.

Knowledge organizations focus on learning and innovation by a strong focus on openness to its knowledge ecology

The key messages from the interviews related to Knowledge organizations



Figure 13. Scenario - Knowledge Organizations

The interviewee thinks in relation to conditions in a knowledge producing organization, the structure needs to fit the purpose by creating a structure which cultivates this. This can be done by making the relations between the organizational parts based on autonomy, diversity, openness and interactivity. To create such a network, we shall abandon the idea of the entrepreneur founder, and create an environment that cultivates the 4 aspects of relations and letting it evolve to cooperation.

The interviewee thinks that organizations need to adopt different kinds of collaborative and coordinating structures, depending on the situation to

become sufficient agile and flexible to their ecological climate. To do so the interviewee points toward design thinking approach as a way of creating the future organization. The process involves identifying a purpose and way of getting there, and then let it coevolve from there as an iterative process. This requires for the organizations to flipside, where it build its structure and knowledge flows from bottom and up. The organizations are to become networked and connected through social and participatory media, and this will fundamentally change the way we work.

The interviewee thinks that the challenge for organizations today is the different business and organizations models, where we have one paradigm that is very open moving toward real innovation and learning and the other hand trying to generate money through an understood and old time paradigm. One of the challenges is that the employees learn and innovate much outside their organizations, people are learning in different ways, and where this learning occurs, it occurs is very differently, which makes it hard for the present organizational structure to capitalize from that. To access that organization's needs to improve their way of handling their knowledge ecology in terms of innovation and the production, so people can tap into that knowledge, use it and create new knowledge. To this there is both organizational and mind-set barriers.

The interviewee thinks that in the future in many organizations will be flexible and dynamic systems with knowledge ecology, where you will be able to manipulate knowledge by using any particular tools of your own wish as an individual person and yet there will be ways of people being able to connect collectively manipulating knowledge. That will be a change in practice because you will work in a setting which has a flatter structure and which has less central coordination. If organizations are going to be open and non-structured and have a free flow of knowledge, we need to develop our ability to self-regulate the way we work and learn due to more flexibility and freedom. If we are rethinking organizations and rethinking how people work we have to take a step back and think about what is the relationship people, knowledge and

the kinds of technologies that we have and the kinds of connections we might need in our organizations. The interviewee believes that the matrix organizations is a learning organization, which lets its employee, both make mistakes and learn from them, but it is also very chaotic and can be hard to navigate in. This creates a strong flexibility where the organization fast can respond on ideas from all walks of the organization to cultivate those and apply them.

The interviewee believes that the future of the organization will be much more network based with a strong approach of leading through influencing. The future knowledge based organization is an ambidextrous organization, which needs to apply many different organizational designs and structures that are interwoven, whether you are in the production department or in an innovation department. The networked organization is built on the premise that the participants take different roles and responsibilities at different times, which also means the role of creating direction. The networked organization also needs to address the basic psychological needs as belonging, trust and confidence.

The interviewee thinks that organizations will change but not as fast as technology might suggest, because of culture and history where the hierarchical structure has proven its worth. But people who are leading will change much as the emergence of the followership paradigm and empowering will be more and more important, but it will not evolve into a leaderless networked organization. The design of the future organization will very much depend on the purpose of the organization, applying differences in design in the different part of the organization. We will see more loose connected network based organizations.

Extrapolation of insights

The interviewees have relatively conjunctive views on the presented assumptions and hypotheses. There are an agreement on that the structures, processes and cultures of the future knowledge based organization will go through radical changes, but also that it will be not to the extent, that technology possibly could take the change, or to the extent that was desirable.

A majority of the interviewees point toward 3 things that counterweight the more radical changes:

1. The basic psychological needs and mind-set of the people who shall use and apply the new technologies
2. The culture and history of the traditional organization, which has strong arguments to maintain status
3. Economic reasons, both in regard to profit and capitalization but also individual effectiveness.

Moving toward a knowledge based organization will require the ability from a lot of the organizations to pick up and harvest from their knowledge ecology. Many of the interviewees agree that the organizations need to develop more openness and willingness to share with their immediate environment. Many point toward the use of social media, but also point out that organizations need to flipside and approach this in a bottom up process and grant the employee more freedom, hence a change in leadership models.

In relation to the design of the future organizations there are great consensus on it was context bound, meaning that the purpose of the organization will strongly influence the way it shall be designed. There is also general agreement on that the future knowledge based organization needs a structure that fits that purpose, reflecting the concept of knowledge ecology to be agile, flexible and adaptable to be able to pick up and harvest the knowledge flows around it.

There is widespread agreement among the interviewees that the future knowledge based organization is a more loosely connected network based organisation with a flatter structure, which requires a great self-regulative ability among its members. There will be less central coordination, but some of the interviewees also pointed out that it will not be leaderless, because the networked organisation grows in complexity. The purpose of the organization will be to create an environment that will cultivate autonomy, diversity, openness and interactivity. From that environment the organization will go through an iterative evolving process to a more structured organization. Some Interviewee argued that the organisation will be a flexible dynamic system closely connected to the knowledge ecology, which will require a followership leader paradigm with an emphasis on the ability to cultivate and harvest ideas in a bottom up process within the organization.

The biggest learning from this, it is the extended agreement on that this will be a game change and the knowledge based organization will be quite different from the industrial organization. The new ways of learning shall be reflected in the way the organization should be structured. The movement in that direction will be challenged by our preconception of economic efficiency, cultural assumption and the individual capabilities to navigate and apply these new technologies.

Our assumption here are less challenged than in the rest, but it became clear that the economic reality of the companies plays a big role in the understanding of future of the knowledge based organizations. It is our assumption that there is no difference between the open shared approaches to knowledge based organizations and economic capitalization of this, but there is a great scepticism about that.

Reflections on and discussion of the method of the thesis

The thesis is a futures study exploring possible futures in relation to ICT integrated organizational learning and knowledge sharing using different research methods with the purpose of posing a number of assumptions and hypotheses about the future. The intention has been to try to take a deeper look into the 'crystal ball' into future based on deeper analyses of the present scientific knowledge and exposing our findings in scenarios to a number of key informants for getting some insights about their perceptions of trends and trajectories into the future.

Futures studies

The choice of a futures studies method was based on two foundations. It was in alignment with our social constructionist and constructivist scientific foundation. Furthermore it was a method explicitly directed toward exploring different possible futures and it is also a method which is used and applied in creating and formulating strategic initiatives and actions (Bell, 2003). It was our aim to try to make a kind of "flash foresight" into the future in relation to ICT integrated organizational learning and knowledge sharing

There are two big challenges in using applying this method. The first one is that futures studies are cross scientific method, which uses methods from many branches of scientific studies. The second is that there is a bigger element of intentions in the method, where the researchers own beliefs, assumptions and intentions are a part of the studies, research and result.

There is an action orientation where the researcher to a great extent interacts with the field of research (Bell, 2003). Especially during our interviews our own intentions became apparent, because a number of

the interviewees both challenged our assumptions in their responses, but also because the positive connotations in our assumptions were challenged. This experience brought our attention toward our own pre-understanding of the issues we explored.

Futures studies has an obligation to be open to criticism (Poulsen, 2005,) and we could have asked the key informants/interviewees for their reflections and comments to our analyses of the interviews and the conclusion of what will be the trends into the future in relation to ICT integrated organizational learning and knowledge sharing.

Literature study

We have in the search process both used systematic search, chain search and deliberate random search for searching for research and literature. In the systematic research we used the keywords: information and communication technologies or ICT combined with respectively organizational learning, knowledge creation, knowledge sharing, knowledge management and innovation. After reading the abstracts we did not find more than four studies related to ICT and organizational learning and knowledge sharing, which we assessed to be in the periphery of the subject studied. We could maybe have made a more defined search with more keywords. In the chain search and deliberate random search we searched for the theoretical literature and the research based literature related to adult learning, organizational learning, ICT and learning, knowledge creation, knowledge sharing, knowledge management and innovation.

To qualify our search patterns and results we have been questioning ourselves over and over again what we perhaps did not capture with our search, so that every step was challenged. The literature study was used to analytical distillation and discussion of key concepts and understandings related to the issues for the futures studies. Our biggest concern in this was how much our presumptions and a preconception has influenced the result.

Key informant interviews

Based on the key informant interview method, we applied our network to gather interviewees, who would and could participate. We pinpointed a number of relevant key informants within the scientific community researching in relation to the explored subject and the HR community with a strategic position in the management. We send email to a number of possible key informants, who lived up to the criteria's described.

The primary criteria was willingness, because we needed to get some who had the time and surplus to participate, secondly was the role in the scientific and HR community, and thirdly knowledge and communicability. The third criteria could not be clarified beforehand, so that relied on the quality of the interview. It was not central for our criteria that the informant was impartial, because as futures studies, we intended to let the interviewee share their beliefs and assumptions about the future of these studies.

We think according to Tremblays (1955) criteria that we found key informants in key positions to the subject.

Discussion

The overall purpose of the thesis is a futures studies into the learning, working, innovation and knowledge sharing in organizations. Based on literature studies we have tried to localize change drivers in learning, knowledge flow and management, and organizing. From this we have built a number of assumptions and hypothesis, which we have used as background material to conduct 6 key informant anticipatory ethnographical interviews. Through the use of an interactional hermeneutical method we have sought to extract the key messages of the content in the interviews.

The following is a thematic discussion of our findings, with the purpose of answering the questions we posed ourselves:

1. If work is innovation and the primary value creator, how do we create an organizational learning environment that cultivates innovation?
2. If innovation is collaborative, what are the impact on the creation, distribution and application of knowledge i.e. the knowledge flow in the organization?
3. What type of organization suits an innovative, knowledge based and collaborative organization? What is the role of ICT in this?
4. How can the integration and saturation of ICT drive and support innovation?

Through our exploration we have discovered that the formulation of our initial questions where not sharp enough and needed adjusting. It became apparent that the question of ICT was an explicit premise in our initial questions. ICT is so embedded in the way of working to support task solving in cooperation and collaboration in organizations, that it became meaningless to explicit ask questions about this in the key informant interviews. The use of ICT in the future seems to be so integrated and saturated in the way of working so the question will more be in what ways can the use of ICT support organizational learning and knowledge sharing in organizations. The use of ICT will be more like a premise than a challenge and the question to be asked is more what impact it will it have on the organizational learning environments. That gave us a shift in focus toward looking more closely into the impact on the accelerated use and integration of ICT in learning, work, knowledge managing and organizational structure, processes and culture.

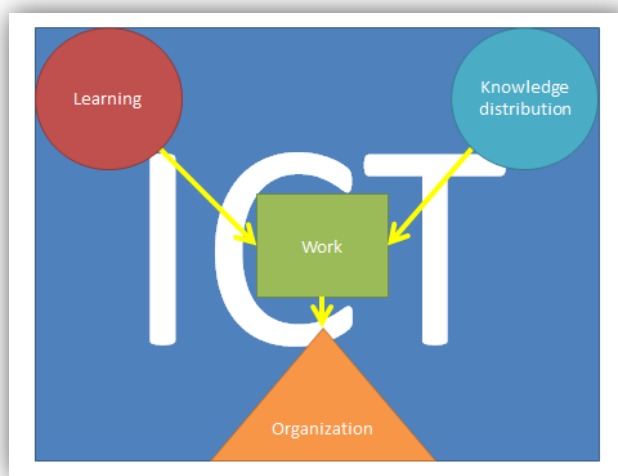


Figure 14.

ICT is constantly present as an integral part of our all aspects of our lives. This point was stressed by Castells in the beginning of this thesis and in our assumptions, and was affirmed through the interviews we conducted.

The figure illustrates how we think about these relations after our exploration. ICT in many forms of technology is ever present, and effect the way we learn, the way knowledge is distributed. This effects how we work and that again leads to new ways of organizing.

Simultaneously all the elements are themselves exposed, influenced and transformed by applying ICT on many levels and in many functions and ways. The

dynamic and chaotic setting creates a very complex research area. As one interviewee said: “People ask: How do you keep up? You don’t, it’s a kind of backwash of information”.

But our key questions remain, but with a stronger emphasis on the first half of the problem formulation:

How do we create learning environments for organizational learning that cultivates innovation in organizations? How can integrate use of ICT in organizations support knowledge creation, knowledge sharing and knowledge management?

You could argue that the last half of the problem formulation should be the first half and be premises for the question with the following rephrasing:

With the increased and accelerated integrated use of ICT in organizations to support knowledge creation, knowledge sharing and knowledge management, how do we create learning environments for organizational learning that cultivates innovation in organizations?

From this perspective we will now discuss our findings in relation to our initial themes.

What are the impacts of new ways of learning on the future of work?

The initial literature studies were used to create a platform for creating assumption and hypotheses about learning. The exploration was done on the basis of the assumption that learning and work is merging.

The intention was to create a background to look into the definition of learning as a product and a process, with the purpose to determine how learning has evolved. The thesis focused on adult learning as a point of entry, because our studies of learning were directed toward adult working.

In our studies we criticized the concept of adult learning for being too wide a concept, which also was proposed by interviewee in our qualitative studies. By one interviewee it was argued that everything is learning. Through our literary studies we have argued against that point of view, with arguments that it is washout the concept of learning process. If everything is learning then we can’t distinguish learning from other form of activities. We have argued that learning is defined by learning something *new*, which is not something you could or knew before. This perspective narrows the definition of learning processes.

Most learning occurs as a part of human communication and interaction, and through that communication and interaction social structures and entities emerges and the thesis seeks to explore learning in a ‘social system’ setting, which triggers certain functions that is directed toward the social system in itself, creating a more stable structure of coordinating and delegating. We argued that this emergent social structure both is reflected in communication patterns but also the patterns of learning in that social system. During our interview it became apparent for us that a majority of the interviewees agreed with the point of view that *many organizations knowledge and learning processes are reflected in their structure*.

Learning in social systems moves between its members from a private, to accessible to collective learning and meaning, supporting the idea of a social system learning process. The majority of the interviewees supported the *concept of social learning in communities* but had varied perspectives on the concept and also many different practical experiences, on how challenging it is to create and maintain. Social learning in the form of networks was challenged by both performance management, but also a failure to see the immediate benefits.

Our understanding of social learning moved from this interactive and communicative perspective toward an understanding of different types of social settings. It is fundamental in our understanding, that social learning is not limited to only physical presence, but is also mediated social learning. Understanding *social learning implies a concept of participation in different degrees*. The concept social learning and participation triggers a number questions regarding structure, process and culture within that social entity. Central for this is the degree of openness, sharing and agreeing to a common and collective understanding of task and process. The different degrees of participation can be graduated on a continuum from a minimum to a maximum degree of participation; sharing, cooperation, collaboration and community. On each level you participate more and involve more in cooperative actions, requiring more and more consensus within the social entity.

The concept of collective learning was a key topic, both explicitly but also implicitly, in the interviews responses. It was argued that the more interknit and coherent a social entity became the more consensus it's required, hence creating a boundary between that social entity and its surroundings. From different approaches the interviewees saw this movement toward a right/wrong description of learning which would emerge within the social entity. The emergence of a social entity evolving into a more stable learning structure is a certain way of interacting and learning, which in itself promotes *certain forms of learning and innovations and blocks others*.

With the emergence of new ways of distributing has the concept of the 'semi-closed' social entity has been challenged by the openness towards sharing and accessing information and knowledge. This openness due to the increased accessibility, which creates the possibility of joining other viewpoints outside the immediate collaborative community, and hence triggering other and perhaps new forms of learning and innovation. This learning is based on the connective structure of information's, where many sources of information are connected across time and space. There was great consensus among the interviewees that this changed the way both *individual and social entity's access and gain information and knowledge, fostering new ways of learning inside and outside the immediate social entity*.

If we assume that work is going to be learning and innovation as posed by Castell and others. The new ways of learning, which both in our literature study and the interviews have pointed towards, this will have a big impact on future of work both in organizations and for individuals.

We see there are two major impacts. The first impact is that much work will be about scanning, harvesting, sharing information and knowledge through connections both inside and outside the immediate social entity. This will trigger the second impact. Due to this connected learning and working, the collaborative community as a social structure will becomes more permeable to the extent, where it might be hard to distinguish the social entity from form its surroundings – hence it is dissolving itself into its environment.

This will question how social entity balance between the open source learning and working and still create a unifying idea or project, to gather followers around and build a collaborative community?

What are the impacts of the growing and accelerated knowledge ecology on the organizations?

Social entities need to decide how they will handle their flow of learning and knowledge. How it picks up the knowledge, store it, retrieve it, distribute and apply it. In the broadest understanding of the term,

social entities require a knowledge management system to pass on acquired and accumulated formal and informal knowledge to evolve.

Many organizations have applied this in a formal KMS to manage and control the knowledge within the organisation. Our literature study into organizational KMS's indicated that there was two basic problems with the KMS. First the codification of knowledge, which required a certain mind-set among its users, and secondly, due to the codification process, there is a build in delay in the process, making knowledge in the system a backward 'window'. Among the interviewees there was great consensus that the formal KMS as many knew from their own or other companies were regarded as a thing of the past. This was expressed explicit and implicit by the lack of answers toward the questioned issue. They also expressed that with the emergence of fast distribution of knowledge, KMS was outdated because of increased accessibility to knowledge from other sources that an organizational KMS.

The interviewees pointed out that the fast distribution of information, data and knowledge through ICT, has made the traditional bureaucratic KMS with its focus on codification and storing of knowledge, obsolete. In many cases it had evolved in to an inflexible administrative entity within the organization, which in many cases reflected the organizational structures, processes and culture.

The increasing distribution of information, data and knowledge also means that there are many more sources of knowledge and many more points of entry into an organization. As one interviewee pointed out; information entry used to be expert driven but now technology makes us all experts. A way of handling this was suggested. The organisational context defines relevant and irrelevant knowledge flow depending on their perceived means and goals and in most cases that is defined by management. From this statement the explored the role of management, role where you define what is relevant and what is not. Most interviewees was concerned with the organizational knowledge flow bandwidth becoming too narrow leaving out too much important knowledge or becoming too wide causing *knowledge constipation*. There was a great agreement that this dilemma should be handled by training employees to handle this new knowledge ecology. This makes the knowledge flow points of entry is significantly more individual.

It is widely agreed among the interviewees that management of the knowledge flow inside and outside the organization is almost incontrollable. Most of the interviewees expressed that organizations should give up the control of the knowledge flow, while others were concerned about if control was lost, thus the organization would cost on efficiency. There was a clear understanding from the interviewees that the knowledge flows created a pressure on the boundaries of the organization, defined by what is accepted *inside knowledge* and what is unaccepted *outside knowledge*.

Our literature study suggested that understanding knowledge flows could better be seen in an ecological perspective that a management system perspective. A viewpoint the interviewees agreed with. The ecological perspective supports a much more dynamic and flexible understanding of knowledge flow and how to handle them. It also stresses the emergence of new structures and entities in the knowledge flow, that originates form the internet. The interviewees pointed toward the organizational challenge of benefitting from this new way of accessing and applying knowledge. They stressed that this hindrance was mostly caused by the organisations themselves by maintain a structure that did not reflect a knowledge ecological understanding of its environment and by employees mind-set.

Learning and knowledge creation is at the heart of the knowledge economy, and if organisations want to prosper from this, then they need to address the specific aspects that are connected to be an organisation in a knowledge based economy. From the interviewees responses both from researchers and HR practitioners, there was a great consensus that most organisations had not adjusted or changed their structure, processes and cultures toward working in a knowledge based environment. A majority of the interviewees know about departments and small companies that worked form a knowledge based approach to organizing. But in most cases it was exceptions.

Based on the assumption of connected learning, there was consensus among the interviewee that organizations need to adopt another approach to knowledge flow and ecology with a stronger focus on sharing and openness toward the organizations environment. There were very different answers, if any, on how this could be achieved. But a shared understanding among the interviewees of the organizational dilemma between openness, sharing and being flexible and addressing the relevant knowledge flows that add to efficiency. One perspective was to embrace organisational permeability fully and other would prefer to reduce complexity by letting management decide which knowledge flows are relevant.

What are the impacts of these two aspects on knowledge based organization?

Organizations emerge from communicative cooperation interactions and from coherent collaborative structures that exist over time, based on a common idea of meaning or purpose. As the collaborative structure grows in complexity certain social structures and processes emerge like coordination, process flow and work differentiation and the integration through culture.

The basic format for organizations was built on the production paradigm with the purpose of producing things in high quantity, quality, economic and with a stabile output. That purpose made a certain effective framework for structures, processes and culture, but with the assumption of learning is work and that learning has taken new forms and the knowledge flows in and out of an organization are changing, the format of organizations need to meet the new purpose and meaning. The interviewees agreed with this assumption but the HR practitioners maintained that the producing organisational format, with a hierarchical organizational structure, is best suited for producing. The point was made that you need different organizational formats for different purposes. Our studies of organizational literature maintains that the format of learning and knowledge based organization are applicable in most organizational formats, as value is created through innovation and learning.

The interviewees expressed that the emergence of the new knowledge ecology and new ways of learning changes the format of organizations in ways we have not seen yet. In our literature study we found several key characteristics of the knowledge based organization. Common for those were that they build on the same elements of structures, processes and culture but in the way the elements are combined reflects the flow of knowledge and learning rather than a producing organization.

The structures, processes and culture of the future knowledge organization need to reflect and mirror the climate of the knowledge ecology and the ways of learning associated with learning and knowledge sharing in the web 2.0. This assumption was supported by a majority of the interviewees, but most also had very few ideas on how. Most of the interviewees called it the 'flipside organization', where the organization would become more 'bottom up', and able to gain benefits from the knowledge ecology and learning through openness and sharing.

Our literature study points toward 3 understandings, which all had learning as the main meaning of the organization; the holographic organization, the learning organization and the super flexible organization. Common for these models are a strong focus on a decentralized power, fast feedback loops, strong communication lines and a large extent of individual and departmental autonomy. The interviewees also pointed to the same aspects of the knowledge organization. One interviewee argued that knowledge organizations should be built on the same principle that governs the internet: openness, autonomy, diversity and interactivity as the primary driver for building a knowledge base organization.

Both the interviewees and our literature studies described the future knowledge based organization as a flexible dynamic loosely connected network, embedded in its knowledge ecology; where it could be hard to distinguish the inside from the outside. Some interviewees meant that this would challenge our whole concept of organizations. The knowledge based organization would be united round a purpose; creating collaboration through a shared meaning or purpose, which would gather followers and through an iterative communicative process create the structures and process needed.

The interviewees with HR practitioner background had a more critical perspective on this even though they agreed on the overall movement. There was three factors, which they saw counteracted this movement; psychology, traditions and economic. Furthermore they also argued that the development in this direction would be as fast as expected by expert and also to a lesser extent e.g. they did not connect to the idea of a leaderless network; even though one HR practitioner mentioned an example of one networked organizations.

Conclusion

The thesis has as a futures study been a journey into the future of ICT in relation to work, learning, knowledge ecology and knowledge organizations. The premise for this is the assumption that in the knowledge economy value is added by learning and innovation and that learning is changing as a consequence of the new ways of distributing and sharing knowledge. The purpose of this has been to explore the impact of these changes in the way we work and organize, and answer the questions: *How do we create learning environments for organizational learning that cultivates innovation in organizations? How can integrate use of ICT in organizations support knowledge creation, knowledge sharing and knowledge management?*

Our journey began with localizing the change drivers in relation to learning, knowledge distribution and the way we organize work with a literature study. The purpose of this was to elaborate our understanding of the socio psychological process of learning as it evolves into a more collaborative and connected ways of learning, applying and integrating the technologies of social and participatory media. *The conclusion is that learning is becoming networked – connected and collaborative through interactive participation.*

Based on this conclusion the study has explored and elaborated on organizations¹⁸ as knowledge flow systems, which capture, codify, store, retrieve, transfer, distribute and apply knowledge in order to evolve. The argument is that this process of preserving and transferring knowledge creates relative stable

¹⁸ Here used in its widest understanding as a social entity (Se chapter on Knowledge ecological organizations)

communicative patterns, which evolve into holding environments for certain types of formal and informal knowledge flows. The organization defines which knowledge flow it determines as relevant or irrelevant, delineating knowledge flows from its immediate ecology, reducing the overall flow of knowledge inside the context of the social entity. *The conclusion is that knowledge flows transcend the context of the organization and operate in a knowledge ecology.*

From these two conclusions the study has explored and elaborated on the structures, processes and culture of social systems in the light of the new learning and knowledge ecology. The argument is that communicative collaborative interactions emerge into relative stable social systems – organizations – which reflect the knowledge flows within the social system. The relatively stable social system evolves certain ways of combining the structures and the processes and creating a culture, reflecting the purpose of that social system and its immediate perceived knowledge ecology. Based on this and the two prior conclusions, the conclusion is that. *A knowledge based organization needs to reflect the purpose and the new ways of connected learning, where knowledge flows transcend organizational boundaries in its organizational design. This requires a strong focus on openness, sharing and connecting with its knowledge ecology.*

The next step of our journey was to expose our change drivers to a number of key informants, with the purpose of exploring the derived assumptions and hypotheses. The interviews are a number of qualitative interviews with scientist and HR practitioners, who were asked to reflect and elaborate on the conclusions. Based on hermeneutical interactive analyses of the interviews concluded the following:

The learning and innovative work will be about scanning, harvesting, sharing information and knowledge through interactive connections inside and outside ones immediate permeable social entity,

Organizations must create a meaning and purpose which gather followers to iterative evolve into a collaborative community

Organizations must create a combination of structures and processes, and create a culture that resembles the new learning and knowledge ecology, balancing openness and cohesiveness.

Organization must adopt an open and sharing approach to knowledge flow and ecology, without reducing the complexity

The future knowledge based organization is a flexible dynamic loosely connected network embedded in knowledge ecology.

Creating learning environments for organizational learning that cultivates innovation in organizations is done by adopting and applying the above conclusions. This will integrated the use of ICT in organization in a way that support knowledge creation, knowledge sharing and knowledge management.

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Annex list

Annex 1: List of links to interview or a DVD with recordings of the interview.

Annex 2: The power point slides used in the interviews

Annex 3: Interviews

Annex 1: Links to the video recordings of The Key Informant Interviews

Senior Researcher Stephen Downes, Institute for Information Technology at the National Research Council, Canada interviewed on 4th May 2012 at 3 p.m:

<https://connect.forskningsnettet.dk/p8oadwao3kn/>

Professor of Learning Innovation Gráinne Conole, University of Leicester, England on 11th May at 5.30 p.m.:

<https://connect.forskningsnettet.dk/p1g3uyb2sf6/>

Professor Allison Littlejohn, Glasgow Caledonian University, Scotland interviewed on 10th May at 3.30 p.m.

<https://connect.forskningsnettet.dk/p2r92b4p2rl/>

HR Director Susanne Spang at Thermo Fisher Scientific in Denmark, Norway & Sweden interviewed on 7th May 2012 at 8 p.m.:

<https://connect.forskningsnettet.dk/p5iuvxd9151/>

Executive HR and Senior Vice President Simon Riis-Hansen at Lego, Denmark interviewed on 15th May 2012 at 5 p.m.:

<https://connect.forskningsnettet.dk/p5ntjfsyp7b/>

Organization & Talent Development Manager Bela Tisoczki at General Electric Deutschland Holding, Germany interviewed 24th May 2012 at 4.30 p.m.:

<https://connect.forskningsnettet.dk/p20b8e56aoc/>

Annex 2: The power point slides used in the interviews

Scenarios

Intro & Prologue

“The shift from traditional mass media to a system of horizontal communication networks organized around the Internet and wireless communication has introduced a multiplicity of communication patterns, at the source of a fundamental cultural transformation, as virtuality becomes an essential dimension of our reality.”

Castells, 2010:xviii

Work = Learning = Innovation

- Learning is moving from the corrective (right/wrong) to the innovative (harvesting & creation)
- 3 levels of meaning: (less) private, (more) accessible and collective negotiation of meaning
- Learning is collaborative – negotiation and sharing of meaning
- **Learning is created through connections – interactivity and collectivity leads to networked learning**

Organizational knowledge flow

- Organizations function as holding environments for knowledge (inside/ outside knowledge)
- Organisations 'capture', organize and systematize knowledge through codification
- The organizational context defines temporarily relevant/irrelevant knowledge flows
- **Knowledge flow transcends the organizational context and operates in a knowledge ecology, associated with new ways of learning and innovating**

Knowledge Organizations

- Production = Value by learning and innovation
- Organization = dynamic coupling between: Structure, process and culture, balancing being robust (boundaries) and flexible (openness)
- Learning and innovation transcends organizational boundaries and operates in a knowledge ecology
- **Knowledge organizations focus on learning and innovation by a strong focus on openness to its knowledge ecology**

Ex. VIDM 5th May 2012



Next step

- What other thoughts do you have regarding these subjects?

Annex 3: Interviews

Key messages from interview with Stephen Downes at 4th May at 3 p.m.

Slide 1: The interview began with introduction to our project and our methodology, and then interview tried to convey a full picture of the setting and the quotation of castell. Next the interviewer gave an instruction on what we wanted the interviewee to do. The direction was:

- Present some idea and get you to elaborate on those
- Based on your own research presented on the online video – elaborate on this?
- Otherwise think top of mind what your thoughts are about this?

Slide 2: The interview presents and elaborates the assumptions on the slide, and presenting the structure of the slide. The presentation ends with the interviewer posing a question: How do you think learning will affect the future of work?

The interviewee point out that he normally draws an important distinction between collaboration and cooperation, and that is, and that goes beyond the question of learning and address the question of organizations generally. Collaboration is defined by collaboration toward a common goal, where cooperation is collaboration, without a shared common goal, in the sense that you can cooperate without collaboration, ex. buy - selling exchange.

The “concept of meaning is a blunt instrument”, and refereeing to the 3 levels of meaning. The information of a person is shared and distributed more widely by that person or others, than in the past, but from that to arguing that meaning is more widely shared, is nonsensical, so rethink that. Meaning is not something you distribute in that way, because the contact isn’t there.

Learning is the creation of connections. There isn’t a difference from connections. You will find it hard to analyse what learning in a society is there is a problem. You can’t have learning without connections, the human learn constantly learning by connecting all the time.

Learning is a cooperative activity not a collaborative activity, but learning is happened in interactions and with experience, but not necessary in collaboration, because collaboration is a certain set of interactions, and is also about power. Learning is more effective supported through cooperation, which promotes autonomy and creativity. In the interviewees point of view learning is moving from the collaborative to the cooperative, because collaboration is about creating agreement, but cooperation supports innovation. The interviewee supports the idea that this is a critique of Wenger’s concept of communities of practices, because it cultivates a unified identity.

The definition of learning is for a person to form a neurological structure, so learning is not collaborative or cooperative, but the point is that the statement is: learning is best supported by cooperation or collaboration. Learning is NOT best supported by collaboration, because the alternative way of supporting learning is cooperation, which allows a person to exercise its own creativity, own points of view, and work toward own objects, which is a more effective way of supporting the forming of new connections.

In a working setting there are several models the first is a client – server model, where the latter sells a performance to the first. Second is a mutual exchange of goods and services for goods and values. The

question becomes, what is the better way to organize a work environment. We are in a place in history where we are moving from an hierarchical organisation to networked based system, and we see this movement mostly on the edges, like in the fighting of wars, where “very understaffed and under resourced organizations can pose a serious threat simply by working on a decentralized and networked basis”. But we also see this in organization of cooperate structures, where we seeing a network interlocking cooperation being created, rather than on big monster organization. The bigger the organization bigger the risk. The networked decentralized organizations are more efficient than the centralized and hierarchical organization, because the networked organization can, through the networked organization can - through self-organization - come up with solutions, which the hierarchical organization simply cannot.

The reason for that is that the hierarchical is dependent on propagation top down in the organization, which means the informational content is limited by the capacity of one person – the founder. In a distributed organisation, that not the case. The knowledge capacity of that organization is based on self-organization and emergence of more complex forms of knowledge. Then it is a mathematical challenge – how much knowledge can one person hold, versus a community of persons?

Given the communicative capacities with ICT, a distributed organization will always outperform a hierarchical.

Slide 3: The interviewer started by challenging the concept of knowledge flow, but pointing that knowledge can't flow. “Knowledge is a property of a self-organizing cognitive system”. Knowledge is a district property of a cognitive system. Knowledge emerges as a form of cognitive self-organization of information. We can think of an organization as a knowing thing, in so far as the organization is structured as a network. The less structured it is, the less it knows, and is depended on the knowledge of the people in it.

The codification is about creating artefact, representing the knowledge it's gathered and put in a big pile. I would not argue that is if you have a big pile of artefact in the organization would mean that the organization knows. This is why knowledge management fails so bad, capturing and storing knowledge don't create new knowledge; it just creates big pile of information. The ability to create linkages between information, artefact and people is what creates knowledge that is above and beyond the individual knowledge. Creating knowledge in an organisation is to enable communication the creation of connections between the members, which becomes the organizational knowledge. The existing structure is creating knowledge, and if it don't it's like a neurological disease.

Slide 4: there are 4 major properties' that describe the effective creation of a network that support this creation of a dynamic network. The 4 criteria's is Autonomy, Diversity, Openness and Interactivity. These criteria's address the type relationships between entities. Individual autonomy is about creating room for individual action and decisions, and diversity is about accesses many points of view, perspectives and voices, which produce better results. Openness is about creating an organization which is capable of receiving information from the outside, and response to its environment. Interactivity, because knowledge is created in that interactivity, where knowledge created in one node, is sent to another node.

It is a view of organizations based on balance and equity, because these conditions produce knowledge organizations. Openness needs to be followed by the capacity to receive, which is produced by the

autonomy and diversity of the members in the organization, but many organizations are pushing away the knowledge from its knowledge ecology.

As opposed to an entrepreneur that creates an organization, you would as a network thinker you would try to set a cooperative with people contributing to whatever they think is relevant and important. So you set an environment that supports autonomy, diversity, openness and interactivity. You start by throwing away your concept of entrepreneurs and focus on the networked approach, which will challenge the concept of compiling power and wealth.

Slide 5: Many virtual organizations look similar, where individual contribution with their own.

Slide 6: Main thing about coordination, but providing them maximum assistance to make people do what they want to do is a more effective way of organization.

Key messages from interview with Grainne Conole 12th May at 4.30 p.m.

Slide 2: The side has very good point and build on the notion of openness. And open resources are growing, based on the idea of connectivity, on massive global scale and access to being a part of a peer to peer distributed community, give rise to opportunities of learning. The learning is horizontal and connected, and through shared understanding and meaning, creating stronger links and connections. Sharing knowledge and learning is much more open, and changes the teacher pupil relationship, but you still need guided learning pathway, because you easily get lost in those kinds of spaces. The shift in learning is about creation more open and connected learning, enabled by social and participatory media.

Following that there is break down of the boundaries of formal and informal learning, creating a more complex environment, with a huge potential if these are harnessed effectively, but will require new digital literacies. In the world of work, this also applied due to ex. you change job and functions, which requires a constant learning and just in time learning, depending on your needs, and moving forward to become a learning organization.

This will influence the future work, because work is taking place in increasingly challenging global society and environments. There is a change in power structure moving from west to east, growth of a huge young labour force, so the change in nature of the kind of knowledge that needs to be generated is changing. It needs to be more just in time, more agile and quickly adapt to needs of the environment and new markets opportunity. Organization can make much better use of participatory and social media, in terms of virtual training and to develop a learning organization to sharing of practices, because learning is the most important key access any company has.

Slide 3: The idea of codification doesn't go very well with the idea of fluidity of social and participative media, because people can connect in so many ways. The connections can be used to build up different networks with common interests, and build on the notion of the learning organization. Where you use technology to connect people more closely and capture knowledge and expertise, with their system. Ecology sits better with notion on how technology is influencing how people work in environments, ex. That social and participatory media will challenge the business models. In a world where content and expertise is increasing free, what is the role of traditional educational providers? These technologies also create new ways of working, where employees, no longer need to be co-located next to their work. We can construct knowledge in increasingly sophisticated collaborative tools, there are fundamental ways where

technology not only change the nature and process of what organizations do, but also general work practises and where people are working.

Organizations need to be better to use social and participative media, but in nature the media is a bottom up and non-hierarchical, so it more about equipping the individual in the organization with the necessary digital literacy skills to harness the potential in these technologies, and also provide them of examples of benefits of this. There are challenges with the competition and the concept of the organizations intellectual capital, but the benefits outweigh the disadvantages.

The implication for organizations is a change in business models, a change in power relationships, more externally global connected, if used effectively, the help organization to become more learning organizations, which harness and share the expertise with the organization more effectively.

Slide 4: To understand organizations we need to look at the nature of different kind of communities: groups, networks and collectives. These different concepts will be important because they can be applied with different purposes in different contexts depending on how close they work together and to which degree collaboration is needed. Ecology is useful here because, it gives an indication of the complexity, dynamics, change and coevolution within those, so that organizations need to be increasing swift, agile and dynamic in how they do things. Affordance is also useful in relation to the technology and users, and the coevolution of practices with the organizations.

Tomorrows organizations need to adopt a design based approach, starting with articulating the problem, and then identify a system to meet those needs, and then let it coevolve and then have an iterative cycle of technical and social interventions to iterative improve it. The challenge is that you can predict where this process will go, because it is driven by coevolution. This will challenge the notions of management and predictability and will flip the game around, and have the flipped organization, where it's not about hierarchy and control but about recognitions of expertise and skills, harnessed and applied to a particular problem, in a particular time and a particular context. The kind of ways we manage organizations will not be appropriate in the future. The whole notion of being on site from 9 to 5 will disappear.

Slide 5: This is a good example on how future organizations might look like, where you harness different technologies to meet particular needs for particular timed event. That is the power of the new media, to support and enable much richer communications to complement face to face events. At the moment the organization is not ready for these events. It's also that you learn to use these technologies by participating in a workshop, but only by active participating in them, and get your own aha moments, and find your own appropriate network. The question is how do you keep up – the answer is you don't, but you have a network of filters to get access to the right stuff. It's a new mode of working, about negotiation through trans media navigations of infinite spaces.

Slide 6: Disruption is a feature, and uncertainty is a reality, we can't predict for the future, notion of copyleft instead of copyright, the way we interact will evolve, because access to ICT is essential to do our job.

Key messages from the interview with Allison Littlejohn at 11th May 3.30 p.m.

Slide 2

How do you think that this kind of learning will affect the future of the way work?

It's a very interesting quote from Castells. And I think that these statements are very interesting as well. It's a very good question. The problem I have with answering this question is that there is a huge: it depends. It depends on what sort of work you're talking about. So I want to focus mainly in knowledge work and by knowledge I mean is a kind of work that people do when they're producing knowledge as an output – instead of some kind of physical artifact. If we think about knowledge work, then we're getting closer to the kinds of learning that are brought about in these statements: Then again it's a generalization and we can always find exceptions.

The first statement:

I think it's true in some ways but I think that if we're looking at learning in organizations in a broad sense some learning will be the kind of corrective learning, shall we say, there are some instances where people need to know factual information. For example if you take someone who has been in an organization for a long time and has moved into a more managerial position there are certain procedures or factual information that that person will need to know. However you'll hope that that person will have a large part of their development would be what you term the innovative here harvesting and creation. So I think if we think about learning – an ecology of learning, shall we say - then it's lightly within organizations to encompass both of these and not simply shift from one to the other. However I agree with the principle of the statement which is that that learning is moving from the corrective to the innovative. I think that is a bit of an idealized statement I don't really think it sums up what is happening in every company.

The second statement:

Again it's an idealized statement which is focused on the idea of open knowledge and people creating new knowledge through connecting, knowledge which already exists. This statement I think is leaning towards the idea of collective learning where people connect knowledge. Is this a direction we're going in, in organizations? I think again it's an idealized direction that we would like companies to move towards. However there's a number of different problems and issues in terms of how systems are connected up, how organizations function and how people interact with one another that are probably a barrier towards moving in these directions.

Third statement:

Again if I go back to the first statement, I agree that to the idea that learning is being social and collaborative and people learning together which involves negotiation and sharing of meaning. The reality within organizations is that many organizations are moving away from the formal training towards learning, which is more open and collaborative, and there is more recognition of learning in projects or on-the-job, for example, which involves negotiation and sharing of meaning. Again the ideal is the direction in terms of organizational learning but it's not always fulfilled.

Fourth statement:

This has some resonance of the work of George Siemens at Atabasca University who looks at the idea of connectivism. George has presented connectivism as a theory which has some links with constructivism, of

course. I think that if people are working at the boundaries of knowledge if we have people who are trying to solve problems in organizations that have never been solved before and if they happen to create some new knowledge, then this idea of connecting with new knowledge and with people who have the right kind of expertise is an imperative. I don't about learning is created through connections, but certainly connections are an important aspect of learning, so again it's an ideal, shall we say, there are some impediments to making the right connections and understanding who might have the right kind of expertise that one requires.

[....]

When it comes to learning and learning in organizations what do you think will be different in 5 years from now? How do think the whole learning movement will impact the way we work?

When I think about organizations I tend to think about the large multinationals we have to remember they're not the only type of organizations. But I think in the large multinationals there is clearly a move towards the integration of what used to be recognized as learning which is really formal educational training to a more mixed approach where formal educational training is linked with non-formal learning - the recognition of what people are actually learning on the job. And I think associated with that companies are trying to build the kinds of network systems which will help people to connect. So how does someone working for an oil company in Houston know that someone else in Singapore has the right kind of knowledge that they need, particularly if they haven't actually connected before? I think focusing on developing on these kinds of systems and processes, mindsets and cultures within the organization that allows this, is certainly a direction that the multinationals companies are taking. If you take companies for example the creative industries where people are working sometimes as a sole trader or as small groups, I think there is a slightly different dynamic going on. I've been doing some work recently with some of the creative industries in Scotland and certainly there is a move towards far more collaboration and collaboration is seen as key to creativity and innovation but the kinds of collaborations people are having is not – is driven by the individual rather than by the individual within the context of an organization, if I making myself clear. So these same kinds of networks are forming, but they tend to be more fluid and there isn't some kind of organizational structure or network or system which is supporting, so there is a difference between the two.

Slide 3

How do we think that this will affect the knowledge flow in organizations?

Again I find these quite ideal statements in many ways.

First statement:

I think it's true that organizations are – different types of organizations are changing in terms of their purpose even they don't understand or know how organizations are changing. For example the difference between a company and a university is less clear than it might have been a decade or two decades ago. If we project into the future then there is some interesting dynamics between organizations like universities and companies. And I think that could have untold impact on society, on companies and on universities on how we perceives these organizations in the future, indeed if they exist as they do at the moment.

This idea of inside – outside knowledge is an interesting one because it conflicts in some ways with some of the previous statements you had on open knowledge and open access and so on. I think this could be a major buyer for companies because there still is a view in terms of intellectual properties and this idea that knowledge equals creating money and knowledge is central to economy, then trying to own knowledge under the current paradigms is a tricky area. Obviously there is some examples of innovations jams or ways where companies have put their IP (*intellectual properties) out and asked people for applications of that IP which opens up knowledge, I would say....but these examples are more exceptions rather than normal business of a company. So there is a tension there and I think it's one we really have to seriously address and if we don't address it then I think there could be changes in the future that can be quite unpredictable for companies and they might not be ready for them.

The second statement:

I think we'll see years of companies who will love to that, but there have been a lot of attempts to codify knowledge, I know particularly in some of the multinationals with the 'baby boomer generation' leaving and taking their and so on, they try to capture the knowledge of the people before they leave to make sure that they have this knowledge baseline within the company but that has been fraught with problems because there is a very clear understanding of knowledge and expertise. Not all knowledge or expertise can be codified and even where it can, then it's not capturing the knowledge which is important and the application of this knowledge for innovation and driving forward to new ideas, that is really important. There has been a lot of misguided, shall we say, attempts to do this which haven't always been as successful as have been hoped. Actually in the future at some point if we haven't realized it, the people who are researching this know it already, that you cannot simply have knowledge and expertise within a system that some it is very human and requires your development of expertise over a lifetime.

Third statement:

Sometimes I think that the knowledge flows which have been defined as irrelevant are actually the most important knowledge flows. One of the most difficult areas is where you have to have knowledge flowing across boundaries whether these boundaries is disciplinary boundaries or boundaries in terms of the groups that people are working in or even across companies and it would be interesting to try understand how much innovation we actually miss by the flow of information being somehow restricted or defined in some way. So this statement is problematic in the sense if we want creativity and real true innovation then it's very difficult for an organizational context to define a knowledge flow. Whereas on the other hand if you don't have some kind of guidance in terms of how you connect knowledge then people in our systems can be completely overwhelmed by the degree of knowledge and number of possible connections so it is getting bounced between the two is very difficult.

Fourth statement:

To be honest I find this one to blind be one of the blind statements that you see everywhere, yes we would all subscribe to this kind of statement. But how will you associate the flow of knowledge with learning and innovation? I think it is something that we not really do understand.

Do you think of focus on the exceptions of organizations as companies as Apple, doesn't really say anything of what is going on I mainstream companies?

I don't think these are blind alleys because of the fact that Apple exists and is pretty successful and powerful organization. But I think to understand what these success factors are, it's very difficult. So it is very easy to think that anybody can be Apple.....To me they are examples that can help spark thinking. However I do think that when you think about particularly opening up knowledge we are thinking about a completely different paradigm in terms of the way how the organizations might operate online and exist. In some ways we are talking about a paradigm shift but the paradigm isn't really changing so there is a contradiction there.

Could you elaborate a bit about the contradiction, how you see that?

The contradiction is that to really bring about innovation and society transformations then we have the opportunity to open up knowledge and open up access to knowledge with new ways of being able to connect that much and in doing so to come up with very creative and innovative ideas and this is really important for society because we can transform health care and we could even create new types of living beings. We don't even know what we can do in the future. On the other hand because we have an understanding of organizations and how they function in the capitalist paradigm, then we're still trying to generate incomes for the reasons we have always been generating them. There are some exceptions to that companies as Lego and so on that have a completely different business models. In the whole we have one paradigm that is very open moving towards real innovation and the other hand we are trying to generate money through an understood and old time paradigm. I am not sure the two fit together.

Slide 4

Statement 3

One of the statements says "Learning and innovation transcends organizational boundaries and operates in knowledge ecology" and that's very true in the sense of people who are working in organizations do not simply learn within that organization. We learn in every aspect of our lives therefore if knowledge organizations were smart we will understand this and I think in terms of the research at the moment in terms of people's networks and how people learn through networks, the kind of knowledge diffusion through networks, there isn't a clear understanding of how people networks meaning peer-to-peer networks can align with the web 2.0 type of networks or the digital network. So we have entered a new era over the past decade, shall we say, where people are learning in different ways and where this learning occurs and how it occurs is very different. I think if organizations can capitalize on that then it would be very beneficial to them.

Statement 1

I think what organizations have to do is to understand what we mean by learning. We use the word learning but often we don't really understand what we mean by that. And when learning begins and ends. For example every single time someone carry out a task at work then they are probably going to be learning. How expansive that learning is depends on the degree to which the person is challenged. And innovation is used very often, but what do we really mean by innovation? Is it invention? Is it innovation within particular context? Or is it transfer of knowledge from one context to another? So I find it very difficult to comment on this first statement, because it looks to me like some kind of mathematic formula, again an ideal, but it doesn't necessarily always work in organizations.

Statement 4:

There is an ecology of knowledge. There is a lot of knowledge out there; it's got very different forms and so on. And for organization to improve in terms of innovation and the production, then people have to tap into that knowledge, use it and create new knowledge. So in a sense, yes it's an ideal. There are many, many barriers for that to happen very efficiently and effectively and some of these barriers will be relatively easy to overcome f.ex. doing the kinds of technical systems that we need to support this is relatively easy compared with changing the cultures and the mindsets of the people who would operate in this knowledge ecology. I have to say that these statements look like the kinds of statements that could have come out of my own papers, I possibly could have been written and then reflect on and seen what on Earth does that mean.

Architect of building an organization.....including the knowledge ecology you are a part of.....How would you build that....?

I would start by try getting the right kind of people in. The people with the right kinds of mindsets, cultures, practices, behaviors that would allow that kind of free flow of information.

It would be value driven?

It would be people driven. I think if you are trying to set up that kind of organization then you have to have the people with the right kinds of mindsets and cultures - and value.

Slide 5

The great thing about this organization is that it's in some ways self-organization, the tools and so on is partly selected by the coordinators rather than by an organization. It isn't using any enterprise system apart from the system maybe from the university in New Zealand. That is a positive because then the people who are involved in the organization can use the kinds of tools and environments they personally prefer and they are familiar with. In an ideal situation we would have a complete interoperability of all kinds of tools. If some of the participants prefer not to use Skype can use a similar kind of tool it can interoperate but obviously we don't have systems that can interoperate in that way. But I think in the future we will have flexible dynamic systems with a knowledge ecology, as you say, then you would be able to manipulate that knowledge by using any particular tools as you wish an individual person and yet there will be way of people being able to connect collectively manipulating knowledge.

It's ironic in a sense that people have choice about the kind of systems they want to use. You would hope the time it takes them to learn to use the systems – not just how to use the systems but be familiar with them and to have them already integrated within their practice would cut down the time it takes to learn how to use systems and how to change a practice.....It can be a huge difference to go from working in an organization with a management and a hierarchy to working in one which has a flatter structure and which has less central coordination. There is a big mind shift in how people work and how they understand one another, what the culture of the organization is and so on. [...]

It's the mind set and your previous experience but also from learning research this idea of being able to self-regulate, I think there is a bit of a tension between the way that schools, colleges and universities are

currently operating where there has been a shift towards supporting the learner rather than possibly allowing the learner to self-regulate. But there is a big disconnect between that approach and then people going into organizations where if we are going to have open and non-structured organizations and free flow of knowledge we have to be able to self-regulate the way in which we work and learn because there is going to be much more flexibility and freedom. And actually my fear for the European economy is that we don't really have people within Europe, who are able to do that.

How can you support the openness and open structures in organizations if there are boundaries for sharing knowledge because the companies want to keep the knowledge for themselves in competition with other companies?

I think there is a fine balance between competition and cooperation because some of the creative industries that I have been working with see cooperation as essential for innovation, innovation is essential for them to make money and exist. It is possible that some of the smaller organizations are more willing to share their intellectual properties than some of the larger organizations which probably can be viewed as a collective within themselves ... What we see coming out from opening up research is that there is almost a meta-level of research where we can discover new things just simply because we have access to lots of open and available knowledge. It is possible that within companies there will be a realization that something similar could be possible within the companies. The way forward is difficult. It is possible that governments could say to companies if you want to operate within this country you will have to open up your knowledge. But even that is very difficult to control if we have companies are working in different countries. Because we are seeing these societal shifts and shall we say the down play of individual states and the power of the individual states and the increase of different types of organizations become more powerful f.ex. multinational companies are much more powerful now than 50 years ago. I think that the open access to knowledge is going to be a key factor.

[....]

What other thoughts do you have regarding these subjects?

I think that one thing we really need is for people in general for all of us to have an understanding on a meta-level about knowledge. What is knowledge? How does it transform? Why is it important? And unless people actually are studying the area of expertise or knowledge development or related areas, I don't think we do really think about these things meaning people in society. And if we are rethinking organizations and rethinking how people work we do have to take a step back and think about what is the relationship people, knowledge and the kinds of technologies that we have and the kinds of connections we might need.

Key messages from interview with Susanne Spang 7th May at 8.00 p.m.

Slide 2: The interviewer points out that she disagrees with the definition of learning, because everybody needs a basic level of common agreed knowledge, defining the 'correct knowledge'. In organizational structures the manager together with the teachers and the pupils define what is the content of the basic knowledge required.

Learning is becoming more and more accessible, based on access to the internet, and in regard to learning in companies, we would like to use and apply the ICT tools more and more. Most of them are not available

for us, because there are many rules of which technologies are allowed and which is not, which created paradoxes because many use them anyhow. This leaves a lot to on the job training. Much of the application ICT in learning is about using virtual meetings and coordination between part of the organization. There are always potentials you miss out on, when put up limits to application of ICT, but that is counterweighted with the economic factor. Also there is a value based cultural aspect of these choices, both in organizations and national cultures, which creates clashed between the applications of ICT based learning. Learning in organizations need to be adjusted toward the different ways of learning, but if we can capture the learning ways of the new generation Z, in another question?

The global aspect is a bigger challenge, than the emergence of new ways of learning, and how we handle remote management and leadership. The visual is an important aspect of communication, so lots of the ICT should focus on the basic technology like the visual. Beside this there is a lot of other and new tools like chat, which can be applied, but is not extensive used, mostly because it is not allowed within the frame of the company IT policy.

The concept of performance management in organization, counteract the organizations ability to harvest and apply learning and knowledge outside the organizations, also due to the limitation of use of technologies. The interviewee points out, how she applied her own informal network to gain learning and knowledge, but also that this is not enhanced of her organization.

Slide 3: The way organizations are moving so that the permeability and openness towards its surroundings are accelerated. So the web is much influencing what going on inside the organizations, because the amount of knowledge on the web is growing, but it makes it more important to be able to distinguish what is correct and what is not. The interviewee is not sure how we distinguish this, and this requires the ability to verify the correctness of information from the web, and we need to better check our sources and also be better to use each other to create that verification. But it will require that the employee can reflect, think and verify the information and knowledge themselves. At this will be learned through on the job training. We will harvest much more information and knowledge on the web in the future, but it will be the organisations culture that determines how this will be used, and be applied inside the organization and how much you will benefit from this information.

Slide 4: The interviewee thinks that this depends on the purpose of the organization. As a part of a matrix based organizational structure, it is very complex, but it creates an enormous flexibility. But the challenge is to decide who takes a task, because the organization seldom limits the employees will to take a task upon them. If you can live in a complex matrix organization, then there is a good foundation for a learning organization, but it's also very chaotic. The disadvantage of this is also that sometimes it's hard to figure out who knows and who is responsible, but it trigger the learning and innovation, because you can do the things your own way. That also means that there is high tolerance for mistakes, and a will to adjust and correct when mistakes happen. One of challenges is that we all have individual targets, but sometimes we end up with something completely different, than what our performance management is telling on what we should do, limiting the use of others and new skills.

To be better to learning the organizations need to work with continuous learning and improvements. This cultivates a constant flow of new ideas, and we need to become responsive and pick up those ideas, which

emerge from many small sources. We need to create organizational room to try new ideas and make mistakes and its worse not to try.

Slide 5: That is how the interviewee would like to see the world, and don't believe that it will be long before companies start to create organisation like that. Whether it is continuous going to be like that or event base, where the network is open or not that is another question, probably depending on the company, ion how conservative they are. The interviewee believes that this will function like this. In the virtual organization remote management not is the most important, influencing will a key issue. If you want people to follow you, you need to apply the ability to influence all around your organizational setting. Managing is probably counterproductive to unleash people creativity.

Key messages from interview with Simon Riis-Hansen 15th May at 5 p.m.

Slide 1

There is a change in some companies organizing in networks in relation to solving tasks. 'The anywhere enterprise' (Cisco), where you from anywhere can work in networks solving tasks together. It is important that you have a sense of belonging When you organize in this way then some of the fundamental psychological needs are influenced e.g. the sense of belonging, the felling of having an identity in a community, the felling of trust and confidence and the experience of there is a boundary between a private sphere and a professional sphere. All these boundaries start to blur.

By meeting in a collaborative community with co-creation of reality you can create new knowledge and new insights either through 'wisdom of crowds' that you are meeting each other in or in a collaborative community. It provides a special challenge if you are meeting in relation to an adaptive challenge because in the community the people can be individually competent but collectively incompetent. In 'integrative problem solving' in communities you meet in a in a mutual disagreement which is productive. It is not the system which is the solution but it is the enabler.

'There is nowhere to hide the World is transparent'. It requires that you are ethical in your behavior because you are organized in a community where you are more symmetrical and everybody cannot see what each other does. You cannot hide anywhere. Here is ethics and being authentically important. The ones who can meet the new reality are the ones who are real and authentically and have enough confidence in themselves to make it work.

To make it work in a community everybody have 'to have a stake in the game'. Value adding conflicts – you shall invest something - a stake in the game -with the risk of losing it. You invest your diversity in the community. Learning is embedded in practice. We learn from extract meaning, learning and experience from the everyday life we are a part of. There is a right and wrong that you explore in reality. It is contextual.

Slide2

All knowledge is not equally valid and equally valuable. Many large companies are suffering from having too much knowledge and insight. Nobody knows what exist of knowledge, what is new and what is old knowledge and what can you use the knowledge for within the organization. The management decides what is right or wrong in relation to knowledge. To create a direction in a company through 'coherence

premium', which means having the right capabilities within the organization. 'How do we compete and earn the right to win?' The management in the company has the right to interpretation, which means an asymmetrical structure in the company.

'You do not have to work for us to work with us'. The companies have to have strategies for using the possibilities in networks and social media externally. Internally in the organization, there is 'pockets' using the digital possibilities and social media for learning and sharing.

Slide 3

The company organizes the open innovation in relation to something that has significance for the company. The management is the focal point that organizes the innovation in relation to something. There are different kinds of innovation because there is 'front end innovation' with deadlines and 'concept lab' with open innovation without boundaries for the innovation. It has to be a part of a value chain within the company. A way of organizing is 'the ambidexterous organization', where different forms of organizing interwoven with each other that do not seem logical on the surface. You can have front end innovation with deadlines in a part of the company and open innovation in another part depending on the needs of the organization. The company is organizing the innovation in relation to something.

Leadership is what happens when you are not there. The future leadership does not demand 'a change of leadership but a transformation of leadership'.

Slide 4

In relation to organizing a company in a networked organizing will in a commercial organization depends on the business model. There has to be a business model understood as 'the money making logic'. A network based organization does not function without an organizing. In a network you have different kinds of roles, there has to be people coordinating and facilitating. It does not have to be a hierarchical organization but you are organized with different kinds of roles at different times. It demands a discipline and a systematic and a repeatability which is very important in a company to support the possibility of repeating and learning from the experience.

Slide 5

A network is not a network of computers but a network of people. There is a psychological dimension that cannot be ignored concerning trust and confidence and sense of belonging.

Key messages from the interview with Bela Tisoczki 24th May at 4.30 p.m.

Slide 2: The interviewee begins with challenging the assumptions about learning. He distinguishes between gathering information and then there is *learning*. Learning is where you integrate that information into your frame of reference, and you may reframe your reference. That type of learning you get through exploration, experiencing things and so on. Depending on your perspective, in collection information, there are instances of right and wrong, and you need to figure that out. The way we figure out what is right and wrong is changing. There is a shift from a single point of reference, where one is an expert, to a net of expertise, because networks quicker outsmart individual experts. I believe it to be overstated that networks are going to be better than those experts, because I think networks only outsmart networks if the expert is in

the network. The new learners are not so preoccupied with what is right and wrong, but more to get a quick answer. They shoot an inquiry to a network, and take whatever comes back. The quality of that answer may or may not be correct. It's more efficient, very effective and fast. But I'm concern that you lose depth in your answers.

There is a new pattern where you ask a network, rather than an individual, but I'm not sure if that results in learning. In learning you have go through experience, reflection that doesn't necessary happen in a networked environment. It also becomes more exploratory that before, because learners want to experience, test, try out, and based on feedback, they adjust from the trying, in order to learn. Learners feel more comfortable with that type of learning, than before. The interviewee thinks that deeper transformation in learning; you can only gain this by certain types of collaborative learning. So when you don't change the learning process, but level it with technological solution, like online coaching then it work.

The major difference between learning now compared to the former generations, is sharing information. The former generation is more reluctant to share information, because it has a risk, and we have the assumption that information is power. So we always think twice before we communicate. The new generation sharing is normal, not concerned about the risks. They don't sit on their knowledge, but share their knowledge openly. They are more willing to learn from others, without the fear of losing face, or not seen as an expert. They naturally share and seek information and knowledge. They will be more naturally networker, compared to my generation. I have to remind myself every day, what I need to communication and to whom. They are: What do I want leave out from my communication? They are fast of keeping track of what happening in multiple channels.

When it comes to learning it's about what is the objective of the learning and training. In traditional formal learning we apply more and more virtual training environments, and it's growing more and more natural, and with the same impact. In more training focused areas the community aspect is growing. But many communities is don't work successful, even thou the technology is there. It's lack of time. Most communities die within 2 weeks, because no one has the time to drive it. Most organizations has a very linear performance management approach, with goals, deadlines etc. This influences the problem solving approach in the organization, because it has to be efficient, and that's not creative at all. Reality in the organization is very linear and goals oriented, even thou we try to create more creative processes in problem solving. Even in innovative organizations, there is a strict linear process.

Slide 3: The interviewee sees that knowledge is made available in the organization through many more channels and tools than before. So employees are creating blogs, working in shared folders, shared virtual environments, reaching out to internal and external networks, so even the boundary of the organization getting blurred. Because to go and harvest solution on the web, might be quicker and less resource demanding than solving itself. But that means we are far from knowledge management, because we are not managing knowledge at all. We are making information available to employees, and expect that they pick up on that information. But they don't. When it comes to availability and accessibility, it's all out there, but is it used? There is no big shift there. The interviewee believes it because this is an alien activity, but also because we don't perceive it as effective, and there is more trust to an expert there is known. The interviewee believes that this type of accessing knowledge is more suited for innovative development department and companies. But the key is whether it is perceived as adding value to the purpose.

The interviewee sees that work is only slightly changing due the new ways of accessing knowledge flows, compared to what the technology might suggest or promote. The biggest change is the virtual aspect of work, where employees can work across locations and globally. It much more accepted to set up dispersed global teams, where the team leader doesn't work the same place as you.

Slide 4: There is currently a conflict between the way we work and the new ways of working, even if we have all the new technologies, but we don't use it. Organization are definitely going to change, but not to the extent we might think it will change, because it is deeply rooted in our culture, how we deal with each other, how we set up organizations. It is rooted in our history and been proven to be quite successful model, so it have some strong arguments. The concept of transparency is also a very western cultural assumption, which might not go down well in eastern countries. This will also depend on what the organization will allow. In most organizations there will continue to be a hierarchy for quite a while yet.

Within the framework of the new emerging organizations and ways of working, this will require a complete new set of leadership skills. It will be more bottoms up, based on a followership paradigm, and gaining the support and empowering employee is important. Moving from an expertise control based type of leadership, because that information flows more freely, and you can know everything. At a point you team will be more knowledgeable than you. So we need a different leader profile emerging, more humble, more listening motivating and collaboration. Because a leaderless organization can't function beyond a certain level of complexity and then it needs to delegate decision and coordination power.

The interviewer would start with the purpose of the organization, if he was to design an organization, based on this assumption. Based on this, he would set up the structures, depended on whether is an innovation organization or a production organization, but also you need to look whether I could contain all types inside the same framework of the organization. This depends on your perception on the efficiency. The learning innovative organization, would be looser in performance targets like deliverable and deadlines, and look more like a development department. It will be relatively hierarchy less, with more involvement and collaboration, also it would be boundary less, and well connected to others, with a capability to transfer this into something practical.

Slide 5: Many more organization forms will look like this, but most likely not as a profit based organization, and networked. Ex. Our learning providers are a network organization with a central coordination, consisting of individual entrepreneurs. The organization is also distributed, virtual and flexible connected through a multiple different channels.