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# Organizational communication: Design research of information sharing

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# Organizational communication:
# Design research of information sharing

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**Abstract**

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This design science research study investigates how organizational information sharing can be improved in large organizations. Based on this, the research question formed as follows: How to share information efficiently in a large community of work? It has been noted, that organizational information sharing is important. Main reasons for this are for example time usage - it's not efficient spending lots of time figuring out something that someone else has already solved. Efficient information sharing will ultimately also affect the job efficiency and therefore on the company profit. Even there is a clear link between work efficiency gained with information sharing and company profit, unfortunately information sharing is usually something that company doesn't pay enough attention to.

There can be two main issues with organization information sharing. First of all, organization might not have any tool intended for information sharing. Selecting proper tool is important because the tool might encourage, or impede, information sharing. Organization should also have clear guidance on information sharing. Employees need to understand what is expected from them. Support, guidance, targets etc. for information sharing needs to be set and communicated by management. These all are important but maybe the most important, and also the hardest to achieve, is the willingness to share the information with colleagues. Some people are willing to document and share information automatically, but this is clearly not the case for most of the people. If and when this is solved, quite big part of the problems with information sharing will be resolved.

In this study, the perspective of the Information System's Design Science Research (DSR) is in the foundation of design; it focuses on research for building, improving and evaluating artifacts, such as models, methods, constructs, plans, information systems and services for implementation of the new perspective of organizational information sharing. This study provides insights how information is shared currently in one example organization and what kind of things could be implemented in order to improve the current situation. The data collection of this study includes experiences from practical environment as well as data from existing researchers.

Meaning of communication and information sharing is to reduce someone's uncertainty of something. Communication can be considered successful when someone has learnt something new. Unfortunately communication doesn't happen automatically. When someone wants to communicate something, he has to find a way how to express himself and a way to extract that information from his head to someone else. While communication can be easy, there can be also lots of disruptions that can make it harder or even impossible for the receiver to understand what has been communicated.

There are lots of different ways to share information. Some method can work nicely in some case, but for some case it doesn't fit at all. In work environment, the most regular ways to share information can be e.g. documents, emails, meetings, face-to-face discussions etc. One channel to share information doesn't usually replace other channels but they are supporting each other's. This can mean e.g. that a document is created, then its content is discussed in a meeting and possible updates for that document are reported face-to-face with someone. There are also ways to improve the communication method by taking some additional steps into use, e.g. repeating or being surprising.

Results of this research are divided into two categories. In the first category there are those items that were observed as critical or mandatory for adequate information sharing. Those are the core principles for information sharing and have to be taken into account. Otherwise information sharing will probably fail. In the other category, there are more or less optional steps. They are not absolute mandatory to have good information sharing practices in place, but they can be considered as continuum for the core practices. When the basics for information sharing are in place, then it would be a good idea to improve existing practices by taking those enhanced steps into use.

One the last chapter of this research, there is more discussion and insights of this research. It includes e.g. future research questions and speculation on possible issues. Also my own role and contribution has been pondered in the last chapter (final conclusion).

Keywords: information sharing, organization, communication, documentation, discussion, knowledge base, informing, DSR, design science research

Laurea-ammattikorkeakoulu, Leppävaara
Tietojärjestelmien kehittämisen YAMK

Olli-Pekka Seppälä

**Tiivistelmä**

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Tämä suunnittelutieteellinen tutkimus tutkii miten organisaation sisäistä viestintää voidaan parantaa suurikokoisessa organisaatiossa. Tämän pohjalta tutkimuskysymys muotoutui seuraavasti: Miten voidaan tehokkaasti jakaa tietoa suurikokoisessa organisaatiossa? Kysymys on oleellinen, koska yrityksen sisäinen viestintä on tärkeää. Syitä tälle voi hakea mm. ajankäytöstä - ei ole järkevää tai tehokasta käyttää aikaa sellaisen tiedon etsimiseen, jonka joku työkaveri on ehkä jo ratkaissut. Tehokas tiedonjakaminen vaikuttaa työtehokkuuteen ja täten yrityksen tulokseen. Siitäkin huolimatta, että on olemassa selkeä yhteys työtehokkuuden ja yrityksen sisäisen tiedonjaon välillä, tiedonjakamiseen ei valitettavasti useinkaan kiinnitetä riittävästi huomiota.

Tiedonjakamiseen liittyvät ongelmat voidaan jakaa kahteen kategoriaan. Ensinnäkin työyhteisöllä ei välttämättä ole olemassa tiedonjakoon tarkoitettua työkalua. Kunnollisen työkalun valitseminen on tärkeää, koska se joko kannustaa tai hankaloittaa tiedonjakamista. Työyhteisöillä tulee myös olla riittävä ohjeistus tiedonjakamiseen liittyen. Työntekijöiden tulee ymmärtää mitä heiltä odotetaan. Tiedonjakamiseen liittyvä tuki, ohjeistus, tavoitteet jne. tulee olla kommunikoitu työyhteisön johdon toimesta. Edellämainitut asiat ovat tärkeitä tiedonjakamisen kannalta, mutta ehkä tärkein ja vaikeimmin saavutettava asia on saada työyhteisön jäsenet aidosti haluamaan jakamaan tietoa. Jotkut työyhteisön jäsenet voivat olla automaattisesti halukkaita jakamaan tietonsa, mutta tilanne ei ole sama kaikkien ihmisten osalta. Jos ja kun tämä osuus ratkaistaan, suuri osa tiedonjakamiseen liittyvistä haasteista on ratkennut samalla.

Tässä tutkimuksessa tietojärjestelmän suunnittelutieteellinen tutkimus (DSR) on tutkimuksen pohjana; se keskittyy tutkimuksen rakentamiseen, artifaktin parantamiseen ja arviointiin, mallien, metodien, käsitteiden, suunnitelmien, tietojärjestelmien ja palveluiden käyttöönottoon organisaation tiedonjaon näkökulmasta. Tämä tutkimus tarjoaa oivalluksia ja ymmärrystä sille miten tietoa jaetaan tällä hetkellä esimerkkitapauksen suurikokoisessa organisaatiossa ja miten nykytilannetta voidaan parantaa. Tämän tutkimuksen tieto pohjautuu omapohjaisiin kokemuksiin käytännön työskentelystä suurikokoisessa organisaatiossa sekä tutkimuksessa on myös huomioitu aiemmat vastaavat tutkimukset organisaation sisäisestä tiedonjakamisesta.

Tiedonjaon ja kommunioinnin tarkoitus on vähentää ihmisen ymmärtämystä ja tietämystä jostain asiasta. Kommunikointi voidaan katsoa onnistuneeksi siinä tapauksessa, jos joku tai jotkut oppivat sen johdosta jotain uutta. Tämä ei kuitenkaan valitettavasti tapahdu automaattisesti. Kun joku haluaa kommunikoida jotakin, hänen tulee löytää keino ilmaista itsensä ja käytännössä siirtää tieto ja ajatukset omasta päästään jonkun toisen päähän. Vaikka kommunikointi voikin olla sinänsä helppoa, siinä voi kuitenkin esiintyä erilaisia häiriöitä, joiden takia viesti saattaa jäädä epäselväksi tai kokonaan saamatta.

On olemassa useita tapoja jakaa tietoa. Jotkin näistä tavoista saattavat toimia erinomaisesti jossain tilanteessa, mutta toiseen tilanteeseen ne eivät välttämättä sovi ollenkaan. Työympäristössä yleisimmät tiedonjakotavat ovat erinäiset dokumentit, sähköpostit, kokoukset, kasvokkain keskuskustelut jne. Edellä mainitut tiedonjakotavat eivät ole tarkoitettu korvaamaan toisia, vaan niiden tarkoitus on tukea toisiaan. Tämä voi tarkoittaa esimerkiksi sitä, että joku luo tietoa sisältävän dokumentin josta keskustellaan kokouksessa ja tiedot mahdollisesta päivityksestä ko. dokumenttiin voidaan kertoa asiasta kiinnostuneelle henkilölle kasvotusten. Kommunikointia voidaan parantaa erinäisillä tavoilla, esimerkiksi ottamalla joitakin lisäyksiä kommunikointiprosessiin, kuten toistamalla esitetty asia tai esittämällä asia yllätyksellisesti.

Tämän tutkimuksen tulokset ovat jaettu kahteen ryhmään. Ensimmäisessä kategoriassa ovat ne asiat, jotka ovat katsottu tärkeäksi tai pakolliseksi riittävän hyvän tiedonjakamisen saavuttamiseksi. Näitä voidaan kutsua tiedonjakamisen ydinalueiksi, ja ne tulisi ottaa jokaisen työyhteisön toimesta huomioon. Muussa tapauksessa tiedonjakaminen saattaa epäonnistua. Toiseen kategoriaan on jaoteltu enemmän tai vähemmän vapaaehtoiset asiat. Ne eivät ole pakollisia hyvän tiedonjaon suhteen, mutta ne voidaan nähdä jatkumoksi ydinasioille. Kun tiedonjaon perusteet ovat siis kunnossa, olisi hyvä jalostaa nykyistä tilannetta ottamalla mukaan valinnaisia ja vapaaehtoisia tiedonjaon asioita.

Tämän tutkimuksen viimeisessä kappaleessa paneudutaan tarkemmin tutkimuksen tekemiseen liittyvään pohdintaan ja keskusteluun. Sieltä löytyvät mm. mahdolliset tulevat tutkimuskysymykset sekä pohdintaa mahdollisista tutkimuksen tekoon liittyvistä ongelmista. Myös tutkijan oma rooli ja panos tämän alueen tutkimuksessa on pohdinnassa viimeisessä kappaleessa nimeltään "final chapter".

Avainsanat: tiedonjakaminen, organisaatio, työyhteisö, kommunikointi, dokumentointi, keskustelu, tietämyskanta, viestintä, DSR, suunnittelututkimus

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## 1. INTRODUCTION

Idea for this thesis came couple of years ago while working in an organization where information was shared poorly. I shall not name the organization, but it is a big Finnish company in telecommunication business. Also, I don't think naming the organization is important, because I believe information sharing is not that different between other large organizations whether they are in telecommunications or in any other line of business. Basis for this thesis is coming from own real life experiences and existing data on this topic. Value of information is becoming more and more important when we are moving away from physical work (e.g. factories) and doing some brainwork related work. On those cases, the knowledge, understanding, information sharing and these kinds of competencies are very important. Many of the work are nowadays so dynamic, that it's essential to quickly learn new things, share the information with colleagues, work together towards the same goal etc.

The main themes in this thesis were how to get people willing to share information and where that information should be stored. There weren't any big challenges creating this thesis because I think I got pretty clear picture from the beginning, which way I want to push this thesis. I would imagine that results of this research would apply at least partly to most of the organizations. Everyone needs to think from their point of view; does this work in my organization. Since information sharing is topical issue and also I have some personal interest in that, I would say this thesis was worth doing. I would be happy to apply the results of this thesis in my own work as well. Unfortunately due to resourcing and time related issues it wasn't possible to apply any actual evaluation. Using some focus groups would've been useful and interesting, but unfortunately these weren't applied partly because information sharing is a bit conceptual and not easily evaluated.

I've seen many organizations where information is shared poorly. Poor information sharing emerged so that information didn't flow between program manager, line manager, team members etc. Someone might not know what other team member was doing or some was not aware of things happening on the program management. It would be essential to share specific information among pre-defined parties/individuals and some information, e.g. administrative information among everyone. Without this, a daily work can be much more challenging because not all needed information is available and different people might be searching for the same information or working on the same task without even knowing it. A lot of time can be spent on searching for information, which your colleagues might already know. Administrative information might not be that important from doing-your-daily-tasks point of view, but even more important to maintain good work ethic etc. This thesis is based on a large company where organization size is 100-200 employees. Based on this background information, research question formed as follows: "How to share information efficiently in a large community of work?"

## 1.1 Objective

Information system is built to improve efficiency (Hevner, March, Park & Ram, 2004). With this design research, reader should have the understanding for information sharing practices. Based on research theories it is possible to design new practice (method), solution (implementation) to design requirement (model). The purpose for this research can be founded from organizational functionality. This means that objective is to improve the information sharing efficiency in a single organization. When organizational efficiency has improved, whole company will benefit. The ultimate goal is of course to to improve company profit and efficient information sharing is a big part of a success in a competitive market.

## 1.2 Importance and rationality of this work

I work in a large organization where information sharing is a daily issue. Improving this would mean a lot of time saved in searching for information and work efficiency would improve significantly. Especially nowadays when work is less mechanical and statical labour, but information, knowledge and prowness are where the value of the company exists.

## 1.3 Limitations

This research will bring out problems that appear in information sharing and represent solutions for information sharing practices. This research mainly refers to such information that can be considered as general (technical or administrative) information in company, organization, project or team. Classified information, e.g. blueprints from yet to be released product is not included in this kind of information. Most information should also be available *at the most* to all employees of the company. This research can be applied e.g. for sharing technical documentations, project information, summer holiday list, architectural documents or minutes of the meeting. This research also covers information sharing methods mainly for organizational use only, not for whole company. Companywide knowledge base in a large company might be very troublesome and in many cases even useless because most of the information is useful only within certain organization or team. Results of this research can be partly applied to small and medium sized companies as well.

## 2. METHODOGY

First we'll need to understand what research is. According to Kuhn (1970) and Lakotos (1978) research can be defined as an activity that contributes something to the understanding and phenomenon. Phenomenon is usually a set of behaviors which researcher(s) finds interesting. Understanding is a knowledge that allows behaviors prognosis of some aspects of the phenomenon. This is quite natural, since our understanding on the world around us is incomplete and questions and problems are waiting for a solution. (Hevner & Chatterjee, 2010.)

Research process, called research methodology can be itemized by eight attributes. According to Hevner and Chatterjee (2010) they are; “research originates with a questions or a problems”, “research requires a clear articulation of a goal”, “research follows a specific plan of procedure”, “research usually divides the principal problem into more manageable sub problems”, “research is guided by the specific research problem, question, or hypothesis”, “research accepts certain critical assumptions”, “research required collection and interpretation of data or creation of artifacts” and “research is by its nature cyclical, iterative, or more exactly helical”. Hevner and Chatterjee (2010) continue by saying that basic goal of good science is to develop a theory, paradigm or model that provides a basis for research to understand the phenomenon being studied.

### 2.1 Research question

Research question is: How to share information efficiently in a large community of work?

### 2.2 Introduction to design science research

Design science research is a research paradigm where designer tries to answer questions affecting human problems via creation of innovative artifacts hence contributing new knowledge to the body of scientific evidence. Artifacts which have been designed are useful and fundamental in understanding that problem. Basic assumption in design science research is that knowledge and understanding of a design problem and its solution are acquired in the building and application of an artifact. (Hevner & Chatterjee, 2010.) Simon (1996) says that the term artifact is used to describe something that is constructed by humans, something that is artificial, and not something that occurs naturally.

### 2.3 Design Science Research in Information Systems

Information systems are implemented so that effectiveness and efficiency can be improved in an organization. The purpose of the information system, its work system, people and

development and implementation methodologies together concludes the extent to which that purpose is achieved. (Hevner & Chatterjee, 2010.)

According to March and Smith (1995) acquiring knowledge for research involves two supplementary but differing paradigms; natural (or behavioral) science and design science. The behavioral science paradigms is based on natural science research methods where it seeks to develop and justify theories which explains or predicts different kind of phenomena's surrounding the analysis, design, implementation and use of information systems. The design science paradigms are based in engineering and the sciences of the artificial. Design science can be categorized as a problem-solving paradigm. (Hevner & Chatterjee, 2010.)

Design science research in information systems indicates what are considered to be so called "wicked problems". These problems can be characterized following; "unstable requirements and constraints based on ill-defined environment contexts", "complex interactions among subcomponents of the problem", "inherent flexibility to change design processes as well as design artifacts", "a critical dependence upon human cognitive abilities to produce effective solution", "a critical dependence upon human social abilities to produce effective solutions". Technological improvements are results of innovative, creative design science processes. Innovations like database management systems, high-level languages, personal computers, software components, intelligent agents, object technology, internet and the World Wide Web have had dramatic impacts on the way in which information systems are perceived, designed, implemented and managed. (Hevner & Chatterjee, 2010.)

An important comprehension is that there is supplementary research cycle between design science and behavioral science to address fundamental problems faced in information technology. Technology and behavior should not be considered as conflicting in information system, but they should be considered inseparable. They are also inseparable in information system research. Practical relevance of the research outcome should be assessed equally with the accuracy of the research performed to achieve the results. (Hevner & Chatterjee, 2010.)

Hevner, March, Park and Ram (2004) defined a design science research guidelines. This 7 step guideline is represented below (table 1):

| | |
|---|---|
| Guideline 1: Design as an Artifact | Design science research must product a viable artifact in the form of a construct, a model, a method or an instantiation |
| Guideline 2: Problem relevance | The objective of design science research is to develop technology-based solutions to important and relevant business problems |
| Guideline 3: Design evaluation | The utility, quality and efficacy of a design artifact must be rigorously demonstrated via well-executed evaluation methods |
| Guideline 4: Research contributions | Effective design science research must provide clear and verifiable contributions in the areas of the design artifact, design, foundations and/or design methodologies |
| Guideline 5: Research rigor | Design science research relies upon the application of rigorous methods in both the construction and evaluation of the design artifact |
| Guideline 6: Design as a search process | The search for an effective artifact requires utilizing available means to reach desired end while satisfying laws in the problem environment |
| Guideline 7: Communication of research | Design science research must be presented effectively to both technology-orientated and management-orientated audiences |

*TABLE 1. Design science research guidelines*

### 2.3.1 Design science research cycles

Hevner (2007) have identified design science research cycles which can be positioned for every design research. These three design science research cycles are represented below (figure 1).

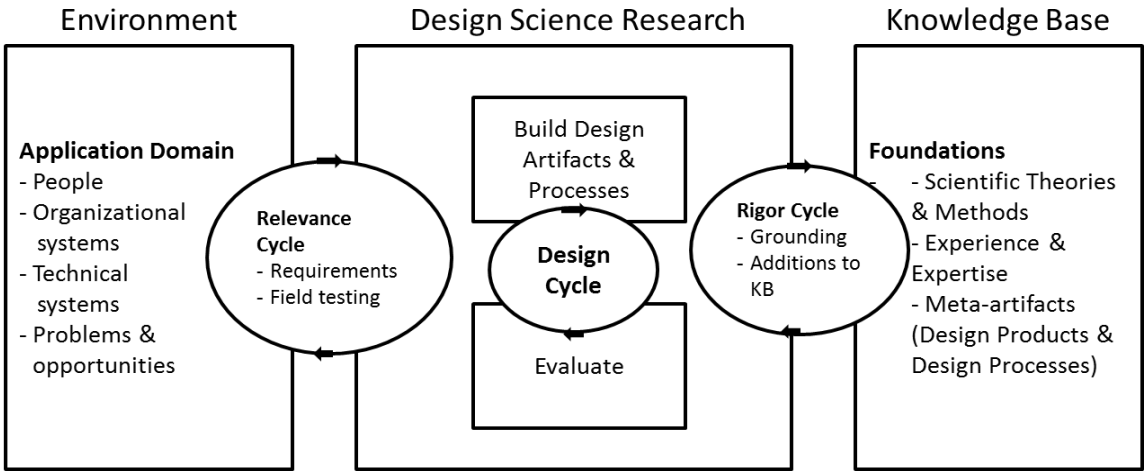


*FIGURE 1. Design science research cycles*

Meaning of Relevance Cycle is to bridge the contextual environment of the research project with design science activities. Meaning of Rigor Cycle is to connect the design science activities with the knowledge base of scientific foundations, experience and expertise that informs the research project. Meaning of Design Cycle is to iterate between the key activities of building and evaluating the design artifacts and processes of the research. (Hevner & Chatterjee, 2010.)

**The Relevance Cycle**

Simon (1996) says that design science research is driven by the need to improve the environment by the introduction and building of new and innovative artifacts. Good research usually should begin by identifying and representing opportunities and problems which are relevant to actual application environment. Relevance cycle initiates research process with an application context that not only provides the requirements for the research but also defines acceptance criteria for the evaluation of the research results. (Hevner & Chatterjee, 2010.)

**The Rigor Cycle**

In addition to a vast knowledge base of scientific theories and engineering methods the knowledge base also contains two types of additional knowledge; “the experiences and expertise that define the state of the art in the application domain of the research” and “the existing artifacts and processes found in the application domain”. Meaning of rigor cycle is to provide past knowledge to the research project. Researcher have to thoroughly utilize existing knowledge base to guarantee that the designs produced are research contributions and not routine designs based on the application of known design processes and the appropriation of

known design artifacts. Researcher has to use his/her consideration for selecting proper theories and methods for the base of research. (Hevner & Chatterjee, 2010.)

**The Design Cycle**

The design cycle can be considered as the heart of any design science research project. It is important to internalize the dependencies of the design cycle on the other two cycles even this cycle is not depending on the other two cycles. You could also say that design cycle is where all the hard work of design science research is done. (Hevner & Chatterjee, 2010.)

## 2.4 System development

Nunamaker, Chen and Purdin (1991) claims that the central nature of systems development leads to multi-methodological approach to IS research that consists of four research strategies; theory building, experimentation, observation and systems development. Theory building includes developing new concepts and construction of conceptual frameworks, models or new methods. Experimentation includes e.g. laboratory and field experiments and computer simulations. Observation includes methods like case and field studies and surveys. Systems development framework includes five different stages: conceptual design, constructing the architecture of the system, analyzing the design, prototyping and evaluation. System development framework is represented on figure 2. (Hevner & Chatterjee, 2010.)

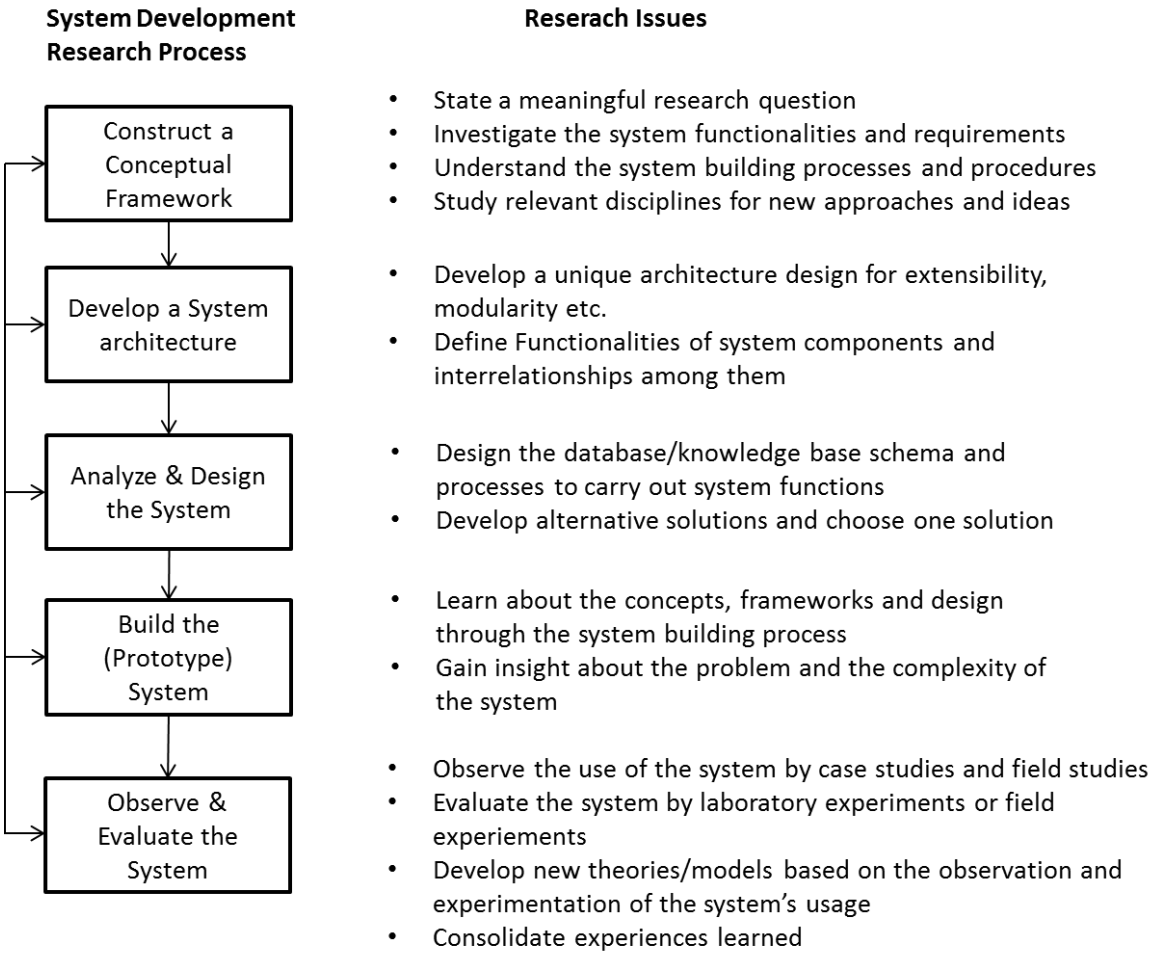


*FIGURE 2. System development research model*

Nunamaker, Chen and Purdin (1991) have defined their conception of systems development in research life cycle. They argue that this integrated approach to Information Systems development is necessary if IS research should follow the momentum of technological innovations and organizational acceptance. The multimethodological approach that they suggest includes theory building, experimentation, observation and systems development. This is represented in a figure 3.

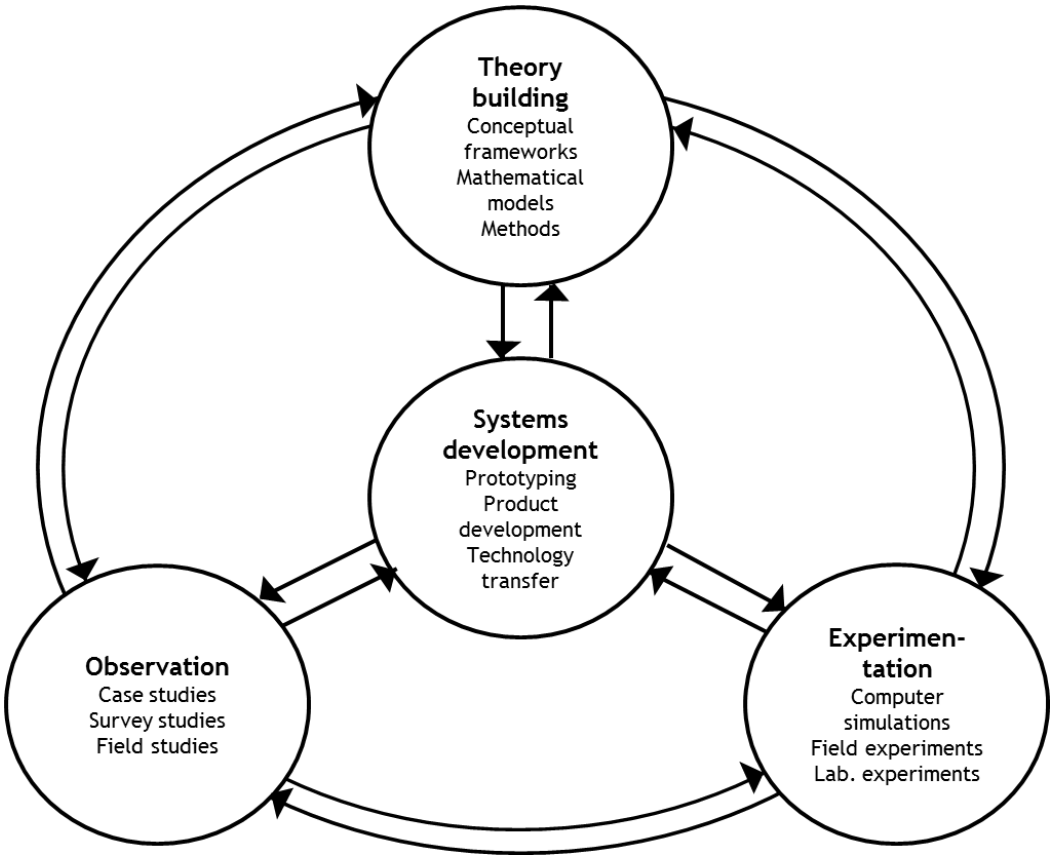


*FIGURE 3. System development research model*

Theory building is about development of models, new methods, frameworks or new concepts. Experimentation phase includes testing how well artifact works in different kinds of simulations or in different experiments either in laboratory or in actual field tests. Observation consists on different studies. These research methodologies can be e.g. field studies, case studies and survey studies. They are usually used when researcher wants to have better understanding on the research domain. In Systems development, there are five stages; concept design, constructing the architecture of the system, prototyping, product development and technology transfer. This is the central point for other research methodologies and there is an interaction with them by providing useful information to each other. (Nunamaker, Chen & Purdin, 1991.)

## 2.5 People and design

Designing software is a social process where people design things which are used by people and also the whole process should use people. Design is a result of the activities and result of the creative individual who operates in a larger social scale. Designer interacts with other people and things which often lead to complex and controversial design considerations. (Hevner & Chatterjee, 2010.)

### 2.5.1 Designing for consumers

David Liddle, lead designer of Xerox Star, gives an example of how technology is adopted in three phases: the enthusiast phase, the professional phase and the consumer phase. Here are explanations to these three phases:

**Enthusiast phase** is the first phase where the early adopters use the technology because it's new and attractive. Technology geeks like it also because it might be hard to use. Enthusiasts will push the limits even further where it was originally designed for. A classic example is World Wide Web which was originally designed by Tim Berners Lee tens of years ago but Web has now transformed to many things beyond Lee's original intended scope and use.

**Professional phase** is the second phase where technology is brought into the work place. These professionals find inventive ways of using it for something practical. Ultimately the focus will be on value, reliability and how much it should cost. Time will improve all of these making it more reliable and cheaper.

**Success with consumers** is the last phase. It can be considered as the measure of ultimate success. Good tool can be considered something which adjusts itself to the user but unfortunately good tools can be hard to find. Nowadays people are expecting user-friendliness and convenient user experience. People are using only tools which bring delight and benefit to them. This is something that every designer needs to keep in his mind.

To design desirable tools, it is important to understand the people for whom they are designing. All countries used to be more or less mass markets, but nowadays everywhere is diverse people of many ethnic backgrounds with different needs and preferences. This is why there isn't one size fits all solution anymore. Business needs to create solutions for people, meaning in a way people control the business. (Hevner & Chatterjee, 2010.)

### 2.5.2 Practice of ethnography in design

It is important to understand what consumers want, their values, cultures and environment. There's a research technique called ethnography that originated in anthropology. It has become a central practice in design research. Anthropology studies human behavior, how people experiences things and makes sense of what people are doing. Social scientists have used ethnographic method to study people culture at a more general level. If we want to understand link between design research and social research, we have to study an ethnography research method. Ethnography is scientifically descriptive and interpretive. It also requires analytic rigor, process and inductive analysis. (Hevner & Chatterjee, 2010.)

Designers are using qualitative design research methods to understand customers. Designers are learning from people by listening and watching them, or experiencing their lives first hand. There are different kinds of focus groups for learning and understanding people behavior. **Traditional focus groups** gathers 10-12 consumers why participates in tightly led and scripted discussion by a moderator, usually lasting about two hours. **Mini-focus groups** usually have 6-8 participants. **1-on-1 interviews** can be tightly scripted or loose interviews. 1-on-1 interviews usually lasts from half an hour to one hour. **Dyads** include two friends to be interviewed. **Super groups** are held in a large auditorium where 50-100 people are gathered together. They view products, designs or other exhibits presented on a large screen. **Triads** have three or more people. **Party groups** are spending two or three hours in on person's home in an informal setting. There is also newer technique called **online discussion groups** which is held on the internet. In this technique people does not need to gather in one place, but everyone will attend via internet from their own location. (Hevner & Chatterjee, 2010.)

### 2.5.3 Designing for scale – Google and people

Nowadays one of the most important aspects in today's design is scalability. When the user base grows, the application still has to remain stable and perform efficiently. Google's search engine can be taken as an example. It has always been performing very well even utilization rate has been growing. In the 1990s there was a period of madness often referred to the "dot com" days. There was lots of excitement in IT which then brought in the information age. Then some time later the crash came on the bubble burst. Right after bubble was burst, small company called Google was founded. Google's founders developed a technology that will eventually become the foundation of the Google search engine. Google's history includes much experimentation by trial and error. From all the experimenting and designing they came up with technique called PageRank. With some more experiments, Google's founders found out that PageRank could be used as an effective search tool. (Hevner & Chatterjee, 2010.)

## 2.6 Software design: past and present

Software design is one of the biggest challenges in information system development. From the fairly primitive beginning, software has been dominating the cost of all forms of IS. Today we are facing new kinds of challenges by new software technologies, greater quality expectations and more complex systems. Because of this, software design remains an important issue that is usually crafted to each software-intensive system development. (Hevner & Chatterjee, 2010.)

### 2.6.1 Software architecture

There are three technology components integrated via system architecture into a functional information system: computing platform, communication networks and software. The objective of software architecture is to produce a mapping to integrate all required functionalities and

qualities of the desired information system provided by software. Targets for all system stakeholders have to be considered and represented in the design of the software architecture. (Hevner & Chatterjee, 2010.)

### 2.6.2 Global trends in data management

One of the most important aspects in computing systems is data design and the effective management of data. Digital revolution has radically extended our definition and understanding of knowledge, information and data. One big challenge for the future of data management will be how to maintain huge amounts of information flowing over the World Wide Web. In the future most of the business transactions will be performed over the internet. New configuration for internet systems have to support real-time data capture, ongoing analyses of data trends, multimedia data, real-time data streaming and high levels of security. Also web-enabled business requires large databases, huge number of simultaneous users and new ways to manage transactions. (Hevner & Chatterjee, 2010.)

### 2.6.3 Software development process and methods

There are four software design components, software architecture, algorithmic programming, data and HCI (Human-Computer Interaction). They are brought together in the design and implementation of a business application by software development processes and methods. **Software development process** is a model of activities, practices and transformations which support managers and engineers in the use of technology to development and maintain software systems. **Software development method** is used to define principles, models and techniques for efficiently creating software artifacts at different phases of development. Hereby the process decides what is the order of development phases and the transition criteria from one phase to the next, while the method specifies what should be done in each phase and how the artifacts of the phase are represented. (Hevner & Chatterjee, 2010.)

## 2.7 Evaluation

Evaluation is one of the most important elements in the design of IT-based artifacts. When designer finds an interesting problem to solve, he designs a solution. Then comes the actual build phase. Then when the artifact is ready, next phase is evaluating for efficiency, usefulness or performance. (Hevner & Chatterjee, 2010.) The designed IT artifact is a socio-technical entity which exists in an environment that lays out the requirements for its evaluation. That evaluation of IT artifacts requires definition of suitable metrics and maybe gathering and analysis of appropriate data. There are several ways to evaluate IT artifacts: functionality, completeness, consistency, accuracy, performance, reliability, usability, fit for the organization and other relevant quality attributes. (Hevner et al. 2004.)

### 2.7.1 What is evaluation?

Evaluation is a systematic measurement of value, worth and significance of something or someone. Evaluation is sometimes used to characterize and assess subjects of interest like arts, criminal justice, government, health care and other technology services. In information systems, evaluation can be quite hard and complex. The question is, what do you evaluate? Do you evaluate the performance of the system (technical) or its overall usefulness to the end-user (socio-technical) or maybe both? (Hevner & Chatterjee, 2010.)

### 2.7.2 Why do we perform evaluations?

There can be many reasons why to perform evaluation, but mostly the reasons are coming from stakeholders. Here are some of the reasons why evaluation in information systems is needed; **Promotional** - It is important to evaluate the system to show that it doesn't only work but it is reliable, safe and cost-effective. **Scholarly** - When researches are reviewed, one of the most important part is where it has been defined how well the system or proposed technology has been evaluated and compared against existing similar systems. If there is no proper evaluation available, it is not usually accepted for publication. **Practical** - If there is not evaluation for new systems, designers cannot know which techniques or methods are most effective or why certain approaches fail. Evaluation is the key to understand the design thoroughly and for other designers to learn from it. (Hevner & Chatterjee, 2010.)

### 2.7.3 Different perspectives of stakeholders

There are different stakeholders with different perspectives when information system is being evaluated. At the end they all look at the same thing but from a different angle. For example when designing a new medicine there are patients, doctors, designers/developers and payers as stakeholders. Patients are interested in 1) will it help me and 2) is it safe. Doctors are interested in 3) is it fast and accurate enough? and 4) is it easy to use for patients. The developers are interested in 5) does it works according to specification? 6) Which function would patients really like to see? and 7) Will they use it? They payers who funded the development are interested in 8) what is the cost/benefit ration of this medicine and 9) is it safe and reliable enough to become market a leader? (Hevner & Chatterjee, 2010.)

### 2.7.4 Basic structure of evaluation studies

All evaluation studies have same kind of structure. This structure is shown below on figure 4.

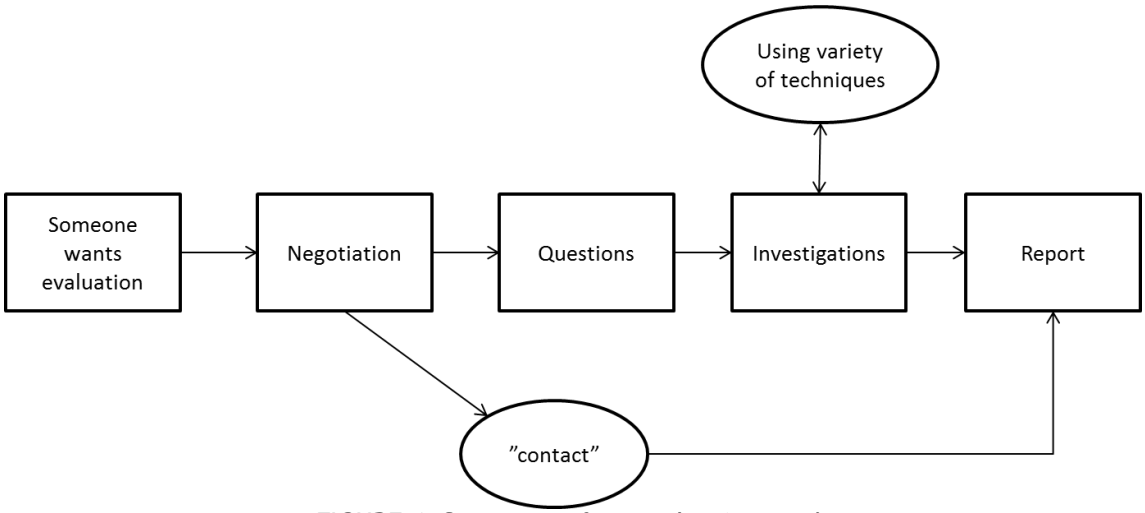


*FIGURE 4. Structure of an evaluation study*

All evaluation is started by someone who needs to know. According to Friedman and Wyatt (1997) the evaluation must begin with a process of negotiation to identify the question that will be a starting point for the study. Outcome of that negotiation is commonly a set of questions and details on how the evaluation should be taken care of and for how long. These issues need to be clearly written down. Next step includes the actual investigation, collecting the data to point the questions and to guide the experiments. The data will be analyzed properly so that it will answer the questions we are asking. Last step is to create a report for relevant parties. The report has to answer the questions that were asked. (Hevner & Chatterjee, 2010.)

## 2.8 Focus groups

It is common to use focus groups in research field to investigate new ideas. Using focus groups in design science research can also bring opportunities and also challenges. For the evaluation of the artifact design, exploratory focus groups (EFGs) will study the artifact and propose improvements in design. Field test part can use confirmatory focus groups (CFGs) to make sure artifacts usage possibilities. Rigorous investigation requires multiple CFGs with qualitative and quantitative data collection and analyses across multiple CFGs. (Hevner & Chatterjee, 2010.)

### 2.8.1 Introduction

Hevner et al. (2004) says that meaning of design science research is to build and evaluate artifacts that address particular business needs. They continue telling that behavioral science researchers are searching for the truth, while design science researchers seek utility. Design science research can be described in two phases: the development of the artifact and its evaluation. Researcher does not only have to design the artifact but to prove that it solves a real problem. Evidence-based artifact evaluation is a major part in design science research. There are several evaluation methods including observation, analytics, experiments, testing or descriptive analysis and action research. (Hevner & Chatterjee, 2010.)

### 2.8.2 Research focus groups

Stewart, Shamdasani and Rook, (2007) clarifies that focus group can be defined as a group including 6-12 persons moderated and supervised by a moderator whose role is to lead the conversion and promote interaction. As one could conclude from the word *focus*, group is limited to a small number of issues. The topics are carefully predetermined. Questions are meant to feel spontaneous but they are actually carefully planned. Focus group interview lasts usually about 2 hours. Having multiple focus groups allows wider understanding of the area. With multiple groups it is possible to gain shared understanding but still understand and separate individual opinions. (Hevner & Chatterjee, 2010.)

### 2.8.3 Formulate research questions and use of focus groups

Research goals have to be clearly understood so that focus groups can be defined and designed. There could be two types of focus groups for achieving different research goals: 1) exploratory focus groups (EFGs) to achieve incremental improvements in artifact design and 2) confirmatory focus groups (CFGs) to demonstrate the utility of the design in a field setting. Exploratory focus groups have two roles. First of all they provide feedback for the possible design changes for both artifact and focus group script. Secondly they can be used to refine scripts and the identification of the constructs to be utilized in future focus groups. Focus group steps can be seen at figure 5. (Hevner & Chatterjee, 2010.)

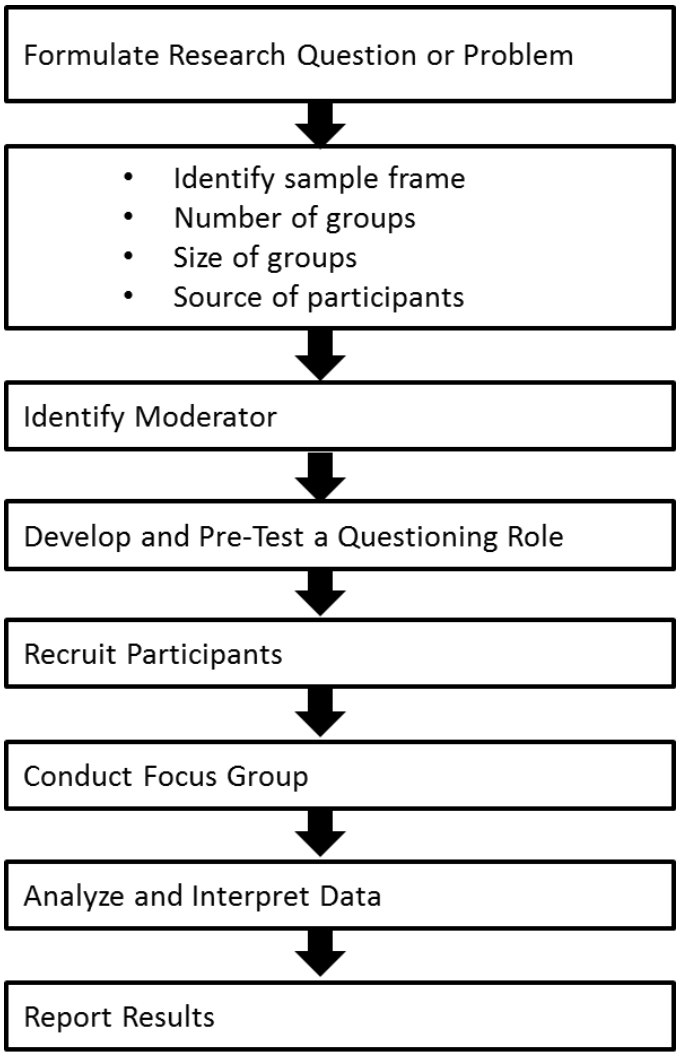


*FIGURE 5. Focus group steps*

Confirmatory focus groups are used to demonstrate the use of the artifact design in the application field. The unit of analysis will be the focus group and not the individual participant if using rigorous research. Because of this, it is important not to make any changes to interview script when interviewing multiple confirmatory focus groups because then interview results between multiple CFGs are not comparable. (Hevner & Chatterjee, 2010.)

### 2.8.4 Number of focus groups

It might not be easy to decide how many focus groups are needed. One could say that use of focus groups should continue until nothing new is learned. Defining when "nothing new" is not learned can be quite challenging. However, for obvious reasons it is not convenient or even possible to interview too many people because of available resources. This means designer have to decide when he has enough information. (Hevner & Chatterjee, 2010.)

### 2.8.5 Number of participants

Several things need to be taken into account when choosing proper group size. It might be easier and less expensive to use only few focus groups with large amount of participants but this could lower "sample size" because there are less groups to compare. Also small groups require higher participation for each participant where larger groups can lead for participants not being active. Morgan (1998) suggests using 4-12 participants. (Hevner & Chatterjee, 2010.)

### 2.8.6 Participant recruitment

Focus group individuals are not randomly selected but they should be selected based on the information they have on that topic. This means the participants need to have some background information for the artifact that is being evaluated. Participants should be also considered as potential users of the design artifacts. One of the most important things in focus group is interaction between participants. Researcher has to think how focus group aligns with the research objective when deciding which participants to choose. (Hevner & Chatterjee, 2010.)

### 2.8.7 Conduct the focus group

According to Stewart at al. (2007) attending to focus group should be fun and stimulating. Krueger & Casey (2000) say that participants are usually seated in U-shape table. This allows moderator to demonstrate the artifact. It is also important to seat participants in the best way possible. This can be done by getting to know each participant before the interview and then seat them accordingly. Experts and most talkative persons should be seated next to moderator. (Hevner & Chatterjee, 2010.)

Focus groups can be also video and/or audio recorded. Every focus group member should be aware if session is recorded. It can be also a good idea to have an observer who does not participate in the session. He will just take notes from the interview. Time is also very important part in interview session. Moderator should be able to end session when time is running out. By then, all questions and open issues need to be closed and taken care of. Pilot focus group could be used to help anticipate and manage the length of focus group. (Hevner & Chatterjee, 2010.)

### 2.8.8 Analyzing and interpret data

There are two design research goals for using focus groups: incremental improvement of the design of the artifact and the demonstration of the utility of design. Because of that EFG and CFG has been suggested. Even the objectives between these two can be different, methods for analyzing them can be similar. Researcher has to then select best technique to be used for qualitative data analysis. (Hevner and Chatterjee, 2010.) Due to timing and resourcing issues,

this research didn't include any focus groups or interviews. Good and thorough research would obviously use focus groups as mentioned above, but this research was using only data from existing researches and from researcher's own experiences.

## 2.9 Analysis

Analyzing the research data is important in order to understand the data being collected and maybe re-think the research process based on the analysis. Analysis should not be just one time operation, but it should be ongoing operation where data is being analyzed continuously. Data can be almost anything gathered during the research, e.g. interview recordings or field test experiments. During the data analysis it should be deliberated what were the main issues, themes, questions etc. Otherwise researcher might easily drown with the details. Idea of analysis is to guide on planning and going forward with the research. Researcher should have clearer picture on the data, get new ideas, help with future analysis etc. (Miles & Huberman, 1994.)

There can be also some ethical issues with the analysis. Qualitative data analysis is not just technical issue. Researcher has to also ponder the rightness and wrongness of the produced knowledge. The outcome is not the only truth that exists. Researcher should also think whether his research is worth doing. Every researcher has their own subjective view for ethical issues. Ethical issues are also only one part of the whole picture where we decide if some action is right and appropriate. One way to solve possible ethical issues is that researcher asks from himself; "Would I like this action to be applied to everyone – including me?" and "will I treat every person I encounter as an end, and not as a means to something I want?". The implication for analysis can be also that if researcher is not truly dedicated to the research, the outcome might be something that looks good, and not something that is right. (Miles & Huberman, 1994, 298.)

Analysis of this thesis is focused on the research question. All the actions and processes were designed based on that, since research question should give the direction of the research. As analysis is comprehensive process, lots of existing content was read with open mind. Since organizational information sharing might not have one answer for everyone's need, existing research data was interpret objectively. During the analysis it was noted that organizational information sharing had two main issues or more precisely, deficiencies, which were the tool for storing and sharing information and second one is the willingness to share information. These two themes were the two cornerstones for this research. This can be also seen from the results. These two main themes emerged easily also from existing researches which supported my own experiences and feelings for organizational information sharing issues.

# 3. COMMUNICATION

American philosopher Lee Thayer once said that communication and functions of energy are two main processes of our lives. Communication impacts in our lives as much as getting your daily meal or health. Why is this? We live in communities. Our existence depends on communities and interactions with other people. (Åberg, 2000.)

## 3.1 Communication as a process

Communication is an action that has start and end. When communication is looked as a process, it can be divided into parts and it is possible to check from which parts communication is made from. These parts are sender, receiver, message, information, channel, interruptions, feedback, interaction and context. According to process discipline, communication is *transmission or exchanging messages* between sender and receiver. This means communication is an exchanging process. (Åberg, 2000.)

### 3.1.1 Sender and receiver

There always needs to be someone who starts the communication process. That one is called sender. Sender can be an individual but also a company or media can be considered as a sender. There also needs to be someone who gets the message: receiver. Receiver can be a predefined individual (e.g. person you are talking with), group (e.g. team in a work place) or large audience via e.g. press release. Sometimes determining sender and receiver can be hard. If communication is examined from sender point of view or linearly, receiver is easily defined: at the end of the process exists an *object*, *receiver, audience* or *target group*. But if communication is interactive, all/both parties are those who are active, subjects. In this case, who is sender, receiver or who is audience? (Åberg, 2000.)

Communication can be considered successful if receiver gets the exact picture in his head that sender intended with that message, i.e. he understood exactly what the sender was trying to say. Based on this, disruptions in a communication can be easily defined: if receiver doesn't get the message as it was intended, there's an error from senders point of view. It's also possible to consider communication successful even receiver doesn't understand the message completely, but is raises some new helpful associations which sender didn't intend. This is added value with interactive communications. (Åberg, 2000.)

### 3.1.2 Information and knowledge

Message is informative when it reduces the receiver's uncertainty from the messages topic. Message therefore carries information. Level of information in messages varies. How much information receiver gets is depending on context of the message, receiver's knowledge of existing messages and communication situation. If message is vague, receiver doesn't get any

useful information. This is actually how many politicians, consultants and even spokesmen communicate. If receiver already knows senders message, it doesn't help the receiver's uncertainty. Need for information is also tied with the current situation. Information can get old pretty fast, so some important message might not be useful at later point at all. This means it's important to communicate when the time is right. (Åberg, 2000.)

Information can be defined as well argued belief. Information can be divided into hidden and visible information. Hidden information represents e.g. experience based information knowing what the right way to do something is. Visible information is research results, reports etc. where information is particularly stated. Belief is a myth that believer can't be argued. (Åberg, 2000.)

### 3.1.3 Disruptions

Communication is very disruption vulnerable. Even Professor Osmo A. Wiio's first communication law says that "communication usually fails, except for coincidence". Disruptions can be divided in many ways. Osmo A. Wiio has divided these interruptions into four topics. (Åberg, 2000.)

***Obstacle*** means that the receiver doesn't get the message at all. E.g. postal office sends a letter to wrong address or a person doesn't read some email at all. This means obstacle is an external disruption: message is successfully sent, but there's a problem before receiver gets the message. (Åberg, 2000.)

In a case of ***noise***, message is mixed with other messages or disruptions. Paper copy is unclear, phone call breaks up when driving through a tunnel or you simply cannot hear what someone is trying to say to you because of a background noise or something. Noise is also an external disruption. (Åberg, 2000.)

***Loss*** plays a part when receiver gets the message but he doesn't get or understand some part of the message. This can be due to bad hearing or eyesight, color blindness, intoxication or level of concentration because of tiredness. Dearth is an internal disruption: it exists when receiver has received the message. (Åberg, 2000.)

In case of ***distortion***, receiver gets the message and there's no problem with hearing and/or reading the message, but it is interpret wrongly. Values, attitudes and needs will impact on interpreting messages. Distortion is an internal disruption. (Åberg, 2000.)

## 3.2 Communication as a semantics system

Message - combination of characters - is not important or meaningful. Message is a tool which we use to deliver meanings. But this delivery process does not equal to e.g. adding travelling bags to a conveyor belt in airport and fetching the same travelling bag from the destinations conveyor belt. Hopefully the content of the travelling bag is the same as it was during departure. In communication this is not the situation. The idea that I have in my head concerning what is a communication, doesn't move anywhere. So that I can deliver that message, I'll have to find a way how to express myself so that the other person understands what I want to say. (Åberg, 2000.)

### 3.2.1 Context

Cultural discipline surrogates are emphasizing that communication cannot be examined loosely from context. Every situation makes up its own boundaries of interpretation. In practice this means it's not enough just to afterwards write down what has been said on a recorder, because it doesn't transpire gestures, facial expressions, listener's reactions or situation where speech was given. (Åberg, 2000.)

### 3.2.2 Efficient communication in different situations

Communication is only efficient when both parties feel that they have received some benefits. In some situations aim is for unambiguous i.e. cloning communication. Pekka Aula (1999) has named this kind of communication as "integrative communication". For integrative communication to be efficient, two things must happen. First of all, receiver should interpret the message exactly as sender intended. Secondly, if there is more than one receiver, everyone should interpret the message pretty much the same way. Typical integrative communication is sharing some basic things like teaching multiplication table in schools or communicating some way of working methods at work. (Åberg, 2000.)

In some cases you shouldn't even try to aim for integrative communication, e.g. when trying to find some creative solution to old problems. This could be - according to Aula (1999) - dissipative communication. In these cases message should be so loose that it triggers some new association with the receiver. Aim is not to clone the sender's idea exactly. There is a wide range of interactive communication between extremely integrative and dissipative communication. It is used to find new solutions using communication. Interaction brings value to communication when trying to find a solution for a problem that might not have any correct answer or when trying together to find organizational vision or mission. (Åberg, 2000.)

### 3.2.3 Using multi-meaningfulness

Ultimate situation would be to communicate using eyesight, hearing, sense of smell, sense of touch and sense of taste so that they strengthen each other. This is called; *affecting on all senses*. Messages have to be so that it triggers also *substitute experience*. For example sense of smell and touch can be delivered through TV commercials. *Strengthening with repeats* is that by repeating the message, possibility for that the whole audience gets the message increases. Also every messaging situation is unique and multi-stimulating. The message is better understood when it has new conceptions. When building up the message, think about what the receiver already knows and use that knowledge. That's called *thinking emphatically*. It's also a good idea to *be surprising*. New thing stops. It activates more things than the old and already known one. Lastly, *don't give ready-made solutions*. Receivers can also think. Insights will be remembered much more easily than ready-made solution. (Åberg, 2000.)

## 3.3 What is a work community?

Organization is an event where people are relating with each other in order to achieve goals which they would not achieve alone. In a result of this, community or organization is born. Organizations are changing all the time. Also the frameworks where organizations are interacting are constantly changing. Below there are situations listed how organizations changes when they are in the middle of turbulence. Assumptions, requisites of this model are following. (Åberg, 2000.)

**Requisite of resources**

Organization has different kind of resources that are combined in order to support achieving targets. Resource is a possibility that can be used. Resources can be material or mental. They can be divided into factor of production and creativeness of production. Factor of production can be e.g. machines, raw materials, contributions, money and knowledge. Creativeness of production are business management processes like design processes, information systems, organizational way of working, team spirit and interaction. (Åberg, 2000.)

**Requisite of group of people**

Resources of the work community are used and steered by group of people who offers its services in certain moment in an exchange for compensation. (Åberg, 2000.)

**Requisite of goal**

There is some kind of, in some way expressed, common organizational goal, which group of people can support with their own contribution. This means that there is mutual or shared goal. Also working in an organization will help achieving individual targets of the organizational members. (Åberg, 2000.)

**Requisite of predictability**

Organizations try to increase predictability of functions and operations by taking certain commonly agreed methods and way of workings into use. (Åberg, 2000.)

**Requisite of work- and authority distribution**

There is some level of work and authority distribution in an organization in order to achieve the common goal. Work distribution is appearing as different units, groups or teams with different tasks. Distribution of authority appears as different kind of hierarchical arrangements, like superior-subordinate relationship and also in organizational levels. (Åberg, 2000.)

**Requisite of cultural birth and changes**

Certain assumptions and way of workings will be born during the organizational operations. These cultural factors are not static; they change - even slowly. (Åberg, 2000.)

**Requisite of structuring communication**

Organizational communication is building, structuring. Organizational communication is not random, it's based on certain and agreed rules. Rules concerns communication relationships, content of messages and those different communication arrangements which organizations have taken into use. (Åberg, 2000.)

### 3.3.1 Definition of organization

Based on these requisites, we can define work community and think about justification of organizations. Work community - organization - is a group of people that are aiming certain targets using and regulating their resources. This happens by dividing work and power and also structuring communication. (Åberg, 2000.)

### 3.3.2 Justifying existence of organization

Why do organizations exist? What is the justification of their existence? Organizations can be observed from many angles. Shareowners will see the company differently than employees, top management or customers. Viewpoint of shareowners has been emphasized lately. They see company as an investment, a money machine. They examine the company from shareholder value point of view. Company is interesting if it gives good profit for an investment. Employees are looking for stable job and better protection against unilateral. Also demands of better job safety have increased. One can also see a job as sinecure - a safe haven where you can work until you retire. But when aiming for vision, there's no time and possibility to stay in those safe havens for too long time. Customer point of view should be natural justification of existence, but sometimes it's forgotten. Basis of everything should be the needs of customer. From customer point of view company is producing services and products which fulfill his or her needs. (Åberg, 2000.)

Ideal situation would be that needs of customers and company employees would meet. Henry Ford crystallized this by saying: "I want to make cars that every American worker can afford". This means justification of existence should be found from a situation which takes all sides into observation. From shareholder way of thinking, you should move to stakeholder way of thinking. Stakeholder concept was born in United States when West was conquered: conquerors marked their territory using piles. Stakeholder is someone who has something at stake. It can be financial, continuity of employment or it can be related to organizational operations like sustainable development. (Åberg, 2000.)

### 3.3.3 Interpretation process

Communication always starts a "sense making" process. We can use Professor Choo's (1998) invention of knowledge creation model. Important things in figure 6 are probing and mutual understanding based on communication. That will create mutual meanings. (Åberg, 2000.)

Birth of mutual understanding is a dynamic process: interpretations are moving in time. Interpretation is based on that particular moment, interpreter and context of the detected signals. This means there is no objective interpretation on what is actually happening. It could be that when events go on, we'll have to check our interpretations. Interpretation is needed anyways, so that needed actions can be decided and taken into action. Based on this, interpretation is at best in an event where things to our best knowledge are considered so that there are enough people having the same opinion on what's the situation of current event. (Åberg, 2000.)

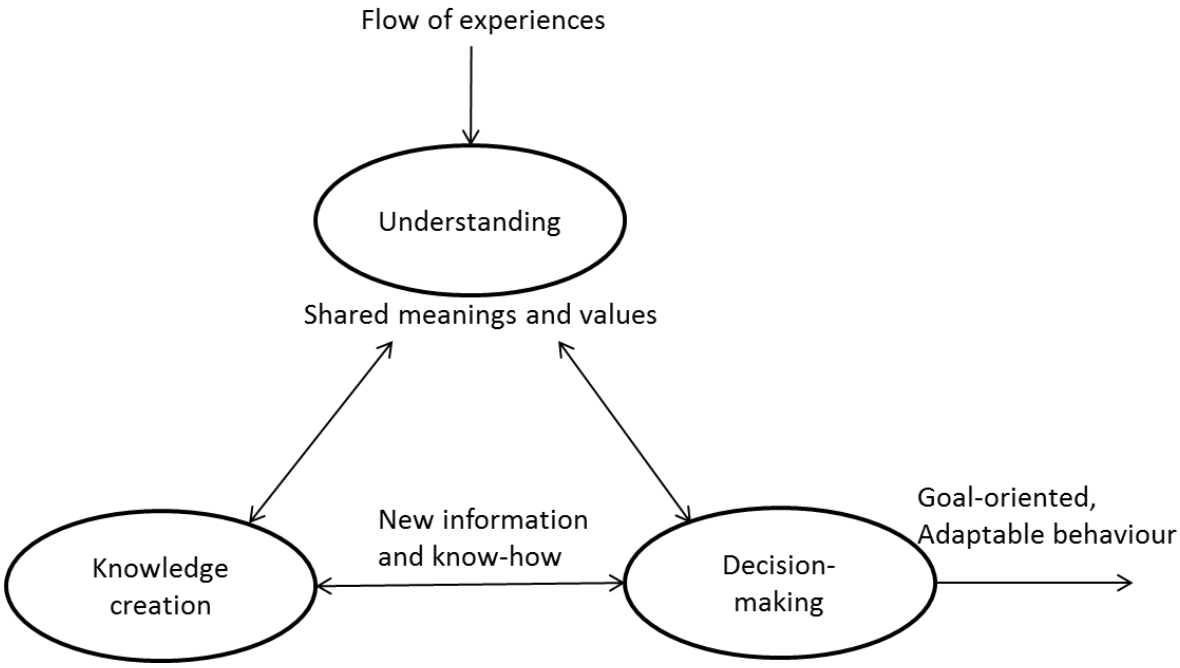


*FIGURE 6: Knowledge cycles*

### 3.3.4 Steering the business management

If business management is about "running a business", many questions will arise. What is "running" a business? What is running or moving? What is the direction of the movement? What does organization run or move? The answer is; resources which are available. Resource is a possibility which can be used. This means resources will always have potential. Running a business is therefore directing resources to right direction. Which way organizations are moving? The answer is; to the future. I suppose there are no organizations that would plan their past. Even the word planning and designing includes the meaning of finding the right way. (Åberg, 2000.)

What is the future? Before one was thinking that future is somewhere out there and waiting for us. Planning and designing was like finding the best crystal ball which showed us the future. Nowadays we are thinking that "there is no future, but it comes". We have been influencing what the future will be with our past and current actions. If there is no future, but it comes, what the future actually is if we are looking at it from today's point of view? Future is an imagination. We can look to the future - or more precisely, to futures - with the eyes of our souls. This means we need a tool which helps us aiming our actions to future, which does not exist, but it comes. The most important tool for this is visualization. (Åberg, 2000.)

The organizations ultimate goal is to exist and stay alive. To achieve this in an ever-changing environment, proactivity is needed. According to Åberg (1997), there are four points to proactive strategy. ***Vision worth aiming for*** is needed which is legitimate from everyone's point of view. In order to achieve a vision, one needs to know internal strengths and weaknesses and also cultural factors. **Good *management system*** is needed which includes decent design system, meaningful organization and system to reward members. Even vision is as fancy and management system is tuned to top performance, profit will not come if personnel are not ***excited and ready for challenges***. And finally ***leeway*** is needed when possibilities or threats arises. With profit, reserve and buffer stock environment changes are aligned. Leeway and flexibility from organizational perspective are the basis for renewal of actions.

### 3.3.5 Vision

Vision is an imagination of state which is worth pursuing and aiming for. Vision is not a mirage. Someday CEO should be able to say everyone in that company that "*Remember when 5 years ago we had a vision about this or that, well, today have achieved that vision!*". But of course, at the same time wise leader will paint a new and better vision that lies somewhere on the horizon. (Åberg, 2000.)

### 3.3.6 What is organizational communication

Osmo A Wiio (1989) has defined organizational communication as "something where messages are transferred inside organizational parts and which enables the goal achieving from organizational and individuals in organization point of view. Communication is an interface which joins organizational parts together and the whole organization to the environment".

Juholin (1999) is examining organizational communication widely. She separates three paradigms in organizational communication. First is ***management central or functional paradigm***, where communication is clearly seen as a resource for management, which supports achieving the organizational goals. Juholin's second paradigm is ***uncontrollable or dissipative paradigm***. Basis for this is a thought that communication is dynamic, nonlinear process which is impossible or very hard to use in planning. Third paradigm is ***responsible and interactive paradigm, dialogical paradigm***. Typical for this is sense of community and activity of every member of the community. Organizational communication is not just one way, from top to down moving communication where personnel is passive party. Network communication and interactive communication is the key for more active information sharing. (Åberg, 2000.)

### 3.3.7 Five reasons for organizational communication

Why does communication exist in organizations? Åberg (2000) has discovered five functions for organizational communication:

1. ***Support for basic operations***. Communication is needed for producing services and products and to deliver them to customers. This is the most important form of organizational communication. If this doesn't work efficiently, everything will fail. This communication is tightly linked to the moment and work processes.
2. ***Long term organizational profiling***. Communication is needed in order to long-spanly build organizational, its individuals and services or products objective and therefore aim to influence on organizational reputation. Long term communication is the key in this.
3. ***Informing***. Communication is needed to tell the organizational events to individuals in organization and also parties outside the organization. Basis for this communication is news that is relevant to the organization.
4. ***Introduction***. Communication is needed to familiarize individuals to their job and organization. Goal for this communication is for sense of community. This communication will highlight the organizational way of working.
5. ***Social interaction***. People are social type of species, so communication is needed to fulfill the social need for communication.

First four can be categorized as the basis for organizational communication, because they will decide on the profit organization is making. The last one is a type of communication which is not for the organization to decide if and how it exists. People will still communicate socially

even if organization will try to limit it. Social interaction is anyways very important part of communication. (Åberg, 2000.)

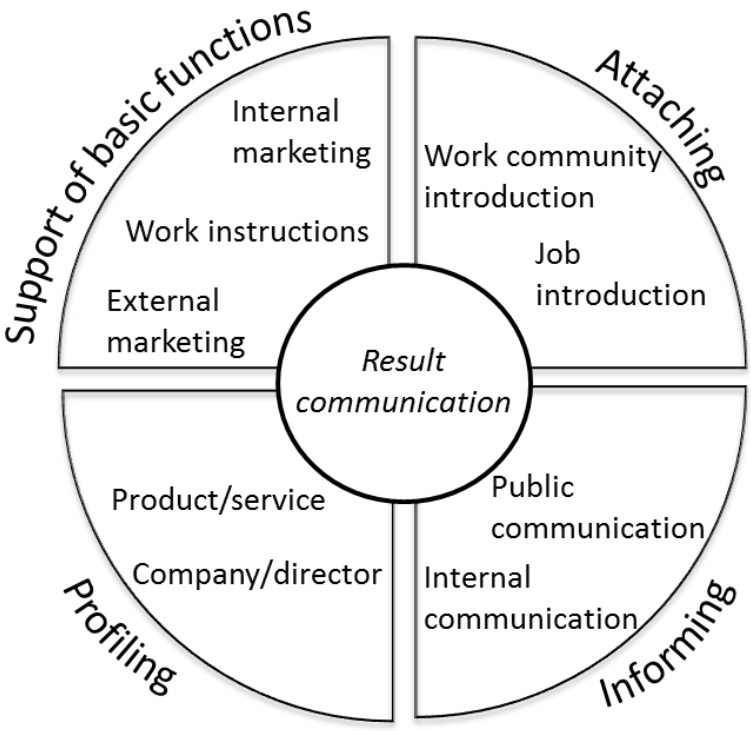


*FIGURE 7: Model of result communication*

## 3.4 Informing

One of the main principles in communication is informing: communication is needed to inform events in an organization, both internal and external parties. The main focus on informing is delivering organizational news. News is based on organizational happenings. In some other forms of communication, messages can be altered and chosen, but with informing, all news should be told, including the bad ones. There can be two kinds of informing: external for people outside the organization and internal for people inside the organization. (Åberg, 2000.)

### 3.4.1 External informing

External informing can have many concepts, which are used differently in different organizations. External informing can be public announcements, external communication, press relationships, public relationships, investor relationships, stakeholder groups etc. There are two main mechanisms for external informing: transmitted communication and direct communication. (Åberg, 2000.)

When audience is big or "anonymous", the only way to reach them is using transmitted communication. Using press conferences or press releases, organization is hoping newspapers,

radio and television reporters to publish that piece of information. This is public briefing. (Åberg, 2000.) According to Huttunen (1994) and Jaatinen (1994), when target audience is small or known, direct private communication can be used. This kind of communication can be called public relations or co-operation.

In most cases external informing is transmitted communication. This means that between the organization who wants to inform something and the target audience is someone: reporter. This makes it harder for the organizational press officer to decide the content of press release, because he has two target audiences to keep in mind: news reporters and the target audience to whom that press release or news shall be reported to. (Åberg, 2000.)

### 3.4.2 Personal communication

Having personal relationships with mass media is the basic requisite for good public relations. When organizational press officer chooses *co-operation with journalist*, he believes that good relationship will help the company or maybe even his own personal interest, e.g. his career. When he chooses *competitive mode* (=not co-operation) with journalists, he deals journalists suspiciously. He thinks they will emphasize negative and sensational things, and he does not believe in transparency. (Åberg, 2000.)

*Journalist choses co-operational strategy* when he trusts the organizational press officer. He believes that organizational press officer is doing the best he can and is telling everything there is to tell. Journalist might see that co-operation and good relationship might help him to get inside information. When *journalist is using competitive strategy*, he thinks that organizational press officer is trying to achieve some organizational or personal goals and is trying to show everything in a good light. Journalist acts suspiciously about every statement organizational press officer is making. (Åberg, 2000.)

*When both sides choses co-operational strategy*, we are in high trust situation. Both sides will benefit in a long run. When one side choses co-operation but the other party choses competitive strategy, we are in low trust situation. When both parties choses competitive strategy, there is a distrust between them. (Åberg, 2000.)

| | | **Strategy of PR** | |
|---|---|---|---|
| | | Competition | Co-operation |
| **Strategy of journalist** | Competition | Both ”loses” | Journalist ”wins” |
| | Co-operation | PR ”wins” | Both ”wins” |

*TABLE 2: Relationships between PR and journalist*

### 3.4.3 Internal informing forms and channels

Internal information - as might be guessed - is focusing on organization internal members. Unlike with external informing, internal informing doesn't have wide range of terminology: basically only internal informing or internal communication is used. (Åberg, 2000.)

Forms on internal informing can be divided into four different categories. According to Åberg (2000) they can be categorized whether they are ***local channels or distant channels***. Local channels will serve organizational unit or individual organizational member. Distant channels will transfer messages to whole organization. The other category is ***direct communication*** **or** ***forwarded small group- and network communication***. Direct communication is based on personal communication. Small group communication is using mass media technics but it is focusing on more limited audience than in direct communication where audience is bigger and more random. Network communication is using obviously intranet or other technical communication methods.

Using these two dimensions we get following fourfold table.

| | **Local channels** | **Distant channels** |
|---|---|---|
| **Direct communication** | Own supervisor<br>Other managers<br>Unit meetings<br>Co-workers | Info sessions<br>Co-operation body and elected officials<br>Meetings and negotiations<br>Direct communication from top management<br>Co-workers and friends from other organizations |
| **Forwarded communication** | Bulletin board<br>Organizational newspapers<br>Network communication | Bulletin board<br>Personnel magazine<br>Customer magazine<br>CEO overview<br>Annual report<br>Databases in network<br>Network communication<br>Mass media |

*TABLE 3. Channels for internal communication*

**Local channels**

Direct communication channels can be e.g. direct superior, other supervisors/managers, meetings, negotiations, co-workers etc. ***Superior-subordinate network*** is the main network for all internal communication. ***Meetings*** are regularly held gatherings. They can cover discussing on operative things and more common things like organizational news. Many of operational information are transferred horizontally from ***co-worker*** to another. Also grapevines are formed via co-workers. Grapevines might have a negative echo, but actually they are quite effective and fast way of communication, where messages are in understandable form. The problem is that grapevine might decline the organizational atmosphere. Forwarded local communication can be e.g. bulletin board, office newspaper or internal other internal messaging. (Åberg, 2000.)

**Distant channels**

Distant channels are forwarding messages usually for whole company. This means that the target audience is wider than single organization or a member of an organization. Distant channels are usually using small group- or network communication. Personal interaction are based only some briefings or press conferences. (Åberg, 2000.)

### 3.4.4 Content of internal communication

According to Juholin (1999) there are two type of content that should be communicated in organization: organizational basic assumptions and everyday business. Basic assumptions are vision, values and strategies. Everyday business is meant to keep organization functional and people interested in their jobs, organization and ecosystem. According to Åberg (2000) these everyday business things are: “organizational financial situation, plans and goals”, “changes in activities, ways of working and organization”, “employment situation”, “own work”, “trainings, coaching and courses”, “employee benefits, employee services and human resource politics”, “activities in other organizations and projects”, “hobbies and free time”, “products and services” and “other topical topics in ecosystem”.

### 3.4.5 Communication shortfall, delivering information and knowledge base

It is possible to study possible communication shortfalls with OCD meter (Organizational Communication Development). Communication shortfall means the gap between the knowledge some person has to some matter and the desired amount of knowledge. Shortfall is divided into channel- and knowledge shortfall. ***Channel shortfall*** means that the information channel doesn't provide as much information on that matter, than what is desired. ***Knowledge shortfall*** means that some information is not available at all. (Huhtala, 1998.)

One could make an assumption that shortfalls will decrease if internal communication is increased. But this might cause a problem. If internal communication is increased too much,

there will be an information flood. It will be harder and harder to find that relevant and important piece of information when there is too much information, information anxiety. (Koski, 1998.)

Need for information is based on that current situation. Piece of information is most valued on that certain moment. After few moments, that information might not be relevant at all. According to Åberg (2000) efficient internal communication system is following: It ***moves*** informative messages. They are usually pieces of information which are relevant at that particular moment, e.g. organizational changes or nominations. There are ***knowledge databases*** which are easily accessed to get the information immediately. Main principle for knowledge databases is that it should hold that kind of information which is hard to anticipate. Basically that means information such as personnel benefits, situation in case of sickness or how to operate during international business trip. The person who needs the information needs to know from where he can have that piece of information. This means there needs to be ***metadata***, information about information and where it's located. Information that exists in knowledge base can be referred in e.g. bulletin boards, emails and meetings.

## 3.5 Evaluating organizational communication

It has been noticed that evaluating a communication is hard. It's not easy to point out that certain communication action or message caused some effective result. Anyways it would be important to know what kind of effect good communication will affect on organizational result. Some are even ready to forsake whole communication evaluation, because they think evaluation is impossible. (Åberg, 2000.)

### 3.5.1 What should be evaluated?

Evaluation takes time, is expensive and neither results are always accurate, it should be pondered where to aim evaluation energy. Process thinking will help on this. Every organized action will consist on processes. On the other hand, processes can be divided into phases and connections of these phases can be examined, different phases input, what kind of work is happening inside these phases and what kind of results will be transferred from one phase to another. (Åberg, 2000.)

There are lots of processes. Therefore it's important to recognize those processes which are more important and which process is already assigned to existing action, unit or department. These processes are called ***core processes***. Organizational communication core processes can be naturally led from organization communication function. The amount of core processes will vary depending on size of the organization or depending on the emphasis of the task. In table 4 there are some core processes listed. Table will also show how these core processes should be measured, tested and evaluated. (Åberg, 2000.)

These evaluation means can be categorized into three groups. In some cases we can evaluate the ***effectiveness*** of communication. If this is not possible, we can evaluate ***quality*** of the communication. Pretty often it's also possible to evaluate usage of adeptness on its purpose, i.e. ***resource effectiveness***. (Åberg, 2000.)

| Communication functions | Core processes | Measuring/evaluation |
|---|---|---|
| **Profiling** | Communicating a vision<br><br>Building a profile | Vision communication impressiveness<br><br>Adequacy of a mental picture |
| **Supporting basic functions with communication** | Marketing communication<br><br>Network co-operation communication<br><br>Communication in changes<br><br>Lobbying<br><br>Communication in a state of emergency | Effectiveness of communication<br><br>Evaluating interactional relationship |
| **Informing** | Internal and external informing<br><br>Joint co-operation | Effectiveness of communication<br><br>Evaluating interactional relationship |
| **Socializing** | Job familiarization<br><br>Organization familiarization | Effectiveness of training and other tasks in familiarization |
| **Core processes for communication** | Leading communication and resource allocation | Resource effectiveness |

*TABLE 4. Core processes on organizational communication and their evaluation*

### 3.5.2 Evaluating communication effectiveness

In theory, communication is effective when it has caused some changes. This means communicational effectiveness needs ***comparison***. This can be made in three ways. Results can be compared on ***objectives***. This means in practice that you are looking forward: have there been some changes towards the set target. Situation can be also compared on the ***previous*** situation. In this case you are looking backwards: have there been some changes compared to what things were? Evaluation can be also made compared to ***competitors***, ***other external targets*** or some ***standard***. (Åberg, 2000.)

### 3.5.3 Evaluation on objectives

When communication objectives are defined clearly enough, evaluation can happen. Communication can aim to impact on receiver's knowledge, opinions, attitudes and/or behavior. Concrete objectives can be set for all of these. This way it's possible to evaluate how well objectives have been achieved. Objectives can be such as *attitude objective*, *behavior objectives* or *intellectual objectives*. (Åberg, 2000.)

### 3.5.4 Evaluation to the past

Here it's examined how communication has changed over time. Evaluation will require that the evaluation measures will be the same. Otherwise we cannot know if there has been any actual change or do we get different results because of changed measurement. Usually evaluation happens on communicational satisfaction or communicational atmosphere, changes in the attitudes of different organizational groups towards own organization or competitors or changes in the usage of different communication methods. (Åberg, 2000.)

### 3.5.5 Evaluation on competitors or industry standards

Competitor evaluation is made quite often: in many cases several times per year. Evaluation on industry standards is trickier, because it's impossible to have any universal measurement on what kind of organizational communication is good. In practice, evaluation on standards is made on how things are on average in similar organizations. (Åberg, 2000.)

### 3.5.6 Evaluating quality of communication

What kind of communication is good quality? From ***production focused*** point of view quality is flawless of operations. ***Design focused*** point of view is emphasizing that quality is good designing, which will result also to good quality production. ***Product focused*** point of view will define certain features for a product. Product is a good quality if it works flawlessly. ***Customer focused*** point of view means evaluation if end user thinks that product is satisfying his expectations and needs. This includes also price/quality experience from customer's point of view. ***System- or environment focused*** quality will evaluate from wider scope products effects: besides fulfilling customer satisfaction, product might have effects on other facets. For example fast food might fulfill the needs for customer, but it will cause a waste problem. These are represented in table 5. (Åberg, 2000.)

| Point of view | Focus | Evaluation |
|---|---|---|
| **Production focused** | Effective use of communicational resources for example in creating reports | Communicational quality is that things are done correctly at once |
| **Design focused** | Effectiveness of different communication models for example regulation of emergency communication | Communication quality is that things are designed well and different communication situations are prepared |
| **Product focused** | Quality of info's and other communicational messages | Communication quality is the result of the work, when we are happy |
| **Customer focused** | Satisfaction for co-operational communication | Happy customer means a good quality communication |
| **Ecosystem focused** | Evaluating communication effect from wide range point of view | Communication quality is mutual satisfaction and increasing organizational influence on the ecosystem |

*TABLE 5. Focuses on evaluation the quality of organization communication*

### 3.5.7 Evaluating communication resource effectiveness

Resource effectiveness is about evaluating the appropriate use of communication resources. Typically this is about following mass media: how internal blogs are read or how internal websites are used. According to Huttunen (1994), it should be at least roughly evaluated how much money, time, material etc. is used for communication. Evaluation can be tricky, but according to Huttunen (1994), some things can be evaluated. These are channels, messages, company image, engaging rate and background factors. He elaborates these so that channel defines how much information receivers are estimating to have received from different channels and how important they think that channel is. A message means how often certain messages have been noticed and how plausible they are considered to be. Company image defines how well does the attributes in some form are describing the company. Engaging rate estimates what the receiver knows about the company, what are his attitudes and has his behavior changed after the communication. And finally background information evaluates what is the receiver's relationship to the organization in the question. (Åberg, 2000.)

Evaluating resource effectiveness is very troublesome. Expenses are easy to investigate, effectiveness is not. Nickels have set the evaluation golden rule already in 1980: the only fair evaluation for communication methods is to evaluate if they have achieved the objectives, not if sales has gone up or organizational result has improved.

## 4. RESULTS

There are many reasons why information sharing is important. One of the most important is expense saving (Hansen, Mors, Løvås, 2005). It's not practical if employees are using their time for searching information which could be already easily available for all relevant parties in a company, organization or team. Two problems in information sharing can be distinguished. First of all organization might not have clear working method or technical possibility for good information sharing. Secondly people might not be willing to share information to their colleagues or other relevant parties. My experiences, and references below, indicate that the latter one is usually a bigger problem.

Because information sharing is often considered troublesome, according to Bartol and Srivastava (2002), sharing can be encouraged with financial reward, gift cards etc. There are also contradictory researches about financial rewards; more about this later on. If information sharing is more of a technical problem, a proper information sharing channel needs to be established. Usually research targets and research results are guiding to right research method, but this design research is guided by research question, as Järvinen (2005) recommends. Whether to minimize loss and risk, improve organizational efficiency or enable innovation, information sharing efforts and initiatives add great value to an organization.

First step - and perhaps the most important one - towards good information sharing is a support from organization's management. It is vital that management (usually line manager or project manager) sets norms and rules for information sharing. Only few people are willing and ready to maintain knowledge base spontaneously. On the other hand organization might not even have proper knowledge base system, or at least employees might not be aware of them. Organization must provide tools, possibility and motivation for information sharing.

An organization has to motivate employees to be dedicated for information sharing, and it also must maintain that dedication. Sometimes a good start in information sharing might deteriorate by time and at the end people share information as they please. It is also vital that management understands that time spent on information sharing is as important as any other working time. Keeping up knowledge base shouldn't take place in extra-time after normal working hours, but management needs to allocate some time for daily information sharing. It is important to explain this to employees so that they understand it is part of their normal daily routines.

Davenport and Prusak (1998) has defined information system as a place to collect, gather, share and use that information. Gibbert and Krause (2002) are emphasizing willingness of people to share information. Thus you can conclude that maybe the biggest obstacle for good information sharing is actually people. Do people want to share information? Previous researches indicate that willingness to share information is greatly depending on the friendship status of two people sharing information and how committed they are to organization processes (Kraut, Egido & Galegher, 1990). This is an important question because people may choose, or not to choose, to share information as organization wants them to. People are more willing to share information if they don't want good just for themselves, but also for other people in the organization (Constant, Kiesler & Sproull, 1994). They continue saying that in practice this means that information is shared better if employees are happy with their co-workers and organization in general.

People have different kind of preferences and goals, and based on that they could share information as they see most suitable for them (Wittenbaum, Hollingshead & Botero, 2004). Boone (1997) states that even if an employee is motivated to do his work, he doesn't want to share information with someone he doesn't trust. Bock, Zmud, Robert, Kim and Lee (2005) confirms that changing people's way of acting and thinking is the biggest challenge for good information sharing.

In organization, or even within team, there might be different kinds of personal goals - for example having a good relationship with a supervisor and co-workers, improving own personal status, having different kinds of options or just being right (Guzzo & Shea, 1992). All this affects on information sharing, for better and for worse. People don't share information just based on what they know and to whom they will tell it to but they also act strategically, meaning how they share the information. In practice this could mean that people tell negative information in positive light and vice versa depending on their own goals. To reach some personal goals, people can keep some information to their selves. (Wittenbaum et al. 2004.)

People seem to make clear difference between material information like written documents or computer programs and immaterial information like human memory, information, experiences, ability to ride a horse or fix computer program (Constant et al. 1994). They continue stating that comparing a thought that has been represented in a document or a thought that has been said in a conversation, it can be interpreted so that thought in a document is "product that includes information" while thought in a conversations is considered as expertise.

Wittenbaum et al. (2004) are writing that different kinds of factors like structure of a group, size, rules and roles are affecting how information is shared. They continue saying that researches have shown bigger groups to be better in information sharing. Information sharing

doesn't need to be intended activity or to be pointed at someone. Hendriks (1999) says that you can learn by following while someone else is working, even if this other person doesn't realize that he is being monitored and that someone is learning from him.

Bock et al. (2005) set nine hypotheses for information sharing and based on that they made three conclusions. These were making sure that organizational chemistry and relationships are in order before first steps towards information sharing are taken. Essential requirement is to have support and encouragement from management. They continue saying that there needs to be homogeneous groups in organization which constitutes essential groups for information sharing and lastly people shouldn't be encouraged to share information by offering great rewards for it.

Bock and Kimy (2001) have familiarized themselves with offering rewards as motivators for information sharing. By default people compare a time that is required for some task and how inconvenient that task is, to reward or benefit they get from it. On the other hand they have noticed in their researches that financial reward has negative echo and it doesn't motivate people to share information. First of all, they concluded that rewards are not good idea because they might be considered as manipulative and someone might think he didn't get a reward he was supposed to. Secondly, rewards break relationships. When someone wins, others will lose. When there is certain amount of rewards to be shared, people feel they are competing with each other's to get that reward. Management might also use rewards and incentives to evaluate personnel in general. Lastly Bock and Kimy (2001) say that rewards can be compared with punishments. The more people are controlled to do something, the more they lose their interest to do that. Reward "hunters" can think; "if they have to bribe me to do that, it cannot be something I want to do".

Nowadays especially in big companies, there are organizations which are competing each other and on the other hand co-operating at the same time. This kind of paradox is a challenge in large companies, which are trying to control information sharing. (Tsai, 2002.) By default all essential information should be available for everyone in a company, but organizations competitive position might affect this. Companywide information sharing was left out from this research from the start, but possible competition between organizations has to be taken into account when considering information sharing and building knowledge base.

What kind of information should be shared? All information that is essential for becoming better and more efficient organization. This information can be everything that might be expected to have further use; for example all documents and articles that affect organizational work, e.g. architectural graphs or installation guides. Also different kinds of scripts or configurations that ease daily work should be added to knowledge base.

## 4.1 Secure information sharing

For a long time, it's been known that information is important on making decisions (Lee, Bagchi-Sen, Rao & Upadhyaya, 2005). That doesn't mean just decisions made by top management, but every employee in company. Decision making is supported by information which is available from knowledge base. Information systems are becoming more and more important on organizational actions and technology dependent, securing information has become one of the most important aspects on knowledge management (King, Marks & McCoy, 2002). One could ask why organization wouldn't want to secure its data from outsiders and to make sure they, who have rights to do so, can access the information at any time. Unfortunately these issues usually arise after some data has been already leaked to a competitor or some data has been lost for forever. One of the most challenging phases on moving from unofficial way of working and produce precise, structured and detailed requirements, which can be executed by security engineers (Ravi, Kumar & Xinwen, 2006).

When people sharing the information have divided into different places and different time zones, the need to produce clear, understandable and shareable information grows (Griffith, Sawyer and Neale, 2003). And this is the situation for many companies. They have offices and employees all over the world, so this needs to be taken into account in secure information sharing.

Simultaneous competition and co-operation are becoming more and more common between different companies. Some part of the company is competing with another company, while different part of the company is doing co-operation with that company, so information have to be shared selectively (Agrawal, Evfimievski & Srikant, 2003). Especially with big companies, there is competition also inside the company. Every organization has the same ultimate goal, but at the same time they might compete on their existence and top management support. Anyways, the starting point should be that non-secret information can be shared (almost) freely inside the same organization.

Basis for secure information sharing is "share securely", where "securely" means that information is not accessed by outsiders. Secure information sharing has been basic, but unattainable goal for many decades. Problem is easy to understand but hard to solve. Digital information is easy to copy and transfer – and access to a copy usually equals access to original data (Ravi et al. 2006). Webster dictionary defined accessibility as follows: "the quality of being present or ready for immediate use". Even the definition is simple, but achieving this target is very difficult (Bhagwan, Savage & Voelker, 2003). Privacy laws and policies are setting limits for information sharing (Agrawal et al. 2003). This needs to be taken into account when building an information sharing system. There can be different rules how information should and can be stored. These issues should be straightened out by a legal team. Because knowledge

base in a company or organization is usually intended just for internal employees, not all the same restrictions and laws apply for private company than for e.g. public services or a public discussion board.

What kind of information should be secured? All non-public data should be secured with user authentication, encryption, firewall and access control. Without any protection, knowledge base can get into competitors possession. Knowing this and the fact that knowledge base usually stores lots of information, it's important to make enough investments on the security. If a company or organization losses the knowledge base, it also loses the competitive advantage (Griffith et al. 2003).

## 4.2 Information sharing methods

Lecklin (2006) has stated that communication in a high quality company is open, precisely defined and efficient. It is also very important to set definitions and standards which are used for information sharing. If every employee shares information as he wishes, information sharing quality cannot be very good. This applies even if an employee has genuine wish to share information to his co-workers. This is where management of the organization or company needs to define norms and communication channels which are used for information sharing. Information can be shared directly by communicating with each other or indirectly via knowledge base (Bock et al. 2005). Neches, Fikes, Finin, Gruber, Patil, Senator and Swartout (1991) are writing that information itself is complex by nature and obtaining it, is equally complicated. Because of this, organization cannot afford of losing already obtained information. They continue saying that using knowledge base is very important so when repeating something, you don't have to start from zero. Instead you have existing knowledge base where information and experiences can be found.

There are different kinds of knowledge bases. Quite often one certain knowledge base doesn't suite for some organization or team whereas for some, it works perfectly. So, there is no one-fits-for-all system available. The best way to share information has to be chosen based on the structure of the organization or team and the kind of information shared. On the other hand one information sharing channel doesn't have to exclude other channels, but they can support and complete each other's. Lecklin (2006) has written how Nokian Renkaat Oyj has built an internal TV-system which shows topical information to employees. This way everyone sees information that is intended for everyone no matter where or when they work. This is an excellent way of sharing information. Because information shared on this kind of media has to be kept short and simple and it cannot be stored, it doesn't cover the actual meaning of a knowledge base. Information in actual knowledge base is more complex and information should be always available.

When storing information, its reuseableness has also to be taken into account (Hansen, Nohria & Tierney, 1999). Because of this, information has to be stored in a way that it can be utilized for other similar projects as well. According to Constant et al. (1994), use and usability of a new system depends on how people use it. In practice this means that people need to know how to use the knowledge base, they need to be motivated to use it and they need to use it actively.

There are tens or even hundreds of tools meant for information sharing. Many of these are free, some are liable to charge and supported by large companies like IBM or Microsoft. Obviously I have not familiarized myself with all of them, but building an information sharing system can include tools and applications as explained in following chapters. Starting point for information sharing could be Wiki-based application, like Microsoft SharePoint. Sharing information with this kind of application is quite easy and by default everyone has rights to create and modify information pages. It's a web based system so you can use it from every computer that has web browser and network connection. Information and documents can be divided into separate pages, so for example R&D or a certain project has their own pages including only information that is relevant to them. Everyone has access to (almost) everywhere and information is not limited this way. Wiki-based application is also familiar to many people already, so employees usually don't need any specific training for this.

In addition to actual knowledge base, especially in large companies where people work all over the world, it's very useful to use also some IM (instant messenger) tool, like Microsoft Office Communicator. This kind of tool doesn't actually fulfill criteria of knowledge base, but it is meant to increase communication between employees. In many cases the fastest way to find something out is to ask it from a co-worked who might know something about it - via IM. This reduces need to contact people face to face at some level, especially if you are working in different countries. Communication via IM is also often experienced as easier and more convenient way to contact a colleague than to call them. With IM it is also possible to communicate with several people at the same time, so all information goes to all relevant parties at once. IM tools are also interactive, unlike e.g. email. IM is also considered to be informal and that promotes its use.

Good additional methods for information sharing are displays or monitors. These should be placed e.g. in halls, office spaces or rooms where people work or walk by. In general they should be located in places where people can easily see them. As mentioned earlier, this kind of media is not meant for sharing detailed technical information but short messages about daily/weekly events, statistics etc. These are updated often and can be internalized with a quick look.

Even if knowledge base is widely used, you should not forget weekly/monthly face to face meetings where information sharing is more free and informal. Also information that might seem insignificant and normally would not be added to knowledge base can come up in these meetings.

## 4.3 Improving organizational communication

In previous chapters there are theoretical information for organizational communication and information sharing. Here I will utilize those as a background information and describe a method for good information sharing using also my own experience in organizational communication.

### 4.3.1 Findings

In an international company, people are usually scattered all over the world. In an optimal situation, employees would be located in the same office. The problem arises especially when employees are located in different time zones. Due to different time zones (time zone difference more than 8 hours), it might not be possible to reach the other person so that you would both still be in the office. Because of this, communication might not be very interactive, since you might be able to send/receive only one e.g. email per day from that person. In many cases this is solved by working before or after your local office hours, but in my opinion that's not very good long term solution

Quite often there are too many meetings during the workday. Yes, meetings are good way to share information, but too many meetings can lead to two main problem. First of all, when spending most of your day in meetings, you might not have time to do your real job. This is often compensated by working overtime. The other problem might be that many of the meetings might be more or less useless for you. Meeting requests are often sent to wider audience than would be necessary. Because of this, you might waste your time in useless meetings, but the other, equally important, downside is that you might not be able to focus on the important meetings.

Same information or documents can be stored in many places. Some individuals or teams might be storing the information to this location and some others might be storing the information somewhere else. This will lead to a situation where it might not be known where one particular piece of information can be founded. Obviously information/documents can be eventually founded from possible places a, b or c, but it's not practical to use your time for searching the document from many potential places.

In every organization information is shared in so called coffee table discussions. This kind of more or less unofficial information sharing method is handy and fine, but the problem might occur if that piece of information would be relevant for more persons that are in that situation.

Maybe the easiest way to see when organization doesn't promote information sharing, is the lack of information sharing tools. There might not be any respectable application or tool which can be used for information sharing. Or there might be an information sharing tool, for example some Wiki based tool, but it might not be used for information sharing. And if there is an information sharing tool and it is even used, there might not be any agreed rules or standards for creating documents etc. When everyone is creating their own documents, they might not be categorized or structured in any standard way. Result will be that there are documents available, but they are either in random places or the context is not following good practice.

If there is a topic that affects many people and the need for information is often similar, then it might be a good idea to set up some "best practices" implementation. One case where such a tool could be used is in IT support. Tool is similar to any FAQ, but not having just questions and corresponding answers, but tool could have e.g. some metadata keywords. If someone wants to know e.g. how to setup an email account in his mobile device, then search function would find that document with keywords like "mobile", "email", "phone", "outlook", "remote", "mail client" etc. Keywords shouldn't be too strict, otherwise document cannot be easily founded. Also a person looking for information on PC based Outlook might be interested in possibility of reading emails on mobile device, even that's not what he was searching initially. So, the idea would be to promote certain topics which might be relevant for the user.

### 4.3.2 Proposals

Setting up environment where information sharing is made possible and even promoted, doesn't have to be hard. There are few things which should be considered, but after that at least basic structure should be available. I have divided my proposal into two categories or perhaps as a natural continuum to improve information sharing even further, into two steps.

### 4.3.3 Core for basic information sharing practices

Get information sharing tool. Documents located in your personal computer don't improve your colleagues' information on that topic. They need to be made easily available for everyone (or at least to a selected group). Tool should be easy to use and effective on storing and finding information. Shared network drive was commonly used on document sharing and storing on the 90's, but it barely provides the minimum requirements nowadays. Highly recommended tool would be Wiki-like tool which is accessible via web browser. It will be accessible with every computer without having to install any additional software. Documents are categorized based on the content and tool shall also support meta keywords. Documents can be also found using the internal search (and for the search function, it's important to set up good keywords for every document). Suggested amount of keywords per document would be from 2 to 5. To name one tool, Microsoft's SharePoint meets pretty much every requirement for good information sharing tool.

Having the best information sharing tool doesn't do any good if people are not using it. This might be the most important but also the hardest aspect to sort out. Organizational management shouldn't assume that people will share information by default, because they do not. Obviously people talk, discuss and ask questions, but people should be also encouraged to write things down, create documents and share those with all relevant people (using the selected information sharing tool and/or in a meetings). As studies have shown, it might not be easy to change someone's mindset who hasn't actively shared information to someone who wants to share his knowledge and documents with other people. Promoting information sharing should be rather subtle, and not compulsive. As known, if something is made compulsive, it immediately becomes something not so fun to do. Compulsive is often considered something that I have to do even I don't want to do it, and obviously that's not the best starting point.

Then how to make people want to share information? Unfortunately I don't have clear answer for this. One motivation could be to take workload away from someone who is not initially willing to share information. If that person has documented his daily work and competencies, then someone could help him by following the documents he has created. Result would be that someone else would be capable of helping that person doing his work – by following the documents he has created earlier. The tool used for information sharing could also include some statistics showing how many documents each person has created or updated. Simply seeing your name as one of the top sharers can be enough motivation for someone. Some level of commanding order can be of course given by superior. This of course should be communicated in a positive way. Every employee should have some standard organizational targets, and including information sharing as a one individual target is natural way to promote information sharing.

Organizational members should be divided so that they are grouped together based on the topic they are working on. This is represented on figure 8.

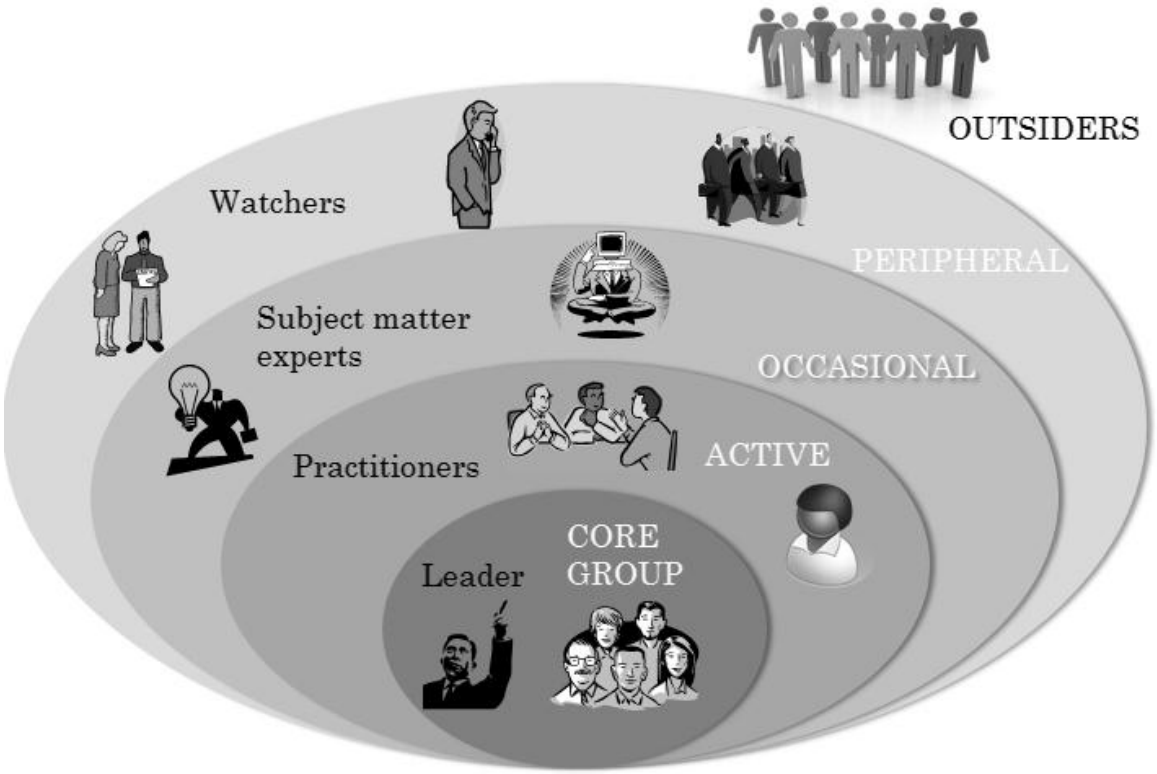


*FIGURE 8. Model of information sharing community*

In practice this means that for example in an organization that has system developers, all the system developers would be located close to each other – this is called *core group*. This way all those people (e.g. system developers) are able to discuss and share information among each other easily. They all could be could be sitting for example in one room. The next one after core group is the *active group*. This group might not be the one who is responsible for doing the work in the question, but core group actively works and discusses with them. Here, the information sharing is not as vital as in core group, but still pretty much compulsory. The active group should be pretty well aware of what core group is doing. Going towards the outer edge of the model, next comes *occasional group*. They are usually experts of some matter. Core group contacts one of the subject matter experts and asks for information. Here, the information flow is usually so that core group asks and subject matter experts answer. On the outer edge there is *peripheral*, people who might not be involved in the process in any other way than, but they might be interested only in the outcome, so there's not that much interaction towards them.

Organizational meetings are natural way to discuss and share information with co-workers. I would anyway suggest revising which meetings are important for you to attend to. Having too many meetings might lead to a situation where you don't have time to do your real job anymore, but also they might also affect negatively on information sharing. By default, of course, you will (or at least should) learn something new from every meeting you are attending, and also you have possibility to share your information with other people.

Nonetheless I would claim that attending fewer, more essential, meetings will increase your information on the most important topics. Too many meetings might lead to a situation where you will be sitting in the meeting room, but not really paying an attention. This can be called numbness, not able to focus 100% on every meeting. Having your calendar full with meetings, you might exhaust yourself so that you are then not able to focus on the more important meetings. So, I would recommend to consider which meeting is important for you and attend only those ones – with full of energy knowing that this meeting is important and enables to share the information which is relevant for me and the others. What comes to the meetings which you are no longer attending to; optionally check the meeting minutes briefly (yes, meeting minutes should be also shared) after the meeting and use few minutes to check if there was some interesting topic for you – do not use e.g. one hour sitting in the meeting room knowing that there won't be probably anything interesting for you.

As it has been mentioned in previous chapters, people usually have the will and need to discuss daily issues (whether private or organizational issues) with their colleagues. Informal coffee table discussions can be very handy on these. Sometimes you can get a lot more out of people by talking with him in a little bit more non-formal situation. Here, the topic doesn't necessary have to be work related, because simply bonding with your colleague will ultimately improve your connection with that person and that leads to improvement of work related discussions as well. What should be noted in coffee table discussions is that they should be more like discussion based events between two or more individuals, not formal information sharing sessions. This is simply because usually not everyone related to that (work related) topic is in attendance. Obviously some things can be shared even not everyone is around, but it's important to make sure that everyone (those that are not participating in the coffee table discussion) gets the relevant information which was shared.

I've seen numerous of times when some piece of information was shared in the coffee table, but then no-one ever remembered to share that information to those who did not participate that session. So, by all means, coffee table discussions should be promoted, but do not make any formal announcements etc. when not everyone is attendance. Even if you know that you remember to discuss about some important issue with non-participants later, they might not be happy to hear about some important organizational change after their colleagues.

Pretty much everything should be documented, but most of the information should be shared interactively, verbally, in some face to face session. This is because people don't want to proactively read and find things from documents, but to hear about new things or updates in some organized session. Depending on the organization and content, but for example in R&D organization it might be a good idea to organize short e.g. weekly session for all relevant parties to share information about overall progression, new features, impediments etc. It might be very useful for someone in the sister R&D team to know what's going on with other teams. Even these would be documented, as I'm quite sure most of us do not actively follow all the

documents that would provide some interesting information for us. Therefore weekly session, between parallel teams and including different job roles would provide lots of good and important information which we might not otherwise get.

Again, depending on the content, but in most cases the bare minimum would be that someone says to you that “here is the document, read chapters x-y”. Unfortunately it can happen quite often that some relevant information for you is documented, but no-one ever mentions this to you. Needless to say, but information which is not used for some reason, is not very useful.

### 4.3.4 Enhanced practicalities

Following suggestions are not absolutely mandatory to enable good information sharing, but at least they would be something to consider when polishing information sharing practices. Life is (or at least should be) continuous learning and developing, so even “pretty good” information sharing practices should be improved. This way no-one will forget the importance of information sharing and will not settle for the current situation.

As mentioned in previous chapter, information sharing, i.e. discussions, are not at their best if person(s) participating the discussion are scattered all over the world. Nowadays we have very good tools to talk and share data with someone located on the other side of the world, but is this the optimal situation? I would say no. Having your closest workmates located in the same country, in the same building but in different floor might not be good enough either. Sure, it’s a very good improvement compared to someone who is sitting in a time zone 12 hours difference. But personally being in this kind of situation, I would categorize persons based on location into two categories; a person who sits not more than few meters away from you and a person who does not. Why’s this? Because people are lazy. If we find out something new; interesting for someone else, or want to ask, or want to share information in general, we probably will not share 90% of these things if the person is not there, in a range of hearing. The other reason might be that we might not have the urge to share information if that makes us to do extra work, e.g. writing a memo, discussing it later or anything that cannot be categorized as ad-hoc free discussion.

Things are not usually documented very well. Sure, there can be documents and they might have good information, but this might not be enough. I would suggest having e.g. monthly documentation/information sharing day. Sometimes we all forget to create or update documents. There could be one day dedicated just information sharing. This day could include e.g. short info session in the morning where information sharing / documentation needs are being discussed, some high level topics would presented which should be documented (and optionally their sub topics) and rest of the day would be dedicated just for information sharing. Whether you would be focusing on creating documents or having non-formal QA sessions with your colleagues, the target is to improve information sharing. Do not focus on your normal tasks, but depending on your role, tasks and situation; create documents, discuss with your

colleagues, ask/answer questions, discuss what kind of information is missing, what kind of information is blurry – be interactive!

At the end of the day, you will not just have new fresh ideas and knowledge what your colleagues are working on, but you have also built your relationship with your workmates and as it has been brought up in this thesis, that alone, good relationship, will have a major positive impact on information sharing for the future. And it should be also noted, that information sharing and/or documentation should not stop at the end of that day; this day is also a reminder or a booster to improve your information sharing for upcoming "normal" workdays as well.

In every organization and company there are lots of acronyms in use. The problem is that all (or most of the) acronyms are used internally only. Because of this no-one can know what certain combination of letters means before someone explains it. For example acronym "PAR" or "NOL" can have many more or less worldwide generic meanings, but the same acronym can be used in some organization or project and it can mean totally different thing. New person joining the organization cannot obviously know acronyms beforehand and you cannot either expect them to remember all of the acronyms. When acronyms are used and there are lots of them (which is the normal case), I would recommend to use e.g. a Wiki-page where all used acronyms are listed and obviously stating the meaning of that acronym. Also all well documented pieces of information should have abbreviations or acronyms –topic at the beginning or end of the document.

## 4.4 Evaluation

Evaluation would be important part of improving organizational communication. Unfortunately, as described on chapter 3.5, evaluation can be very troublesome and might not always give accurate results. This thesis doesn't give comprehensive solution for evaluation, but following topics can be considered as an evaluation points for organizational communication: innovation fostering, reduced cost of employee training, agility and improved decision making, improved decision making, improved strategic planning, virtual collaboration, faster decision cycles, greater awareness, faster learning, free flow of ideas (lead to insight and innovation), reducing risk and finally greater productivity.

Items above are natural results of improved information sharing. But the problem is that they can be hard to evaluate. And if they can be evaluated, the interpretation can be hard because improved results in faster learning or greater productivity might not be seen immediately. The other problem can be proving the reason for better results. How can you prove that productivity has improved because of improved information sharing?

But figures don't lie and therefore I'd suggest having following tree measurements in place. It's true that they do not comprehensively measure the results of improved of information sharing, but they do give some kind of direction.

1. Number or articles/documents created/updated

Having cold figures on how many documents (containing relevant information) a person has created, will roughly tell how active that person has been on information sharing. To encourage people on creating documents (and uploading them to information sharing tool), system could tell how many documents each person has created. Seeing your name in the top 10 list or under "latest documents from:" can cheer you up. It's true, that obviously this doesn't tell you e.g. how much that person has been sharing information verbally. Also it should be noted, that not everyone can be expected on creating the same amount of documents – each person can and should have personal target for this. Every employee should have some targets for his job, and number of created documents can be one individual target.

2. Times accessed

Many of the tools used for information sharing, can also have a feature showing how many times certain document has been opened. This will tell if other people found that document useful or interesting. Seeing that your document has been used 1, 10 or 100 times can give you a nice feeling, understanding that the time and effort spent on creating and sharing that document, was not gratuitous. One important aspect is the naming convention. Documents need to have descriptive and coherent naming structure. Naming should be so descriptive that people would know the content without opening the document.

3. Satisfaction survey

Most of the companies have some sort of general yearly satisfaction surveys, but to evaluate quality of information sharing in some sub-organization or team, a separate survey can be introduced. People answering the questions would be those that create and use documents created by someone else. Questions could be e.g. "Is there enough documents available for me?" and other type of questions could be related to information sharing happening verbally. Based on the survey results, certain actions can be taken into use. Survey should be repeated in few months to see if results have improved and possible issues with some question have been fixed.

## 5. DISCUSSION

This research is based on theoretical data, based on reference literature and observations in working life. Introduction to design science research is mostly based on Hevner & Chatterjee's 2010 edition on "Design Research in Information Systems". Research material is collected from various places, including books and articles.

### 5.1 Reliability

Miles and Huberman (1994) are saying that in order to research be reliable, its study process has to be consistent, stable towards the future and across researchers and methods. They have defined ten questions for research reliability. These are listed on the table 6 below.

| | |
|---|---|
| 1. | "Are the research questions clear and are the features of the study design congruent with them?" |
| 2. | "Is the researcher's role and status within the site explicitly described?" |
| 3. | "Do findings show meaningful parallelism across data sources?" |
| 4. | "Are basic paradigms and analytics constructs clearly specified?" |
| 5. | "Were data collected across the full range of appropriate settings, times, respondents and so on suggested by the research questions?" |
| 6. | "If multiple field-workers are involved, do they have comparable data collection protocols?" |
| 7. | "Were coding checks made, and did they show adequate agreement?" |
| 8. | "Were data quality checks made?" |
| 9. | "Do multiple observers' accounts converge, in instances, settings or times when they might be expected to?" |
| 10. | "Were any forms of peer or colleague review in place?" |

*TABLE 6. Definition of research reliability*

Making of this research might not answer "yes" to every previous question (which would be the ideal situation). But Miles and Huberman (1994) also condensed the reliability into one question: "Have things been done with reasonable care?". The answer to this question is "yes". I have used quite a lot of references in this research. Obviously this itself doesn't prove anything, but using existing studies, comparing them and using own experiences on organizational information sharing gave me quite a good picture on information sharing practices and models. I have taken into account that not all practices are useful or similar in every environment, but this research doesn't even try to provide answer to all possible ecosystems. Making this research took about two years to complete. During this time my work organization has changed three times. This didn't harm the research; actually it only confirms my findings. It seems that the problems with information sharing are somewhat similar across organizations and teams.

## 5.2 Validity

The question here is whether the results of this research is true or not – or something between. Miles and Huberman (1994) have divided validity into internal- and external validity. Internal validity means whether results of the research is valid in that context which have been defined e.g. in the research limitations. External validity is answer to question whether research results can be utilized in other environments as well. For this research, natural point of view is only the internal validity. As it has been mentioned, I have not even tried to give one-size-fits-all solution, but to answer the research question on limited environment (large company having organization with 100-200 employees). Findings are consistent, results seems plausible, own experiences reflect pretty well to previous researches etc. But not everything can be copied from this research to all similar environments. Everything can and even should be questioned and using own judgment when applying these results should give the best result.

Answering to validity to external environments can be a little trickier. Reader should consider what kind of ecosystem he is trying to apply the results to, is there other similar studies giving same kind of answers and are the results generic enough from my environment. Here, the reader has a bit more responsibility, because researcher doesn't even try to promise results to work in different kind of environment. This research can be considered quite general for all work environments. Some parts can be also applied for non-work related communication situations, but maybe e.g. setting knowledge base or weekly meetings with friends or family is exaggerate and even gratuitous. Even the results doesn't even try to answer needs for e.g. small- or medium sized companies, I would consider results to be pretty valid for them also. Again, it's the reader's responsibility whether he or she will apply e.g. suggested knowledge bases to an organization sized 5 or 50.

## 5.3 Future research questions

Information sharing can be observed from many angles. As this research took quite general overview for information sharing, we did not get any detailed results. Interesting research questions for the future could be e.g. "Can one knowledge base be enough to fulfill all documentation needs for a big company?" or "How to encourage people to share information?". I found these research questions interesting and important because to my experience, there can be lots and lots of different tools used for information sharing even inside one organization. Efficiency would improve and money would be saved if organization would centralize information needs to a one tool. As for the second research questions for the future, as stated in this research, willingness to share information is maybe the biggest obstacle in information sharing. If that is solved, all the rest obstacles should be quite easily solved.

## 5.4 Final conclusion

Organizational information sharing is important. Main reasons for this are for example time usage - it's not efficient spending lots of time figuring out something that someone else has already solved. Efficient information sharing will ultimately also affect the job efficiency and therefore on company profit. Even there is a clear link between work efficiency gained with information sharing and company profit, unfortunately information sharing is usually something that company doesn't pay enough attention to.

There can be two main issues with organization information sharing. First of all, organization might not have any tool intended for information sharing. Selecting proper tool is important because the tool might encourage, or impede, information sharing. Organization should also have clear guidance on information sharing. Employees need to understand what is expected from them. Support, guidance, targets etc. for information sharing needs to be set and communicated by management. These all are important but maybe the most important, and also the hardest to achieve, is the willingness to share the information with colleagues. Some people are willing to document and share information automatically, but this is clearly not the case for some people. If and when this is solved, quite big part of the problems with information sharing is resolved.

Meaning of communication and information sharing is to reduce someone's uncertainty of something. Communication can be considered successful when someone has learnt something new. Unfortunately communication doesn't happen automatically. When someone wants to communicate something, he has to find a way how to express himself and a way to extract that information from his head to someone else. While communication can be easy, there can be also lots of disruptions that can make it harder or even impossible for the receiver to understand what has been communicated.

There are lots of different ways to share information. Some method can work nicely in some case, but for some case it doesn't fit at all. In work environment, the most regular ways to share information can be e.g. documents, emails, meetings, face-to-face discussions etc. One channel to share information doesn't usually replace other channel but they are supporting each other’s. This can mean e.g. that a document is created, then its content is discussed in a meeting and possible updates for that document are reported face-to-face with someone. There are also ways to improve the communication method by taking some additional steps into use, e.g. repeating or being surprising.

I can see clear benefits for this research. Obviously, reader of this thesis hopefully learns something new on information sharing, but I can see big personal benefit for researching this domain. I suppose many of us, including me, have observed some communicational issues and problems with information flows. Nowadays when we are living in a little bit uncertain and dynamic world, informational and communicational issues are more or less the same even e.g.

job description would change or you would completely change the field or work. I'm quite certain that the knowledge I got from this research will help me understanding organizational communication for the rest of my life. Hopefully I can improve the organizational communication on my behalf in my future roles. Having a pinch of psychological aspect on this research (mainly from the "how to make people willing to share information") was also interesting aspect.

There weren't any big problems with creating this research. Idea of this kind of research was already in my mind some years ago. Since this was my first actual (design) research, sometimes I felt maybe a little bit wobbly and uncertain, but I think I have now some level of understanding on design research and obviously from the information sharing as well. Limiting this research to only big organizations was natural for me, since that's where I have working experience from. Sometimes there were challenges on setting the research limits. Information sharing itself is quite big domain and it can be observed from many angles. This was a little challenge for me as well, since I had to consider which parts I will take into this research. For example the secure aspect on information sharing was a little bit indeterminate, but I took it as a part of this research (even shortened a lot from its original state) because security aspect for documents including immaterial understanding is important.

Design research methods were used for this research. I found design research quite natural selection for this thesis. Maybe because of the essence of information sharing, I didn't see other research methods as suitable as design research. For sure, this topic allows other research methods, so maybe e.g. case study could be the next continuum for this research. Or maybe research results from this research could be actually implemented and results could be evaluated.

I hope my minor contribution to this field will improve information sharing and communicational aspects on work environment. At least I am now enlightened and ready to give my own contribution and understanding to the environment I'm working in. Since this research only scratched the surface, it would be easy to deepen this research. Maybe someday I will also continue researching this interesting field with more time and resources.

My status and role in this study was based on norms and standards set by school. In this study, I tried to be objective. I think based on this study it is possible to develop information sharing practices in many companies and organizations. This design research produced a basic model which can be used for improving information sharing. And finally I will answer to research question (How to share information efficiently in a large community of work) as follows: Efficient information sharing in a work community is possible when management and employees are committed to sharing information based on set standards and if there is at least one knowledge base tool available.

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