



Aalto University  
School of Business

# VIRTUALIZING INTERORGANIZATIONAL COLLABORATION

CASE SHIPPALETTE OY, A DESIGN  
MICROENTERPRISE

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## Abstract

Luxury cruise ship building industry is looking for opportunities to increase capacity to build new vessels at an ever-increasing rate. Interior design is one area of expertise in shipbuilding that still today, instead of automation, relies heavily on the creativity and analytical thinking of knowledge workers. This study aims to increase knowledge on virtualization of collaboration in design work, enabling a capacity increase in interior design.

The problem of inadequate capacity in design work is mainly related to human resources. The building project of a luxury cruise ship is an effort of a network of companies. All the professionals specialized in interior design work are not located geographically in the same locations with the building projects. By virtualizing interorganizational collaboration, the barrier of physical distance between participating companies could be lowered or removed.

This thesis looks at the problem of limited capacity from the perspective of ShipPalette. It is a microenterprise offering subcontracting services, such as coordination and sourcing of interior design, to shipyards. The entrepreneur of the case company is highly committed to virtualization of work, but alone the microenterprise can do only little in the business network. The partner companies need to be encouraged to participate in a mutual effort.

Strategic information systems (IS) planning process for networked microenterprises is formed as a theoretical framework for developing virtual collaboration. The model emphasizes straightforward and simple approach to organizational development, making the model usable for microenterprises. In interorganizational collaboration, and in a networked industry in general, the influence of business environment is significant. Consideration of both internal and external factors are central to the theoretical framework.

Action research is applied as a primary research method in this thesis. The researcher of this study is employed by the case company and utilizes observations in collection of material for the study. Research is done alongside action. Semi-structured interviews are used to deepen knowledge about the organization and backgrounds, but also to gather information about network partners. The study starts by completing an extensive literature review in the topics related to virtualization and to the specific context of the case company.

Considering a significant IS project ongoing at the same time at Meyer Turku shipyard, a major customer of ShipPalette, specification of actual tools was left outside of this study. The most important finding of the research is that the greatest barrier to virtualize collaboration is the work-related culture. Findings in earlier literature are therefore supported. As a new aspect, this thesis contributed to IS research by presenting ways to manage and ease organizational change. By sharing correct and essential information about virtualization even a microenterprise can encourage an entire network to develop its ways of working.

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**Keywords** virtual work, design work, microenterprise, networked industry, IS planning

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# 1 Introduction

## 1.1 Background for the Research

Physical location and time limitations have become less and less important for knowledge workers. Technology has enabled greater flexibility at work and increased workforce mobility. Because of this development, some firms have introduced new office layouts for employees to work at their traditional premises, creating concepts such as open offices and coworking spaces. On the contrary, some companies have moved to smaller premises and decided to invest more money in smarter technology and cloud computing. (Johns & Gratton, 2013) Whatever the organizational reaction to virtualization has been, every organization has needed to consider the changing work environment.

Virtual work is the way successful companies and teams work in the 21<sup>st</sup> century (Powell, Piccoli, & Ives, 2004). The transition from traditional physical environment to virtual environment has happened in stages. Some workers have lived along the transition and seen it as a natural evolution of work. (Johns & Gratton, 2013) Transition for them has been easy. Others have been slower to understand the significance of the transition and had difficulties to see anything positive in the change. The importance of the transition is the fact that work and collaboration in virtual environment are not same as face-to-face work and physical collaboration, neither should they be treated the same way. Virtual work is typically divided into very small tasks and performed by extremely specialized professionals. At its best, virtual work can help businesses to grow and to expand into areas that were previously inaccessible. (Johns, Laubscher, & Malone, 2011)

Cruise travel industry is one of global leisure industries. Against the present trends of global economy, cruise travel industry is booming. Globally the number of cruise passengers has been in steady growth over the past years. In 2016 altogether 24 million passengers are expected to travel with cruise lines that are part of the global cruise industry trade association CLIA. New cruise vessels are built at the maximum available capacity. Cruise lines have reserved shipbuilding capacity from shipyards already for years to the future. (CLIA, 2016)

Increase in shipbuilding capacity would mean more business for the shipyards and for their network companies as they could take more orders in. Some of the capacity in shipbuilding can be increased for example by investing more in automation and in better equipment, shortening the lead times of production. However, in some operations, like interior

design and furnishing, the capacity is not easily increased. These operations rely highly on creativity and knowledge work of world class professionals working across organizational borders. The interior design professionals are quite rarely available for more work, especially in remote geographical areas such as Finland. Good virtual tools are needed to enhance productivity and to recruit work force from abroad. In the end the goal is to increase the capacity of interior design in shipbuilding.

Challenges related to interior design human resources are not the only ones. The need to enhance communication between participating shipbuilding companies is important. In fact, a central characteristic of modern cruise shipbuilding is the high level of networking. In other words, the shipbuilding industry is highly networked. This means that most of the business value is created together through cooperation of the participating companies. Efficient communication would help collaboration and efficient collaboration would lead to increased competitive advantage. (Holm, Eriksson, & Johanson, 1996) At Meyer Turku shipyard over 80% of the ship's value comes from the network of subcontractors and suppliers. (Meyer Turku Oy, 2016c)

At the moment interorganizational collaboration, especially in interior design, usually happens in the same physical location, working together face to face (Niemi, 2016). What makes the situation challenging is the fact that the world class professionals involved in interior design and furnishing in shipbuilding work globally. For example, for architects shipbuilding industry is only one industry where they work. The same architects might design hotels, conference centers, shopping centers and other public spaces. Similarly, the shipbuilding professionals not just work globally but also live around the world. Some live in the United States of America, others live in different parts of Europe and still some in Asia. Additionally, shipbuilding suppliers, like the fabric manufacturers for interior furnishing, are located around the globe.

In practice, it is extremely difficult to get the shipbuilding professionals to work in the same physical location at the same time. The challenge will only grow as the shipbuilding capacity is raised. The need for good and reliable interorganizational collaboration is evident. Use of virtual tools in communication would certainly improve collaboration among the companies from around the world.



## 1.2 Research Motivation

ShipPalette Oy, an interior furnishing subcontractor for Meyer Turku shipyard, has noticed the pressure to increase its production capacity. The opportunities to grow business are obvious. ShipPalette offers professional services to its customers and thus its increase in production is highly dependent on human resources. The new opportunities cannot be pursued through some easy changes in operation and moreover the company lacks knowledge about the possibilities. ShipPalette is a small actor in the industry and the intentions of other network companies play a big role as collaboration is developed.

Better employment of virtual tools is one option to enhance interorganizational collaboration in shipbuilding industry. If virtual collaboration functions well, the quality of work will inevitably become better. Moreover, operational savings can be gained as travelling expenses related to work are minimized. Meetings and coworking could be organized more often through virtual tools without increasing costs. Furthermore, office virtualization would remove the geographical limitations of workforce. ShipPalette has been looking for ways to recruit professionals from abroad but this far the practicalities have limited the intentions. Virtualization of work and collaboration have been thought to assist to overcome these limitations but companies have lacked knowledge and precise information. It is obvious that the practitioners would gain from increased knowledge.

Further studies about virtual collaboration are also needed in the academic side. As an academic research this study aims to learn more about the specific setting and to generalize the findings in proper context. The generalized context in question is a design microenterprise operating in a highly networked industry. This thesis was academically motivated by the gaps in research and the current project intends to add knowledge to previous research. Previous research about the topic and gaps in it are further discussed in the next subchapter *Research Gap*.

## 1.3 Research Objectives

### 1.3.1 Research Gap

Microenterprises are a significant part of economies on local, national and international level (Lieberman-Yaconi, Hooper, & Hutchings, 2010). Still the use of IS in microenterprises is studied relatively little. First of all, microenterprises are often included in small business

category. (Roberts & Wood, 2002) However, the definition of small business varies a lot and includes often companies that are very different to microenterprises. A small business can be anything up to 50 employees and a turnover of 10 million euros. Microenterprises on the other hand are companies employing less than 10 workers and having a turnover less than 2 million euros. (European Commission, 2016) The difference in company size affects employment of information systems both positively and negatively. Small number of employees for example eases the change in company culture but often limits the knowledge about different topics. Different characteristics of microenterprise and their relation to information systems are discussed later in literature review.

Second notable research gap relates to research context. Usually case companies and context in research focuses in large organizations. Large companies are of course more interesting for greater public and the importance of their acts is also greater. However, small businesses are fundamentally different to large organizations. The problems small businesses face, are most often different to those of larger organizations. Also, the resources and possibilities of smaller businesses to influence the market are very limited. (Roberts & Wood, 2002) The theories suggested for large organizations might not be applicable to small businesses, especially not for microenterprises. But developing operational efficiency is still very important for small organizations. New or revised theories for microenterprises are needed.

Third research gap is the aspect that microenterprises are and usually remain quite unknown and thus inaccessible for researchers. The tasks and experiments they do are usually rather small scale and might be very case specific. However, the number of microenterprises is significant. In Finland over 90% of all companies are microenterprises (Yrittäjät, 2016). These thousands of other companies, even though possibly operating in different industry, might benefit a lot from the lessons the other have learned. (Roberts & Wood, 2002) This thesis aims to contribute in filling the three research gaps related to the use of information systems (IS) in microenterprises.

### 1.3.2 Research Questions

The main focus of this study is in virtualization of interorganizational collaboration from a perspective of a microenterprise working with design and architecture related tasks. The case company and the specific industry play key roles in the research context. The intention is to look at the topic in larger perspective than simply by discussing about procurement of one

software solution. A desired outcome is an applicable process to begin and proceed the process to acquire and implement information systems. Especially implementation phase includes also several factors from the areas of social science. The process could be used by other microenterprises operating in similar industry and needing similar functionality from virtual tools. The model is intended to act as a practical tool for the case company in the future.

For a microenterprise, the business decision concerning information systems might be difficult, especially if knowledge about information systems is weak and the need for system more complex than traditional office package. Simple method to ease decision making would be desired. To further ease the planning process of information systems acquiring, the important factors affecting the choice and methods to identify needs are to be studied.

The research questions of this thesis are written out below. The first question is the main research question and the two following questions aim to direct the study deeper into the underlying reasons. This thesis intends to answer the following questions:

How a microenterprise can lead change towards virtualization of design work and related collaboration within a highly networked industry?

What are the practical steps to take to lead this change towards virtualization?

What are the most important system requirements for the interorganizational collaboration platform?

## **1.4 Research Structure and Methods**

This research aims to meet the objectives set for it through three different steps of research. First, a literature review is conducted to deepen the knowledge in three specific areas related to this research: virtual work, ICT (Information and Communications Technology) and microenterprises and ICT in design work. Literature related to virtual work explains the background of virtualization among businesses and other organizations. This part aims to reveal the benefits and drawbacks of virtualization. Use of ICT in microenterprises focuses in the literature about the special characteristics of very small companies in relation to technological development. ICT in design work presents literature about the role and special

characteristics of technology in design work. The three areas and their relation to each other are summarized in the end of the literature review together with the social factors affecting information systems development.

As the second step of the research, interviews are conducted both with the entrepreneur of the case company and with its partner network company representatives. The partner network companies cover both the shipyard and other subcontractors taking part in interior design of the cruise ships. The interviewees from the network companies are persons who both have good understanding of the practical work processes and are well aware of the technological possibilities in their work. They are selected according to the case company entrepreneur's recommendations. Interviews are conducted in June-July 2016 as semi-structured interviews.

The last step of the research is to apply the primary research method, action research, to the circumstances of the case company. The key assumption of action research is that the social settings cannot be reduced for study but that action brings understanding. (Baskerville, 1999) The research method aims to assist in practical problem solving and to increase scientific knowledge. Researchers in action research both observe and participate in the studied topic and work in close cooperation with the client. The client, the case company entrepreneur in the context of this thesis, and the researcher are both mutually dependent. (Hult & Lennung, 1980)

The empirical part of this research, which introduces the findings of the action research, is conducted in close cooperation with the case company. Similarly, the theoretical model used in this research is formed according to action research findings. Practical involvement in this research is secured through researcher working part time in the case company. In this arrangement, the client gets valuable information about office virtualization and information systems, while the researcher gains good practical insight to the operation and management of a microenterprise. Observations in the studied company also further support understanding of the backgrounds of the studied context.

The structure of the thesis report follows the structure of the research with minor modifications. The findings from the interviews are discussed in the empirical part together with other findings of action research. As the second step of the report, a theoretical model related to development of information systems in microenterprises is introduced and discussed. The theoretical model acts as a framework for the empirical part. The empirical findings and results of the research project are introduced and discussed in the last parts of the thesis.

## 1.5 Self-Evaluation Criteria for the Project

Information Systems projects are usually complex projects. Development projects and especially the design phases of the projects might take long time. It is not obvious that the result of an IS project is always complete systems with some particular features. The development of the system usually continues as long as the system is used. Thus the system is never completely ready. Conversely, the final result of a project might be also termination of the project if for example the implementation is too risky for the business. Because of these characteristics of IS projects, it is not easy to recognize success of the project. Even if the design objectives are met, the project itself might be a failure if for example the system is not used by the users. (Lyytinen & Hirschheim, 1988)

Self-evaluation is one way to review an IS project. Reflection and self-evaluation is used in this project to review success of the project. Clear goals and beforehand defined evaluation criteria are crucial for success of evaluation. Good evaluation criteria also assist to align the new systems with other business objectives. The various factors can be categorized in different levels according to their specificity, but they all aim to identify added value of the new system. (Chaffey & Wood, 2005, pp. 314)

One important question related to IS project self-evaluation is when the project is finished. Has it been agreed that the project will be ready when the system is in use? What happens if the requirements are too demanding or if the customer organization lacks resources to finish the project? A possibility to terminate the project is certainly needed. (Lyytinen & Hirschheim, 1988) For this research project it is determined that the project is ready when the strategic plan related to information systems is written out and handed over to the entrepreneur of case company. The plan and the entire research are to be documented in respectable academic manner.

Another question related to self-evaluation of the project is what makes an IS project good or what makes it poor? What are the expectations and requirements for the system? An example could be a system that removes unnecessary steps in production but is not used by the employees because of its complexity. Still further the question is why the project was a failure? Was the system not good enough or was the problem for example in the employee training? Or were the expectations probably too demanding? (Lyytinen & Hirschheim, 1988) To make sure that the case company of this project is engaged to the results of the project, much of the strategic work is done in close cooperation with the entrepreneur of the company. The

cooperation aims to ensure that the expectations of the case company are realistic and thus the success can be evaluated accurately. The cooperation also familiarizes the management to the process and thus intends to ensure continuation of the process in the future.

IS projects have usually many participants with different and conflicting values and desires. A question to answer in self-evaluation of the project is what are the shared values and where and how the compromises are needed. One solution to this problem might be stakeholder groups, a method where participants are grouped according to their interests or tasks and not necessarily their values. (Lyytinen & Hirschheim, 1988) In the case company of this project it is important that the IS strategy is aligned with overall business strategy. Internal conflicts in values related to IS strategy are not typical as the case company employs only three people and they are all closely related to this project and working towards the same goal. However, the external stakeholders might have conflicting values. Especially the major customer of the case company has strong power over the case company. Consideration of the external environment is important to find shared values and minimize conflicting desires related to ways of work.

Self-evaluation and reflection of this project is done in the end of this thesis report. In the evaluation, the above-mentioned criteria are used. These criteria are summarized below.

#### **Self-evaluation criteria for this project:**

- 1) *IS strategic plan is written out and handed over to the entrepreneur.* – Methods and procedures for academic text are followed in reporting the research.
- 2) *IS strategic plan is worked in cooperation with the case company entrepreneur.* – Company engagement is important both for future continuation of IS employment and accurate evaluation of this project.
- 3) *The IS strategy is aligned with overall business strategy. It also considers the external business environment.* – To find shared values inside the company and in the external business environment it is important to remove all possible communication barriers.

## **1.6 Abbreviations and Terminology**

This research includes particular abbreviations and terminology that are further clarified and explained in this subsection. Some of the terminology is mainly related to the studied context and deserves to be clarified. On the other hand, some of the terminology is quite widely and freely used to describe various concepts in earlier literature. The terms need to be clarified in order to avoid misunderstandings.

**Cruise Line (or Ship Owner)** – Cruise line is the company that operates cruises and offers cruise services to individual customers and travel agents. Cruise line also usually owns the cruise ships. They contract shipyards to build new ships and often provide the design of the ship to the builder. (Köykkä, 2016b)

**ICT – Information and Communications Technology** (or **IT – Information Technology**) is the term used to summarize hardware technology and software applications to create information systems. Hardware technology includes computer and network technology. (Chaffey & Wood, 2005, pp. 21)

**IS – Information Systems** are systems to capture objective facts (i.e. data) and to transform it into usable information and knowledge (Chaffey & Wood, 2005, pp. 21). Information systems can also be used to store, analyze and disseminate information for specific purposes. (Rainer, Prince, & Watson, cop. 2013, pp. 4)

**Microenterprise** – A microenterprise is a small company employing less than 10 people and having an annual turnover less than 2 million euros. (European Commission, 2016) A significant number of microenterprises are companies of only one employee, the owner-entrepreneur. (Kamal, 2013)

**Networked Industry** – The term networked industry refers to an industry where companies compete against each other as a network of companies instead of as individual companies. Increased profitability and competitive advantage are directly related to relationship commitment. (Holm et al., 1996)

**Shipyard** – Shipyard is the operator in shipbuilding industry that is responsible for constructing the ship. It coordinates the network to work for common goals. Shipyards construct new ships and also refurbish and modernize old ones.

**Virtual Office** – Virtual office is an office model consisting of workers who work for shared business purposes but do not necessarily share the same physical location and/or working hours. People are brought together and collaboration steered through various IT solutions.

**VoIP** – Voice over Internet Protocol. A technology solution enabling users to make calls through internet connection. VoIP has transformed global telecommunications industry by offering an alternative and often much cheaper solutions for analog connection. (Investopedia, 2016)



## 2 Literature Review

### 2.1 Virtual Work

#### 2.1.1 From Past to Present

In early 1980s freelancers started in large scale a new trend of virtual work, also called remote work. Technological development and through it connectivity for example through email enabled these virtual workers not to be tied into place and time. They were free to decide how their work tasks were done. What mattered the most was the quality of work. However, regardless of the great benefits of flexibility, also some compromises were inevitable. The early virtual workers lacked the benefits of traditional company connections: from healthcare benefits and professional training to sense of involvement in larger mission. (Johns & Gratton, 2013)

Fortunately, technology continued to develop in fast pace. New opportunities to collaborate were introduced. Also, much needed governance systems for new technological solutions were developed. At the same time, requirements towards employees increased. Companies needed their people to work extremely long hours in projects with their international customers and colleagues. Global catastrophes and shocks, such as terrorist attacks and pandemics, further encouraged virtual work. Employees had to be able to work together despite the fact that not everyone could be present in the same physical location. At this phase of development, the greatest challenges rose from the beliefs of people that remote workers are less engaged and productive than their colleagues sitting in the offices. Leadership development to manage untied work was as important as cultural change in the professional communities. (Johns & Gratton, 2013)

The story above by Johns and Gratton provides the large-scale phases of virtual work development: the beginning of virtual work dates to 80's, people have started to value flexibility more in recent days and technological development has happened in fast pace. The details of the backgrounds and adoption have not been mutually agreed on as the topic of virtual working has been popular in many different research contexts. (Powell et al., 2004)

In 2005 Kirkman and Mathieu published an article discussing the extent, information value and synchronicity of virtual tools used in team work. The study provided a good measure to the extent of virtualization of work by stating that it is not common to identify teams not utilizing virtual tools. Therefore, the extent of virtualization was already quite wide in 2005.



The article further aimed to find reasons why teams have or have not transferred to virtual environments. Interestingly, stating opposite than Johns and Gratton in their article, Kirkman and Mathieu argued that geographical dispersion has not been a defining factor of virtual team work even though it has anteceded it. (Kirkman & Mathieu, 2005)

Despite the differing opinions on the background of work virtualization, still today the number of virtual workers is growing. Some experts estimate that over 1,3 billion people will work virtually in few years (Johns & Gratton, 2013). Other estimates say that 50% of people in the United States will work remotely by 2020 (Bean, 2016). It is obvious that the ongoing change in the ways of work is not a minor shift in organizational history. Virtual workers are a great mass of work force already now. Among this mass lies also a great business opportunity for corporations that can adapt this modern organizational structure quickly. Future business is done with future people.

### 2.1.2 Developing Virtual Work

Growing number of virtual workers has created new business and office models for virtual workers, such as work hubs. These new work spaces have been established to create natural relationships and to develop professional skills. Work hubs are small work places that consist of people working in the same field of profession but who are not necessarily employed by the same employer. The employers might be even competitors with each other. The workers get to spend time with people similar to themselves and perspectives and skills are gained from other workers. At their best the work hubs succeed even better than the traditional office models. (Johns & Gratton, 2013)

Not much is written in the literature about how to build virtual offices in practice. In fact, some practitioners state that it is almost impossible to transfer a business into a virtual office if it is not done right from the beginning. If the organization is built centralized from the beginning, the transition to virtual office where people are scattered is extremely difficult. But if the virtual office is in place right from the beginning, it will remain there also when the business expands and new departments are established. (Kane, 2015) The company culture is extremely hard to change and that is why many people still work in their traditional cubicles. All the needed technology for highly efficient virtual work already exist.

An alternative path might be to virtualize some parts of the work and take advantage of different levels of virtual work. Johns and Gratton (2013) have suggested aspects to keep in mind when reaching towards the opportunities of virtual work. First, every effort should focus

on supporting greater collaboration. Working together is the key to innovate better and faster. Second suggestion is to reconceive physical work place. The purpose of physical work space is no longer to support efficient processes or to house tools that workers need to perform their job. Rather, the physical space should help to create and deliver ideas, fellowship, teamwork and trust. Third aspect to consider in virtual work is to reconstruct the workflows to connect with remote talents. Workflow should be built around a purpose rather than a function and everyone, regardless of their physical location, should be able to connect with their colleagues. Fourth idea in the model is to invest in intuitive collaboration technology that follows the ways individuals personally use technology. This kind of solutions are more likely to become adapted in the organization. Final suggestion is to praise variety. People are different and they work differently. Their work place should also consider these differences?

### 2.1.3 Challenges and Benefits of Virtual Work

One of the concerns that virtual workers strongly disagree about is the sense of community and the richness of collaboration. Often virtual environment is compared to physical environment and virtual communication to face-to-face discussions. Those who speak for traditional hallway conversations and face-to-face meetings often reason that virtual environment lacks unstructured social contact that is necessary for normal human relationships. (Johns & Gratton, 2013) On the other side, those who speak for virtual environment, reason that workers sitting in the face-to-face meetings still do not talk to each other. Workers rather stare at their laptops and mobile devices. There is no natural connection anyway in the stuffy meeting rooms. (Kane, 2015)

Spillover between work and home is another area of virtual work that lacks mutual understanding. On the positive side, virtual work has enabled people in various situations to balance their life priorities to work commitments. Examples of these workers who benefit from virtual work are stay home moms, physically sick people and those living in rural areas. But not only people with commitments or disabilities enjoy the flexibility of work. Higher life satisfaction is reached by workers who are not anymore tied to spend every hour of their daytime at work and more importantly are not tied to a place. (Johns & Gratton, 2013)

On the negative side of the conversation related to spillover between work and home are the people who have challenges to adjust work demands to those at home. They experience dissatisfaction to life because of virtual work. The problem is in the shared personal resources that are not clearly distributed between work and personal life. These resources include time,

money and knowledge for example. In the same way, high role importance might lead to conflicts between work and home. If the worker has high importance at work, the conflict is more probable in work-family context and if the person has high importance at home, the conflict is more probable in family-work context. (Wolfram & Gratton, 2014)

Virtual environments are criticized also for their poor opportunities for knowledge transfer. This is feared as the workers do not naturally spend time with each other and thus share unspoken knowledge. (Johns & Gratton, 2013) Social interaction and networking tools could possibly fill this gap, but often they are not used because of lack of time. It might also be more difficult to maintain relationships in multicultural virtual environment. The barriers for knowledge transfer are also in time differences and geographical dispersion. On the other, hand time differences can be seen as an advantage for example in new product development where the new product can be tested continuously because of the different working hours. (Haapasalo & Lohikoski, 2013)

#### 2.1.4 What Makes Virtual Work Effective?

Organizational transformation to virtual environments has its effects on various areas of work life. Management, motivation, administration and worker identity are all factors to consider. Markus, Manville & Agres (2000) have introduced success factors of virtual teams in their paper *What Makes a Virtual Organization Work*. The ideology and findings of the paper are derived from one of the new organizational forms of the modern society: open-source software development communities. In these organizations, the labor force works usually on volunteer basis and quite freely without almost any government.

Managing the organizational structure is one of the fundamental aspects of the transformation to virtual teams. Peter F. Drucker wrote about new management approach in his article *Management's new paradigms* (1998) and argued that people must be led instead of managed. The same principle seems to be apply in virtual organizations and it definitely is true in open-source development communities. The workers are closer to volunteers who work in temporary teams rather than workers in cross organizational structures. (Markus, Agres, & Manville, 2000)

The traditional motivational factors, like money or career progression, are not usually the most important ones in open-source communities. Instead personal benefits of improved product and social aids are often more important. Monetary compensation is not totally

irrelevant, but it is different compared to the traditional individual approach. Open-source rewards focus on Collective performance. (Markus et al., 2000)

Contrary to what one could expect, good discipline among the workers is surprisingly good in open-source projects. The governance mechanism relies on peer review, reputation building and shared culture and rules. People in these online communities care what others think about them and membership is an important factor in their identity. (Markus et al., 2000) All of the governance mechanism factors are a set of mutual values and expectations about how things work or should work (Jones, Hesterly, & Borgatti, 1997). They also enable successful collaboration even though the participants are practically strangers to each other (Markus et al., 2000).

Findings from open-source communities can be applied to virtual organizations almost directly. Markus et al. (2000) summarized the factors of efficient virtual organizations to five core principles:

- 1) The motivation factors need to be mutually agreed, powerful sets of factors including collectively shared success rewards.
- 2) Membership in a project is flexible to some extent. The core of participants is maintained and temporary efforts are used to complement the core.
- 3) Self-governance of the organization works if it includes management of participants, shared culture, values and rules, possibilities to review work and give sanctions if rules are violated and reputation as a motivator and as a control mechanism.
- 4) Work needs to be effectively structured and processed. Control is based on a few simple rules.
- 5) Technology and the norms to use it are important factors and shape communication and coordination of the work.

In traditional organizations of today these principles might be far from the practice. However, the business environment is changing and so are the organizations. Efficient virtual teams might be essential aspects of success in business. (Markus et al., 2000)

## 2.2 ICT in Microenterprises

### 2.2.1 Implementation of ICT in Microenterprises

Adoption of ICT can benefit a microenterprise widely. In strategic perspective ICT improves competitiveness and enables better access to new markets, both locally and globally. New information and expertise can be gained through ICT and benefit learning and productivity in a microenterprise. ICT might also increase administration efficiency. (Qureshi, 2005)

In more detail, ICT can for example reduce business costs, enhance productivity and provide new growth possibilities. Well adopted and implemented ICT solutions might develop business cooperation and relationships. Internal benefits are possible as well through better information sharing. ICT can develop or further facilitate collaboration between employees that have mutual goals. (Barba-Sánchez, del Pilar Martínez-Ruiz, & Jiménez-Zarco, 2007)

The benefits of ICT are obvious but the development paths are more uncertain. Hiring an ICT development consultant is one option (Roberts & Wood, 2002), though often a costly one. To organize or apply to a prearranged “IT therapy”, a process introduced by Wolcott, Kamal and Qureshi (2008), is another possibility. It is also often impossible to take into practice as access to skilled volunteers that could help the microenterprise for free are not easy to find.

Mapping the current state of the company and setting the directions for future ICT development are steps for strategic alignment of information systems and other business aspects. Levy, Powell and Yetton (2001) have suggested focus-dominance model for SME's to help in these steps. The model has two dimensions: strategic-focus (cost reduction vs. value added) and customer dominance (high vs. low). The formed table quadrants are named to identify the strategic positions of IS in a company. The four quadrants are named efficiency, coordination, collaboration and innovation.

Efficiency quadrant incorporates companies that use IS mainly for business controlling purposes, such as financial control. IS is seen as cost in these companies and customer dominance is usually high. In the coordination quadrant are companies that use IS to maintain customer relationships. In these companies IS is still seen as a cost to the business. However, it is a necessity, because manual systems are not functional enough as customer base becomes larger. The collaboration quadrant is the phase of IS development where business relations are maintained and information transferred in cost-efficient manner with particular customers or partners. Use of IS tools is still limited but IS strategy is reactive to business strategy. Finally, the innovation quadrant represents companies that fully integrate IS with business strategy. IS

not only reacts to business strategy but also influences the direction of it. Figure 1 presents the model of Levy et al. (Levy et al., 2001).

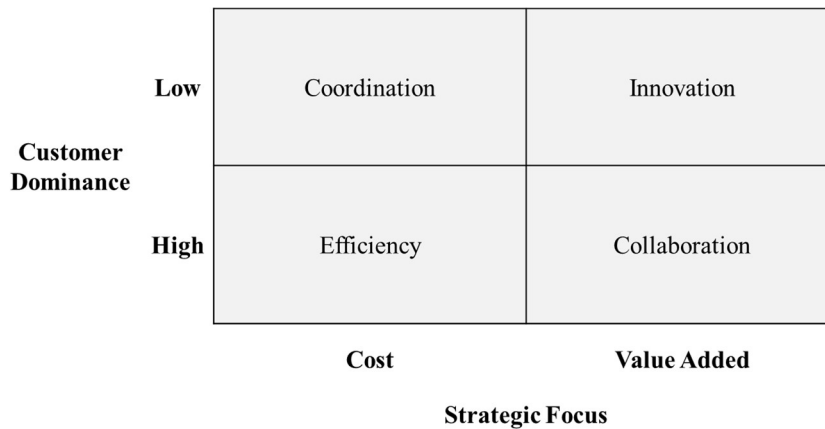


Figure 1. Focus-dominance model for SME's (Levy et al., 2001).

Often microenterprises start from the efficiency-quadrant of the Focus-dominance model (Qureshi et al., 2010). According to Levy et al. (2001) this means that the technology is seen to help reduce costs and to complete simple administrative tasks in the firms. Despite the great benefits of better IS employment, not all companies want to move forward with their IS strategy, at least not all the way to the innovation quadrant (Levy, Powell, & Yetton, 2002). However, for those who want to, the path can be either direct step to innovation quadrant or through collaboration or coordination quadrants (Qureshi et al., 2010).

### 2.2.2 Challenges that Microenterprises Face with ICT

Microenterprises are companies that employ less than ten employees. In many occasions a microenterprise consists of only one employee, the owner-entrepreneur of the company. Because of this and the smaller value of the business these enterprises have some special challenges related to Information Systems. Many different academic papers have identified and discussed these challenges separately, but Wolcott et al. (2008) have summarized the most common challenges altogether into six categories. The categories in their model are capabilities, resources, access, attitude, context and operations. (Wolcott, Kamal, & Qureshi, 2008)

Challenges related to capabilities might be either real or perceived. Reasons, such as lack of technology knowledge, inadequate IT development capability and poor troubleshooting

skills, are all common and very real for many entrepreneurs and microenterprise employees. But for some these challenges might be just an excuse not to go deeper into the new area of technology. The core problem in these cases might be the lack of IT planning ability. Much of the practical knowledge work can be outsourced and the modern systems are usually rather easy to use. In the end internet is full of instructions and support forums for those that want to learn. (Rainer, Prince, & Watson, cop. 2013; Wolcott et al., 2008)

Lack of money is a typical microenterprise challenge related to resources. Again, in some cases this is true and the solution not that easily available. (Wolcott et al., 2008) But in some cases money is not the core of the problem. Many information system providers price their service according to usage or according to the number of licenses. If the customer organization is small, also the price is small. Another possible solution might be open source software. These free solutions are often as good and as secure as the paid ones (Rainer et al., cop. 2013, pp. 502). In these cases, the lack of information is a better reason, information being a type of a resource as well.

Access challenges are common problems in rural areas and in developing countries. Internet, although almost self-evident in western cities, is still limited in these areas. Not much can be done to these circumstances even though portable options with good coverage exist to help in some cases. Another access related challenge is inadequate software or hardware. (Wolcott et al., 2008) Despite these challenges, technology develops all the time and most probably continues to become cheaper. The current challenges are not permanent.

Attitude-related challenges are probably the most serious challenges related to IS. Wolcott et al. (2008) listed issues such as resistance to technology, lack of practical value, lack of confidence and lack of trust under this category. Part of the problem might be lack of information, the same core problem as with the lack of resources. IT therapy, the method used by Wolcott et al., is can be used to tackle this challenge. However, as mentioned earlier, an appropriate IT therapist might be hard to find.

Differences in culture and mismatch between technology and social or business systems is not unique for microenterprises. Larger organizations face these challenges as well but at different level and in different occasions. In microenterprises context-related challenges, as these barriers can be called, are often present due to personal characteristics. Therefore, they need to be handled individually. Mismatch between technology and social or business systems

might be linked to attitude-related challenges and can be addressed by providing more information. (Wolcott et al., 2008)

Operational challenges are present almost in every microenterprise. The organizations have no dedicated staff for IS and thus support and ready-made procedures for problems are not in place. (Wolcott et al., 2008) The core problem is usually in resource-related challenges.

## 2.3 ICT in Design Work

### 2.3.1 Perceptions of ICT

*Many designers are content with the transition from pen and paper to mouse and monitor, but for some, this rift in media is inherently distracting, and the translation process often necessitates a copious amount of time spent redrawing and digitizing existing work. Schweikardt & Gross, pp. 108 (2000)*

Change of working methods in different phases of the work is common in design work (Bueno & Turkienicz, 2014). An architect might start the initial sketching with a pen and paper, but later the work is transferred to digital environment for final polishing and presentation. The transition process sounds laborious. And it is that for many as also noted in the direct quote above from Schweikardt & Gross. However, a crucial characteristic of design work is the connection between mind and work, the ability to produce a visual object of a mental image. Creativity goes hand in hand with the freedom of work. (Schweikardt & Gross, 2000)

Traditional design processes are foreign to the language used in information systems and ICT solutions. They are also distant from the dialogue between man and machine. In the early phases of the development of ICT systems, man-machine relationship had no history. Design process asked for dialogue but it was impossible with computers and other technological solutions in their foreign language. Repetitions and circular symbiosis was the key for the human-machine relationship to establish stronger unity in design work. (Negreponete, 2011)

ICT solutions often suffer from the lack of appropriate functionalities that are conventionally used by architects. This adds to the pain described in the previous quote. The number of different functionalities required in the systems is high, but Bueno & Turkienicz (2014) have created 4 principle categories to summarize them. The categories are multimodal, bimanual interaction, sketch-based modeling, preliminary performance simulations and



interoperability for designing stages transition. These functionalities are needed in the early stages of design work and should be incorporated into one single software. Each of the four categories cover different tasks or phases of design work. Multimodal, bimanual interaction category covers the different interaction modes and needs. Sketch-based modeling category covers the sketching phase to create and design freehand drawings and generate 3D models of them. Preliminary performance simulations are the tasks to modify the appearance of the model temporarily, according to preliminary performance results. The key for interoperability in design stage transition is in the file format standards. They allow a smooth transition between different tools and systems. (Bueno & Turkienicz, 2014) The detailed functionality is summarized in Figure 2.

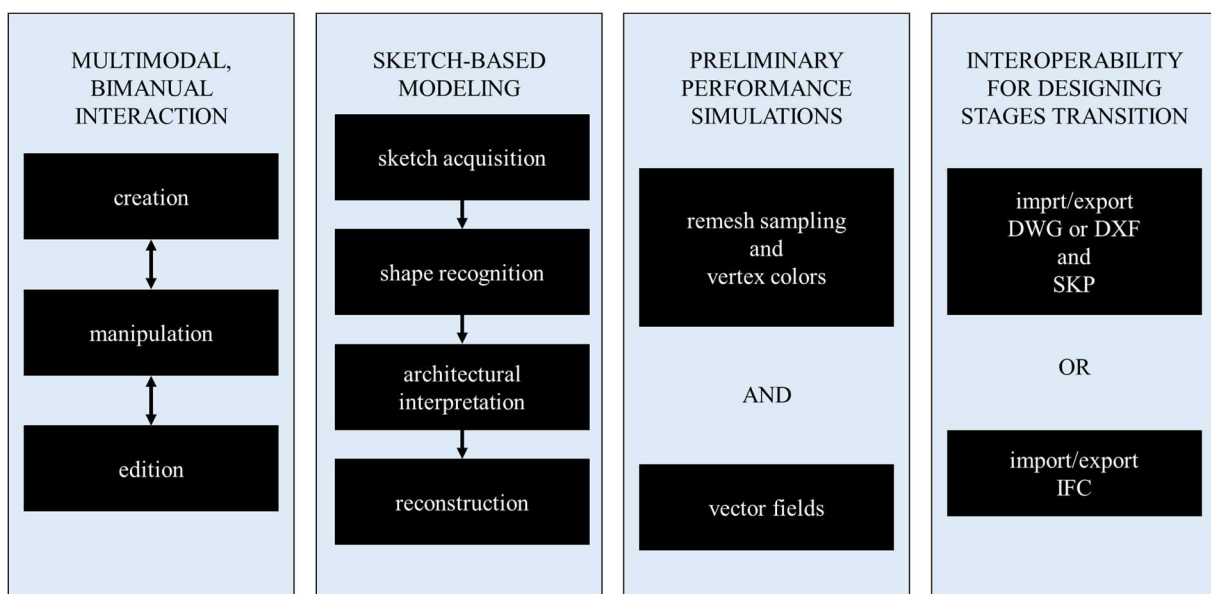


Figure 2. Principles of functionality needed in software for early stages of architectural design by Bueno & Turkienicz (2014).

The information systems created exclusively for design work have traditionally suffered from unfriendly interfaces (Bueno & Turkienicz, 2014). On the other hand, user friendly interfaces have at times led to compromises with the amount of information in the system. Creation of specific tools for design work is valuable but must not belittle the different aspects of design work and the various functionality needs. The system designer might start the process by considering a universal user. Anyway, finding the right balance is a complex task. (Ramalhete, Senos, & Aguiar, 2010)

### 2.3.2 ICT solutions and Information Systems of Design Work

Information systems have over 50 years of history in design work. The first systems allowing graphical design with computers were developed in the 1960s. Originally the idea was to create automated design processes that imitate predictive possibilities in design. In other words, the systems helped the designers to perform their work more efficiently by automating repetitive and predictable processes. However, scholars were not satisfied with this level of development. They were forming new theories about human-machine relationship. Soon afterwards the scholars introduced an ideology that computers could be utilized to expand the human intellect, instead of just to automate processes. This new perspective took development into whole another level and enabled use of systems in complex architecture of forms, spaces and structures. (Menges & Ahlquist, 2011)

The development of information systems towards expanding the human intellect has been foundational also in modern development of the tools. However, also other levels of assisting are still important. In principle, the use of information systems in design work can be split into three categories (Negreponte, 2011):

- 1) The current practices can be automated.
- 2) The current practices can be adjusted to meet the specifications and structure of a machine.
- 3) Design mechanism of a system can be evolutionary and it can be trained and grown.

Design work, similarly, as many others area of life, has experienced better information sharing possibilities through information systems. Effective collaboration is directly linked to efficient overall design work. The specialties of the information transferred between the parties participating in the design work are the visual aspects of communication. Furthermore, the viewpoints from different professional disciplines (engineering, business etc.) need to be considered. (Leon, Doolan, Laing, Malins, & Salman, 2014)

Besides information sharing, the information systems are used also to store and manage information, for example properties of various materials. Innovative use of materials is one way to create new designs but at the same time very detailed information, such as functions and forms of various materials, is needed. Different systems to store material information exist and the need for a system might vary depending on the stage of the design project. The systems

also vary in their function and can basically be divided into two categories: those providing information and those assisting to find inspiration. Whatever the need is, the material information systems might be great tools to assist in solving design problems. (Ramalhete et al., 2010)

ICT enabled sketching systems have a controversial role in design work. As reasoned in the previous subsection, many designers still prefer pen and paper in the early phases of design work. Schweikardt & Gross (2000) have introduced and experimented Digital Clay, a system utilizing ICT solutions to transfer 2-dimensional sketches into 3-dimensional models. As an early experiment the tool focused only in line sketches and the need to extend the techniques into symbols and text was obvious. However, the study addressed quite widely the various input methods (mouse, digitizing tablet and digitizing tablet with LCD display) and applied an alternative algorithm for complex command language. The intention of the study was to ease the transition from physical sketching models to digital design environments. (Schweikardt & Gross, 2000)

### 2.3.3 Future Possibilities of Design Work

Information systems have allowed design work to take huge development steps in rather short time (Menges & Ahlquist, 2011). Technological development has enabled integration of physical and digital realms (Leon et al., 2014). According to some scholars there is still more to come. Conceptual design environments, virtual platforms where designers and architects can create and show mockups correspondingly as in physical environments, have been studied experimentally already for a while (Araújo, Jorge, & Duarte, 2012).

What makes conceptual design environments superior compared to the traditional physical environments, where the physical mockups are possibly created according to the computer assisted designs? First of all, the conceptual design environments are more flexible by providing opportunities to present wider range of formal solutions, all in real scale models. Second, the design solutions and choices can be simulated in real time and the structure and performance of the models can be tested. Third, modelling can be done using natural gestures with the help of stereoscopic visualization. Once the basic commands are learned, the designer can easily visualize the model with his or her hands. All in all, the conceptual design environments are free from the physical limitations associated with physical mockups and are easy to learn. (Araújo et al., 2012)

## 2.4 Social and Personal Factors in ICT Development

### 2.4.1 Importance of Social and Personal Factors

Virtual work, use of information systems in microenterprises and in design work are all areas of research closely related to this thesis. They are important factors in building the theoretical framework of this study. It can be concluded that company culture and management skills are strong factors in developing virtual work in a design microenterprise. Finding the correct information and sharing it often helps to progress the implementation of information systems and to overcome the barriers of change. Development of Information Systems certainly involves more than just hardware, the computers and the software (Barba-Sánchez et al., 2007).

Development of information systems in organizations involves social and personal factors in addition to technological aspects. Social factors might be even more important than the technology ones as Mata, Fuerst and Barney (1995) have reasoned. They developed a framework based on the resource-based view of a firm to study the relationship between resources and competitive advantage. Mata et al. tested the framework with four types of IT resources, all of them suggested by previous literature to be sources of competitive advantage. The four types were access to capital, proprietary technology, technical IT skills and managerial IT skills. The conclusion was that IT managerial skills are the only source of sustained competitive advantage. (Mata, Fuerst, & Barney, 1995)

Successful introduction of information systems can take time and lots of resources in smaller companies. Barba-Sánchez et al. (2007) summarized the ways for successful implementation to three different elements: gradual introduction of solutions, adequate training and support and development of full awareness of the potentials of ICT. The elements are linked to each other as training can increase awareness of the potentials of ICT and gradual introduction helps in building the needed support channels. (Barba-Sánchez et al., 2007)

### 2.4.2 Different Responses to Change

Human behavior and actions are affected by many different forces. In practice when a person ponders whether to do something or not, all of the forces affecting the decision can be summarized in two categories. The two underlying forces are ability and motivation. Ability asks the question “can I do what is required?” and motivation asks the question “will it be worth it?”. In the end these questions and the personal answers to them determine the behavior and actions of every human being. (Patterson, Grenny, Maxfield, McMillan, & Switzler, 2008, pp. 77) While every human being has similar mental logic to determine their behavior and

actions, everyone still has their personal response to change according to their capabilities and perceptions.

Individuals usually resist change. People experience a variety of emotions when they experience change in their life, whether it happens on the personal level or is related for example to organizational change. Resistance to technological change is a common challenge in today's organizations. Identifying the change related emotions is very important for an individual suffering from ill feeling and lowered performance. But identification is helpful also for persons managing the change process. (Chaffey & Wood, 2005, pp. 393)

The main individual emotions related to change can be summarized in seven elements. These elements and their relation to the individual's well-being/performance and time are illustrated in Figure 3. The first emotion in the change process is *shock* as often people have only little or no warning at all about change. The degree of the emotion depends on the desirability of the change and the individual's preparation for it. Shock is followed by *denial*. Resistance to change is high at this second stage and the stage often includes intentions to turn attention to other issues. The lowest point of emotional scale is at the stage of *depression*. At this point a person realizes that change is inevitable. The emotions might vary from fear to guilt. Fourth stage of the seven emotional elements is *letting go* as an individual starts to dissociate him- or herself from the previous state and is ready to move on. In the *testing* phase the individual starts to experiment the new state. Acceptance is growing but it might suffer from encountered problems. The sixth element is *consolidation* as the individual starts to build on the positive sides of change. *Acceptance* is finally reached as the new stage is seen as normal. This model by Chaffey and Wood (2005) is adapted from the model of Hopson and Adams (1976).

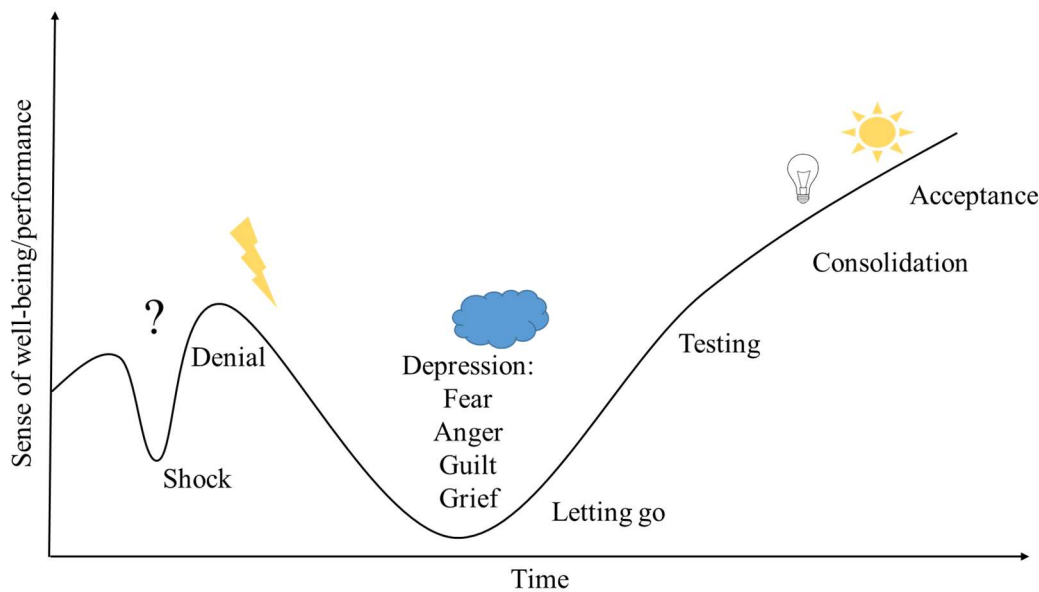


Figure 3. Transition curve of emotions in a situation of change. (Chaffey & Wood, 2005, pp. 392).

The emotions in the transition curve are often mixed to each other. The transition rarely happens precisely from phase to phase. Also different people progress differently in the curve. Each person's unique circumstances determine the emotional progression or regression. (Adams, Hayes, & Hopson, 1976)

Systems avoidance is one of the most typical ways to resist change in technology context. Systems avoidance means that an end-user of the new system resists to use or minimizes the use of it. The end-user might continue using the old system, use a parallel system or use manual processes for the same tasks. Other possible ways of change related resistance are aggression, projection and criticism. Aggression means physical damaging of the new system. Projection happens when the new system is wrongly blamed for problems in work. Criticism covers public expressions of non-justified concerns about the system. (Chaffey & Wood, 2005, pp. 393)

### 2.4.3 Organizational Culture

Implementation of information systems might influence the ways of work significantly, especially in smaller companies. The change starts from considering the existing organizational culture. (Barba-Sánchez et al., 2007)

Organizational culture is shaped by the attitudes, values and beliefs of the workers. In smaller organizations, the personal beliefs of the owner are naturally the origin of the company culture. External factors, such as customers and competitors and the relationship to them also

often influences internal company culture. Values and ways of working are compared to those at the company itself. External factors are discussed more in next subchapter about networked industry. (Chaffey & Wood, 2005, pp. 394)

Edgar Schein, in his book *Organizational Culture and Leadership* (2010), has classified the culture to three levels: artifacts, espoused beliefs or values and basic underlying assumptions. The intention of this classification is to analyze culture and to explain what a culture really is. Artifacts are the surface level of culture, the tangible elements of culture. It includes everything visible, audible and touchable of the culture. Espoused beliefs or values are preferences that guide action. They are usually learned ideas about how things work. The deepest cultural level are the basic underlying assumptions. They are elements that are taken for granted. A variation inside an organization is usually very small at this level of culture. (Schein, 2010, pp. 23-32)

Transformation in the level of artifacts is obvious when information systems are implemented within an organization. Ultimately espoused beliefs and underlying assumptions are the levels that determine the success of information system implementation. That is why also most of the change management process should focus on these two deeper levels of organizational culture. (Chaffey & Wood, 2005, pp. 394)

#### 2.4.4 Interorganizational Collaboration and Networked Industry Structure

As mentioned, the influence of external companies to an individual company is often present especially in networked industries. In business networks the cooperation is continuous and based on trust. The companies and their ways of working inevitably influence the companies they are partnering with. Work is often developed together within a network.

An industry network evolves gradually and often slowly. The formation of a network begins as one company, either a supplier or a buyer, initiates business with another company. If the other company responds affirmingly, the interaction begins. Commitments and transactions are made by both firms. During the trade the firms learn about each other, about their competences and behavior. This develops the connection from transaction oriented relationship into a relationship based collaboration. Understanding about coordination of the relationship increases and so does hopefully trust. If the coordination succeeds and both parties consider the relationship valuable, a long-lasting partnership may be formed. An important aspect to note is that the development of the business relationship is not deterministic, because

continuous engagement from both parties is needed. Another important aspect is that the business relationship is based on the relations of individuals. (Holm et al., 1996)

Business networks are formed on these individual business relationships. A network takes the relationships to proper context as the companies are usually not isolated to only collaborate with each other. Often one's business is dependent on both its supplier and customer. On the other hand, for example the supplier is dependent on the customer business of its direct customer. Once these relationships are mutually dependent, a network is formed. Distinctive for a business network is that by working together as a network the companies are able to produce greater value to the end product than by working only by themselves. (Holm et al., 1996)

An extensive study about network relationships and collaboration within networks is performed by Sari Mäenpää (2013) in her doctoral thesis *Managing network relations in the project business context*. Interestingly Mäenpää's doctoral thesis discusses the same context as this Master's thesis, the networks around shipyards in Finnish maritime industry. The doctoral thesis introduces valuable findings about the role of social capital on collaboration by taking the theory of social exchange to the context of network companies. Collaboration is looked from new perspectives to understand the importance of relational aspects. Network is based not just on cost focus, contracts or resource availability, but also on relational competence. According to the study, all relational aspects should be considered in successful collaboration and business, not just mechanical information sharing. (Mäenpää, 2013)

#### 2.4.5 Change Management Process

Personal experiences related to information systems and experiences in the change process related to the implementation are often impossible to change. Company culture or ways of working within a network are as well difficult to change especially in short term. Organizational culture and the formation of it was introduced more in detail earlier in this literature review.

Removing or correcting of these internal forces that restrict the change might be unrealistic, but managing them is possible. Change might happen in the future even though the past cannot be changed. In the end, good change management can influence positively to the atmosphere of the company and slowly transfer the entire company culture. Change management is often at the core of organizational transformation project. (Chaffey & Wood, 2005, pp. 384)



Table 1. Facilitation through change process. (Chaffey & Wood, 2005, pp. 397)

Transition phase applications	Typical actions by change management	Implications for information management
<b>Shock / awareness</b>	Create an atmosphere open for change. Announce early enough to involve senior management.	Pre-announcement to and involvement of senior management important for ownership.
<b>Denial</b>	Identify reasons for denial. Repetition of the reasons of change. Involve staff early.	Involvement is practical for some staff and is typically a requirement of information projects. Communication to others in staff.
<b>Depression</b>	Support and listen rather than ignoring the complaints.	This stage is often neglected in information management projects.
<b>Letting go</b>	Continue explaining the benefits without belittling the old system. Associate targets with the new system.	Prototype usually available at this stage. Provide tangible evidence of the new system and its benefits.
<b>Testing</b>	Encourage experimentation despite the existing problems.	Depending on involvement testing phase is either testing of the system or adoption of new system. Positive and negative feedback welcomed. Discuss and act upon where needed.
<b>Consolidation</b>	Review and recognize performance. Communicate benefits.	Assess and communicate the improvements achieved through the new system.
<b>Reflection and learning</b>	Organize structured learning through reviews. Unstructured learning through e.g. feedback.	Post-implementation reviews at this stage. Structured system to log problems.

Change management in general is such a large topic that it is not discussed in detail in this section. Change management principles, however, can be introduced through a facilitating process for change management. Chaffey and Wood (2005) have created a table to summarize steps and progress of change management. With the help of previous research on the topic the table matches individual emotions of the change process to typical actions of change management and implications for information management. Table 1 presents the facilitation steps of change management.

Another way to perceive the change process is suggested by Patterson et. Al. (2008, pp.77-78). In the book *Influencer* the authors have introduced and discussed a technique to help people make change happen easier. The technique is stated to be applicable to every sphere of life. In the influencing technique the two principle forces of human behavior are motivation and ability which were discussed previously in subchapter 2.4.1. These two principle behaviors can be combined with three levels of influence: personal, social and structural. Once the two principle forces and the three levels of influence are connected to each other, six different sources of influence can be identified. The six sources and a short description of each are presented in Table 2.

Table 2. Six sources of influence. (Patterson et al., 2008, pp. 77-78)

	Motivation	Ability
<b>Personal</b>	<u>Personal Motivation</u> Change needs to be desirable.	<u>Personal Ability</u> Needed skills are to be trained.
<b>Social</b>	<u>Social Motivation</u> Right kind of peer pressure helps to change.	<u>Social Ability</u> One person cannot change much. Many people can change an entire community.
<b>Structural</b>	<u>Structural Motivation</u> Rewards and accountability increase motivation.	<u>Structural Ability</u> Change in environment eases the change process.

Change management techniques are many and it is not easy to find the right one. Majority of the change management actions can be summarized in communication and support.

Communication is a key factor in reducing uncertainty. At the core of communication is the intention to share information. People often lack knowledge and thus feel uncomfortable with the new things. Support is helping people to get what they need on the basis of what they feel. For example, if a person feels powerless, the person needs respect of competence. Much of the support is directed to personal feelings. (Adams et al., 1976)

Implementation of an IT solution is a remarkable change within an organization and an even greater effort within an industry network. Successful organizational transformation is started by planning the process. IT planning process, a formal process to develop IT resources, goes through formal steps to gain information regarding important factors related to the process. The information is combined with the forces in the organizational and business environment to form strategic and operational plans. (Rainer et al., cop. 2013, pp. 493)

IT planning process is utilized as a theoretical framework of this thesis to address the areas discussed in this literature review. Previously presented implications for information management in the model *facilitation through change process* by Chaffey and Wood is utilized in the planning process in suitable parts. In practice the planning process of organizational change should cover at least pre-announcement and involvement of senior management and other personnel. Next chapter takes a closer look to the theoretical framework. Chapters to follow take the theory into practice and discuss the results of this research.

### 3 Theoretical Framework on Planning for Virtualization of Collaboration

#### 3.1 Process Models to Analyze Strategic Plan for IS

##### 3.1.1 IS Planning Process in Relation to Organizational Planning

New information systems acquiring relates usually closely to organizational planning. The need for the systems originates from changes in the organizations or from demands of the organization. The business case, the costs and benefits of the new system, is another side of the relation of IS to the organizational planning: should the investments be made in the system or in other areas of organization and how the organization benefits from the system, what can be done with the benefits. Rainer, Prince and Watson, in their book *Management Information Systems* (cop. 2013, pp. 493), have created a formal process to illustrate the planning stages of IS within an organization. The process map is presented in Figure 4.



Figure 4. Analysis of the organizational strategic plan by Rainer et al. (2013, pp. 493).

According to the formal process of Rainer et al., new information system planning starts with analysis of the organizations mission. The large missional directions set the foundation

for organizational goals and objectives. At the same time the changing markets, opportunities and other factors in the business environment affect the strategic plan. A business assessment is needed to reveal these factors. The balance between the business objectives and external factors forms organizations strategic plan. It includes the steps to reach the organizational mission and on the other hand integrates systems and technology to the business. This so-called IT-business integration ensures that the initiatives in systems and technology support organizations business objectives. (Rainer et al., cop. 2013, pp. 493-494)

IS strategic plan is produced by comparing the organizations strategic plan to the current IT architecture. Current IT architecture reveals where the organization is now in regards to hardware and software solutions. IT architecture reveals also how the information resources of the organization are utilized to reach the mission. The IS strategic plan needs to be aligned with organization's strategic plan, it needs to provide for the needs of IT architecture and it must efficiently allocate development resources of IS projects. (Rainer et al., cop. 2013, pp. 494)

The next step of the formal process is to establish IS operational plan. It means that the strategic plan is taken into project level. IT department and the functional area managers take the lead in these projects. Usually the IS operational plan includes mission of the IS function, summary of the IS environment, objectives of the IS function, constraints of the IS function, listing of IT applications and project resource allocation. To align IT architecture with the new operational plan, the IT architecture is revised according the organizations strategic plan. (Rainer et al., cop. 2013, pp. 495)

### 3.1.2 Implications to Smaller Organizations

Small organizations have naturally very limited resources for information system projects. Their needs are usually neither as demanding as those of larger organizations. In smaller organizations the persons who manage, develop and use the systems are usually the same. Thus, smaller organizations typically use less formal processes, if any, to plan and justify information systems. (Roberts & Wood, 2002)

It is however important to note that even in smaller organizations the steps of the previously introduced formal organizational strategic plan are important. The steps should be considered at least at some level even if the organization cannot fully follow the formal process. (Rainer et al., cop. 2013, pp. 493)

Roberts and Wood have introduced a less demanding version of IS planning process in their article *The use of computerized information systems to gain strategic competitive*

*advantage: the case of a start-up manufacturing company* (1997) Later Roberts and Wood refined the model slightly, named it IS planning methodology and applied it again in their other article *The strategic use of computerized information systems* (2002). The methodology by Roberts and Wood is more applicable to circumstances of a small business than the model by Rainer et al. It is also important to note that Roberts and Wood applied the model specifically to a microenterprise in their later article.

IS planning methodology by Roberts and Wood (2002) starts similarly with the organizational planning process of Rainer et al. Overall business objectives define the business or organizational strategy. However, the first step is the only similarity between the two models. In the next phase of this simpler version information requirements are already identified and divided into computerized and non-computerized requirements. Traditional IT requirements are those that are in the computerized group. These requirements can be further categorized into software and hardware categories. This categorization can be applied to entire technological architecture of a company. Therefore, it is well applicable still in today's companies at the era of cloud based solutions. IS planning methodology is presented as a process map in Figure 5.

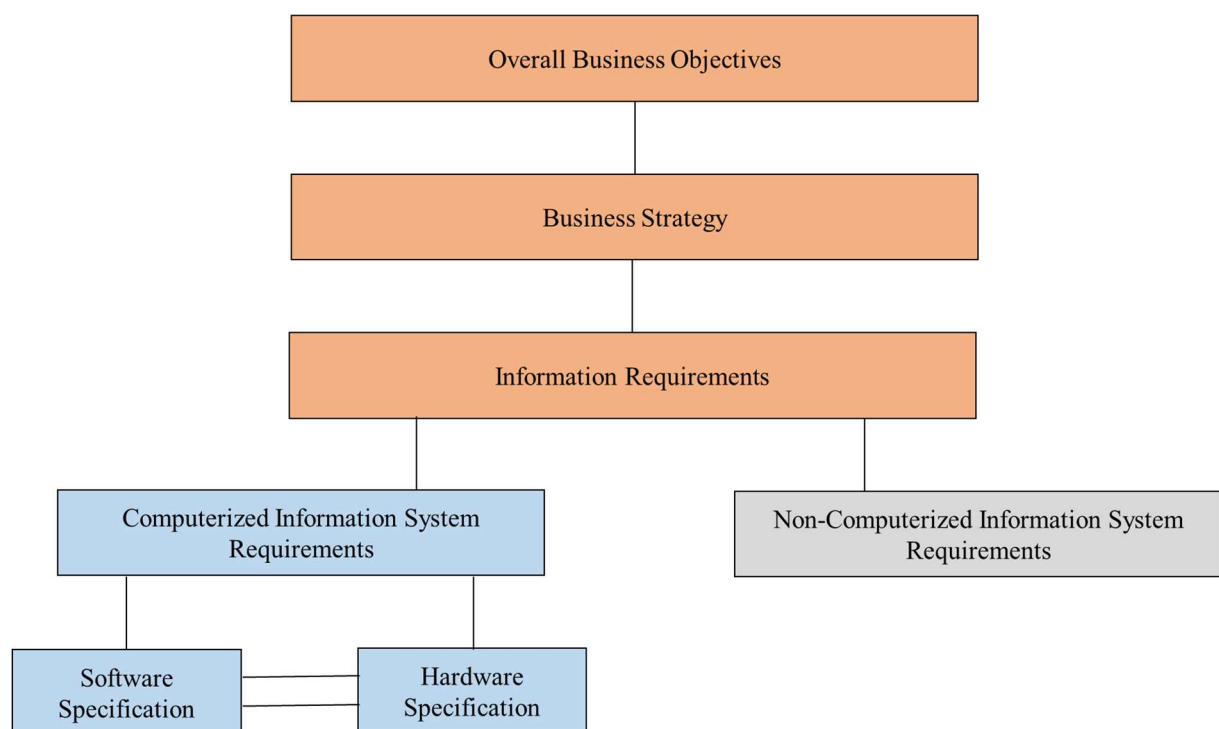


Figure 5. IS planning methodology. (Roberts & Wood, 2002)

### 3.1.3 Importance of External Business Environment

Internal factors are important in formation of organizational strategic objectives as reasoned in the previous subchapters. However, it is important to note that besides these internal forces, the customers, suppliers, partners and competitors of a company impact organization's IS capabilities and information needs as well. Analysis of external stakeholders might reveal great opportunities in the IS sphere and help organizations to develop also internal processes. On the other hand, ignoring or undermining the external factors might create serious threats to organization. For example, in technological development the timing for development is important and problems might arise both from too early or too late changes. (Chaffey & Wood, 2005, pp. 294,313)

The importance of connectivity and collaboration with other players of the industry is highlighted in business-to-business trade and among networked industry clusters. The definition and formation of these networks were introduced in the end of the literature review of this thesis. In these business environments of high level of interorganizational cooperation the connectivity and the collaboration possibilities with other players of the industry are critical elements of success.

Social and technological factors are forces that shape the business environment and create new IS capabilities as well as new information needs. Social factors related to information systems are for example those that tell how people feel about using technology or what communication channels people prefer to use. Technological factors are for example technological trends from the industry to use existing solutions better or to create completely new business opportunities. These two topics were touched and further explained in the literature review of this thesis.

Furthermore, legal, economic and political factors contribute to business environment and IS development as well. These factors are not previously discussed in this thesis but briefly clarified here. Legal factors relate usually to protection of information and identities. Economic factors are often closely related to social factors but consider instead the larger scale, the level of economic development in different nations. Political factors can be related to legal factors but can be also incentives, such as financial aid for technology investments. (Chaffey & Wood, 2005, pp. 312) In the context of small businesses, Finland and 21<sup>st</sup> century, the most relevant factors in the larger perspective are social and technological factors. Therefore legal, economic and political factors are discussed less in this thesis.

Michel Porter's classic model of five competitive forces from 1980s is a valid tool to analyze the external business environment. In the model the external threats are bargaining power of customers, power of suppliers, rivalry between competitors, threat of new entrants and threat of substitutes. Rivalry between the competitors reflect the competition happening among the established players in the industry. The other four forces reflect the fact that the competition goes also further from the established players. (M. E. Porter, 1980, pp. 4) In his paper *Strategy and the Internet* (Porter, 2001) Porter himself has applied the model to evaluate the impact of a technical invention on industry. The model is well applicable to assess information system and the external environment. Figure 6 illustrates Porter's model of five competitive forces.

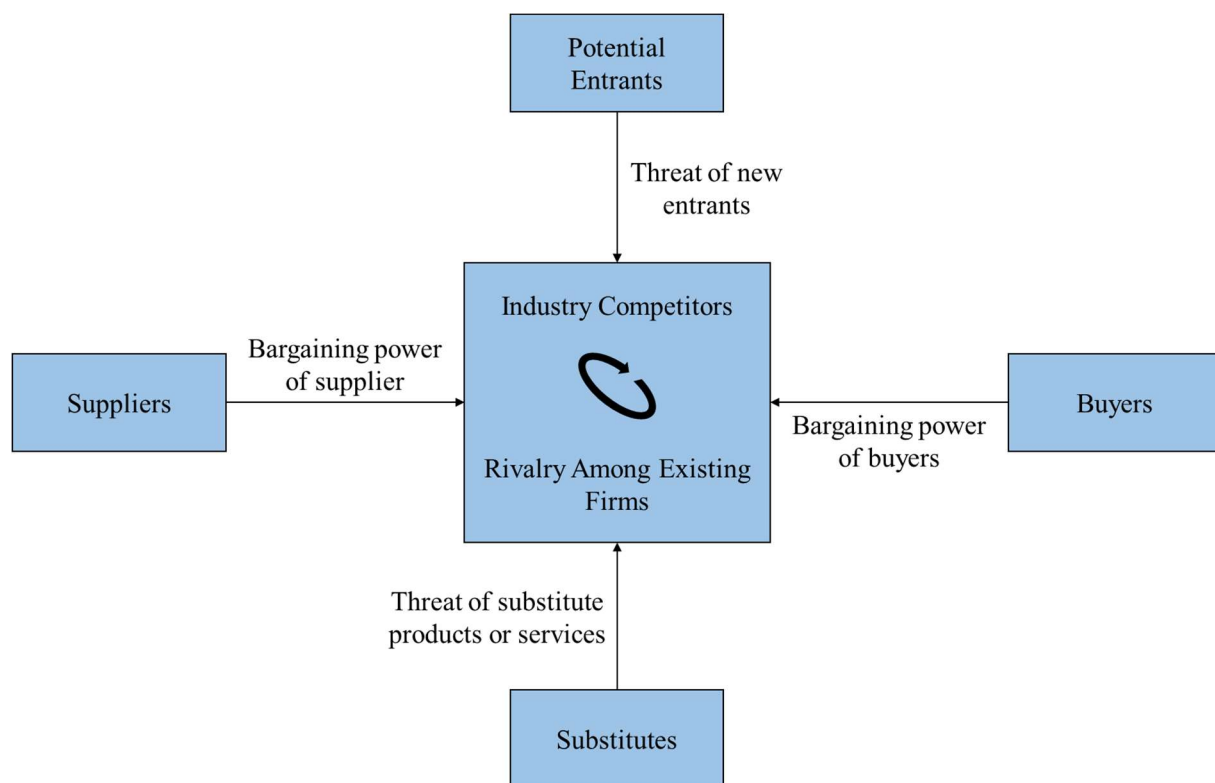


Figure 6. Porter's (1980) Five Competitive Forces.

Porter's model of five competitive forces is a great model to analyze the players in a networked industry. Every development initiative should consider these five forces to be successful. To form an applicable IS planning process for a networked microenterprise this model about external forces is integrated into organizational planning process.



### 3.1.4 Organizational Culture within a Networked Microenterprise

In the literature review of this thesis it was argued that company culture, management skills and information sharing were all important factors in IS development. These so called *soft factors* or *people aspects* are so crucial to the development project that they need to be included in the IS development process. Organizational culture was introduced as one internal force influencing the change process.

A valid question to consider in the context of this study is whether such small companies as microenterprises have organizational culture at all. Certain ways of working are undoubtedly present even in a company of one employee but can a very small company develop and maintain an organizational culture?

Previous research tends to agree that organizational culture is present in every organization regardless of the size of the company (Choueke & Armstrong, 2000; Duh, Belak, & Milfelner, 2010). This research did not identify any study that focused solely in microenterprises and organizational culture. However, microenterprises were included in the studied companies at least in two articles about organizational culture. These studies did not show any separation in company culture in relation to the size of an organization. What the previous research does not agree on is the questions about formation of culture and what an organizational culture really is. Some opinions say that culture is driven by the management and others say that culture cannot be generated. (Choueke & Armstrong, 2000)

Mojca, Jernei and Borut (2010) have studied differences in organizational culture in their article *Core Values, Culture and Ethical Climate as Constitutional Elements of Ethical Behaviour: Exploring Differences Between Family and Non-Family Enterprises*. They include in their study microenterprises along with other companies. An interesting and meaningful finding in their research was that company size correlated with the differences in organizational culture only in one type of culture: market culture, where competitiveness, increasing market share and productivity are valued, correlated positively with larger companies. In other types of organizational culture the company size had no correlation with organizational culture even though the study covered companies from microenterprises to large, over 250 employee companies.

As background information for this thesis it is important to note that also microenterprises have organizational cultures. The formation and development of the culture can be seen to follow the same principles introduced in the literature review of this thesis.

When an organization is developing or improving its practices, the culture should be considered as one fundamental internal factor driving or restricting the change. The influence of networked industry to a microenterprise's organizational culture is further discussed in the empirical part of this thesis.

### 3.2 Revised Process Model for IS Development in a Microenterprise

In the IS planning methodology by Roberts and Wood, the external business environment factors are included in information system requirements. However, it can be argued that leaving the consideration of the external environment to the last phase of the IS planning process is not good strategic thinking. Networked industry structure and therefore the external forces have great influence in the strategic decisions of the company and competition with other businesses, as argued in the previous subsection. Especially large volume customers are strong forces if high fixed costs characterize the industry (M. E. Porter, 1980, pp. 24-26). In shipbuilding industry the importance of customer power is highlighted because of large volumes but also because of high level of specialization.

In the model of Rainer et al. the external factors are considered in the phase *organization strategic plan*, together with other factors of business assessment. This is much better approach than leaving the consideration to the end especially now that the focus is in a networked industry. However, as mentioned earlier, the model of Rainer et al. is designed for larger organizations because it is a demanding and long organizational development model. Microenterprises are the smallest and least resourceful businesses of all and therefore the complicated process is not applicable to them. The need for a light, straightforward and not that resource intensive IS planning process is evident.

It can be argued that in a networked industry the significance of the business environment might be even greater for small organizations than what it is for larger organizations. For example, in IS development smaller organizations have very limited possibilities to influence industry trends or the ways the systems are utilized. Instead, small organizations are highly reliable on their customer and supplier operations. Therefore, small organizations need to consider external business environment latest in the strategic planning phase.

The IS planning methodology by Roberts and Wood focus mainly on technological requirements, not on organizational or social factors like management skills, user training,

personal characteristics and company culture. The IS planning process by Rainer et al. could be understood to include these people factors but not very clearly. Depending on the interpretation of the terms business assessment and IT architecture, the people aspect lies somewhere in between of those.

Why then the term business assessment, the phase of the formal method of Rainer et al., is not a good term to use? Why it should be clarified? To start with, business assessment it self is not a very well-defined process. Starting entrepreneurs, while working with their new business plan, most often do some kind of business assessment while starting their business, but the level of the assessment is not standard. There exist several different methods to do the assessment and business planning. What makes things worst are the facts that the plans are often criticized for their content and the processes are criticized for wasting valuable time of the entrepreneurs, time that they could have used for other more productive work. (Kuehn, Grider, & Sell, 2009)

The term business assessment used by Rainer et al. leaves too much space for interpretation and is too complicated to use for a small business. Therefore, business assessment is not used in this thesis in the context of microenterprises and IS planning. Instead, the external factors and organizational characteristics are clearly identified already in the theoretical model.

In the final phase of the model by Roberts and Wood the IS requirements are categorized in computerized and non-computerized requirements. Clearer and more modern terms to use in the categorization would be technological and organizational requirements. Technological requirements could be split into software and hardware specification similarly as computerized requirements in the model by Roberts and Wood. The categorization is valid although cloud based solutions are more and more popular today. For example, network and security issues still focus greatly on hardware. Organizational requirements could be further split into communication plan and training and support strategies. These were the most important areas of change management, as reasoned earlier in the end of the literature review.

Clear and straightforward process steps are needed to make a planning process applicable for a microenterprise. Figure 7 is the process map of the revised IS planning methodology, called *strategic IS planning process for networked microenterprises*. In the new model the business strategy is formed according to overall business objectives, but it is influenced by external business environment and organization culture and ways of working. The division to

external and internal factor is intentional as both factors play important roles in organizational development of a networked microenterprise. A microenterprise needs clear, internally agreed directions for its business but at the same time a networked microenterprise cannot plan its future by ignoring the partner network or the rest of the business environment.

In the revised model, an IS strategic plan is created according to the business strategy. IS strategic plan is as well directly influenced by external business environment and organization culture and ways of working. IT infrastructure, for example, is important both inside the company and in the network. Similarly, the need for information or training comes both within a microenterprise and from the partner network.

The IS strategic plan includes both technological IS requirements and organizational IS requirements. The technological IS requirements are divided into software and hardware specifications, similarly to the model of Roberts & Wood. Organizational IS requirements are divided into communication strategy and training & support plan. The intention of the *strategic IS planning process for networked microenterprises* is to keep the planning process simple and easy to understand and therefore applicable for a microenterprise.

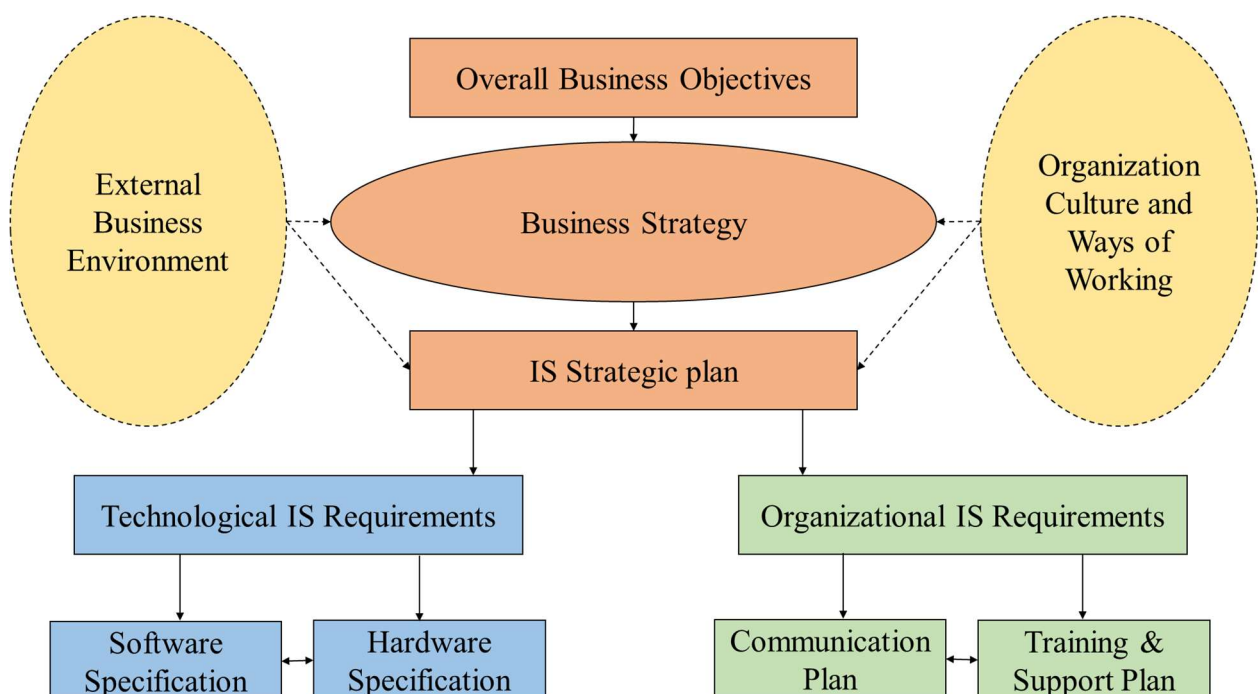


Figure 7. Strategic IS planning process for networked microenterprises.

This theoretical model *strategic IS planning process for networked microenterprises* is applied in practice to the circumstances of the case company ShipPalette Oy. Over the next chapters the findings of the thesis project are reflected against the theoretical framework. A plan to virtualize interorganizational collaboration is introduced for ShipPalette and its partner network. The final results of the virtualization project are discussed in the end of this thesis.

## 4 Virtualizing Collaboration, Case ShipPalette Oy

### 4.1 Business Environment

#### 4.1.1 The Case Company ShipPalette Oy

ShipPalette Oy is a microenterprise in Finnish shipbuilding industry. At the moment the company employs two part-time workers in addition to the full time entrepreneur. Moreover, one person works project based for ShipPalette as a subcontractor. Annual turnover of ShipPalette is approximately 140 000 euros. The official location of the company is the home of the entrepreneur in Vantaa even though most of the business is at the moment done together with Meyer Turku shipyard in Southwest Finland. (Köykkä, 2016b) The distance between the locations of ShipPalette and Meyer Turku is almost 200 kilometers.

The entrepreneur of ShipPalette holds a bachelor's degree in architecture but has worked most of her career as a consultant in shipbuilding industry. Her previous employees have been companies varying from shipyards to cruise lines and service contractors. Past 5 years she has worked as a private entrepreneur, employing herself and recently also other part time workers. Over the past few years the entrepreneur has completed a MBA degree in Aalto Executive Education to increase her business skills and train herself. The education has been great support for ShipPalette as well. Some of the ideas and concepts utilized in this thesis are derived from the exercises completed during the MBA education.

At the moment ShipPalette offers two types of services to its customers: cost complexity consulting and loose furniture design and procurement services. Cost complexity consulting services consist of coordination of architectural tasks and negotiations about cost exceeding contract terms. Loose furniture related services are mainly sourcing services according to given budget. The tasks include however design work and coordination of it at some level. (Köykkä, 2016b)

The daily work at ShipPalette includes normal knowledge work routines, such as negotiations, document drafting and calculations. These tasks are easily transferred into virtual environment and already now most of the work is done with different information systems. The special characteristic of the case company and its work routines is the design related work. These tasks such as reading, interpreting and discussing about architectural drawings is an integral part of the work. Success and performance in these task is the major competitive advantage in the operating environment. Traditionally these tasks are done face to face in

meetings at shipyard or at other subcontractors. Virtualizing them would be a great benefit for the company. (Köykkä, 2016b)

Remote work is a lifeline for ShipPalette. At the moment the entrepreneur has no possibilities to relocate to Turku or anywhere else because of her family situations. For privacy, these situations are not discussed further in this thesis. For the entrepreneur occasional visits to shipyard are normal but most of the work should be possible to do remotely from home. At the moment, remote working is possible but not very successful nor particularly advanced. For example, mobile phone and email are often used for communication as internet based solutions are thought to be either difficult or unstable to use.

As mentioned, ShipPalette has no traditional office premises. The entrepreneur works mainly from her own home. The other workers of the company work also most of the time individually from their own homes and visit occasionally the entrepreneur at her home for meetings and co-working. Information systems and technology are utilized at some level in the operation of ShipPalette, creating theoretical office infrastructure. In practice, traditional telephone calling and emailing are common and often the convenient ways to communicate internally and externally. The reason for this is that the modern and more advanced tools and their opportunities are not well known and understood in the company. The skill levels of the users in the partner network also vary a lot. (Köykkä, 2016b) The used information systems are discussed more deeply later in the subchapter about IS strategy, because current IT infrastructure relates closely to the new IS strategy.

In the future ShipPalette is looking for ways to expand its business. These plans and the need to improve current work and collaboration acted as motivational factors for this thesis as explained in the introduction. The challenge in business expansion is that skilled professionals are located in different parts of the world.

In current situation many of the virtual working opportunities remain unexploited by ShipPalette and its partner network. Collaboration between the stakeholders could be much better than what it is now and also remote working could be much better supported. Better virtual tools could benefit the companies to enhance operations and to grow. (Köykkä, 2016b) The business expansion plans of ShipPalette are discussed later in the subsection about business strategy.

#### 4.1.2 Finnish Cruise Shipbuilding Industry

Shipbuilding industry is one of the four main sectors of maritime industry in Finland. Shipyards and its network companies are the main operators in the industry. The largest and most successful shipyard in Finland is Meyer Turku Shipyard. The shipyard in Turku has a long history, dating back to 1737. Throughout almost 300 years the it has had various owners. (Meyer Turku Oy, 2016b) Today the Turku shipyard is owned and operated by Meyer Werft, a German shipyard having a history of seven generations of family ownership.

Over the years, depending on the owner and the business opportunities, the Turku shipyard has focused to build various types of ships from wooden steam crafts to luxury cruisers. Meyer Turku shipyard, as the Turku shipyard is called today, is specialized in cruise ships, car-passenger ferries and special vessels. (Meyer Turku Oy, 2016b)

As the case company of this thesis is a small subcontractor for Meyer Turku, the empirical part focuses on different sides of the Turku shipyard and its network of subcontractors. This does not mean that the Turku shipyard is everything in Finnish shipbuilding industry. There is another larger scale shipyard in Helsinki, the Arctech Helsinki shipyard in the capital of Finland. It is specialized in building ice breaking supply vessels so the market is different to that of the Turku shipyard. In addition to the large shipyards in Turku and Helsinki, there are four smaller shipyards located in Southwest Finland. Not surprisingly the shipbuilding industry is one of the major employers in the Southwestern Finland. (Prizztech, 2015)

Over the past few years Meyer Turku has won orders for several cruise ships and led the shipbuilding industry in Finland to rapid growth. The investments in shipbuilding capacity at the shipyard has brought new business opportunities for cruise ship building and led the entire network towards bright future. (Prizztech, 2015)

The network companies of a shipyard, such as turnkey suppliers, equipment and material suppliers, engineering offices and design studios play important roles in shipbuilding. They are all somehow connected to each other and the shipyard and therefore called a network. Together these subcontractors create over 80% of the total value of new ship builds at Meyer Turku shipyard. (Meyer Turku Oy, 2016c)

Figure 8 presents the structure of the partner network at Meyer Turku. The figure is formed according to the information received in the case company interviews. Only major connection points between individual companies and shipyard or cruise line are shown in order



to keep the figure readable. In practice, there are many other links between the different companies. ShipPalette could be categorized in the supporting services -category in this model.

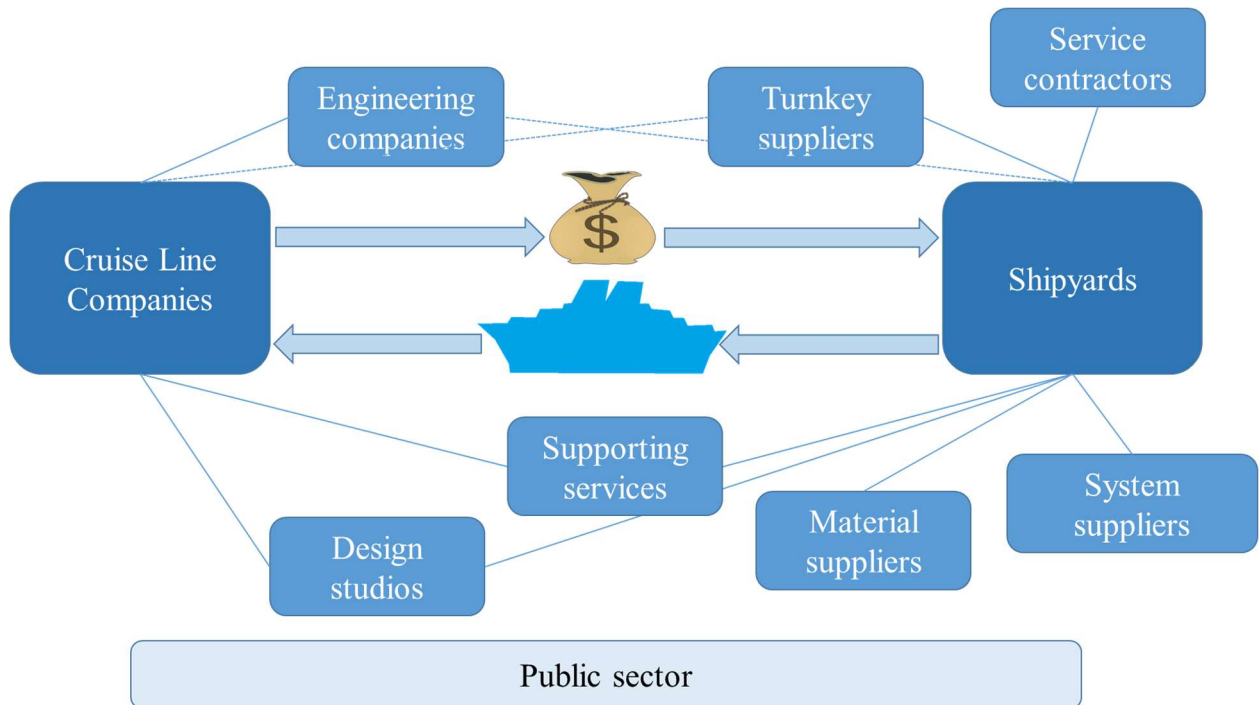


Figure 8. Network of companies in cruise shipbuilding. (Köykkä, 2016b)

The shipyard, as the large operator and the shipbuilding industry, sets the standards and trends for the work in the industry. Usually the shipyard is the contractor from whom the end customer orders the ship. Traditionally one Finnish shipyard has had a major role for the local subcontractors because they have relied heavily in domestic trade. Few years back Finnish shipbuilding industry was in a turmoil and many subcontractors expanded to global markets to survive and secure their future. International expansion was actually very successful to many players. In 2015 the amount of export trade for the subcontractors was around 50% as in 2013 the same number accounted only some 30%. As a result of this internalization, many subcontractors are changing their business strategies. Growth opportunities are pursued on the global markets as domestic customers are more secure and still very important. (Prizztech, 2015) The changing business environment puts pressure to the shipyard which needs to secure its shipbuilding capacity and grow its valuable network of subcontractors.

Past years of economic insecurity have left their mark also into infrastructure of the Turku shipyard. Investments especially into office spaces have been minimal over these years.

Not much have happened in the office layout nor in property development. Some of the technology is also outdated. After Meyer Werft took over the Turku shipyard and won several important orders, improvements and investments have started again. (Niemi, 2016) Currently the order book of the shipyard is full for over five years adding stability and confidence for the future (Meyer Turku Oy, 2016a).

Over time the Finnish shipbuilding industry has offered long careers for the employees. A natural reason for this might be that a significant part of shipbuilding work is learned in practice. Once the professional skills are learned it is not easy nor convenient to move away from the shipbuilding industry. This is the way the industry works still today although some universities provide good educational options. Also Turku shipyard has its own shipbuilding school. (Lilja, 2016)

Even though long traditions and experienced workers are often an advantage for the shipyard they also create challenges in organizational change. New ideas and concepts for example to enhance productivity at work are often adapted slowly and gradually.

#### 4.1.3 Global Opportunities

Most of the revenues of the Finnish shipbuilding industry, as mentioned earlier, come from the export trade. (Prizztech, 2015) In global context Caribbean is the largest regional market in cruise travelling with a share of one third of the entire market. Mediterranean cruises and other European destinations have been following behind with still remarkable shares from the global market. Asia and Australia are the fastest growing regional markets that will most probably tap soon into the level of (other than Mediterranean) European destinations. (CLIA, 2016)

Globally cruise travel industry is doing very well and experiencing good growth in near history. In 2015 altogether 23,2 million passengers cruised with those ocean cruise lines that are part of a global cruise industry trade association CLIA (Cruise Lines International Association). Growth over the past five years in the number of passengers has been remarkable, 21,5% from 19,1 million in 2010. For 2016 the growth is expected to continue and the total number of passengers to reach 24 million passengers (CLIA, 2016). The customer base of cruise industry is growing all the time as the large generations around the globe are getting older (Niemi, 2016).

For years 2016-2022 in total 52 new ocean cruise vessels have been ordered, totaling more than \$6,5 billion in value (CLIA, 2016). 52 is remarkably large number especially as the qualified cruise ship building capacity is relatively small around the world. Meyer Turku is one

of the world's few shipyards specialized in cruise vessel building. The other cruise ship builders are likewise European shipyards, located in Germany, France and Italy.

In the world there are hundreds of shipyards specialized in new ships building (LINK Publisher S.C., 2016). Many of these shipyards, especially those in Asia, perform very well in building the ship hulls. Because of that they perform very well in the completion of cargo ships. These shipyards however struggle to produce luxury cruise ships because they lack expertise in coordination of architectural work. The few European shipyards excel in this complicated task and manage to keep cruise ship building as a privilege of few.

The European cruise vessel shipyards, including Meyer Turku, have sold out their capacity to build new ships for several years into the future. The cruise lines are in desperate need of new vessels to serve the increasing number of passengers. Full order books are not just a positive thing for the shipyards as cruise lines are making every effort to find new capacity. Competition between the European cruise vessel builders is also still very tight. Finnish shipbuilding industry is known from its quality in products and services. Advancement in project management, network communication skills and cooperation are all essential factors across the network qualifying for its excellent reputation. (Prizztech, 2015)

As current cruise vessel builders struggle to provide capacity to their customers, also business in the future is threatened. New orders might be lost to new players who, because of urgent need of new vessels at cruise lines, undoubtedly get opportunities to learn cruise ship building. They will also have an opportunity to build a skilled network of subcontractors. Lloyd Werft Group might be one example of this development. The new shipyard group was formed as Genting HK, a leading Asian leisure and entertainment company bought three German shipyards in order to build global fleet to its three different cruise brands. (Breaking Travel News, 2016) Future will show how the new player performs in global competition.

Virtualizing collaboration, as mentioned in the introduction of this thesis, is one possible way to increase capacity in shipbuilding, especially for ShipPalette and Meyer Turku. Better employment of information systems is necessary for recruitment of shipbuilding professionals around the world. Additionally, the digital tools will ensure the future of work. New labor force of Digi natives will soon spread to business life and good tools are essential to get these new workers on board (Mylly, 2016). Fast pace of modern business requires also digital solutions to manage and transfer information. (Lähdesmäki, 2016)

The timing for deeper study in the topic is great as Meyer Turku shipyard has just recently contracted their capacity for over five years in the future and the shipyard is looking for ways to increase productivity. Long order book will add security for the future for the shipyard and for its subcontractors as well. Challenges for development will rise from the fact that Meyer Werft took control of the Turku shipyard only two years back. Meyer Werft shipyard has some significant differences in the ways of operation compared to those of Meyer Turku shipyard. For example, the design process of Meyer Werft is based on centralized data while Meyer Turku works with several different systems. Information systems of Meyer Turku will definitely be affected if the organization is transferred more towards the model of Meyer Werft. It is still unclear how much the parent company wishes to unify the processes across the shipyards. (Niemi, 2016) Thus the office virtualization plan for ShipPalette assumes that current ways of operation continue in the future.

## 4.2 Plan to Virtualize Collaboration in ShipPalette Oy

### 4.2.1 Overall Business Objectives

The business objectives and strategy work introduced in this part were thought of and drafted in close co-operation with the entrepreneur of ShipPalette. Detailed business strategies and decisions are confidential and thus not included in this thesis. Anyway, general level introduction of the company and its directions, which is presented in this subchapter, is sufficient to produce office virtualization plan for the case company.

Traditional business objectives, such as money or fame, are not at the list of business objectives of ShipPalette. Of course, the reason for being of a business is always to generate revenue but money or fame in themselves are not objectives that, in the opinion of ShipPalette's entrepreneur, drive truly successful business. Similarly, the articles by Roberts and Wood did not set monetary objectives for the case companies (Roberts & Wood, 1997; Roberts & Wood, 2002).

ShipPalette focuses on long term success and sometimes it means that for example the revenues are not maximized. Also by focusing on something that is compensation from success rather than an actual business objective, you are not really focusing on the vision of the company. As the entrepreneur is the owner of the company, she has all the rights and possibilities to decide the objectives of the business as she wishes. The difference to larger businesses in this aspect is huge. (Köykkä, 2016a)

Instead of money or fame, the ability to impact positively on the work and on colleagues is what drives the company forward. This means that the people working at ShipPalette get satisfied if they make things work better than they currently are or if they are able to help others. A positive impact is also thought to transmit from work to employees. If employees are satisfied at their work, good chances are that they also satisfied in their life. (Köykkä, 2016a)

Knowledge transfer is another important objective for ShipPalette. The amount of knowledge and experience held by older professionals, probably already retired ones, is huge. It would be both a shame and also a threat for future ship building business to leave these skills and knowledge behind. ShipPalette's entrepreneur herself keeps these two objectives in high priority and wishes the same also from other employees. (Köykkä, 2016a) ShipPalette's two most important overall business objectives are presented in Figure 9.

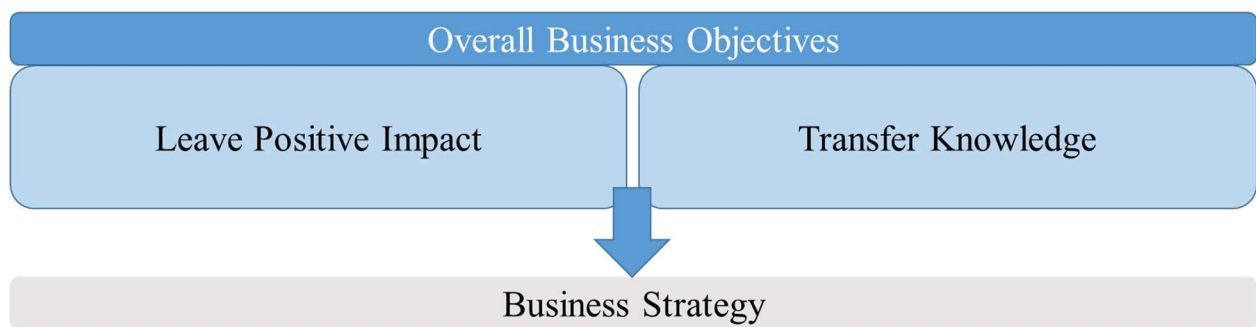


Figure 9. ShipPalette's overall business objectives.

ShipPalette's overall business objectives can be summarized in three principles: serve well, be transparent and build partnerships with customers and suppliers. Serving is extended into everything that ShipPalette does with its customers and other stakeholders. It means that another company or person is helped even if the compensation is not clear. Transparency is important factor for example in pricing. If the pricing is transparent, it increases trust between the business partners. Partnership is built mainly with the Meyer Turku shipyard which is at the moment the only customer of ShipPalette. Partnerships are also built with the subcontractors of the company. All partnerships aim at long term cooperation and they are believed to bear fruit now as well as in the future.

At the core of the business objectives is an assumption that if the company supports its customers to be successful, a compensation from that will come at some point one way or

another. The compensation might not be the highest possible revenue but can be for example long lasting business relations with the partners. Staying in business for a long time is not obvious for a microenterprise. The overall business objectives of ShipPalette support also the characteristics of global and national shipbuilding industry. As the professional circles of cruise shipbuilding are relatively small globally, reputation and contacts are crucial elements of success. (Köykkä, 2016a)

#### 4.2.2 Business Strategy

As a business strategy ShipPalette has decided to focus on work that the bigger companies are unwilling or not specialized to do. Cost complexity and coordination of loose furniture design and procurement are the two services, as mentioned earlier, that ShipPalette offers to its customers. These tasks require high level of expertise and focus on smaller entities. They are also areas where a positive impact and knowledge transfer are very important. Negotiations and other practical tasks happen often in situations where interests of participating parties conflict with each other. The tasks also require knowledge that is learned only through experience. Therefore, the business strategy is a great way to meet the overall business objectives of the company. (Köykkä, 2016a)

The strategic decision to focus on the niche services means that ShipPalette needs to stay small and agile. They are reasons why the firm can succeed in the business. Company growth, which is pursued in long run, can be moderate but the intention is not to compete with the bigger players in the field. (Köykkä, 2016a)

Company growth at ShipPalette is mainly a human resources question. At the moment ShipPalette is highly dependent on the expertise of the company CEO. She has extensive experience in various tasks in the industry and great global network of contacts. The strategy to manage work load and grow business is to transfer needed knowledge to new employees, familiarize them to the work, hand the tasks over to them and act in an advisory role. At the same time the company gets better as the new workers bring in to the company new knowhow and expertise for example from the areas of design work or logistics.

The challenge in recruitment is that skilled work force is not easily available. The work requires extensive industry experience and knowledge as the variety among different projects and customers is high. ShipPalette's entrepreneur has a few potential new workers in her contact network but these people are located in different parts of the world. The challenge is to get the people around the world to work for the same projects despite the geographical

distances. Most of them are also in secure jobs and although they might not be fully satisfied with their work, it might be a big risk for them to switch to work for a small player. To offer an interesting possibility for these professionals to work according to their passion and life purpose is the only way for ShipPalette grow and to expand its business to new areas. (Köykkä, 2016a)

Formation of ShipPalette's business strategy is presented in Figure 10. The theoretical model utilized in this thesis included also consideration of external business environment and organizational culture. These aspects are influencing in the background in formation of business strategy and discussed next after the presentation of the building blocks of business strategy.

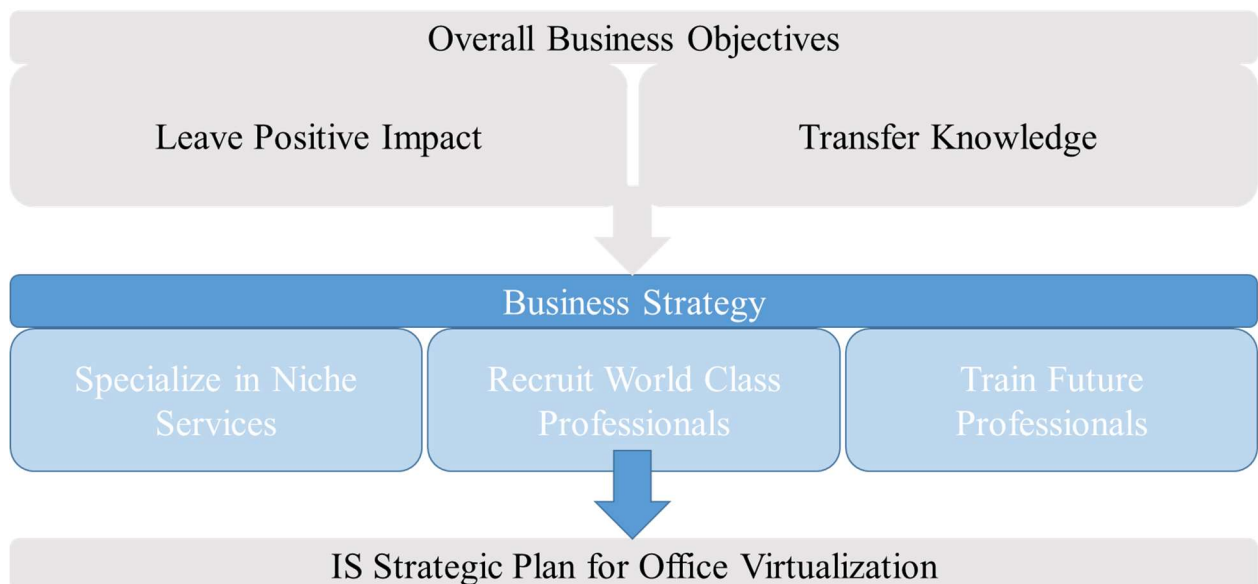


Figure 10. Key factors of ShipPalette's business strategy.

The main external forces influencing in business strategy are customers and suppliers. Meyer Turku shipyard as the only customer of ShipPalette has strong power to influence in forms of cooperation and in developing them. As a customer of ShipPalette the shipyard is always "at right". The customer power is great also because the shipyard has already well-established processes as a big company. Close collaboration with the shipyard is important because mutual dependency is great.

ShipPalette has only a few suppliers. The business mainly consists of professional services that are produced by the company itself. Of course, some professional services and for



example technological tools are procured from suppliers. These services and products are not specific nor in themselves truly critical for the business of ShipPalette so the supplier power is not remarkable.

A more interesting part of the supplier network is one worker who is technically a subcontractor. The subcontractor is a one-person company who works alongside other people but charges for the services instead of receiving salary from ShipPalette. The arrangement is done because the work is project based and because this subcontractor works also for other companies and projects. There might be need for this kind of arrangements also in the future if the need for work force continues to be more project dependent and if the workers continue to work for other projects as well.

Despite the status of external workforce, ShipPalette currently treats and trains this one person company the same way it treats and trains its normal workforce. The desire is to build a mutually dependent partnership that benefits both parties. Supplier power is moderately present in these relationships because the one person companies have, as they learn the work, the option to bypass ShipPalette and offer their services directly to the shipyard. This might be the case for example if the companies want to work alone instead of cooperation or if some disagreements arise. (Köykkä, 2016a)

Organizational culture in a microenterprise was discussed in the together with the theoretical framework of this thesis. It was concluded that a microenterprise has organizational culture and that can be certainly confirmed in this study about ShipPalette. Organizational culture of ShipPalette influences its business strategy for example through the values. As mentioned in the business objectives, money is not the most important thing for ShipPalette or for its employees. Personal passion, willingness to help others and the satisfaction received from completing something are believed to be much better motivational factors than money. The three important values rising from company culture are transparency, servanthood and openness. Organizational culture influences business strategy in the central ideology of the company that that problems are seen as opportunities. This is clearly visible in practice as the company's business is built around problems that others cannot handle. (Köykkä, 2016a)

In the theoretical discussion about organizational culture a question about the influence of networked industry to a microenterprise's organizational culture was left open. This topic was not thoroughly studied in this study but through observations and interviews some information was gathered. It was noted that the network has affected the company culture of



ShipPalette relatively little. The organizational culture is quite distinctive from the others. The reason for this might be that the organizational culture of a microenterprise is so strongly associated to the personal values of the entrepreneur that it is very difficult to change. Because the employees of ShipPalette are also very close to each other, an external force needs to be very strong to influence the culture. To keep external forces and organizational culture as separate forces seems to be the right decision also in the case of ShipPalette.

#### 4.2.3 IS Strategic Plan for Office Virtualization

Information systems aim to assist in executing the business strategy and for that purpose an IS strategic plan is formed. Organizational culture and ways of working influence IS strategic plan by identifying how employees currently work, what are their anticipations towards IS and what is the current IT infrastructure like. External business environment brings the needs of the business environment into consideration.

In the interviews conducted for this thesis it was noted that lack of knowledge and lack of IT skills are the main concerns and needs related to information systems. Lack of knowledge about technological solutions makes the entire topic of virtual tools unpleasant to discuss about. Technical requirements related to office virtualization are discussed in the next subchapter to remove unnecessary doubts about virtual tools. Organization's IS requirements are included in the IS strategic plan as the last step of the IS planning process.

At ShipPalette there are currently a few virtual tools in use. Internally at ShipPalette, in addition to basic Microsoft Office programs, only VoIP (Voice over Internet Protocol), mainly Skype for business, is used for occasional communication. For communication with the partner companies also another online meeting software and a software for file sharing are used. Besides these communication tools, some CAD-tools (computer assisted design) are used mainly to view drawings and designs. The drawings used in interior design are mainly basic 2D drawings. (Köykkä, 2016b; Niemi, 2016)

The problem with the existing solutions seems to be that no one really knows if the used solutions are the best ones and if they are, how to utilize them in the best possible way. The same problem is present in the partner network. The users' core competence is not in information systems or in the development of them so it is obvious that the companies are coming behind in the development. Even if someone has the knowledge, it is hard to share and utilize at work as the network companies are so many in number and the skill level of users vary a lot. Companies are also physically distant to each other so training is difficult to arrange.

The current work processes suffer from lack of IS integration within the network. Sometimes for example ShipPalette does some work on excel files as there is no access to shipyards systems. The work is sent on excel file to workers of shipyard and they need to transfer the file to their systems so that the information becomes usable. Poor integration generates excess work for both ShipPalette and its partners. (Köykkä, 2016b)

It can be argued whether an organization needs a separate information system specialist or not to plan and execute IS strategy. On the basis of the conducted interviews inside ShipPalette and among its partner companies, the most important areas that the IS strategic plan for office virtualization should cover are finding correct information, exploring the possibilities and training and supporting everyone in the network. These topics and the strategic decisions are further discussed in next subchapters about technological and organizational IS requirements. The formation of IS strategic plan for office virtualization is presented in Figure 11.

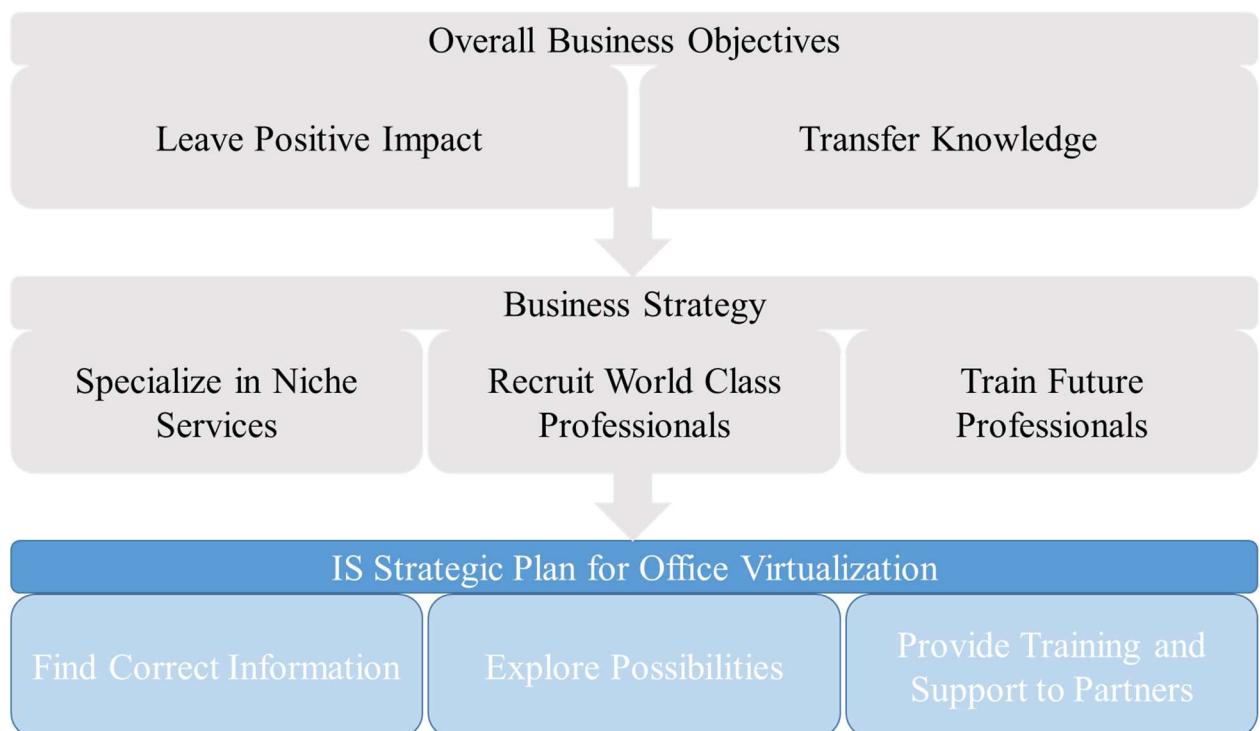


Figure 11. Key areas to cover in IS strategic plan for office virtualization.

#### 4.2.4 Technological IS Requirements

The first part of the IS requirements are technological IS requirements. They are further split into software and hardware specifications. Both software and hardware requirements are discussed in this same chapter as they relate often to each other and are sometimes dependent on each other.

##### **Integration to customer systems:**

As a microenterprise ShipPalette alone cannot do much with great virtual collaboration solutions, especially if they are serving only the company itself. Integration to customer systems, in this case especially to Meyer Turku shipyard's information systems is the first technological IS requirement for ShipPalette. In practice this means that the decision on the new system needs to consider both current IT infrastructure of the customer company as well as upcoming changes in it. The first technological requirement focuses mainly on the software side although sometimes hardware limits the available options of software.

The first requirement leads also to a complexity in ShipPalette's IS plan. At the time of this thesis, Meyer Turku has just started to plan a new intranet solution which will most probably act also as a collaboration platform for the shipyard and its network companies. The new platform might introduce some new systems or replace some of the old ones. The project is still at an early phase and the shipyard has not yet selected a provider for the platform. (Mylly, 2016)

Because of the first requirement to integrate ShipPalette's systems to the customer systems and because of the ongoing project in the customer organization, the decision about the specified solutions and providers of ShipPalette's virtual collaboration solutions needs to be postponed into future. The scope of this thesis is limited to planning of changes and development of the existing systems and organizations.

##### **Efficient collaboration:**

According to the IS strategy of ShipPalette another important requirement for office virtualization system is efficient collaboration. This requirement touches on both software and hardware specifications. Efficient collaboration means that work related cooperation is wide-ranging and all kinds of information is shared and worked on together.

Online meetings are often compared to face-to-face meetings. In the context of ShipPalette, Meyer Turku and other players in the industry the criticism towards online meetings is directed to quality of communication and possibilities of collaboration. Face-to-face meetings are preferred because, compared to online meetings, people get to know each other better in them. Presentation of material is also easier in person than through online tools. Online communication always carries the risk that other persons are misunderstood. (Niemi, 2016)

To overcome these challenges, people need to be able to communicate through high quality voice and video. Video is an important factor in getting to know each other. Talking is also much more natural and you can see if the other person is engaged to the meeting. Communication and file sharing needs to happen in real time without delays. As mentioned earlier, the work tasks in the context of the case are both design related tasks and basic office tasks. Efficient collaboration needs to enable virtual coworking with the same drawing or image at the same time. In addition to sharing of graphical documents the workers need to be able to share and collaborate on text documents, Excel files and presentations. The requirements of efficient collaboration narrow down actual technological solutions and sets high quality standards for the systems. (Köykkä, 2016a; Köykkä, 2016b)

**Ease of use:**

The new virtual collaboration systems and related hardware need to be easy to use because the skill levels of users vary a lot. The systems need to be so easy to use that everyone can use them. The least advanced user in the network sets the standard for everyone. (Köykkä, 2016b) If the systems and hardware are too hard to use right from the beginning, the users might not even experiment them and might avoid them right from the beginning. One missing link in the network destroys the system implementation immediately. User skills can be increased by training and support but it does not solve all the requirements related to ease of use. Proper peer pressure could also possibly help to level the skill variation among the users, but that requires active user participation. They can also help to encounter and solve problems later in the experimenting phase. Training and support are discussed in more detail in the next subchapter about organizational IS requirements.

**Information safety and protection possibilities:**

Information management and traffic need to be safe and controllable in the new systems. The requirement is that information can be shared widely but possibilities to restrict access on confidential material are needed. Scalability of information management is also important. It means that different levels need to be able to restrict differently. Of course, the systems need to have the normal abilities for securing information. In the interviews conducted for this thesis it was asked if the persons remembered any serious security threats from the past. Nothing serious did not come up, but in smaller scale there were examples were for example emails that were sent to wrong address by mistake. These email issues confirm that systems need to be as safe and simple as possible. Mistakes always happen and the system should be designed to block these mistakes.

Information safety and control over shared information are critical topics in the entire work virtualization process. On one hand, the basic principle in information management is that the more an organization shares, the better it becomes. Production and distribution of information has been more central to well developed economies than what production and distribution of things have been (Drucker, 1994, pp. 8).

Meyer Turku has as well decided in their intranet-project to share as much information as possible. Practice is not that straightforward as too openly shared or poorly managed information is a serious business threat. In interior design of cruise ships some of the material is very sensitive and needs to be protected carefully. Information safety and protection are both software and hardware issues. Software safety and protection cover for example internet threats. Hardware safety and protection is needed for physical threats such as theft or misuse. In addition to basic IT related protection methods information safety can be protected through contracts and wise company culture. (Mylly, 2016)

**Mobility and support for various operating platforms:**

Mobility is crucial for the virtualization process right from the beginning. It is an important requirement also in the intranet project of Meyer Turku. Mobile devices are used in work tasks already a lot and the variety of operating platforms in mobile devices is greater than in computers. Different mobile platforms need to be supported by the new virtualization solutions. (Mylly, 2016) Mobility requirement is mainly a software issue as the hardware is already widely in use.

### Alternative (back-up) solution:

One need relating to technological hardware is the need for an alternative solution for virtual collaboration. In practice this means a backup plan for virtual communication. In online meetings this might be for example the ability to participate in meetings by calling with a normal mobile phone. This need rises from the fact that occasionally virtual collaboration is not possible even though the needed solutions are there and people willing to use them. Workers in the shipbuilding industry need to work at times in extreme circumstances at the work sites where internet connections are bad, costly and might go through the ship's satellites (Lähdesmäki, 2016). These restrictions related to internet connectivity are identified and considered in the planning process. But they are also seen as only temporary restrictions. A basic 2G mobile-cellular network covers about 95% of global population already now and faster mobile-broadband networks are spreading at the fast phase (ITU, 2016).

All the technological IS requirements and their specification are summarized in Table 3. As mentioned earlier, hardware and software specifications often relate to each other. They might also depend on each other.

Table 3. Technological IS requirements for ShipPalette's office virtualization.

Technological IS requirement	Specification
Integration to customer systems	Software
Efficient collaboration	Hardware & software
Ease of use	Hardware & software
Information safety and protection possibilities	Hardware & software
Mobility and support for various operating platforms	Software
Alternative (back-up) solution	Hardware

#### 4.2.5 Organizational IS Requirements

*It is then solid training and listening to the problems in the implementation phase. All kinds of workshops. It is like the most important phase of this whole project. -Tapani Mylly, Communications Manager, Meyer Turku*

The direct quote in the beginning of this subchapter well summarizes the theoretical finding about the importance of communication and training. These wise words were said by Tapani Mylly who was interviewed for this thesis work mainly because there is a large scale IS project ongoing at Meyer Turku shipyard at the same time with this project. The importance of communication and training were identified also in the customer organization of ShipPalette. Mutually identified need strongly supports and promotes this last step of the virtualization plan for interorganizational collaboration.

As already said, the second part of IS requirements are organizational IS requirements. Information sharing and training are in the center of this phase. As soon as new information is discovered, it needs to be shared to the entire network so that it can be efficiently utilized. Training opportunities at Meyer Turku could possibly assist in stakeholder training. Although the organizational requirements are discussed as the last topic of the model, they are probably the most important factors in the entire planning project. Implementation can easily fail because of organizational requirements. Failed implementation destroys the success of the entire project.

Information sharing is not an easy task. Moreover, often the hours spent for it cannot be billed. It is a temptation for entrepreneurs to neglect communication, training and support and instead focus on tasks that they can directly bill. (Köykkä, 2016a)

However, many of the work related practical problems could be solved through good information sharing. Also, new ways to increase work efficiency could be learned. That is why information sharing should be made easy. Communication and training and support are identified as most important ways of information and knowledge sharing in this thesis. The plans for communication and training and support are supposed to make sharing easy.

Communication is a way to share information to the network. On the basis of the communication plan is the ideology from ShipPalette's values that problems are seen as opportunities. The principle is now through the communication plan applied to IT matters as well. By introducing a simple information sharing process, ShipPalette aims to clarify the problematic and unknown areas of work.

On the basis of the communication process is the knowledge learned through this thesis. Studies related to the research have helped ShipPalette to find answers to some practical questions. The plan suggests now to share this information with the network. Sharing will happen in face to face conversations and whenever problems popup again. New problems will

certainly rise as well in the future. Those problems could be tackled by finding correct information and communicating it afterwards to all stakeholders. In practice the problems can be solved and information searched internally at ShipPalette by the researcher of this thesis as he is employed by the company. The entrepreneur can share the discovered information with the stakeholders in next possible occasion.

Information and knowledge communication is not the only important area of communication. In addition to knowledge communication it is important to communicate also expectations to the partner companies. ShipPalette negotiates projects and agrees on the terms for each project individually. The expectations for the work should be communicated already in the contract negotiations. For example, if ShipPalette wishes to utilize virtual tools more in communication, it should be communicated when new contracts are negotiated. On the contrary the shipyard should communicate their expectations for example for physical presence. The chance to influence future work is much better at this phase. Also the work will be more convenient for both sides as they know what to expect from the cooperation.

The other way to share knowledge and information is through training and support. Long geographical distances between different stakeholders create special challenges for training and support. Already in the current network structure stakeholders need to travel a lot to meet each other face to face. In person meetings across the network take place occasionally but when they happen people are usually very busy with actual work related things. There is not much extra time to reserve for additional training.

Meyer Turku shipyard provides good training opportunities. Besides shipbuilding training these courses teach also some IT related skills. The training opportunities are open for partner companies so the existing possibilities can be utilized in the training of IT skills. (Lilja, 2016) Because of high variety of user skills it is evident that not every network player in need of training has yet found their way to the available courses. It would be the best possible solution for everyone who does not feel comfortable to work with IT to attend these in person sessions at the shipyard. In person training would possibly help the workers to overcome doubts more easily and the trainer could see where the actual problems lie and just listen to the person in need. Listening often helps to handle change. (Mylly, 2016) ShipPalette could help to promote the courses of Meyer Turku. The existing course offering should be sufficient, at least in the beginning of the virtualization process, to familiarize the stakeholders to the topic.



The support should be continuous in order to ensure constant development. In practice, because of the long geographical distances between different parties, in person support is not always possible. An alternative option would be to arrange support and possibly also training sessions remotely. The problem with remote support or training is that the person who is in need might not even be able to start training if he or she is totally unaware of how IT works. If this kind of situations exists ShipPalette should take the extra mile and make everything to arrange a face to face session. Other technically advanced partners closer to the person in need could be asked to help as well. The organizational IS requirements are summarized in Figure 12.

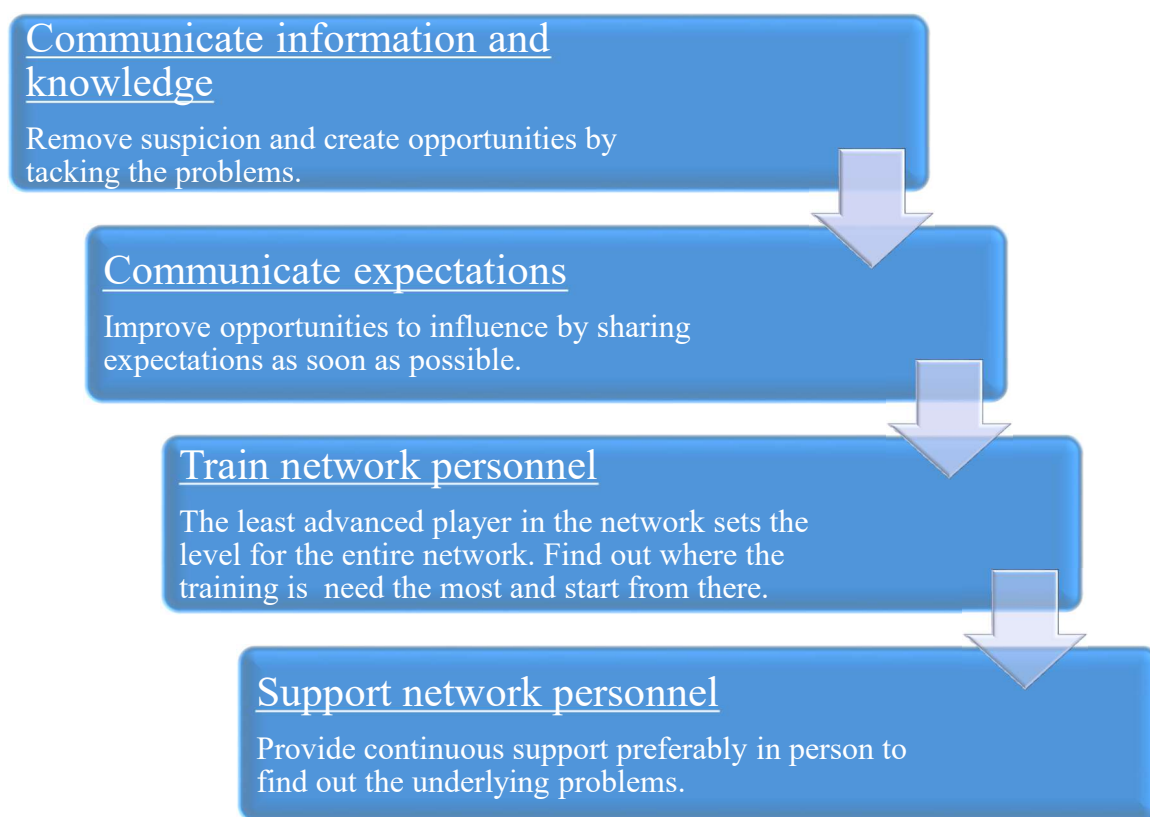


Figure 12. Steps to respond to organizational IS requirements.

Organizational IS requirements are key components of change management as reasoned earlier in this thesis. The literature review of this thesis introduced managerial actions and implications of a change management process. The suggestion in the literature review was that the IS implementation planning process should cover at least pre-announcement of the project and early involvement of management and other staff. Early involvement of personnel and information sharing knowledge early in the process will help to facilitate the first personal

emotions that the workers will face. In the context of ShipPalette the focus of change management is more in the partner network than in the company itself, because the entrepreneur and all the workers of ShipPalette are already driving the virtualization project seriously. The network companies are and will be informed, involved and trained in the same process as ShipPalette seeks to respond to organizational IS requirements. It can be concluded that the plan to virtualize the collaboration seems to cover the suggested requirements.

This empirical part has discussed mainly the findings of the research project and introduced also the proposed development steps. The focus has been in what have been discovered in the process of research and how these findings have been treated in the light of the theoretical framework. A deeper review of results, effects of intervention and learnings in this research project is conducted in the next chapter.

## 5 Conclusions and Discussion

### 5.1 Results of the Study

This thesis studied the possibilities to increase virtual collaboration within an industry network. The case company ShipPalette initiated the project in order to expand its business and to develop current work. Right from the beginning of the project it was observed that the business is done in so close cooperation with the partner companies that it is not possible to develop only internal processes. Even more important than internal change is to help the change happen in the industry network. Therefore, the results also consider the partner companies as well as ShipPalette, the actual case company of this project.

The results of this project can be presented in two parts. First of all, the study revealed and identified various advantages and challenges of virtualization of interorganizational collaboration for ShipPalette and its network companies. The starting point for the study was the current situation in the cruise ship building network. To expand business, which is a shared goal for ShipPalette and its network partners, human resources need to be better available. Specifically, for ShipPalette this means that new employees need to be recruited to perform knowledge work and to coordinate design work. However, skilled workforce is not easily available in Finland and also ShipPalette relies on remote work. Virtualization of collaboration is a way to address the issue of global workforce mobility. In this study the benefits and challenges of virtual collaboration were identified through interviews and practical observations.

The advantages of virtualized interorganizational collaboration are greater workforce mobility and more efficient collaboration. These advantages are concrete ways for ShipPalette and its partner companies to increase shipbuilding capacity and to enhance the quality of work processes at shipbuilding projects as Meyer Turku shipyard. Needed technology for virtual collaboration, even in design related work, is nowadays quite well available within reasonable budget and the costs are often scaled to the size of the company. Therefore, the financial commitments are not too big even for the smallest of the network companies. Much of the information about virtualization of interorganizational collaboration learned in this thesis project has also been shared within the network throughout the project. Therefore, lack of information about ICT solutions, which is often common especially in smaller companies, is not anymore a barrier of virtualization in the network of ShipPalette.

Throughout the research it was observed that adaptation of ICT seems to be mostly a work related cultural issue at ShipPalette and in its partner network. The barriers of virtual collaboration are not new ones. Similar issues have been identified in previous studies about ICT adaptation in microenterprises (Wolcott et al., 2008). The findings of this research supported these findings of previous research.

In the interviews it was learned that individual persons, or even entire companies of the partner network of ShipPalette, would be ready to develop interorganizational collaboration right away by starting to utilize virtual tools more. However, the transformation in the entire network is not that easy. Larger scale transformation takes time and requires commitment from the persons and companies leading the change.

The second part of the results took the initial findings even further. An interesting and significant issue to study was to identify ways to lead and manage the organizational change. The reality is that company culture and other people related aspects are often very difficult areas to lead transformation at (Chaffey & Wood, 2005, pp. 384). This is certainly the situation in the studied context as well.

There are no shortcuts to solve the problems and barriers of ICT adaptation. The problems and misconceptions of people need to be tackled one by one and often preferably even individually. Luckily some principles can be utilized to manage the change process. Through efficient management transformation has better chances to succeed.

In this research, it was presented that the key areas to focus on the change management are good communication, support and training. Communication is crucial for knowledge sharing and to increase mutual trust both internally and externally. Good communication is honest, timely and informative. Support and training on the other hand are important especially for those who are uncertain about the change or who lack the needed skills of the new processes.

A theoretical framework to plan virtualization of collaboration was formed and utilized in this research to make the virtualization plan concrete. The steps of the plan were defining overall business objectives, formation of business strategy and according to that, formation of IS strategic plan. The last step of the planning framework was to define technological and organizational IS requirements. These steps were completed in close cooperation with the case company entrepreneur.

## 5.2 Effects of Intervention Through Action Research

Implementation of the virtualization plan was left out from the scope of this thesis intentionally. Therefore, the effect of intervention needs to be evaluated differently than simply by reviewing the practical changes or development in organizations. As mentioned the transformation will take time for people to see the change towards virtual collaboration in practice in the network companies.

A better way to evaluate the effect of the intervention is to analyze the change of mindset in the case company and in its network companies. Interestingly, the business expansion plans of ShipPalette started to become realistic while this research project was coming to the end. In fall 2016 ShipPalette started negotiations about possible joint venture with one of the partner companies. The new company would utilize virtual possibilities as the distance to other network partners would be long. The new company would be located in Vantaa which has been previously out of question for the other partner company. This occurrence provides good evidence for successfulness of intervention through this research. The virtual collaboration opportunities were seen possible and realistic while they previously were just a grey area full of uncertainty.

Research questions are also important factors in evaluating the effectivity of intervention especially in academic context. The questions guide the research to intended direction and an effective research should answer them thoroughly. The research questions were presented in the introduction of this thesis. Next the effectivity of intervention is evaluated by reviewing the research questions and examining how the study succeeded to answer the questions. The common factor for all of the research questions was that they limited the context of the study to that of the case company ShipPalette, a design microenterprise.

The first and the main research question asked how a microenterprise can lead change towards virtualization of design work and related collaboration within highly networked industry? For ShipPalette alone the virtualization plan would be rather easy to execute as the organization is small and everyone is committed to the change. The challenge is to make the change happen in a rather large network. Most importantly, it was noted that to make the change happen it is important to partner with the central player in the network, in the context of this study the shipyard. Change can be driven by a smaller company but the support of the center of the network is crucial. In selection of actual tools the system integration between the shipyard and the case company is important, because most likely the IS infrastructure of the

shipyard is not prone to change according to the requirements of a small supplier. It was noted that good communication and practical support in the change process are necessary for ShipPalette to drive the development. These tasks aim to focus on the soft factors of change. The people aspects seem to be the most important factors in the change.

The second and third questions of the research were sub questions to the main question and aimed to direct the research in greater detail and into practice. The second question asked what are the practical steps to take to lead this change towards virtualization? In this research the practical steps to make the change happen were identified through IS planning process. The theoretical model, which was used as a structure of IS planning process, was modified from two theoretical frameworks presented in previous literature. The modification was done according to the results of action research. In short, the practical steps of the plan were identifying of overall business objectives, reflection of business strategy and creation of IS strategic plan. The IS strategic plan included the requirements for technology and organization. It can be said that the practical steps for virtualization of collaboration were clearly identified.

The third research question asked what are the most important system requirements for the interorganizational collaboration platform? This question played an important role in the formation of the used theory. Through action research it was noted that, especially in the studied context, both external and internal forces had an important role in information systems acquiring or more precisely already in the planning process of virtualization. The significant external forces in this study were customer power and supplier bargaining power. Internally, organizational culture and ways of working were identified as important factors. External and internal forces were considered in the formation of strategic IS plan together with business strategy deriving from overall business objectives. Traditional business strategy process alongside with external and internal forces affect the selection of collaboration platform greatly. The most important technological requirements of the system were identified to be integration to customer systems, efficient collaboration, ease of use, information safety and protection possibilities, mobility and support for various operating platforms and alternative (back-up) solution.

It can be concluded that intervention through action was effective in this research. With the help of the study the case company gained practical business advantage. The research expanded theoretical knowledge through action research in a specific and rarely studied context of microenterprises.

### 5.3 Learnings and Suggestions for Further Research

This research was conducted as an action research. In the method, practical involvement in the case company is deep. Previously in the literature microenterprises are studied relatively little mainly because access to them is often limited. Furthermore, everything these small companies do is relatively insignificant in larger scale. This research and its findings provided valuable information about the circumstances, problems and solutions of a microenterprise. In this case the access of researcher was very good and also the business environment was studied carefully. The most valuable learnings relate to the importance of external business environment and organizational culture. The technology for the virtual solutions exists and the challenges are related to social factors and lack of information.

In this research, it was also reasoned that even though the importance of a microenterprise is small, the importance of the research in this specific situation might be still extremely important for other microenterprises. The resources to handle challenges are always minimal in microenterprises and sharing the knowledge to others might help them to overcome the challenges more easily. In the end the number of microenterprises is huge (Yrittäjät, 2016) and if one company is facing a problem, the odds are that someone else is facing the similar problems too. The generalization related to the findings is presented later in a subchapter titled *generalization*.

For further research, studies among other microenterprises can be suggested. The circumstances of this thesis were those of a design microenterprise operating in a highly networked industry. For the theoretical framework, the used model was modified from a previous framework that was tested with and clearly designed for companies serving mainly consumer customer. The contexts of this study and the previous study were thus different and cannot be used neither to confirm nor to disprove each other. For future research it is suggested that the presented theoretical framework is studied in the circumstances of a small business operating in business to business trade but in less networked industry than the case company of this thesis. The research could focus on the question whether the introduced modification in the theoretical model is important because of the networked industry or because of the characteristics of business to business trade.

A follow up study to the specific case studied in this thesis would also be recommended. As mentioned, the practical implementation and the acquiring process of the systems were left out from the scope of this research because of the large IS project happening at the same time

in the customer company. However, it would be useful to know how the findings and suggestions of this study have worked out in practice and if the suggested framework has continued to be sufficient. The follow up study could take even more practical approach than this research and study the effect of both the Turku shipyard's intranet project and the virtualization plan presented in this thesis.

Furthermore, a follow-up study could discuss and improve the collaboration processes inside a specific company or within the network. The process development could be integrated into actual system selection phase. In this thesis, the processes were not discussed in detail as the systems should be selected and specified before the development work could take place.

In larger perspective, it would be interesting and important to study the impact of virtualization in working habits and work culture in general. This could be compared to current work legislation and give suggestions how governmental regulation could ease the ongoing transformation. For example France has just recently proposed a law to give knowledge workers a permission to go offline after work. In practice this law, called "right to disconnect", would mean that the workers do not have to worry for example about email after agreed working hours. The intention is to protect workers from burnout resulted from continuous connectivity. (Staufenberg, 2016)

## 5.4 Trustworthiness of the Study

### 5.4.1 Reliability of the Study

The empirical findings of this thesis were based on specific interviews as well as on observations while working in the case company. The interviews conducted for this thesis had mostly same questions with each other to increase reliability of the findings. It was noted that the same themes, for example about the lack of knowledge, came up in all of the interviews.

Altogether five people were interviewed for the empirical part of the thesis. Two of the persons work at Meyer Turku in similar roles with each other. The interview session with them was held together as their opinions were thought to complement each other. The other interviewees represented different companies and they worked in various roles. These interview sessions were one-to-one sessions to add reliability.

Observations that were done in practical settings are not seen as reliable sources of information. This is because observations might be biased or not correctly understood



especially if the setting is not previously familiar. Therefore, the observations in the case company were used mainly to support findings from the interviews. However, the significance of supporting material was great as it helped to understand the problems and underlying reasons better. They also provided background information for the findings.

#### 5.4.2 Limitations

The findings of this research are limited to the specific context of a design microenterprise operating in networked industry. In this context the importance of external forces (customer power and supplier bargaining power) and organizational culture are great. A single company might have totally different position and power in other industry settings or in different business model. For example, the environments of the microenterprises studied in the paper of Roberts and Wood (2002) were very different to those of this research.

The applicability of the IS development process introduced in this thesis is tested in these circumstances of a single company and its stakeholders. In order to apply the findings of this research into any other situations, companies or industries, the researcher should carry out a careful background study about the used theoretical models. Additionally, the industry and the industry relations need to be studied carefully. This study would confirm or disprove the importance of external business environment and organizational culture.

#### 5.4.3 Generalization

Theoretical framework formed and used in this thesis was formed only by considering the circumstances of one company and its network companies. Despite the lack of cross industry benchmarking, some generalization can be suggested. The case company of this research operates in highly networked industry where collaboration and connections play important roles in success of an individual company. These characteristics of the industry were particularly considered in the formation of the theoretical model. Therefore, it is suggested that the model might be applicable also in other similar situations where business is done mostly within the industry network. In these occasions, especially for smaller organizations, it might be necessary to consider also other network companies in order to continue successful operation.

Another area of generalization is the size of the company. This research studied a microenterprise of three employees and of turnover smaller than 200 000 euros. The challenges and opportunities that this small company faces are significantly different to problems or opportunities of SME's or larger corporations. A takeaway from this research for other microenterprises could be the simplification of a more complex theoretical strategic IS

planning process framework. Even if exactly the same model is not applicable to the context of other microenterprises, the ideology about a simplified model could help the microenterprises to acquire and implement information systems. It is notable that a well-functioning model for a small organization can be formed by combining a complex and generalized model with another previously introduced simplified, case specific model.

## **5.5 Reflection and Self-Evaluation**

### **5.5.1 Action Research Reflected**

Action research was the primary research method of this thesis. To extend knowledge, interviews were conducted in the case company and in the business network. Furthermore, an extensive literature review extended the knowledge about the areas of research in the thesis. The basic principles of action research were discussed in the introduction of the thesis. This subchapter aims to explain the practical use of this research method in this piece academic research.

Action was at the center of the project right from the beginning. Contracting a master's thesis worker to work on the topic of office virtualization was an actual step for ShipPalette to develop current work and expand its business. As a result, this project was started. In the first discussions between the researcher and the case company it was agreed that the researcher will work part time in the case company to help in practical issues related to the development of the company. This decision had double purpose: it gave the researcher practical knowledge about the industry and the work in general and it helped the case company resource wise to continue development of the business also in other areas than virtualization of collaboration. Because of this practical involvement in the case company and because of the characteristic of the project, action research was a natural and best alternative as a research method. Action research, as explained in the introduction, is centered around high level of involvement in the case company.

The primary problem given for action research was how to virtualize work of a microenterprise working in design industry. This problem formed also the basics of the research questions. During studies of external business environment, it was found out that providing a concrete solution to the problem in this thesis is impossible. This was a result of findings that the shipyard, a major customer of the case company, is having a large IS project

ongoing at the same time. Furthermore, the networked industry structure is not favorable for development focusing solely on one company.

Active and critical evaluation of the goals of the study and of the desired outcomes of the project enabled the project to continue despite the setbacks. The project still aimed to assist the virtualization of collaboration even though concrete suggestions about the IS tools were not to be given. The focus remained in planning the next steps and implementation of virtualization.

Through interviews and practical involvement in the case company, the most important factors of change management were identified as discussed in the subchapter *Results*. Different factors related to change management ended up being the greatest barriers of virtualization. With the suggestions given in this thesis project, the case company should have actual tools to proceed on the decision to virtualize collaboration.

Action research provided great understanding of the studied problem. The effectivity of action research was further discussed in the earlier subchapter about effects of intervention. Also, learnings through action research were separately specified in the subchapter titled *Learnings and Suggestions for Further Research*.

### 5.5.2 Self-Evaluation of the Project

Self-evaluation criteria for this research were introduced and further explained in the introduction chapter of this thesis. For reflection and to evaluate the success of this project, a self-evaluation is done in this chapter at the end of the thesis. To review the evaluation criteria, they are restated below.

#### **Self-evaluation criteria for this project:**

- 1) *IS strategic plan is written out and handed over to the entrepreneur.*
- 2) *IS strategic plan is worked in cooperation with the case company entrepreneur.*
- 3) *The IS strategy is aligned with overall business strategy. It also considers the external business environment.*

This thesis, besides of being a piece of academic research, has documented the collaboration virtualization plan created for the case company ShipPalette. At the end of the project a printed and finalized thesis is handed over to the case company entrepreneur as

documentation of the project. However, this does not mean that the entrepreneur receives information about the project and findings only when the project is ready.

During the documentation phase of the thesis a work version of the thesis was given to the entrepreneur for review two times. The intention was to keep the entrepreneur updated of the progress and findings of the study, but also to receive comments, corrections and further thoughts about the research. Furthermore, separate sessions were arranged together with the entrepreneur to discuss the feedback. In these occasions a written documentation was handed over to the entrepreneur to make sure that both are at the same page in the progress of the project. Still, there were many other occasions apart from these two, in which cooperation for the project was actually done.

The thesis project, as explained earlier, was commissioned by ShipPalette and conducted in close cooperation with the company. The scope of the study was set together with the entrepreneur of the case company and also the interviewees were recommended by her. The review and feedback discussion sessions supported the cooperation between the case company and the researcher. The sessions also assisted in information transfer already during the project and eased the continuation of the project as some information and knowledge was applied into practice straight away. The practical steps in the IS development process were thought about together with the entrepreneur as well. The importance of the practical steps was high as they were meant to take the findings of the thesis project into practice.

Despite several sessions of successful cooperation, there were some limitations in the cooperation as well. The theoretical model applied for the thesis was formed according to the literature review, observations in the case company and interviews. Because of the structure of the thesis and the timing of the project for the summer time, the formation of the theoretical model took place in July which is a common summer holiday season in Finland. Thus also the entrepreneur of the case company was having her summer holiday in July and the theoretical model applied to this thesis was introduced to her only after she came back to work. The model was quite refined at that time as the researcher had already discussed about the model with the academic instructor of the research. It was not an easy situation for the entrepreneur to suggest any modifications. In the end, she agreed to the suggested theory, but in practice the formation process failed to consider the entrepreneur at the proper time. Because of this it cannot be stated that the thesis was completed entirely in close cooperation with the case company. This criteria was fulfilled partially.

Alignment of business strategy and IS strategy were critical elements of the theoretical framework applied for this thesis. IS strategy was particularly formed on top of the business strategy. The influence of external business environment was found to be critical in the studied context and the theory learned in previous literature was confirmed in the conducted interviews. The theoretical framework was complemented with the influence of organizational culture. Similarly, as the influence of external business environment, also this was confirmed in the interviews and practical observations. Therefore, the thesis fulfilled the third evaluation criteria and even exceeded it by developing the theory further. Self-evaluation of the thesis project is summarized in Table 4.

*Table 4. Evaluation of the projects.*

Evaluation criteria		Self-evaluation
1)	IS strategic plan is written out and handed over to the entrepreneur.	Fulfilled
2)	IS strategic plan is worked in cooperation with the case company entrepreneur.	Partially fulfilled
3)	The IS strategy is aligned with overall business strategy and company culture. It also considers the external business environment.	Fulfilled

This thesis project was valuable learning lesson for the researcher. Knowledge about the specific context and IS development in smaller organizations were not very well known to him before the project. The working process included lots of practical learning but also important academic findings. Moreover, the process and the outcome of this thesis helped the case company to plan and execute the next steps related to virtualization of collaboration within the network. Practical business advantage was gained.

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