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INFORMATION MANAGEMENT IN ICT PROJECTS

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Tämä opinnäytetyö käsittelee kolmen pienen/keskisuuren IT- yrityksen informaation hallintaa projekteissa. Informaation hallinnan prosessit ovat tärkeä osa menestyksekästä liiketoimintaa jatkuvasti kehittyvässä yhteiskunnassa, jossa maailmanlaajuinen tieto on saatavilla helpommin kuin koskaan aikaisemmin. Nykypäivän globaalin informaation riskit ja mahdollisuudet synnyttävät tarpeen analysoida ja määritellä informaation hallinnan prosesseja. Tämä mahdollistaa modernin yhteiskunnan vaatimuksien tasolla pysymisen. Dynaamisen ja nopeasti vaihtelevan liiketoiminta-ympäristön haasteet yhdessä IT – yritysten moninaisten roolien ja toimintojen kanssa asettavat vaatimuksia yritysten informaation hallinnalle. Projektin kaikissa vaiheissa tulee ottaa huomioon, että myyntityöntekijät, johto, asiakassuhteita hoitavat työntekijät, graafiset suunnittelijat ja ohjelmoijat voivat saada tarvitsemansa informaation. Tällä tavoin varmistetaan projektin sujuvuus ja tehtävien tehokas hoitaminen. Tietoturvallisuus on osa-alue, jota ei voi missään vaiheessa jättää huomiotta ja selkeät roolit, määritykset ja ohjeistukset auttavat yritystä saavuttamaan menestyksekkään tuloksen projektissaan.

Tutkimus, joka suoritettiin kirjallisena haastatteluna, pyrkii määrittelemään mukana olevien yritysten informaation hallintaa. Kvalitatiivinen menetelmä valittiin tutkimusmenetelmäksi, koska sen avulla on mahdollista tuottaa uusia ideoita ja informaatiota, joka on uutta ja odottamatonta tai jota ei muuten saataisi selville. Tämä informaatio toivottavasti auttaa mukana olevia yrityksiä saamaan laadukkaampaa ja syvällisempää informaatiota yrityksen viestinnästä ja informaation eri prosesseista heidän omissa projekteissaan.

Tämän opinnäytetyön tulosten tarkoitus on laajentaa informaation hallinnan prosessien ymmärrystä IT -projektien osalta. Opinnäytetyö ja tutkimustulokset tuovat lisä-informaatiota mukana oleville yrityksille heidän informaation hallinnastaan yleisellä tasolla ja näin auttavat heitä analysoimaan ja tarkastelemaan objektiivisesti omia informaatio-prosessejaan tulevaisuuden projekteissaan, nyt ja tulevaisuudessa.

Avainsanat	Informaation hallinta, IT –projekti, tietoturvallisuus, IT -yritys

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ABSTRACT

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This thesis is a case-study of three SMEs and their information management processes in ICT-projects. Information management processes are an essential factor in successful business operations in a constantly developing society, where the global information is more easily accessible than ever. The risks and possibilities of communication in today's information filled working-life need to be analyzed and the processes determined, in order to be able to keep up with the modern society demands. The many different roles and tasks and the fast moving, dynamic business environment is a true challenge for the efficient information management in ICT-companies. The salespersons, management, customer service, graphic designers, programmers etc. all need to be able to access the information they need in order to be able to proceed with the tasks which needs to be considered in all phases of the project. Information security can not be compromised and the roles, determinations and directions need to be clear and understandable so that a successful project can be achieved.

The research, conducted in form of written interviews, was executed to examine the information management processes in the case companies. The qualitative method was chosen as the used research method, based on its capability to produce new ideas and information that otherwise would not be found or expected. It will help the companies to gain better and deeper information of their communication and information processes within their ICT projects.

The objective of the results in this thesis is to broaden the understanding of the information management processes in ICT projects. The results also provide general knowledge of the projects, which will help the companies to analyze and look objectively at their information management and its processes in their own projects that are either on-going or that will be coming up in the future.

Keywords Information management, ICT –project, information security, ICT -company

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1 INTRODUCTION

The thesis deals with the information management in an ICT-business-environment and the procedures and practices that are used in managing the information flows. This research concerns small and medium-sized ICT-businesses located in Vaasa, Finland. The purpose of the research is to find out how information management works in the researched companies and their customer -projects.

Information management is an important feature in ICT-projects. It is essential that the parties that take part in the project within the company have all the detailed information needed available at all times. There are usually many different roles and tasks that need to be taken into consideration when managing a customer-project in ICT company. The salespersons, management, customer service, graphic-designers, programmers etc. all need in order to be able to access the information they need to be able to proceed with the tasks. The industry often operates in fast-moving, dynamic schedules and there can be various changes during the project that the employees need to keep track of. This is a challenge for the efficient information management.

Employees of the ICT company often have demanding tasks and projects and need to be able to follow the process from beginning to end. Management's role in giving detailed and up-to-date information and in providing the tools to achieve the pre-settled goals is important. These facts put pressure for the rightly practiced information management inside the company. Information itself can be very detailed and have features are highly confidential. There are several forms of information that are managed within the ICT-projects and there can be different procedures and practices for keeping these organized.

Company policies concerning the information flows within an organization need to be taken into consideration all the time. Constant changes in the workforce and in the organizational level demand a clear and well-handled communication process. The essentiality of well-defined roles in the project management can not be overlooked. In this thesis there are three case companies that are Company X,

Company Y and Company Z. They all are Vaasa-based ICT companies, SMEs that have ICT projects that need information management.

1.1 Problem

The research topic for the research is Information Management in ICT-projects. The study deals with information management issues and procedures throughout the projects that are being used in the case companies. The focus is on SME's in the ICT sector and that are located in Vaasa, Finland.

The research problem is to determine the flow of the information management process in the ICT companies. The aim of the research is also to answer to the research questions:

1) What sort of processes and practises are being used in managing the information in ICT projects?

2) What are the possible challenges and bottlenecks of the ICT processes information management?

3) How to improve the processes considering the information management in the three ICT case companies that are participating in the case study?

1.2 Aim

The aim of this thesis is to broaden the understanding of the information management processes in ICT projects. The thesis and the research results will also provide information for the case-companies about their information management processes in general: the challenges, bottlenecks and possibilities of those, and help them analyze and look objectively at their information management processes in their ICT projects. This information can be further on utilized in the developmental processes within the case companies, helping them find solutions that can help them improve their information management in ICT projects. Conclusions and suggestions are presented based on the analyzed research results. Suggestions based on the theory and the research-results can

offer information also for other ICT companies that want to find out more about the information management in their own ICT projects.

1.3 Perspective

The focus is on information management in the ICT projects of SME's. The view of an SME can differ from a large corporation information management process, but there are the same main principles and tactics that need to be considered. This thesis focuses on the information chains between the project management and employees and between project-management and customers: how it is handled, what sort of practises and implementations there are in each of the companies and are there any differences between these three case companies.

1.4 Outline of the thesis

The thesis is divided in four sections: theoretical study, empirical study, the results of the research and the conclusions based on the theory and research.

Firstly the theory and explanations of the following subjects are presented in the theoretical study of the thesis: Information management in ICT projects –chapter focuses on the theoretical knowledge of information management and the concepts of information and communication in general. Projects in general, project management and concepts surrounding projects life-cycle are discussed. Also, the key area of information management, information security, and its features like risks, restrictions, data security and technical aspects are discussed. The concept of project assessment and the metrics and measurements considering a successful project are presented. Also, the team-management of an ICT project is discussed.

In the empirical part of the thesis, the methodology of the research and the empirical study in the three case companies are presented. After that the validity and reliability of the research are discussed. All three case-companies are presented in the chapter "Company overview of the case companies X, Y and Z".

In fourth section the results are presented in chapters “Projects in case companies” and ”Information management in case-companies”.

The conclusions and suggestions based on the theory and on the research and its results are discussed in the final section of this thesis.

2 INFORMATION MANAGEMENT IN ICT PROJECTS

After establishing the need for a project and specifying the objectives, timetables, funding and resources, it is important to emphasize the phases of the process that are critical in managing the project as shown in Table 1. (Kezner, H., 2009, PMBOK guide)

Table 1. Different stages of a project.

Different stages of a project
1) Project initiation
2) Project planning
3) Project execution
4) Project monitoring and control
5) Project closure
6) Project assessment

Initiation refers to all activities that are carried out to define the resource limits, recognizing the benefits and all the preparations of the documents. Also, assigning the project manager is essential in the project management process. The planning phase covers the different definitions of the requirements, quality and quantity of the work load, the schedules for the different activities within the project and the risk evaluation process. In the execution phase of the project the negotiations of the team members are carried out alongside with the direction of the work among the team members.

While monitoring and controlling the progress, it is important to be able to compare the actual outcomes to the predicted ones and to analyze and adjust the impacts and adjustments that need to be made. The closure of the project means the closures of the contracts and financials and, of course, the administrative closure as well. All the work that was meant to be done has to be completed and the objectives accomplished at this stage. If the objectives of the project have been accomplished, the project has been successful: the project was done in the timeframe expected, the costs were accurately predicted, the desired outcomes were achieved and the resources were used in an effective manner.

The benefits of a well managed project are substantial. By identifying the responsibilities and tasks within the project, one can assure that all the functions are being delivered. A timetable helps the scheduling and keeping up with the desired deadlines and the reporting and the measuring of the success of the project is easier. During the project, project management gives tools for corrective moves and adjustments that can be also utilized in actions following the project and in different projects. This will benefit the future-planning of activities. Also, the determination of realistic and achievable goals and objectives becomes easier when the project is managed and controlled. (Kezner, H., 2009)

2.1 The concept of project and project management

There exists several kinds of projects, but there are some common features that can be listed when talking about projects. First of all, projects are planned; they have a timeline and objectives that can vary depending on the type of a project. They exist to improve the management inside the organization and their products, services or structures. Projects help the implementation of strategies and provide organizational focus. In companies and organizations there can be a large number of projects going on at the same time. This portfolio of projects (Cleland, D.I., 2004) can be changing all the time and the ideas that existed before the establishment of the project can develop and change during the project life-cycle. A project has an objective, a cost-calculation and a timeline of development. In other words, a project is a series of activities that aim to deliver added-value to the company or for the customer, in many cases both.

Maintained project needs to have an effective plan that is flexible and there is enough room for changes, but still there is a pre-determined timeline and lifecycle for the project. The authorities and responsibilities within the project need to be carefully determined and delegated. Monitoring, evaluating and controlling are tools of making the project more efficient and effective. The team participation level needs to be high and the implementation of the project needs to be efficient and precise. In planning the project, there are various factors that need to be taken into consideration. The costs and the schedules need to be realistic, the timeline needs to be determined and the roles and responsibilities need to be delegated in the best possible way to ensure that the project is well-maintained and that all aspects are being taken care of. For the management an adequate information system is essential, as is an information system between all participants that are working inside the project.

Projects are usually done, because the outcome is considered to be important and projects help the company to gain innovative and effective results. It is also cost-efficient to pre-determine the responsibilities and plan ahead. When there is a project, there is a need to meet either the internal or the external customer's needs and wants and an expectation that the project results will help to fulfil those needs. Unique possibilities are expected to arise in the project life-cycle and there is a result-oriented expecting that the results can be successfully achieved during the timeline that the project is planned for. Sometimes these goals are achieved, but sometimes the evaluation during the projects leads to a consensus that the project needs to be altered or terminated. Reviewing the projects regularly helps the managers to decide which way to go.

Projects usually have a mission, objectives, goals and strategies. Mission declares the overall strategic purpose, which the company is aiming at. All activities within the company or organization are meant to aim to contribute to the mission. Objectives tell what the achievements are that need to be carried out if the company wants to ensure that the mission has been completed. Goals offer the milestones for evaluateing whether the company has reached the objectives. (Cleland, D.I., 2004) Projects are considered to be the blocks that help to build the

road to the goals. In a miniature-organization, the project-team, managers and employees share the responsibilities and resources to be able to reach the goals of the organization.

The advantages that arise when the developmental work is being done with project-method are obvious. The focusing of the resources and knowhow within the company helps the implementation of strategies and creates value. A project is always an opportunity to learn and to develop skills, knowledge and attitudes that can later help also other organizational purposes or goals that exist beyond the borders of the project itself. Progress of the projects is mostly measurable and the results can provide essential information for the company.

Projects sometimes fail and there are several reasons why. The implementation can go wrong, the lack of commitment or interest within the project, poor management or no management at all, unspecific roles or unsatisfactory level of information management can be some profound reasons for failure. The clear definitions of the company visions and strategic managerial decisions are essential.

Leadership qualities and styles of the management can be in an important role, depending on the organization, the type of the project and the team members who are participating in the project. There is a tendency that the followers unknowingly emulate the management's style of leading in their own behaviour within the project, whether the style is participative, democratic, empathetic, abusive, dictatorial etc. (Cleland, D.I., 2004) This may lead to project failure or to project success, depending on the team and the task.

2.2 Information and communication

To ensure the rightness of the communicated information, at the right time for the right persons, it is essential to communicate effectively within the project. This is also a cost-efficient way of doing business, since in business-operations time is often money and efficient information flow helps to keep to project within the limits of the budget.

Communication can be verbal, non-verbal, written, gestures, expressions etc. However, effective communications can be defined to be:

- Exchange of information
- Transmitting information
- Verbal or written
- An effective technique to express ideas
- An information changing process between individuals trough different channels

In projects and working-environments within the company, communication mainly takes place in the following ways: from the managers to subordinates and vice versa and also between the colleagues. In projects where there are external-customers involved there are, however, many more variables that need to be taken into consideration when planning the information management processes.

The different barriers that can influence the communication process and the information flow need to be identified and dealt with. These barriers can be, for example, the perception barrier, which can occur when two or more individuals view the same message in a different way. This can be avoided by using exact terms and precise meanings, if possible.

The personality and the interests of the communicator also effect the information communicated and the way that it is received and understood. Attitudes, emotions and prejudices can influence the communication process and lead to misunderstood information. Previous experiences and the knowledge level of the subject at hand also are very important factors in the process of the communication. People tend to have more interest and listening capability to things they have more knowledge and interest about and then the possibility to receive and deliver correct information is better the in a situation where the person has no interest or familiarity with the topic. (Kezner, H., 2009)

Communication in designing and planning of any type of project is essential. The message that is sent to the receiver is often distracted by lack of verbal or communicational skills and there are other factors that can affect the

communication process as well. Noise is a considerable factor when it comes to distraction of communication. It always makes the message more unclear and the whole process of communication less effective.

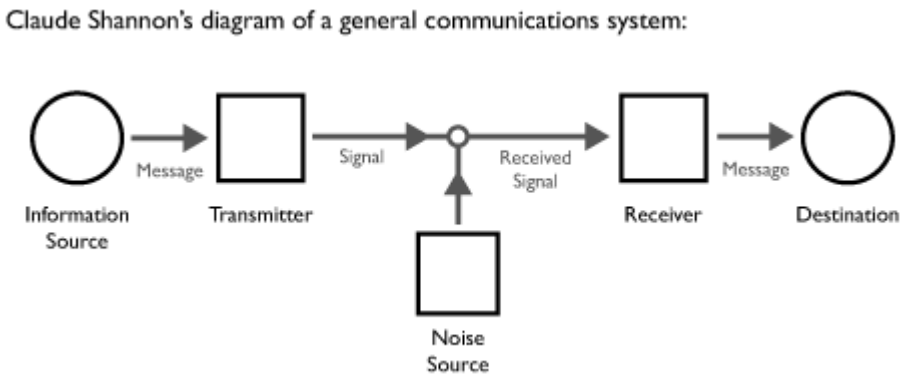

Figure 1. "Claude Shannon's diagram demonstrates how noise always affects a communication channel." (Suda B, 2009)

Claude Shannon's diagram of a general communications system (Figure 1.) introduces noise as part of the communication process where the message moves to its destination. (Suda, B., 2009). In the process of information transmission noise is affecting the message. At times the noise can be minimal and sometimes it can be so enormous that it will destroy the content of the message during the transmission.

In today's working-life communication is often digital and done by email and other communication-devices, which makes the possibility of a misunderstanding rise even more. The lack of face-to-face communication and the usage of technical communication solutions within the workplace create a possible risk of non-effective information communication. Meetings and directions are often delivered digitally and through video-conferences, telephone-meetings and internal communication tools (chats, communicators etc.) are widely used, especially in the ICT projects and in companies that are familiar with using the modern technology as a working tool. Initially these tools were, of course, created to make

the communication and information delivery more efficient and fast and to, therefore, improve the communication capability. However, today the lack of personal contact between the customer and the company providing a service or product for the customer can lead to situations where the information is lacking content. This same tendency is possible internally within the company, when the communication of the colleagues and between employees and management is done mainly digitally.

As communication tools such as video-teleconferencing help to speed up decision making and the reachability of the parties in the project, it also creates a communication environment where there is less contribution, less interruption and less discussion. People adapt to the fact, that there is a limited possibility for conversation and communication and that the execution of the project can be done without face-to-face interaction. This obviously creates risks in the information efficiency and accuracy. (van der Klej, R., Schraagen, J.M., Werhoven, P., De Dreu, C.K.W., 2009)

2.3 The concept of information management

The Data Management Association (DAMA) defines data and information management as "… the development, execution, and supervision of plans, policies, programs, and practices that control, protect, deliver, and enhance the value of data and information assets." (Mind Tools, 2014, accessed 18.02.2014)

In the discussion on information management, it is important to look at the complete environment of the information within the company. Information environment is the whole information flow, including the computer systems, but also the variety of different communication strategies and practices used in the company. The information flow is about how, when and why people share, search, modify and pay attention, or ignore, information and also the sorts of information that is needed and the ways that it is available. How the information is stored and retrieved plays an important role in the management of information. In ICT projects, where there is often a need for a multi-professional teams involvement and therefore also high demand for correct and well-managed information, the

communication strategies and practices become essentially important. The team-members need to provide content and to be able to participate in the several phases of the project which can have dynamic and constantly changing features that need to be communicated clearly and in a professional manner.

While there are many possible solutions to assist the information management with technical systems providing document management, the importance of more conservative forms of communication are also important when the information is shared within the organization. Information management has an important role in determining how the communication with the customers is being handled, how the company information is protected and secured and how efficiently the employees and team-members can receive and provide information. All these factors also contribute to the company's possibility to achieve their pre-determined goals and objectives and other metrics of satisfactory performance.

The amount of information that needs to be managed varies in different organizations. In ICT-companies the amount of digital-information is enormous and the need for data-management is therefore, exceptionally important. Inefficiently managed information is a risk: it can lead to not only poor management and poor results, but also there are possibilities of financial losses, security risks, privacy risks and inefficient processes. The maintenance of information and data storage is equally important: accurate, complete and updated information with secure, yet easily accessible databases are a key-issue when working in competitive business-environment. Information management can also have an effect on company image: inefficient communication inside the organization can lead to missed opportunities and deadlines, which can lead to a fast loss of reputation. Frustrated customers lead to negative publicity and brand loss, which naturally leads to monetary losses.

There are points that need the attention of the management, when improving the companies information management, or determining the factors that need to be included in. The bottlenecks and inefficiencies of the information availability need to be identified. The essential information, that a team member needs to be able to provide content, needs to be accessible at all times to be able to efficiently

go through the project. Often the employees and team-members have important knowledge and information about the current issues that are not efficient enough and this information should be utilized in the process of determining the practices, alongside with analytical tools and discussions. The identification of the possible errors and inefficiencies is essential when finding the cause for the problem: whether it is a result of problem with technical, maintenance or human issues. (Mind Tools, 2014, accessed 18.02.2014)

Analyzing the risks in information management is equally important. Data security and moderated accessibility can not be overlooked. Vital information needs to be protected and the determinations and practices in the information management strategies need to be always looked at in a way that the security of information is not compromised at any stage.

Today the technical communication tools are widely at use. Smartphones, laptops, tablets, communicators are important tools of information in modern working-life. The usage of these tools needs to be determined and managed in a way that they work as efficient tools that add value to the company's information flow. Educated use that considers the security issues and privacy matters is a must, especially, when these tools often do help the workflow: the work can be done off-site and remotely. In large corporations there usually is an IT department that takes care of the updates and protection of the data or/and the guidance for responsible use of the company information-tools. Software and hardware maintenance is also usually their responsibility. In smaller and medium-sized companies these operations are often either done by the employees or bought from an outside-professional. However, it is known to be beneficial to determine a role for the persons that are responsible for these operations, so that the needed steps are done on regular bases. (Davenport T.H., 1997) The data-storages need to be also up-to-date, so that all the old, incomplete and inaccurate information is deleted or not in active use. This helps the managing of the right information and reduces the size of the data storage, which is important in keeping the availability of data-storage up-to-date.

2.4 ICT projects in general

ICT projects, like any other projects, are planned, they have timelines and goals that they aim to achieve. Depending on the type of an ICT project, they usually also have objectives that aim to improve something: products, services, company-image, information flow etc. There is an expectancy to deliver some added-value for one or more of the project participants. (Cleland, D.I., 2004)

In ICT-projects there are several characteristics that are common. The usage of technology enables the efficient activities within the project, helps to keep the implementation cost-efficient and ensures the fast accessibility and contacting inside the project. ICT-tools themselves provide an enormous benefit in many stages of the project, when they are adequately used and implemented into company infrastructure and the human resources behind the technological tools are also adequate. Having said this, ICT also often means more time-consuming operations considering installations, content development, education/training and implementation of new programs and other ICT tools.

Although technology is in essential role in ICT projects, it is not the main issue in ICT projects. It is the tool that helps to achieve the objectives and innovations that the company is trying to achieve. These objectives are often essential for the company's strategic decisions and directions and that is what makes ICT projects an important tool for them. (Korrström, F., 2013)

Results can be measured in many ways. One way is to measure the financial – success of an ICT project, but often there are other metrics that provide essential information on the success of the project as well. For example, ICT projects can have significant effects for the development objectives of the company: it may lift up things that need to be looked at more closely or that are exceptionally well handled.

ICT projects that are mainly discussed in this thesis are the type of projects that often have an ordering customer, who has a want or a need that needs to be satisfied. The case companies both provide ICT solutions and designs which can

help the customer to achieve their objectives and goals. There are advertising-strategies, campaign-development, www-solutions, intranet-related goals, information sharing tools needed and many kinds of other ICT related projects, which the case companies handle on daily bases. These projects can start with a contact between a customer and a company and they can last, depending on the project, for one day or for several years. The case companies deal with several customers and customer-assignments at the same time and this puts a pressure not only on to their time management and information management, but also on their ICT solutions that they use every day.

The customer should always be the main focus in ICT projects. It can be either the internal or the external customer, but the importance of the customer-relationship can not be overlooked in the ICT project management. The core services that are offered for the customer can usually be enhanced with communication that is easy to understand and easy to adapt to.

In ICT projects, the accessibility and functional features of the service provided are in an essential role. Technical functionality is only part of the service that the customer is getting through the project: the quality of communication and the end-result that meets the needs and original wants of the customer is a very important factor in ICT projects.

Information is an element that is very important when dealing with any project. In ICT projects it is even more essential. As seen in the figure below, the elements of customer participation and communication are part of the service: the customer is always a co-producer/co-creator of the project and the communication between the service-provider and the customer needs to be as good as possible.

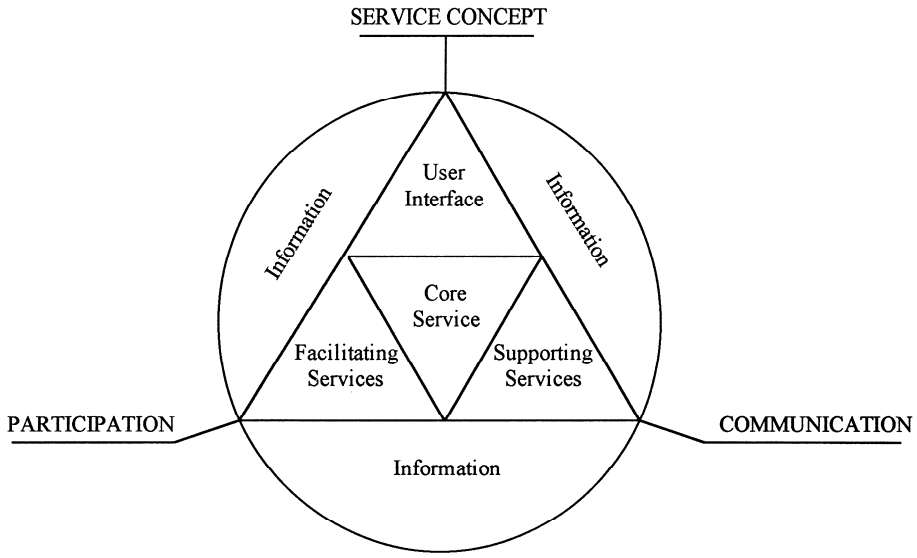

Figure 2. The NetOfferModel, Grönroos C, Heinonen F, Isoniemi K., Lindholm M., 2000

If we take a look at for example a website that the ICT service provider is offering for the customer: the site must be functional, the navigation needs to be easy and clear, the links, layout and other contents of the website need to be easy to process. (Grönroos, C. 2007) The information flow between the customer and the service-provider is essentially important for the customer when assessing the project during it and afterwards. If the communication was good and consistent, the end-product is usually more satisfying and more what was wanted in the first place. Good ICT-project managing can help to produce even additional value for the customer by exceeding their needs and wants in someway and this can only be achieved by truly understanding the concept that the customer is after.

2.5 Information security in information management

When information management is concerned, information security should be taken into account in all phases. In ICT projects, where there is not only the internal information within the company but also the information and confidential matters of the customers and possible sub-ordinates and co-operators, it is essential to create and maintain suitable information security-systems for the project. In such information the data will be protected from various security

threats and still be accessible, during the project for all the participants that are in need of the information. Today, business has increasingly shifted to computer networks. E-mail, the internet and mobile networks are the business tools of everyday life and therefore information security has become more and more important.

Earlier, information security was more seen as a separate part of the business, whereas today it is more or less present in all activities of the operations and as a very integral part of it. Policies vary within enterprises, but companies across the globe are investing more and more to their data security development and maintenance as part of their everyday business-operations. Information security is in the budget and the resources are allocated more than in the past because of its importance as a part of productive and efficient business operations has increased.

When speaking about data security, it can mean several things. It is the administrative security, personnel security, commercial security, data processing, security, communications security, hardware security, software security, privacy issues, etc. (Miettinen, JE , 1999)

Data processing security refers to the security aspect that affects data protection issues. Computer safety is part of the data processing security, but this term also includes the manual data processing work done in a company. Although data is today often processed in a modern way, takes place mostly on technical hardware and is also very much software dependent, companies are still also handling information manually.

Communications security includes usage of all data networks (Web, e-mail, mobile networks, etc.) and the protection of the activities and processes in the company. It is essential that outsiders do not have access to these networks and that the data traffic remains in its original form, in all the phases of the communication chain. (Miettinen, JE, 1999)

Hardware / equipment security and related software security is an important and integral part of the communication security. The structural safety of the hardware

and the technical characteristics of the challenges and opportunities are an important part of the hardware security, including the various software update-practices and different software requirements and recommendations. Companies and organizations have the opportunity to take care of the hardware and software security updates and maintenance independently, or to outsource these services. This is also associated with a variety of information security aspects that should be taken into account.

The usage of authorized and licensed software systems is considered to improve the information security (Miettinen, JE, 1999) and can help to ensure that the company has access to the necessary security features at all times. Also, the definitions and determinations of access rights, monitoring and documentation are an important part of information security. Data, in terms of security, deals with different saving formats, their storage and backup, as well as the access/availability determination- processes. Also this aspect is an essential part of the ICT project information management.

There are different dimensions to look at when speaking about information security: confidentiality, integrity and availability. (Parker, DB, 1998) In addition to the information security there are these three attributes: authenticity, utility, and possession. (Miettinen, JE., 1999)

Confidentiality is essential: the information is intended to certain persons and should be examined by them only. In case of confidentiality being at threat or at risk, business secrets, product information, customer and personal data are the type of data that can in wrong hands lead to false usage of data or even to serious financial risks. Integrity emphasizes that the data remains the same throughout the process: it does not get lost or there is not more information than in the beginning. These can happen accidentally or deliberately. Accessibility refers to the availability of data. This refers to the resources: human resources and equipment, but also to the function and quality level within the company. Different types of failures in computer systems or dysfunctions of different data networks can cause interruptions in the availability.

Authenticity, utility, and possession, according to J.E. Miettinen (1999), are the three additional dimensions of information security. By authenticity he means that the information is original, unadulterated and untouched. Falsified information can, for example, harm the decision-making processes inside the company or otherwise lead to misunderstandings throughout the information management process. Utility means, that the company has the easily accessible information in the exact form they need it. It is not enough that the information is available, it also needs to be useful and in an accessible format. Possession dimension means practically the chance that a single person has for manipulating the company-owned data. The possession can be threatened when the data falls into wrong hands, either accidentally or on purpose. (J.E. Miettinen, 1999) Such a situation may arise, for example, after burglary or theft of the equipment.

The importance of backups, if the data is destroyed, stolen or otherwise ends up in wrong hands, needs to be addressed. The companies evaluate these situations and then form the measurements they need to take in form of policies, to be able to set objectives of these policies and strategies beforehand in case of such situations emerging.

The various security threats are present all the time. Professional spyware / phishing, hacking and viruses, as well as many of the technical installations threats are present in day to day business. It is, of course, impossible to prevent or to locate all the possible threats, but most threats can be categorized as follows:

- Accidentally or purposely born threats

- Passive and active threats

- Internal and external threats

- Man-made and natural/environmental threats (Miettinen, JE , 1999)

Accidental threats arising are usually due to a technical malfunction, or exist because of human error or negligence. Deliberate actions are aimed at the information flows of the company, for example computer viruses that are

deliberate attack on the company's information systems. Passive threats do not pose an immediate threat to the company's operations but can, for example, monitor the company’s networks. The active threat, however, is a goal threat, which aims to cause damage to the company or some part of it (the employee, information systems, etc.).

Human beings in general are the most significant security threat to businesses, because their activities are particularly difficult to control compared to technical installations and information environments. (Miettinen J.E., 1999) Different personal and professional secrecy disclosure agreements which are specifically agreed on at the time when an employee begins his/her career in the company have become common.

Nature around us is also an unpredictable threat and the various natural disasters such as storms can indirectly cause a threat: long power outages or equipment failure because of a thunderstorm can occur, among other things.

Customer relations, product development, financial management and the management of human resources are good examples of the active information flows that need to be protected inside the company. The importance of this factor can not be overlooked in the modern competitive environment. When assessing the risks it is important to develop the policies: how to protect and preserve the information that is at any risk to be lost? In modern competitive environment the well-managed information security is essential and can create competitive advantage for the company that has developed its processes into valuable policies, implemented in the working environment.

Reporting and regular, up-to -date information, are important tools in measuring the level of information security in the company. J.E. Miettinen (1999) describes the benefits that measurements can help to obtain in his book, Information Security Management, 1999:

- Are the protections sufficient and good quality

- Are the protections implemented cost-effective

- Are the actions properly focused, to the right extent and at the right time

- Do the protective actions meet their targets / objectives

The company defines its own security policies and the different procedures that they will implement in their daily business operations. It should be an integral part of the threat-identification and the measuring process can be used as a tool to monitor the objectives. With the results the development of the information security can move to a desirable direction when flaws and well-working functions are easily detected.

Proper training and education of information security issues, alongside with the accurate implementation of company policy are essential. The usage of different anti-virus and other security software need to be up to date and the correct allocation of resources and responsibilities are exceptional tools for managers dealing with information management issues. The security-guidelines need to be available at all times, so that the employees and managers can have easy access to refresh their memory.

2.6 Assessing ICT project success

The success of an ICT project can be measured in many ways. There can be different economical metrics that define the success: has the outcome of the project been profitable, was the project done in a cost-efficient way, how much money was saved/costs reduced, what were the financial outcomes of the project etc. There are, however, also other measurements that are to be considered critically important when assessing the success of an ICT project. As in projects in general, the assessment of achieved goals and objectives that were determined beforehand is important. How well were the goals met, were there any barriers when trying to achieve the objectives and what can we learn from those? Were there any new outcomes or added value which were not expected, but resulted from the project and how can these be utilized? One critical success-factor is the implementation phase of the project and the participation of the participants and the efficient management communication inside the project. If the implementation

fails, no satisfying results of the project can be expected. From customers' point of view it is also essential to consider the service delivery and the quality of it. Did the project provide better quality, faster service or other value that would not otherwise been achieved? In company point-of-view the decision making efficiency and a more transparent process in general can be determined as success-factors. The improved access to information and other technological improvements can be seen beneficial. (Gichoya D., 2004)

As the same measurements do apply to ICT projects as to projects in general, there are several factors that can lead to a failure of an ICT project. Technical, organizational, developmental, user failure and other forms of failure are to be examined. Were the project objectives and goal determined well, was the timeframe planned to support the success of the project and were the costs and other resources planned in a way that was efficient and suitable for this project?

One should to keep in mind that there are many levels of failure: the project can suffer a complete failure, a partial failure or just some part of the project can be considered to be not-successful. (Gichoya D., 2004) Desirable outcomes are always a combination of results and predetermined wants and needs that were expected from a project that can be different for every type of a project.

2.7 Team management in ICT projects

In ICT projects there are some essential elements which need to be managed in order to achieve successful project results: People, Process and Technology. (Macapagal M, 2010) In order to be able to achieve the optimum results within the project, the relationships between and among these need to be in balance. The manager that deals with these elements needs to have the competence and resources to handle all these areas right from the start until the end of the project. ICT-projects are not only a set of technical, hardware/software etc. activities, but they involve a significant amount of human interaction between the management and employees and other project participants, such as customers and other co-operators. Therefore, a capability to interact and manage humans and teams is a vitally important asset to a project manager in ICT-projects. People are the ones

who develop and operate the projects. In ICT-projects these people, who are professionals in their own field, form a team that is responsible for their own roles and tasks within the project. A manager needs to be able to answer to and manage the expectations of the people working in the project.

As project management is not only a method, but rather a process, the challenges are various. Time-management, resources, costs, people – they all need attention from the project-management. Planning, implementation, monitoring and evaluation are the tools that every project-manager needs to be able to operate in order to be able to manage efficiently. (Macapagal M, 2010) The project manager needs to re-evaluate the processes between these elements all the time, to be able to provide possibilities for the parties involved and to remove unnecessary and inefficient processes from the project. Sometimes this can be done only after the evaluation of the projects, when the project has already ended, but this can be a valuable process for future-projects: to be able to determine the efficient parts of the process and to be able to give up the ones that add no value to the process.

Although technology is not everything in ICT projects, it is a very essential part of them. From a management point-of-view, it is vital to be able to determine the technical solutions that do support the achievement of success in projects and provide the tools and technical solutions that are efficient enough for the organization. In this determination process, the needs and wants of the professionals within the teams are important. A company needs to have technical solutions that support the actual need of the participant that is performing the work. Users should be put ahead of technology to be able to avoid the waste of resources and costs.

Team management in ICT processes is similar to any team-management. A team needs to have an identity, roles in their team and predetermined processes and responsibilities to support the team-up. This helps the employees to understand and achieve common goals and objectives of the team, of the company. Teams encourage commitment when there is the common responsibility to achieve as a participant that has a well-clarified working field and a clear vision of the team’s goals.

The independent authority of each member of the team in their functional area needs to be clear. This helps the team-member to provide answers and ideas for the project decisions needed. Good team manager takes care of the team's interpersonal relationships by helping them establish a functioning team and by participating as a supporting manager in the teams productions. A manager can help the team to focus their attention of detail and remind members of the milestones that need to be achieved. Suggestions, encouragement and support help the members of the team to accomplish their goals. In case there is a conflict, the prompt identification and discussion is essential for solving the conflict as soon as possible. In multi-professional teams conflicts are not uncommon, since the different working styles, responsibilities and commitment levels alongside with different level of experience and expertise can cause conflict situations. Management needs to develop procedures that help to deal with different situations like this. Open communication among team-members helps to resolve the met issues and ensure productivity inside the team.

3 EMPIRICAL STUDY IN THE THREE CASE-COMPANIES

3.1 Methodology

In this case study the qualitative method is being used, based on its capability to produce new ideas and information that otherwise would not be found or expected. It will help the case-companies to gain better and deeper information of their communication and information processes within their ICT-projects. The approach in qualitative research is flexible and allows more adjustments and possible changes in content and objectives, as they emerge during the research. This helps the companies that are participating to benefit from the research, as they get more freedom to participate in the process, even though the results and information that is gained will be carefully analyzed and presented in graphical form in the thesis.

A weakness of qualitative research is that the weight class of the findings is difficult to assess. Since the nature of the case-study is to find out the practises, bottlenecks and the possibilities in the ICT process of three case-companies participating, the qualitative method is suitable for this type of research. The number of participants is small and the sample is not a random sample, but rather includes the persons in the case-companies who are responsible and capable of assessing the information processes within their ICT projects, such as project managers, information specialist etc. They have deeper knowledge about the information processes in their company and can give relevant information for the study.

The main methods of qualitative research are

(1) a group discussion , and

(2) personal in-depth interviews .

In qualitative studies, data are collected primarily through informal conversation with people, but using a variety of selected projective techniques. In informal discussions people are allowed to express their thoughts and feelings

spontaneously, in their own words and on their own terms. This method helps people to express their emotions, which otherwise can be challenging to set into words. (IRO, 2009)

Personal in-depth interviews work especially well when you want to understand an individual's attitudes, attitudes or reactions to a particular matter as a whole. This method will be used in this study. The questions will be planned in advance and the participant gets to see the questions in advance to be able to prepare and think them through before the interview.

The qualitative data gathered in this thesis will be analyzed by using content analysis. Content analysis can be used to analyze written or/and oral communication. It allows the compact form of the collected data when a phenomenon is studied. The content analysis of the research material allows the separation of the similarities and differences and helps to open up the meanings of things, consequences and connections between the answers of the participants. Content analysis is in practice a document analysis. The document can be a book, an article, an interview, a speech, a dialogue or any other type of material. Content analysis is about making fragmented material clear and, therefore, the drawing of conclusions possible.

Content analysis of qualitative research technique consists of three different ways of thinking: conventional, directed and summative. These approaches are used in interpreting the meanings of the content presented in the documents. In this thesis the conventional content analysis is being used, in which the analysis of the information is derived directly from the respondents' answers.

In this particular research-interviewing process, the questions are asked in Finnish from the participants, and the results will be translated in English, since the thesis is to be written in English. The participants do have the possibility to see the questions in advance and the interview questions will be sent to the contact-person in each company and the answers are asked from two to three participants in each of the companies, if possible. If the participants choose to, they will be able to answer also through email, and the questions are formed in an open form, so that

the answers will provide more information even in written than they would otherwise. The questions that will be asked from each participant will be provided at the end of this thesis, both in English and in Finnish.

3.2 Validity and reliability of the case study

In this research the aim is to produce valid results in an ethically acceptable manner. In this research the internal validity, in other words; to what extent the results correspond with the real situation, is relatively high, since there are three case companies that all work in the researched field and are able to answer the questions asked in a very realistic way. This helps to evaluate the reality in the case-companies and therefore give a valid view on their everyday ICT -projects and the management of those.

This research concentrates the information management of Vaasa-based SME's and the process, the bottlenecks and the challenges in their ICT projects. In this sort of research which is more like a developmental project that gives insights and information for the companies involved, the rules of validity and reliability in general are somewhat challenging to apply. However, the information gathered through this resource gives a reliable result of the situation of the case companies, offers results and answers that help to develop their own processes and while analysed, is able to provide conclusions that help the companies to see the challenges and bottlenecks and define the resolutions for these.

I asked that two to three participants from each company would answer the questions. The final number of participants who answered the interview from the companies was four. I got one answer from the Company X's Project Manager, one answer from the Company Y's Partner / Copywriter / Concept Designer and two answers from Company Z's Project Coordinator and also from their Software Developer.

The small number of participants could have an effect on the validity, depending on the purpose of the research, but in this case where the purpose is to provide information for the companies about their own processes, and also considering the

role of the participants in the company (one has multiple roles as Partner, Copywriter and Concept designer / Company Y) I believe the results are reliable, when it comes to assessing the information management -processes in the companies ICT-projects. More participants from different roles in the company could have been beneficial in terms of providing information from different points of view and thereby they would have bettered the validity as well.

3.3 Company overview of the case companies X, Y and Z

Company X is a software house that has offices located both in Vaasa and in Helsinki and the company is specializing in Microsoft SharePoint. The company creates and develops browser-based software solutions that help their customers automate and improve the efficiency of their daily tasks.

Company X was founded in 1999 and they have over 30 employees working in Vaasa and in Helsinki. (YTJ, 2014) In Vaasa the company has 16 employees, of which 15 are men and one is a woman. The age-range between the employees is from 20 to 40.

In Company X they do consulting, support, developing and cloud-hosting as their main areas of business. All these are related to ICT and information management. In the company there are occupations such as management, sales-person, project manager, programmer and customer support. They create different SharePoint solutions, intranet, public websites and extranet solutions for their customers.

Company X’s technology behind their work is based on Microsoft technology. (Office 365, SharePoint Services 3.0/4.0, Microsoft Office SharePoint Server 2007, SharePoint 2010 and SharePoint 2013) and they are at the highest level of the Microsoft Software Solution partner program that has been created for companies that are developing Microsoft-based applications.

Some of their references are Atria, ABB, Stora Enso, Metso, Paulig, Vaasan Sähkö, Ministry of Foreign Affairs and Lassila & Tikanoja. (companyX.fi accessed 05.02.2014)

Company Y is an advertising-office located in Vaasa. Company Y was founded in 2004 (YTJ, 2014). Their business consists of various advertising- and media-related solutions from creating logos and printed business styles to social media strategies and video advertising. In Company Y they also do campaign planning and have been behind the idea of the Energy Ambassador –concept in Vaasa.

Currently Company Y has 12 full-time employees: CEO, partner, concept -designer, copywriters, art director, web developer, project manager and project coordinator. They also have two part-time employees and one intern at the time. Out of all these employees, seven are women and eight are men. They work daily with various sized ICT projects and need to have efficient information management in their multi-professional working environment. Some of the employees have multiple roles / occupations: for example one can be a partner/concept designer and a copywriter at the same time. The age-range between the employees is 22 – 38 years at the moment.

Some of their references are: Stormossen, Energy Ambassador of Vaasa, Vaasa University of Applied Sciences / VAMK, Vaasan Seutu / Vaasa Region and Vaasa is Jackpot. (companyY.fi, accessed 05.02.2014)

Company Z is an IT-solution company located in Vaasa. Company Z was founded in 2004 (Kauppalehti.fi, accessed 07.03.2014). Their business consists of providing web-based IT solutions for companies, creating web-pages (design, management, content-creation, WWW -technology), web shops, reservation-systems, b2b-order-portals and consulting.

Currently company Z has nine employees, of which eight are men and one is a woman and the age range among the employees is between 26 – 51 years. They have several different occupations in their company: CEO, five software-programmers, graphic designer, project manager and sales manager. Their work is a multi-professional project-type of work, where there are many professionals doing their own part/role in the project simultaneously. This requires an efficient way of managing information and projects to be able to provide content for the customer as agreed and in the timeframe they expect it.

Some of their references are: Vaasan Sähkö / Vaasa Electricity, Särkänniemi amusement park, Sportia, Chamber of commerce in Ostrobothnia and SGN Group.

4 RESULTS

4.1 Projects in case-companies

All three companies that participate in this thesis work in an ICT environment. They all have projects that involve external customers and that require communication and information between the customer and a multi-professional team that is working on a project.

The role of the Project Manager

Two of the companies, X and Y, have project Managers and company Z has a project coordinator. However, all these project-managerial roles were defined in a very similar way, when the role of the project management was inquired about the participants: project management participates in the sales-process, interacts with the customers and is an information-channel between the external customer and the team that is executing the project in the company. The project manager determines the specific needs of the customer with the customer and communicates these needs to the programmers, graphic designers and for the rest of the team participating in the project. His / her role also consists of documentation, general directions, overview of the project, the time-schedule, work-resourcing and invoicing. These roles were present in each of the companies when they described their project-managerial tasks.

In company Z the project-coordinator also mentioned that she is also responsible for testing the outcome of the project with the technical team, before it is published or delivered to the customer.

Typical project in the case-companies

In the interview all three companies were asked to describe a typical project with the question: “Please briefly describe a typical implementation of the project from start to finish. What are the different steps involved in this process?” Similarities were found in all three answers that can be seen in a simplified form in a following Table 2. :

Table 2. The typical project in the case-companies.

Company X	**Company Y**	**Company Z**
- sales, offers, acceptance of the offer - project-manager defines the timetable and definitions in the project together with the customer - briefing of the team of the needs and wants of the customer - execution of the project as desired - publishing of the project - invoicing - assessment of the project	-sales, offers, acceptance of the offer - briefing with the customer / project-manager, who then briefs the team - internal presentation of creative ideas in Company Y - execution -presentation for the customer, who chooses the concept - presentation of the finished concept - media-planning in a team: the Project Manager presents the media-plan for the customer -execution according to the media-plan in different medias and forms - follow-ups -reporting the results for the customer and the debriefing - invoicing - assessment of the project	-sales, offers, acceptance of the offer - project coordinator determines the time-schedule and the definitions in the project with the customer - briefing of the graphic designer - execution and presentation of the graphic design, customer comments, changes -acceptance of layout - briefing of the coders / programmers - Programming / execution of the code, integrations to other systems etc. - content gathering with the customer, building the site - consulting on the site usage, customer-support & publishing - invoicing - assessment of the project

Company Y and Company Z do projects that often require more graphical design and creative phases which explains the fact that there are a few more stages in the typical project than there are in Company X. The similarities are present in the answers of all three case-companies answers: all projects usually begin with sales, then the project-manager or –coordinator briefs the team in the company, then the project is executed and assessed.

Contact with the customers

Company Y, being an advertisement industry company, mentioned in the answers that in their company the graphic-designer and the copywriter can be present in meetings with the customers early on and during the project. This was a clear difference when compared to the other two companies, where the contacting with the customer was almost solely done by the project management.

In company Z, the graphic designer can sometimes have a contact directly with the customer also, but the programmers rarely do. If the programmers are in contact with the customer, they are usually in contact with a technical specialist within the external customers company and discuss technical details. This also happens in both companies X and Z, based on the answers received.

Project-management tools

All three case-companies use different software applications to help the project-management and to make the information agreed more accessible for all project participants in their team. Time schedules, different technical specifications and definitions of the project are determined with the help of these tools and the documentation of the project can be done by using the technical assistance of these applications.

In Table 3. the different project-management software-tools that the case companies participating in this research use are presented.

Table 3. The project-management tools in the case-companies.

Company X	**Company Y**	**Company Z**
MS Office SharePoint 2010 & 2013, MS CRM	VISMA Severa MS Excel	Easy.Projects.net

Company X uses MS Office, SharePoint 2010 & 2013, MS CRM and their own project management tool (the name was not mentioned in the answers) as their project management tools. Other programmes they use in their work are Visual Studio and Adobe Photoshop.

Company Y manages their projects with the assistance of VISMA Severa & MS Excel. They also use multiple other programmes in their work: Adobe CC, Sublime text and MS Office were mentioned in the answers.

Company Z uses mainly an application called Easy.Projects.net. Other applications used in Company Z were Adobe Photoshop, Visual Studio, MS Office, Notepad++, all different browsers and mobile –applications, based on their answers.

The project-management tools are mainly used by the project-management or the general management (CEO etc.) in the company. Other applications are mostly used by the technical team that is contributing to the ICT project at hand.

Technical guidelines and briefing in the case-companies

Question about the technical briefing/guidelines within the company was asked with an interview question: “How are the technical guidelines taken care of in your company?”

Companies Y & Z both felt that this factor could be developed in their company: the time schedules are often so tight that there is no time for thorough analyzing of

the technical requirements and directions. All the companies use chat, email, phone and face-to-face contact as a tool for these guidelines, in practise. Company X answered, that they always use MS Best Practises –models and guidelines and also the individual determination of each projects execution is of course given in all of the companies in the beginning and during the project.

Success assessment of the projects and customer feedback

The assessment –practises of the project were also inquired about in the interview to define the practises and factors that determine the successful project in the case-companies with the following questions: Do you evaluate the success of the project during or after the project? What tells you that this was a successful project?

Companies X and Y did the evaluations during and after the project, based on their answers. Company X's participant expressed that the kept time-schedule and deadlines as well as the kept budget are important for them, when they are assessing the success of an ICT project.

In Company Y the measurements of the successful ICT project were that how well the measurements and determinations made beforehand were met during and after the project.

Company Z had two answers: the project coordinator answered that the actual assessment is done rarely after the project and the programmer / software developer said that there is no assessment after the project. They are just given the next project. However, when asked about the customer's feedback role in the assessment of the project, with the question: "What sort of role does customer feedback have in the assessment of the success of the project?", Company Z's participants both said that it is important, whereas "99% of the feedback is negative, if there is positive feedback, it never gets to us" and that "99,99% of the feedback we ever get is negative, since if it works, the customers do not give feedback." This could imply that the projects are in fact assessed, because the lack

of customer feedback can mean a successful project for the company. No other criteria were mentioned in Company Z's answers to this question.

Companies X & Y felt that the customer feedback was very important and that they both ask and encourage the customers to give feedback on the projects and Company Y's participant said that the customer feedback is an essential element for their company when they are assessing the successfulness of an ICT project.

Suggestions of the interviewed persons in the case-companies

At the end of the interview the participants were given the possibility to openly answer to the question: "Feel free to describe what kind of things you think should be developed in your company's information management or in the project management". Considering projects and project management, the following suggestions for development were given as answers:

Company X: "Fewer programs and fewer versions of programs: because of practical demands this is possible only to certain extend."

Company Y: "More specified working processes for different project types to make the work- and the information flow faster and more efficient."

Company Z: "Getting all the information at one time would be helpful: no more doing the wrong things or useless work-phases, because of lacking information. Efficient customer contacts need to be made: at least once a week." Also the other answer included the same request / developmental suggestion: "Need all the facts at the beginning of the project and better briefing than we are now getting."

4.2 Information management in case-companies

Information management and all its aspects are in an essential role in all three case companies. Companies X, Y and Z are all working in the field of ICT and they are usually working with many projects at the same time. All these projects consist of data that needs to be communicated in several ways. There is spoken, written and visual information as well as digital data that all need to be managed and communicated between the project participants. Project participants in this

case are the external customers as well as the team at the case company which is working with the project. The co-operators, subsidiaries and customers of the customer need to also be taken into consideration.

Information-flow processes in the case-companies

In the interview the case companies were asked about their information processes:

“Briefly describe the information flow processes in your company: what kind of tools do you use, is the current situation working well or should it be developed?” All participants felt that the information-processes were all the processes communicated between the team at the company and the information delivered and achieved to and from the customers.

In Company X’s answer it is said, that their information processes are at the moment in a changing stage, since they are implementing a new system. They use information channels such as email, Skype, Lync, phone, online-tools and meetings.

Company Y’s participant describes their information-flow processes as well-working and they also use the phone, email, chat/online-tools and meetings.

Company Z’s participants answered that their information processes are usually carried out by email, Lync, phones, Easy Project – tool and in meetings. They both felt that this is working quite well, but more face-to-face meetings and conversations could be beneficial in their opinion and that the technical team could have more meetings between themselves, if needed.

Managerial responsibility in communication

As was analyzed earlier in the previous chapter considering the projects in the companies, project management has an essential role in the information communication in every one of the case companies. Project manager who usually communicates the information gathered from the customer to the team which is working in the project and also does the documentation, work resourcing and project management in the project. This is a big responsibility that has an essential

effect on the information-flow inside the company. General management participates more or less in these processes all the time and this also underlines the role of the managerial employees, their attitudes and practices effect on the whole information process in the company.

Communication with the customer

The customer contacts and the information flow between the company and the customer were studied in the interview with the question: “How are the customer-contacts taken care of during the project?” This question aims to define the information that is communicated between the company and the customer.

All three companies told as answers that they all use the telephone, email, online-tools, face-to-face meetings and online-meetings to manage the contacts with the customers. These tools are easy to use and can be accessed always and make the communication with the customer seamless. The customers use the same tools when they contact the company.

Project manager or project coordinator is the main person within the company who is in contact with the customer company, although especially in Company Z also the CEO is in contact with the customer occasionally, in the beginning and also during the project. Project-manager communicates the new specifications or the changes and modifications in directions for the executing team and the team then proceeds with the new directions or modifies the product that they are currently working on as directed. In Company Z the CEO also participates in this process and this was seen as a confusing factor and a possible distraction in information, since the same information is either communicated twice or there is fragmented information that is not always helpful for the employees that are trying to execute the project.

Distractions in the information-flow

Other distractions in the information flow were given, when asked the question: "What kind of distractions is experienced in the flow of information in your company and how those distractions are handled?" Clear differences can be seen in the following Table 4. in the fact that what sort of things each participant saw as a distractions of information flow:

Table 4. Distractions in the information flow.

Company X	**Company Y**	**Company Z**
- extra e-mails - lack of intranet-usage	- constant rush - customers' knowledge-base	- double-communication - lack of information - wrong information - fragmented information - inefficient planning - inadequate documentation of the specifications

Company X mentioned the following factors, that cause distractions in their information: unnecessary, extra emails, the lack of the intranet usage (“People sometimes forget, that there are existing info-channels like intranet, document banks etc.”)

Company Y’s participant described the distractions of information in their company being the constant rush: there is not enough time and the information is given in a hurry. Also the different background of customers can be seen as a distraction in information when the lack of knowledge of the customer seems to interfere the presentation and also the explaining of things to the customer. This can be time-consuming and sometimes also a distraction.

Besides the double communication in the Company Z, the participants mentioned other distractions as lack of information, wrong information, wrongly communicated information, fragmented information and the inefficient planning and documentation of the specifications agreed.

Meeting practises in the case-companies

The role and importance of the meeting practises was examined by the question: “What sort of meeting-practises do you have in your company and are they useful / could they be improved somehow?”

Companies Y and Z felt that the meetings conducted in face-to-face method were beneficial for the information-flow between the customer and the company and also inside the company. Company X’s participant mentioned that the customers do not always use or are not allowed to use online tools and this can make the information flow inefficient because this can cause more travelling and face-to-face meetings than if the same thing could be done online in less time.

Companies X & Y both felt that their meeting-practises were efficient and working well inside the company. Company Z’s participants agreed on the fact that the meetings are generally working well and that they are beneficial. The project coordinator said that the technical staff is allowed to have their own meetings, should there be a need for this, but the software developer believed that

this was not allowed without a separate permission. These sorts of meetings were considered beneficial by both participants since the technical work needs the updates of what is done, how and when maybe in even a more specific form and more often than once a week.

All of the companies had a weekly meeting once a week. In these meetings general information of the situation and the projects at hand are discussed and everyone tells what they are doing at the moment and what they will be doing next. Suggestions and comments of others are also presented in these meetings. Based on the answers the meetings can be improved in very practical ways: everyone needs to be present in the meetings and by better preparation the efficiency can be improved and make the meetings less time consuming. The participation of all employees in these meetings is seen as beneficial.

Communication between management and employees

When asked about the information flow between the management and the employees (Please describe the information processes between management and employees), the participants had some similarities and some differences in their answers.

Company Y described that their information flow between the management and the employees was fluent, due the low organisation structure. The information and its communication was not seen as an actual process, since the communication is straight forward and is done on daily basis, face-to-face and all the time.

In Company Z the communication between the management is done mostly via Lync, other online-tools, phone and email. The CEO usually is not present at the office. However, the project management and the project coordinator are present at the office all the time. This is working well, but as described in the answers about the meeting practises, the absence from the weekly meetings is not viewed beneficial based on the answers of the Company Z's participants.

Company X did not answer to this question.

Roles and responsibilities of information management

“Do you have clearly divided roles and responsibilities for the individuals that are involved in information management processes? “, was an interview question that tries to examine whether the roles in the companies information processes of the case company are clearly determined.

Clear differences in the participants’ answers appeared in this question. Company X’s participant felt, that the roles in their company were well defined and clear, considering the information management. Company Y’s answer was: “No, roles are not divided for information management processes” and Company Z’s participants agreed that the roles were divided, but they could use development and more clear definitions.

Information security in the case-companies

Information security in these companies that work in the field of ICT industry and handle classified data all the time is very important. “In practice, what kind of things does information security mean in your company?” is a question in the interview that aims to examine the aspects of information security inside the company and the factors, processes and practises that are considered to be under the term information security.

All the companies that answered to this interview explained very similar things in this answer: Internal information, customer’s information, documentation, code, conversations, accessibility, restrictions and protection of the data and materials was seen as part of information security. All companies also explained that they use updates, server security protection and virus scanners to protect the data and their systems. There are threats to their systems that are real and that need the attention all the time: SQL injections, human mistakes, server attacks etc. Restricted accessibility was seen as very essential factor in information security in all of the participating companies. Only pre-determined persons can access the planning materials and the other information gained during the project. Unnecessary copies of information need to be avoided and the information needs

to be protected always also in third party services. The possible flaws in the publishing phase need to be also taken into consideration. Based on their answers all the companies agreed that information security is an essentially important factor in their line of business and in ICT projects in general.

4 CONCLUSIONS

The aim of this thesis was to gather and provide information about the information-management in ICT projects of the three participating case companies X, Y and Z. The information was gathered with the help of interviews and the questions were based on a theoretical frame. In the conclusions the main results and their implications are discussed alongside with the limitations of the work.

The aim of the research was to identify the different aspects of information management and also to determine where the bottlenecks and possible information distractions are positioned. The results that the case companies provided with their answers were used to analyse these factors. Each specific answer gives important information about the processes of the companies, and I hope, that this thesis can provide the kind of descriptions that the companies can utilize while improving their processes and information management in their projects.

These results can in my understanding, be utilized also in developing the information management in other companies that need to analyse their information flows and managerial aspects of their projects. Internal factors in different companies can vary and the projects are naturally unique and reflect their own working-methods and company culture, but the main principles of the aspects remain similar.

However, since the constant development and fast changes in ICT companies and projects involving ICT are evident, further follow up and observance of the processes are essential to maintaining the desired level of quality. New improvements and developmental aspects can arise all the time and, therefore, it is important to re-analyse the processes from time to time.

The fact that every case company had their dedicated person who is handling the project management is excellent. As Kezner (2009) describes, the project management provides the tools for adjustments and benefit the project and the future planning. Project management also helps the realistic goal determination

and control during the project. This was, in my opinion, very well understood in the case companies. They all had put effort in project management and the tasks that the project manager or project coordinator is handling are determined well and controlled efficiently. This most definitely benefits the companies' setting of objectives and achieving their goals as well as helps the resourcing and time-management of the projects.

The determinations of the roles and the restrictions and allowances of the user-accessibility help the companies to better their information security and also maintain the information-flow and storage data appropriately. As inefficiently managed information can lead to poor results and risks such as financial losses, security risks, privacy risks and inefficient processes, the maintenance of information and data storage is very important. All of the companies that were questioned in this thesis used project management programmes and software that helps them keep control of the information during the project and also after the project, which is excellent. The companies did not report any computability problems between the software and the applications that they use in the company.

Basically in all three companies all projects are more or less IT processes that involve a pre-determined group of people who participate in each project. Mostly these people have the possibility to participate in developing the project. However, I believe that with more encouragement of the whole team to participate in the development, the companies could get more innovative ideas and practically suitable solutions.

Sometimes the lack of time and resources can distract the creative processes and the execution of the project and cause distractions in the information-flow. Clear process-descriptions and efficient and informative briefing at the beginning of a project can definitely benefit the companies. Also, the participation of the technical specialists and graphic designers at the beginning of the project could be beneficial, since the second-hand information that is received from the project manager or the sales person or the CEO is always just that: second-hand information.

Company Y had also debriefing meetings with the customer and as I understand it, this has to do with the nature of their assignments and the reporting of the results still it seems like a very good idea and potentially useful for all of the participating companies. The customer can provide feedback which would otherwise be forgotten or not given at all and that can benefit the future planning a great deal. Since all of the participating companies valued customer-feedback highly, this would probably be in their best interest.

Information security in the companies is on a good level. The protections are sufficient and of good quality and the actions taken to achieve information security seem to be properly focused, to the right extent and at the right time. The companies do not just update the programs and restrict the usage and protect their servers, they also take security into consideration when implementing their services with third party services etc. The companies could in my opinion further consider the risks that involve human mistakes and lack of determined processes and technical guidelines. These areas could be improved to improve the information security and is often not given the attention they need. With proper implementation, guidelines and efficient briefing these risks can also be still lowered.

When looking at the implementation of a single, typical project in each of the companies, the critical stages that are needed in the project are there. However, there are differences and the evaluation during the project was missing from the answers. This does not mean that the evaluation does not happen, it simply means that this was not mentioned. This can be a weakness in the questions asked or there is a possibility that the project is assessed only afterwards, if then. If there is no evaluation and follow-up during the project, it could be useful for the companies to re-think the need of that.

All companies have meetings, use online-tools, phones and email to change information. Meetings are usually held once a week and the day-to-day communication is done mostly by using digital-tools: online-chat, email and the phone. Customer-meetings do take place both online and in person, face-to-face. As said in the theoretical section of the thesis, although communication tools such

as video-teleconferencing help to speed up decision making and the reachability of the parties in the project, they also create a communication environment where there is less contribution, less interruption and less discussion. People adapt to the fact that there is a limited possibility for conversation and communication and that the execution of the project can be done without face-to-face interaction. This obviously creates risks in the information efficiency and accuracy. (van der Klej, R., Schraagen, J.M., Werhoven, P., De Dreu, C.K.W., 2009)

I suggest that although all companies are working in the field of communication and use online-tools as an important part of their communication, they should still appreciate and utilize face-to-face-communication, based on the theory presented above.

The limitations of this work included the small number of the participants. Also, some of the questions could have been more carefully formulated and I did receive important feedback from one of the participants, the interview questions themselves could have been more specific and better formulated. However, I believe, that this thesis and its research results can in fact answer to the research problem presented as well as the research questions. There will be possibilities in the future to examine this topic more and I would suggest that the interaction and communication between the team and the management and its relationship with the results and commitment of the employees could be researched more.

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INTERVIEW QUESTIONS IN ENGLISH

Background Questions:

How many employees are there in your company?

How many of them are men and women?

What is the age range?

What sort of job titles / job descriptions do you have?

1. Is there a project Secretary or project manager in your company, what is his job description do you think that it meets it's purpose? (If you do not have a separate project manager or secretary , in your experience, should you and why?)

2. What kind of software is used in your company?

a) in project management

b) in any other work such as programming , graphic design , etc.

3. What kind of things is included in your company's IT processes and who are involved in the development of these processes?

4. In practice, what kind of things does information security mean in your company?

5. How are the technical guidelines taken care of in your company?

6. Please briefly describe a typical implementation of the project from start to finish. What are the different steps involved in this process?

7. Briefly describe the information-flow processes in your company: what kind of tools you use and is the current situation working well or should it be developed?

8. How are the customer-contacts taken care of during the project?

9. Do the workers that create the content (programmers, graphic designers, etc) have a contact to the customer directly or through an intermediary, and if so, how?

10. What kind of distractions is experienced in the flow of information in your company and how those distractions are handled?

11. What sort of meeting-practises do you have in your company and are they useful / can they be improved somehow?

12. Please describe the information processes between management and employees?

13. Do you have clearly divided roles and responsibilities for individuals that are involved in information management processes?

14. Do you evaluate the success of the project after or during the project and what kind of things will tell you that this was a successful project?

15. What sort of role does customer feedback have in the assessment of the success of the project?

16. Feel free to describe what kind of things do you think should be developed in your company's information – management or in the project-management?

INTERVIEW QUESTIONS IN FINNISH / TUTKIMUSHAASTATTELUN KYSYMYKSET SUOMEKSI

Taustakysymykset:

Paljonko yrityksessänne on kaiken kaikkiaan henkilökuntaa?

Paljonko heistä on miehiä ja naisia?

Mikä on ikäjakauma?

Millaisia työnimikkeitä/työnkuvia yrityksessänne on?

1. Mikäli yrityksessänne toimii projektisihteeri tai projektipäällikkö, millainen on hänen työnkuvansa ja onko vastaako se mielestänne tarkoitustaan?

(Jos teillä ei ole erillistä projektipäällikköä tai sihteeriä, koetteko, että tarvetta olisi ja miksi?)

2. Millaisia ohjelmia yrityksessänne käytetään

a) projektinhallinnassa

b) muussa työssä, mm. ohjelmointi, graafinen suunnittelu jne.

3. Millaisia asioita miellätte teidän yrityksessänne kuuluvan IT -prosesseiksi ja ketkä osallistuvat niiden kehittämiseen?

4. Millaisia asioita tietoturvallisuus tarkoittaa teidän yrityksessänne käytännössä?

5. Miten tekninen ohjeistus on yrityksessänne hoidettu?

6. Kuvailkaa lyhyesti tyypillistä projektinne toteutusta alusta loppuun. Mitä eri kontakti- ja työvaiheita tähän prosessiin sisältyy?

7. Kuvailkaa tiedon kulun prosesseja yrityksessänne lyhyesti: millaisia tiedonkulun välineitä käytätte, toimiiko tilanne hyvin nykyisellään tai olisiko siinä mielestänne kehitettävää?

8. Miten kontaktit asiakkaaseen projektin aikana hoidetaan?

9. Osallistuvatko työtä tuottavat osapuolet (ohjelmoijat, graafiset suunnittelijat jne) kontaktointiin asiakkaan kanssa suoraan tai välikäsien kautta ja jos, niin miten?

10. Millaisia häiriötekijöitä koette tiedonkulussa olevan yrityksessänne ja miten niitä käsitellään?

11. Millaiset palaverikäytännöt teillä on yrityksessänne käytössä informaatiovälineenä, ovatko ne hyödyllisiä ja miten niitä voisi kehittää?

12. Kuvailkaa tiedonkulun prosessia johdon ja työntekijöiden välillä?

13. Onko yrityksessänne mielestänne jaettu selkeät roolit ja vastuualueet henkilöille, jotka ovat mukana tiedonhallinnan prosesseissa?

14. Arvioitteko projektin onnistumista jälkikäteen tai sen aikana ja millaiset asiat kertovat teille onnistuneesta projektista?

15. Millainen merkitys teille on asiakaspalautteella projektin onnistumisen arvioinnin kannalta?

16. Kerro vapaasti, millaisia asioita mielestäsi pitäisi yrityksenne projektityöskentelyssä tai informaation-hallinnassa kehittää?