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Creating a Project Model for Information System Construction in the Case Company

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This thesis investigates and evaluates different project models for constructing an information system in order to choose and create one to fit the IT management of the case company. In this thesis, an IT system for communication has been selected as a focus for development. Project models are evaluated from several viewpoints, and relevant theory is used to create a model that fits the purpose best. The proposed project model is to be positioned in the construction phase between the specification and transition phases.

In the review of literature, this thesis overviews the following topics: how the IT supports business and strategy, and what are the characteristics of service organization and service implementation. A practical investigation starts with the current state analysis and continues into analysis of different project model theories. This provides a basis for choosing the suitable project model to build upon. After developing a project model for information systems construction, the validation of the project model provides feedback to further refine the model. The validation is based on a workshop and expert interviews conducted in the case company.

The outcome of this thesis is a project model for information systems construction. The project model describes the processes used to create new information systems successfully in the case company. Two templates are included in the project model which are to be used in the model. The first template includes change management requirements and the second template includes release and deployment requirements.

This thesis is a qualitative empirical case study research. The sources of the study are the documents, workshop results and expert interviews derived from the case company. With assistance of the review of literature and case study, the project model is developed to fit construction of the new information systems in the case company.

Keywords	Project Model, Information System Construction, IT Models, IT Management

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1 Introduction

IT management is the foundation for the business in most of the modern companies. It provides the environment and the tools for the business to function as efficient as possible. In many cases, if these tools stop working, the company stops functioning properly and starts to lose money. However, it is often the case that inside the company IT management is regarded as a separate “necessary evil” in which the employees are seen to work closely with each other while the others have no idea what they are actually doing. This thesis aims to open up the logic of making decisions by the internal IT department when working on construction of an information system in the case company.

1.1 Business Challenge, Objective and Expected Outcome of This Thesis

This thesis investigates and evaluates different project models in order to choose and create one to fit the IT management of the case company, on the example of one particular project. The current key challenge is to successfully implement and deploy the IT system for communication in the company. Therefore, in this thesis, an IT system for communication has been selected as a focus for development. Previous IT implementation projects have not always been successful.

Accordingly, the main objective of the thesis is to create **a tailored project model for information system construction**. This will be a daily tool to use and be seen as an important part of the processes. The **expected outcome** of the thesis is a **project model with the necessary templates** for future constructions and implementations of new information systems based on the theory covered and own experience in construction of an Information system in a live production environment.

The challenge is also to persuade people to use the new project model, as with everything new, people are not likely to use the system if it is not easy to use or seen as a useful tool.

1.2 Business Context

The case company is a mid-size company in the field of engineering services. It employs about 500 experts providing offer high-quality services at 10 different locations. The case company offers versatile services in all stages of the design process, from consultation to project management. (Case company website)

As described in the case company web-site, the company was founded in 1970's in the midst of the oil crisis. For many design offices, the oil crisis meant leaner times, and it bankrupted the Finnish unit of a larger Swedish engineering company. During this time the company has grown from a handful of employees to a multitalented corporation of around 500 employees. The power behind this steady growth has always been the fearless development of solutions for information technology and sound long-term company policies. Figure 1 below shows the dynamics of the company growth based on the data from the number of employees and invoicing. (Case company website)

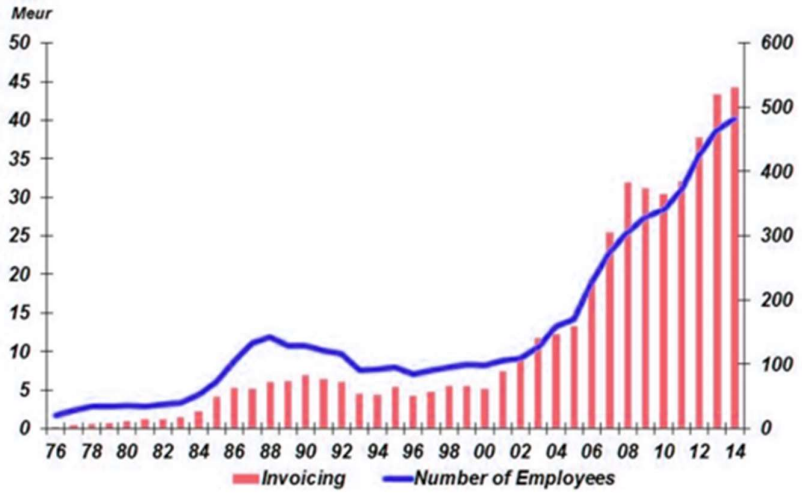

Figure 1. Company growth based on the number of employees and invoicing (Case company website).

Presently, development of IT systems is a major challenge for the rapidly growing case company. The rapid growth of the case company, as shown in Figure 1, can also be seen in the change from the obsolete hardware and IT systems to the new and modern ones. Some of the systems, hardware as well as software, are pretty old and a lot of new hardware and software have been taken to use in the late years. Old systems are being

updated to newer ones as fast as possible. One of the latest projects has been to virtualize most of the existing physical hosts.

The case organization of this thesis, where the project model is being built, is the Information management department. The role of information management department is to support all company employees and in particular the core business processes. Presently, IT department both develops and maintains the company's information systems independently as well as cooperatively with company's internal clients and with the departments that utilize the information systems.

1.3 IT Strategic Objectives of the Case Company

IT strategy of the case company states that "the business and the IT are still searching for the most suitable and efficient way to collaborate. Currently, most of the time the interaction starts from the IT department covering IT matters for the business." The IT vision states, among other things, the following: "The IT is successful when it is providing the right quality services cost-effectively, and when business-driven change projects are successfully managed. A competent, efficient and responsive IT uses modern processes, services and technologies." (IT-strategia 2013)

To support the rapid business growth of the company, the IT department is looking to introduce a new model for IT governance. Importantly, in the case company the IT department is led with a decision-making model that is commonly agreed with the business. In the future, this approach needs to be kept, so that "a decision-making model for the IT is to be created as a part of the IT governance. The development of communication skills is incorporated into IT governance." (IT-strategia 2013)

To improve the current efficiency, the IT service processes need to be put in a better order. Tangible goals for this are the creation of service processes, training and actually taking them into use. In line with the strategy, a new project model needs to be developed and taken into use in IT projects. Such an IT project model and its suitable parts will be introduced to the business units and training will be arranged. The efficiency will be improved by adding transparency to the development projects. According to the current strategy, the current partially undocumented modes of operation and process drafts will be developed during the strategy period. (IT-strategia 2013)

This thesis supports the strategic objectives of the company by developing and tailoring the project model for information system construction.

2 Method and Material

This section described the research process, data analysis and data collection methods used in this thesis.

2.1 Research Approach

This thesis is conducted as a case study based in the IT department of the case company. The data was collected from interviewing experts, conducting workshop, analyzing results and documents. A case study is a research strategy, which aims to produce the most in-depth and detailed information about the incident under investigation, in its real environment. The case study research approach is always qualitative, even though data collection methods may be both qualitative as well as quantitative. The focus of the examination can be, for example, on a company or its part as a unit for analysis, or the company's product, service, activity or process (Ojasalo, Moilanen & Ritalahti 2014: 52–57). The case study can also be conducted as analysis of multiple cases under examination, but they must all be intertwined with a common topic or a common field (Hirsjärvi, Remes & Sajavaara 2004: 125–126). It is typical for a case study that the target of the examination is focused or can be changed as the work progresses. Normally the data is collected by using multiple methods (Ojasalo et al. 2014: 52–57; Yin cop. 2014: 114–118).

In a case study, it is important to combine the data collected by different methods. Interview as a method enables the interviewed to bring up information on himself. This sometimes results to new perspectives being brought up to the material. The interviewing methods can be roughly divided into two different categories, either structured interviews or other type of interviews such as theme, depth or group interviews. The more structured the interview is, the more precisely the questions have been determined and the created interview framework is being followed. This delimits the chances of the interviewees to bring up information outside of the framework. The right way to interview is fully dependent on what kind of information is targeted. (Ojasalo et al. 2014: 106–108)

2.2 Research Process

The research process in this study is built following a case study logic and included five main steps: conducting the current state analysis, searching for applicable theory on the problem of the thesis, developing and validating the model, and revising it before handing to the case company. Figure 2 visualizes the research process in this thesis.

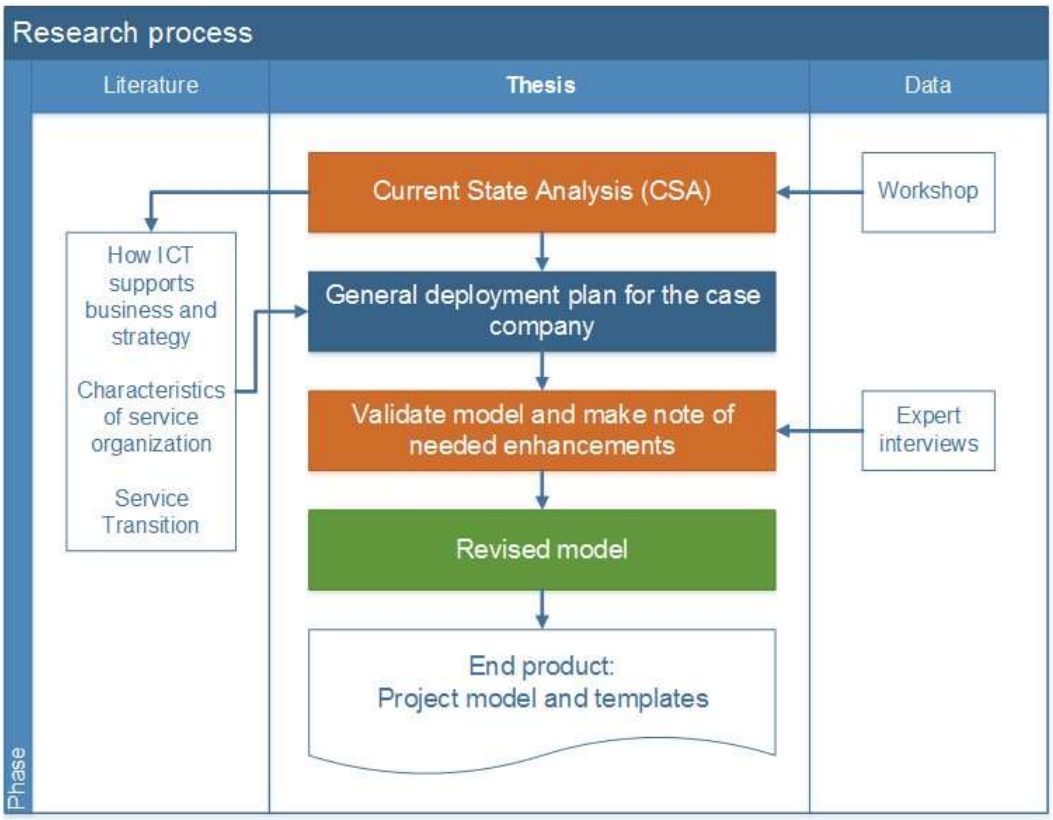

Figure 2. Research process of this study visualized.

As shown in Figure 2, to start the investigation, the current state analysis is conducted by interviewing the employees, and perceiving and understanding the outlines of the workflows and processes. The current state analysis is also utilized to record and measure the impact of the project. Literature to support the thesis is chosen from the fields that affect the project directly. It includes both theoretical and practical literature consisting of theories, practical cases and technical documentation. In the review of literature, the thesis focuses on how the IT supports business and strategy, and what are the characteristics of service organization and service implementation. It continues into analysis

of different project model theories. This provides a basis for choosing a suitable project model to build upon.

To improve the quality of the outcome, the study progressed in two identical stages, each consisting of three phases. In the first phase, the Boddy's model as seen later in Figure 11, was observed in developing the project model. In the second round, the model was enhanced by feedback asked from the team as of its usefulness, from which the final model was produced. Thus, after developing a project model for information systems construction, the validation of the project model provided feedback to further refine the model. The validation was based on a workshop and expert interviews conducted in the case company. The outcome of this thesis is a project model for information systems construction.

This logic of this research process is based on the business challenge. Current IT communication tools limit the options of what could be used either by technical reasons or by making unnecessarily many extra tasks for them to be actually efficient. Thus, this thesis focuses on finding the right tools as a combined effort of researching all the possibilities as well as utilizing all the existing tools that the company already uses.

2.3 Data Collection and Data Analysis Methods

In this thesis, the data was collected from the key stakeholders in the IT department. Since the IT department of the case company employs only nine employees, an open-end interview and discussions proved to be a more useful way to collect the data in this case study. This includes the head of information management department as well as the specialist team.

Data collection was done by interviews, becoming familiar with the company's practices and by getting acquainted with the company's guidance. Data analysis methods include exploring the related data based on Content (thematic) analysis, and also familiarizing with the company's process models, observing, discussing and co-creating SW models together with the team. Additionally, information was gathered from the following company documents: IT strategy, action plans, meeting memos and business project models. A lot of the information has also been gathered by working in the IT department on daily routines and projects.

Table 1. Data collection meetings.

	Data source	*Data type*	*When collected, how documented*
1	IT department	IT strategy planning meeting, 3 hours	14 October 2015 Field notes
2	IT Manager	Interview, 1 hour	12 November 2015 Field notes
3	System Architect	Interview, 1 hour	13 November 2015 Field notes
4	IT department	IT strategy planning meeting, 3 hours	25 November 2015 Field notes
5	System Architect	Interview, 1 hour	18 February 2016 Field notes
6	IT Manager	Interview, 1 hour	3 March 2016 Field notes
7	IT Manager and System Architect	Validation meeting, 2 hours	14 April 2016 Field notes

This thesis is partly based on personal experience building and deploying an information system internally within the department. The goal of the project was to ease communication, data collection and sharing inside IT operations. One of the main challenges was lack of an implementation and construction model for a new system. This created a request for change. Thus, a personal interest to the project is derived from the project relating to the writer's everyday work life.

3 Current State Analysis

This section presents the results of the current state analysis conducted on the present situation in information systems acquisition and use. The section starts with the description of the setting (the case unit of this study) where the current state analysis is conducted.

3.1 Information Management Department

The case organization of this thesis is the Information management department. The role of information management department is to support all company employees and in particular the core business processes. Information management's role in the organization is illustrated in Figure 3 below.

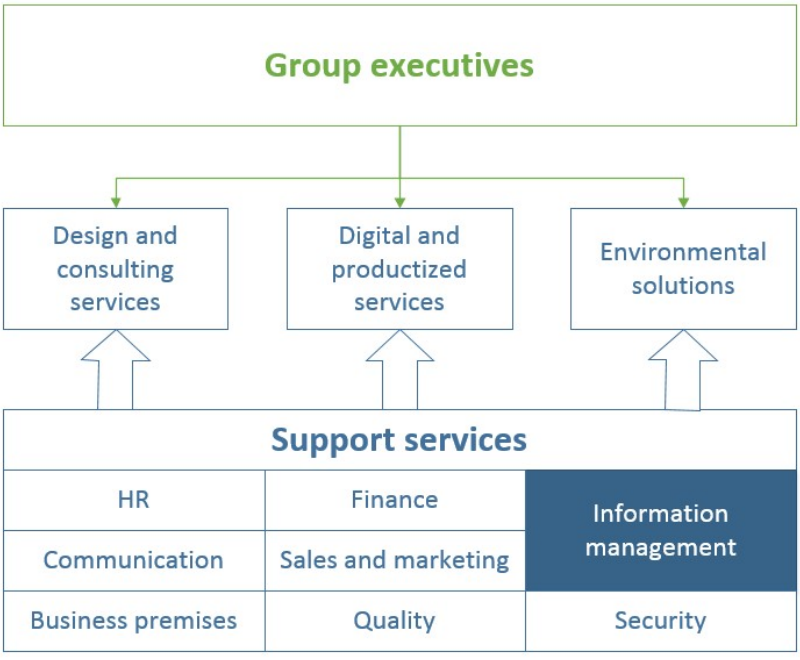

Figure 3. Organization chart representing information management's role.

The information management department acts as a part of support services and it produces every technological necessity needed by operative roles. These roles in addition to management are formed from three main categories, as shown in Figure 2: design and consulting services, digital and productized services and environmental services.

Currently, the information management department consists of nine specialists whose job is to manage all the services mentioned in the company's technical service catalogue. Key elements of the technical service catalogue are shown Figure 4 below.

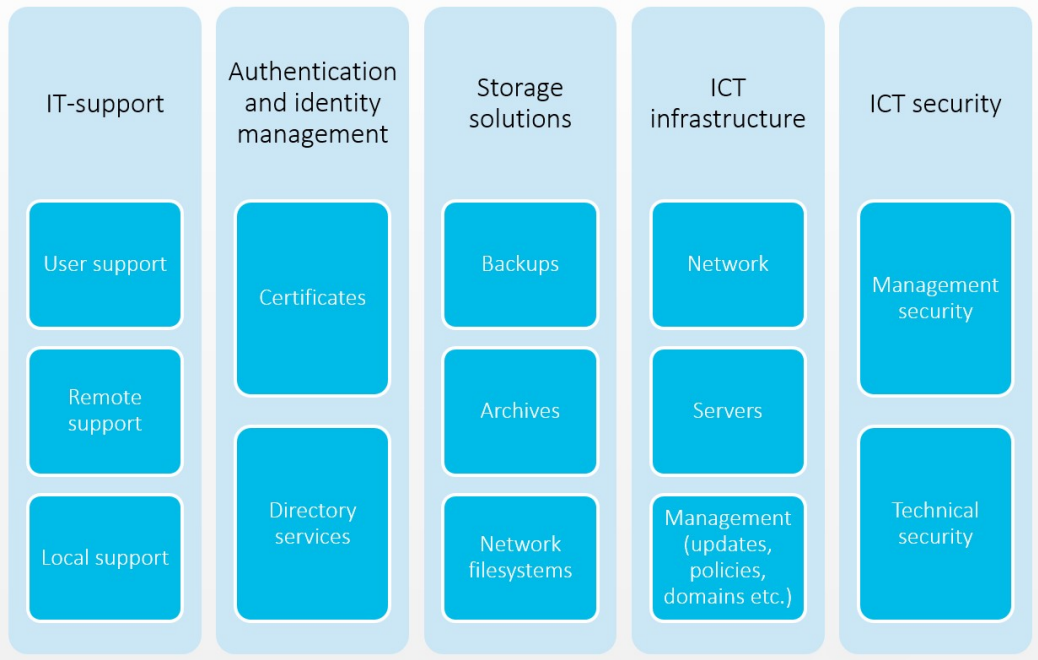

Figure 4. Technical services of IT Management of case company (Based on Technical service catalogue).

Figure 3 describes the main services that the IT department provides to the business. IT department is responsible for all of the main categories which can be divided into more detailed parts, for the entire company. IT support is fully in house and can be divided to local and remote support. Authentication and identity management, storage solutions, ICT infrastructure and ICT security are all administered by IT department. ICT strategy and, as a part of it, the ICT architecture and all the action plans that are based on them direct the departments operation supporting the company strategy and its realization.

Presently, IT department both develops and maintains the company's information systems independently as well as cooperatively with company's internal clients and with the departments that utilize the information systems. The users are already included in the planning phase when the information system is considered important in the particular user group. The users are professionals in their industry whose active contribution is

necessary for a successful project. Smaller changes are implemented rapidly but the construction of the bigger information systems might take months at a time. The release and deployment processes are also responsible for training the end users and operating staff and circulating information and documentation of the newly deployed release.

It is up to information management department to enable efficient and highly optimized ways to work as well as securing the continuity of the company and providing support for end users. However, in the current state of the company, the projects are done all over the company and without a specific structure. The viewpoint is too narrow and problems are solved on department level instead of company level.

3.2 Current Situation with Information Acquisition Deployment and Use

During the case company 40-year history, the IT know-how and implementation of new information systems has been emphasized, especially in the latest years (Case company web-site). Therefore, the case company pay special attention to this area, although the common IT practices have not yet been properly established.

Presently, the case company lacks a common operating model for information system implementation projects. Development ideas are not discussed and examined systematically, neither based on requirements from all units, in which case the whole company's requirements are not observed and noted. As a result, when the information system is acquired for a business unit, it is not necessarily known by other business units. As such, if at any time, it would be desired to be brought to use in other business units, it would not necessarily be fit for the purpose. This is because the acquirement has not been cooperatively planned and it might be unclear what problem has been tried to solve in the first case when the information system was being acquired. Work is easily duplicated when there is not enough dialogue between business units' projects. (Source: Interviews with the case company team members)

> *"As an example to be mentioned, the duplication of the work, when it is not known whether any of the ICT needs are present for the other departments."* (Source: Interviews with the case company team members)

So far the IT projects have been implemented without a set project model. Even though the case company has a well-established project model to be used in client projects, it does not fit well with IT project management as the client projects nature and view point are different. Project models that are currently in use for external clients are designed for different requirements for example in big infrastructure projects such as road and bridge projects. They can't be utilized in internal information system implementation and acquirement projects. (Source: Interview of the case company team members)

> *"Sufficient knowledge of the current systems is required to be able to determine what the current systems are capable of. The need and the benefits sought should always be described first."* (Source: Interviews with the case company team members)

Next, since the case company has not got structured IT project documentation models, the data from the formerly made projects cannot be utilized efficiently. Time and resources are wasted since the same issues will be re-invented when information on earlier projects not easy to find.

At the same time, the resources for IT operations are scarce. Same employees are responsible for the IT systems administration as well as development. IT development is done interspersed with administration tasks which can be both a strength and a weakness at the same time. A small, capable and well co-operating team is responsible for managing all of the IT operations supporting the internal IT systems inside the company. The team consists of nine employees: three in "direct" contact with internal clients which could be considered help desk but includes administrative tasks, four server engineers/architects, a network architect and an IT manager.

Instead, results of the interviews show that, before acquiring an Information system, it should be determined if this IT system is usable to the whole company, or if it should be only used within one particular business unit. Next, when acquiring an information system to the whole company, the specification should be done co-operatively. All these requirements point to the need for the company to have a clear operating model for information system acquirements. This would lead a clear way to manage acquirements in a unified manner and agreed issues would always be taken into account. Often IT operations are invited to the project only in the implementation phase. In this case, IT

operations are unable to specify requirements as the business unit has already chosen the information system and signed the contract with the supplier. (Source: Interview of the case company team members)

> *"IT department often encounters, for example, situations where the information system and the supplier have already been selected. The contract is only brought to the IT department to be signed. Similarly, the service may be terminated on frail arguments."* (Source: Interviews with the case company team members)

As a consequence, IT experts' work becomes more difficult when there is no uniform guideline for IT system acquirements.

3.3 Summary of the Current State Analysis

As discussed above, the case company has a strong competence in IT implementation and Project Management know-how in projects for external customers. Still, a common practice is missing for the information system acquirement and implementation. Because of these issues, the following theory will be looked into in order to propose a model in deploying information systems in the case company.

Table 2 below shows the summary of the current state of information system construction projects.

Table 2. Strengths and weaknesses in information system construction projects

Strengths	**Weaknesses**
• competent team • hardware • software, partially • team spirit • supportive, open atmosphere • same people are responsible for administration and development • long and broad experience in IT implementation • PM know-how in client projects	1. IT PM template missing 2. lack of structured documentation 3. same people responsible for administration and development 4. IT operations involved too late in information system acquirements 5. IT acquirement and implementation model missing 6. lack of applicable software for sharing specific information

As summarized in Table 2, the case company has a strong and competent IT team with supportive, open atmosphere and a great team spirit. The IT team has a long and broad experience in IT implementation and project management in internal client projects. The same people are responsible for both administration as well as development.

At the same time, a common practice is missing for the information system acquirement and implementation. It is especially visible in the lack of a common IT project management template, the lack of structured documentation, the lack of IT acquirement and implementation model and the lack of applicable software for sharing the project information. The weaknesses get highlighted when the IT operations are involved too late in information system acquirements and the same people are responsible for the administration and the development, meaning that the same people need to manage the acquirements of the new systems while administering the old ones at the same time. Because of these issues, the following section will look into the applicable theory in order to propose a model in the construction of information systems in the case company.

4 Applicable Theory on Project Models in Information Systems

This section discusses the key concepts essential to the discussion on how IT supports business and strategy, the characteristics of service organizations, and the service implementation, relevant to constructing a new project model.

4.1 IT Support for Business and Strategy

Companies and organizations use information systems to support, enhance and optimize their operation. The added value for the client is created in a company's value chain which is built on business processes. Business processes can be divided into *core* processes that serve the client. These are generated from multiple collaborated operations, as well as supporting processes and sub processes. The added value produced for the client is made in the core processes that are supported by the other processes. Processes consist of events that are imported from information systems and databases into an information system. Efficient use of information systems requires careful planning and use that is based on business processes. (Gupta 1996: 43–45; Alter 1999: 39–41; Johnson & Scholes 2002: 160–161)

Most of ICT information systems are utilized in the organization's *operative* activities, and only part of the information systems is designed for *strategic* decision making and strategy process. (Gupta 1996: 518) Strategic information system can be defined as follows: "An ICT information system is strategic if it increases the organizations competitive advantage or prevents the competitor from achieving it." (King & Teo 1996: 38) Strategic information systems can be divided into three categories: 1) Systems that support business functions such as accounting, marketing and product processes' and service processes' guidance, 2) systems and information systems that support the strategy process and 3) systems that are part of company or organization strategy. Instead of where the information system is used, classifying the information system as *strategic* or *operative* is determined by what is achieved with the information system. Business practice suggests that all ICT solutions should support realization of organizations strategy.

The relationship between business and technology design works in various ways in different organizations. Realizing the strategy or using the technology strategically differ case by case, and the way technology is utilized in a particular organization can vary

vastly. Figure 5 below shows the relationship between business and information technology.

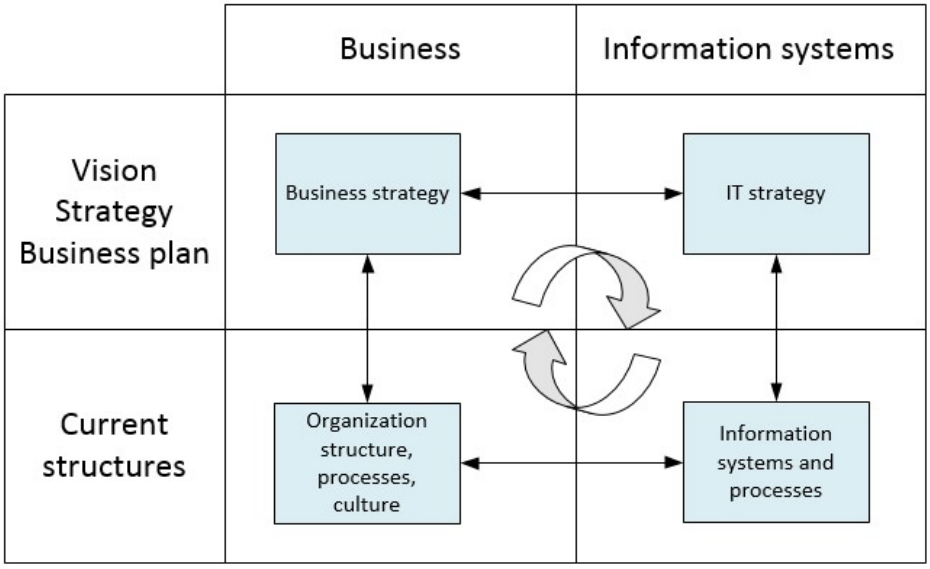

Figure 5. Relationship between business and information technology (Boddy et al. 2002: 87).

As seen from Figure 5, the information systems support both, the organization's current structure and processes. Business strategy proceeds from the current state and takes into account the client requirements and expectations and interacts with ICT strategy process. Based on that, an ICT strategy springs to life which supports new business strategy's required processes and the new business strategy itself.

The benefits gained from the technology can be divided into tangible and intangible benefits. The tangible benefits gained from the information system are, for instance, the savings from operative optimizations, operative, product and/or service quality improvement benefits, avoidance of increased expenses or benefits from increased revenue. Intangible benefits are harder to define than tangible benefits. Intangible benefits gained from information systems are for example improvement in internal and external communication, improvement in customer satisfaction and increased operational flexibility. (Boddy et al. 2002: 106–109)

Business practice suggests that the intangible assets rarely produce economical wealth directly, but it rather has an indirect effect upon it through complicated causations. Information assets are one of important *intangible* asset examples. Information assets are composed of information systems, databases and networks. Information systems, databases and information networks create organizations strategic IT portfolio, which has a measurable input to strategic implementation. (Kaplan & Norton 2004: 54–56 and 58–60)

To build intangible information assets, an organization needs to conduct information system projects. Information system projects are part of business and their results are measured in money and not in, for example, systems technical marvel or modernity. Ideally, every new information system expense should create conditions to improve upon performance and efficiency. However, it can be observed that objectives that are made beforehand are not met in the expected time frame. In many cases the benefits are obtained as late as years after the new information system has been taken into production in the organization. This issue is known as technological productivity paradox phenomenon and is caused by organizations incompetency in improving the operative efficiency and productivity by utilizing the information system. Root cause for this can be, for example, the time delay in organizing the processes and change resistance; operate like before even though the new system would offer a simpler and more efficient way to operate. The benefits of the investments are unrealized or they will be delayed. (Dos Santos & Sussman 2000: 430–431)

Information systems projects can be conducted by various ICT organization, both *internal* or *external*. ICT leadership conventions are different in between organizations. It has been proved in Karimi et al.'s (2001) research that ICT leadership conventions have an effect on the client service. This result is in-line with previous results which show that ICT creates and maintains service providers' competitive advantage and helps to improve client service. This is visualized in Figure 6 below (Karimi et al. 2001: 148).

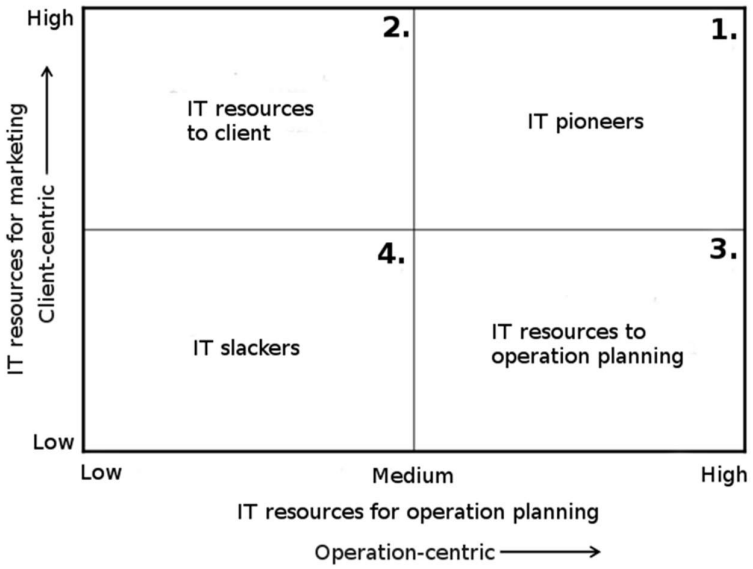

Figure 6. Technological resources in companies (Karimi et al. 2001: 130).

Figure 6 shows the logic behind distribution of IT resources in leading companies. Figure 6 also shows that ICT pioneer companies' technological leadership qualities are ahead and on an upper level, and that this type of resource utilization has a clear positive effect on client relationship. (Karimi et al. 2001: 148) This observation is especially important for those organization which consider themselves as service organizations.

4.2 Characteristics of Service Organizations

Critical success factors for service organizations are built around the client needs as their starting point. Critical success factors are the service organizations operating processes, human resources and the professional competence, credibility, assertiveness and productivity. Well working entirety creates positive spiral which creates new success and prosperity. (Løwendahl 2000: 138–139) Critical success factors for service organizations are shown in Figure 7.

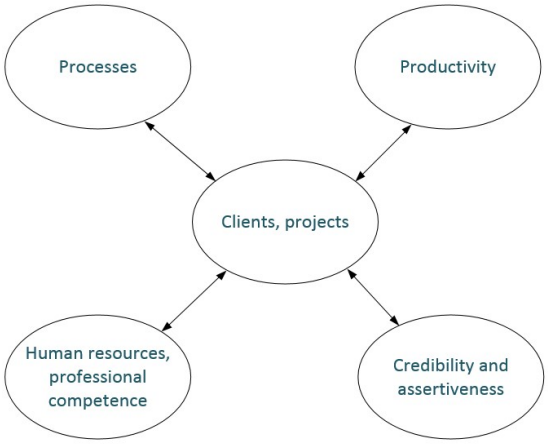

Figure 7. Critical success factors of a service organization (Løwendahl 2000: 139).

As seen from Figure 7, the key success factors for a service organization are the human resources and professional competence, the productivity and the processes, as well as the credibility and assertiveness with the clients. When looking more carefully into the professional competences, especially for an expert organization, the following characteristics seem as important, as shown in Table 3 below.

Table 3. Løwendahl's (2000: 20) definition of the characteristics of an expert organization.

	Characteristics of an expert organization
1	It is a service organization composed of employees who have a higher education which also follows advancements in the science of their own field of expertise.
2	Its services are highly tailored to client needs.
3	Its members can consider and make their own decisions when serving client or client organization.
4	Producing the service requires involvement of a member in client organization.
5	Work is handled following professional ethics placing the client needs higher than the yield and respecting the limits of expertise.

As stressed by Løwendahl's (2000: 20) in Table 3, the success of an expert organization depends on the human capital, the employers. In other words, the information intensive service organization is dependent on intellectual capital and its management. Intellectual capital can be divided into human capital, structural capital and relational capital. Human

capital includes such things as expertise, knowledge, attitude and personal characteristics. There are also other types of capital, in addition to the human capital. Relational capital contains the client relationships, other stakeholder relationships, contracts, reputation and image. Structural capital comprises the processes and systems, values and culture, working environment and documented information. Management of intellectual capital, and to be precise, management of information intensive service organization is complicated. The reason is that the subjects to the management are immaterial, invisible and intangible and the management is done on different levels. Therefore, considering these various types of organizational assets, a versatile information system is required to support the management. (Lönnqvist & Kujansivu 2005: 55–58). Moreover, creation of such a system would typically require quite a big magnitude of change in the organization.

Agile organizations typically perceive changes as normal procedure opposed to being perceived as unique occurrences. When the need for change is accepted and reforms are being prepared, the participants have established practices used to implement the change. Established practices increase the chances noticeably to achieve the reformation of business and IT services. Joint capabilities to perform tasks are generated if both parties have the necessary acquirements and established procedures that support each other. (Salmela et al. 2010: 86)

But even traditional organization are able of such a change, needed for implementation of an effective information system. The ability to implement small changes quickly is very central to the practice of industries in which business processes are changing rapidly and are closely tied to IT services. The ability for continuous minor development is at least as important mutual skill as implementation of large projects. (Salmela at al 2010: 86) Thus, an effective information system is possible for any type of organization, either agile or traditional. Moreover, a great deal of success depends on the organization type, but on its ability to implement the system or service successfully.

4.3 System Implementation

Implementing a new information system is not only a technical task. Old business processes need to be reengineered. Business process reengineering is about rethinking and redesigning, so that the processes fit together with the new information system. It

has been shown that the operation is inefficient if the information system is more developed than the business processes. (Flodén 2013: 90)

The problem of information based technologies is that the typical IT management often does not see the information technologies as a service. Therefore, they are not designed and delivered as managed services to the clients. Instead, IT is managed as administrative routines and the internal efficiency and costs are the main criteria. This leads the clients and business units to perceive the IT as an administrative unit only instead of a service provider. In the long run, the success is determined by identifying the important outcomes for the client as well as how well the unnecessary throughput is disposed. (Bhatia 2012: 199)

Contrary to popular belief, the cost of new devices and software usually make only a small portion of development costs. Big part of the costs generates from the re-engineering when the organization and business processes are customized to the new information system, learning the new opportunities and training the users to use the new system. Therefore, the time spent preparing for the introduction of the new system should be considered in the plans. A well-functioning information system development project ensures that budget is not exceeded. (Flodén 2013: 92) But there are also other challenges when implementing a new information system.

4.3.1 Challenges in Implementation of Information Systems

The success of implementation of information systems varies greatly. Some of the projects succeed and accomplish the tasks set increasing the business processes and company performance in a desirable way. Some of the information system projects fail. Causes for failure are many. ICTs short history and culture, which has lasted only for few centuries, does not provide such fundamental experience that there is with other older fields of study. Every organization and company is unique and the needs are distinctive. Therefore, there are no two equivalent IT projects. Even deploying a readymade information system in different organizations can differ considerably. Companies differ both in ICT knowhow as well as resources and thus the readiness to introduce new systems in distinct companies and organizations varies. Other reasons for failure can be blamed for poor planning. Project management, considering the stakeholders as well as incorporating human resources and IT specialists, emphasizing open information flow and

having support from the leaders are the most important factors for ensuring success. (Haikala & Märijärvi 2006: 23–27)

Next, the success of IT system implementation depends on the soft issues a great deal. If implemented, IT systems have an impact on a company's strategic and organizational issues. Therefore, if the organizations idiosyncrasies and culture are ignored, the designed IT systems features will not be serving and supporting the operations in the planned way, as proven by Markus and Benjamin (1997). Markus and Benjamin warn about the 'magic bullet theory'. This metaphor illustrates the false notion where a new IT system would actually alter human behavior and working habits of the organization, remove old methods and develop the organization. It is like a magic bullet fired by an ICT specialist that hits the target and makes what the foreman and leaders required and everything will snap into place at once. In reality, although the IT system will definitely affect the ways of working the organization, it cannot radically change the soft issues in the organization, and therefore should build on them, or at least take them into account.

Importantly, it is the human resources that take the key role in the success of the IT system implementation. The inclusion of employees and users to, and the attitude towards the new information system and new way of operation are conditions of success. Commitment and motivation succeeds best by taking the future users along already in the planning phase. Open information flow, reasons and needs of the new information system or system help to commit the employees to the transition. Utilization of new technologies requires versatile and advanced expertise in many areas of knowhow. The development of this knowhow is a notable challenge in both the information management as well as among the users. The boundaries in different tasks may change and plenty of education is required. Utilizing new operation processes and systems demand new tasks and modification of responsibilities. No benefit is gained by only importing a new information system to use in an organization. (Boddy et al. 2005: 127–130; 221–227) A system implementation project is therefore a difficult management of a change project from the point of view of foremen and leaders.

4.3.2 The External and Internal Context of Change

In addition to the desired IT system's features and properties, there are many external and internal factors in the organization that make a dramatic effect on the implementation

of an IT system. In other words, the context of change should be carefully considered when implementing an IT system. *External* factors include, for example, new technologies, activities of competitors, legislation, regulatory provisions and general business conditions. *Internal* factors include, for example, organizational structure and culture, goals, employee competence, economy, ICT architecture and utilized technology as well as with utmost importance the company's business processes.

Research literature points to some critical dimensions responsible for the difficulty of IT system implementation. Figure 8 clarifies some of such dimensions (Boddy et al. 2005: 227).

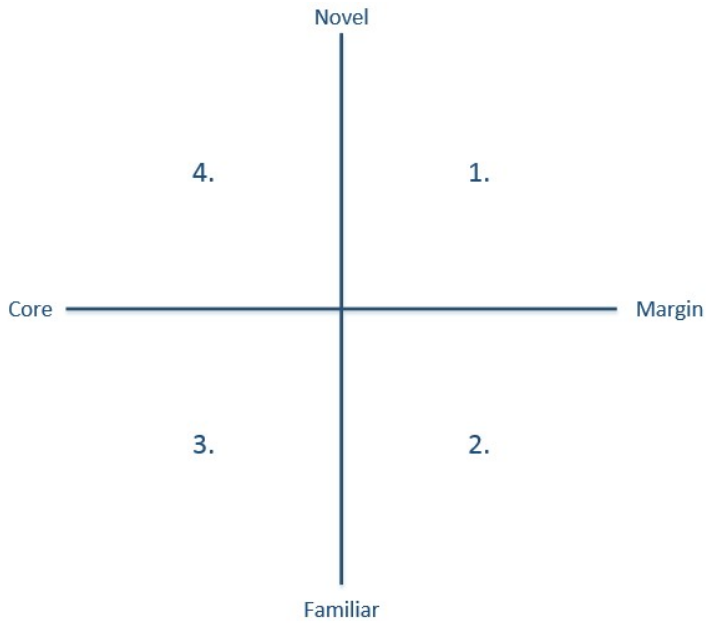

Figure 8. Critical dimensions of IS projects (Boddy et al. 2005: 227).

As shown in Figure 8, the first dimension (horizontal axis) describes how central the change made is to the foundational business tasks: core or marginal. The second dimension (vertical axis) describes the novelty of the change: novel or familiar. The most challenging and riskiest cases are the ones that are placed in the sector 4 'core and novel'. The easiest cases are the ones in sector 2 'marginal and familiar'. The cases found in sectors 1 and 3 are in between difficulty level of sectors 2 and 4.

Also, the success of past ICT projects has impact on the success of the new project. If the earlier projects have been completed successfully, which means on schedule, according to the budget and the set goals have been achieved, the attitude of the employees to a new change is most likely positive and the chances for success are good. On the contrary, if the organization's past experiences include a lot of failed ICT projects, the attitude towards new projects often becomes automatically negative, and the chances for success become smaller. (Boddy et al. 2005: 224–225) Therefore, the managers involved in analyzing the challenges of implementing the IT system, should seriously consider a wide range of the factors influencing the success of IS projects. One of the primary factor relates to managing the new IS project.

4.3.3 Critical Factors of Information System Projects: Project Management

Project management includes project planning, initiation, monitoring and guiding the progress and ending the project. The first things while planning the project is to consider the objectives and constraints of the project. The objectives need to be defined clearly and precisely so that the implementation can be evaluated at the end of the project. The constraints and limitations are often linked to the available human and monetary resources as well as to the timetable. (Haikala & Märijärvi 2006: 226–227)

Project planning consists of organizing, focusing the objectives, analyzing the risks, choosing the technology and working methods to be used, designing the support functions (documentation, product management, quality assurance), dividing the project into parts as well as scheduling the parts. The time needed for project dividing and scheduling the parts are often challenging. (Haikala & Märijärvi 2006: 227). The smaller the parts can be made, the more accurate the workload estimations are. Small tasks enable a more efficient project monitoring. Deviations in schedules can be detected sooner if the tasks are smaller. Software projects are usually divided in hierarchical subtasks which creates a so called "work breakdown structure" (WBS). First the highest level is divided in activities. Activities are worked on through the project at all times during the project. These activities are affiliated with the project and divided in to even smaller entities that consist of task sequences and other functions. The lowest level activities are called tasks. (Haikala & Märijärvi 2006: 227; 230)

The WBS of the project, the workload estimates based on WBS, the constraints of the project and usable resources make the bases for project scheduling. Project scheduling is difficult in practice, and most of the time the deadlines are exceeded. It is estimated that the project is successful if the scheduled time is not more than 20% overdue of the estimated workload estimations. (Haikala & Märijärvi 2006: 232) To help the project to stay on schedule, a good project plan needs to be created.

The project plan describes how the defined resources are used in a defined schedule to achieve the desired end result. The project plan also describes the project's risks, support functions, means of implementation etc. The project plan is a tool to track the implementation of the project. It helps to see the possible discrepancies and deviations in the timetable of the project or in the use of resources as early as possible. (Haikala & Märijärvi 2006: 240) After the project plan is created, the next stage is the initiation of the project.

Initiation of the project is a critical phase. The project participants need to know immediately in the initiation phase that they are part of the project. Therefore, a separate opening event needs to be organized. There the objectives, importance, participants and stakeholders, timetable, monitoring and reporting practices of the project are run through. After the opening event, every participant should be aware of their own part in the project organization and engaged to reach the project goals.

After the project is initiated, the implementation stage starts. The realizations of the project are logged into the project meetings and reviews related to monitoring and guidance. The project plan is focused when the project progresses further. The earlier the deviations are observed, the easier it is to intervene with them. It is favorable to create a final report of the project: how much did the project yield, what went well, what went wrong and what should be done differently in the future. (Haikala & Märijärvi 2006: 226–227)

For the project to be successfully implemented, project managers also need to realistically identify and evaluate the project risks. Project risk management is divided into risk mapping and preparing for risks. Risk mapping means identifying probable risks, analyzing them and assessment of the probabilities of the risks. Preparations can be made by minimizing the probabilities of risks and with back-up plans. Check lists can be used to manage risks. Going through check lists help to identify risks already in the planning

phase as well as during the project. Most probable risks are usually not technical but rather human based, such as project planning, monitoring and organizing. (Haikala & Märijärvi 2006: 238)

When the project ends, it is important to gather the key figures for the future projects: how the workload and time estimates were held, number of changes in definitions, error count in testing etc. It is also useful to agree upon client and user feedback for instance after one year of use. As with the initiation of the project, the projects end has to be communicated to all participants and stakeholders. It is advised to record when the project can be considered ended and the responsibility to be transferred to the administrator of the project plan. (Haikala & Märijärvi 2006: 226–227) Key to successful project management is to acknowledge the stakeholders, human resources available and how the communication is arranged and upheld.

4.3.4 Project Stakeholders and Organizational Communication

Stakeholders are persons and groups that have their own interests in the project and can affect the end result of the project. Stakeholders strive to actively support the changes in order to ensure that the project is successful. On the other hand, the project can affect the stakeholders without them noticing it. Stakeholders are interested in the contents of the changes, results and the change leadership. Project manager needs to gain and uphold the support of the stakeholders. Stakeholders can be from the company or external parties. They can be from different functions or departments of the company, users or for example IT department. External stakeholders like clients, suppliers or consults have also an effect on the project. (Boddy et al. 2005: 236)

To establish the business environment in which the IT system is developed and implemented, a stakeholder analysis is made. In the stakeholder analysis, it is figured out who are linked and in what way to the project, for instance, as an employer, user, authority or a competitor. Stakeholders are seen as anyone whose work is affected momentarily, temporarily, or on a longer term. All stakeholders cannot necessarily be recognized but the most important ones should be recognized in early stages of the project. Stakeholder analysis is needed particularly for project planning, risk management and requirement management and is especially important in cases where organizations working ways and processes are changed. Stakeholders' goals can be contradictory and cannot all be

taken into account. Stakeholders' potential negative attitudes should be identified and influenced upon actively to increase the project implementations chance of success. (Haikala & Mikkonen 2011: 155)

Important tasks of the project manager include the following tasks, as listed in Table 4 below.

Table 4. Tasks of the project manager (Boddy et al. 2005: 236.).

	Tasks of the Project Manager
1	identify stakeholders, pressure groups and interested parties
2	estimate each stakeholder's commitment level
3	estimate each stakeholder's strength in promoting or demoting the change
4	assess their points of interest, what they will think and do about the change
5	manage relations with them to gain their support or to contain the opposition

One of good examples of projects with a variety of stakeholders is software production, which is typically organized as projects. In these projects, the software supplier's viewpoint is easily highlighted. In addition to the supplier's viewpoint, project management should include the client's viewpoint. Without the client the project is unnecessary. Therefore, the new information system is implemented in the project on the basis of the clients specified requirements and the client's business objectives. It happens because the client usually sees the project as a bigger concept than only as the software production and implementation, and typically pursues to develop the company operations for the business environment as a whole. (Haikala-Mikkonen: 2011:19)

A client can be either internal or external to the company, with whom the contract is made with to deliver the system. Respectively, the software producer can also be internal or external. It is common practice to supplement one's own operations with services which are bought from an external supplier. Supplier's task is to solve client's problem using the necessary IT utilities. One way or another the client needs to communicate and inform the supplier, what problem he plans to solve with this project. (Haikala-Mikkonen: 2011:19)

From the supplier's viewpoint, the starting point of the software project is when the client provides the requirements and objectives. This helps with structuring the content of the project as precisely as possible, from the client's perspective. Balancing between the client and product orientation is one of the challenges in information system development. The better the client's needs are fulfilled, the more precisely the client's requirements are taken into account. On the other hand, the more customizations are made to the client's information systems, the more administration is required. If similar requirements could all fit to many clients, it would be possible to develop one information system that could be suitably configured to fit all clients' requirements. This would simplify the administration as the changes made to each of the clients' software could be done to one single information system. In addition, the clients would benefit from the changes that the other clients have requested. The development ideas can of course also take completely different directions with different clients. (Haikala-Mikkonen 2011: 19)

Project failures are generally dependent on the following reasons: lack of user input, incomplete requirements and specifications, changing requirements and lack of executive support. IT management should concentrate on how their resolution delivery and resource management processes are operating and creating services to the business units. These processes include relationship management, demand management, portfolio management, resource management, financial management and systems development processes. (Bhatia 2012: 201)

To prevent and deal with failures, a support group for the project is often includes the technical experts, such as a specialist for an uncommon tool. Support group members give guidance in designing technical solutions and inspecting their feasibility. Project manager reports to the steering group which consists of both supplier's as well as client's representatives. Steering group monitors the projects progress, helps to solve the big problems and accepts the changes to the project plan. (Haikala & Märijärvi 2006: 229)

In a slightly bigger system implementation, it is not enough only to install a software on a server. It is also necessary to asses again the processes in which the system is affiliated with. Many IT projects turn out for failure at the latest when the users start to use the new system and try their best to re-apply the steps that were done in the old system. Because of this optimization goals are missed and on the other hand the users are frustrated because it does not fit the old work habits. A user conclusion follows that the new

software is bad and that the old system was easier. This new view spreads out in break rooms and open-plan offices and in other places where users meet creating a new common understanding that the project has failed. Project manager is hurt and astonished: the software works as it should and one's own understanding is that everything has gone as planned. (Kouhi 2013: 63)

Software installation and preparation for operation are important but this is only half of a successful project. The other half is about change management and reorganizing work habits and processes so that the system will be used efficiently. Processes that accompany the software can stay the same only when a software is replaced with another identical software. Changes in processes can be a lot more meaningful for the performance than the system itself. Many times the main reason in the change in the system is to allow for a change in the processes. (Kouhi 2013: 63–64)

Change management is needed already in software changes. But because, in the cause of a change, the work habits and processes are usually affected as well, there should be extra effort made to change management. Change management is mainly about communication. Every significant project plan should include a communication plan. Communication should be well planned, clear and focused. It should focus on what is essential from the user perspective and on the other hand about what kind of changes in the user mindset and behaviour would be desirable and what kind of expectations are to be created for them. (Kouhi 2013: 64)

Practice suggests that creating and managing expectations is a central part of any project success. If the users know what to expect when a new system or policy is introduced it is less likely to create problems than if the changes come as a surprise. This applies especially when uncomfortable things concerned. Usually the productivity decreases when a new system is introduced and the users are still learning the way it works and some of the possible bugs are ironed out. After this dip the productivity will increase but it might be compromised if the users and company managers interpret the initial difficulties with the systems as a failure of the project or as poor functionality. View of a failed system feeds on and prevents from reaching the productive phase. If the turbulence has been expected for the early life of the system, it is easier to overcome the inefficient phase.

With good change management, better expectations and understanding can be created to show that the learning curve is a part of the project and when one can expect to get to the stable status. (Kouhi 2013: 65) Thus, continuous and planned communication make the cornerstones of good change management. Users, management and other stakeholders important to the project are to be kept informed about the progress of the project. There is not always a lot to tell about the project but a long silence might be interpreted as having problems with the project and not told about.

Good information flow and communication are indispensable to organizational operations. The communication between stakeholders and project management needs to be verified to ensure success of a single project. Nowadays Lean-philosophy is emphasized in management practices in which basic principles are composed of identifying and reducing unnecessary tasks and losses together with continued improvement of operations. According to Lean, informing and communication means to respect and consider the client. In this case clients include also the organizations internal clients, for example the clients of IT system project are the ones who will be the end users of the IT system. Client consideration means that the client is served with just the right information and in just the right shape that the client needs it. (Runebjörk & Wendleby 2013: 239; Blomkvist 2012: 11 – 19)

Relationship management is about how organization manages and treats their relationships with clients, suppliers and within their internal organization. Current trend is that relationships have become more advanced. In some fields the relationships are more focused on doing co-operative work and on others there is more competition. Without relationship management many functions internal to the company would not work. However, sometimes it is not seen in this way but as an organizational problem, which is either hard or impossible to solve.

Relationships can be divided into different maturity levels within core operations and IT functions as well, as shown in Figure 9.

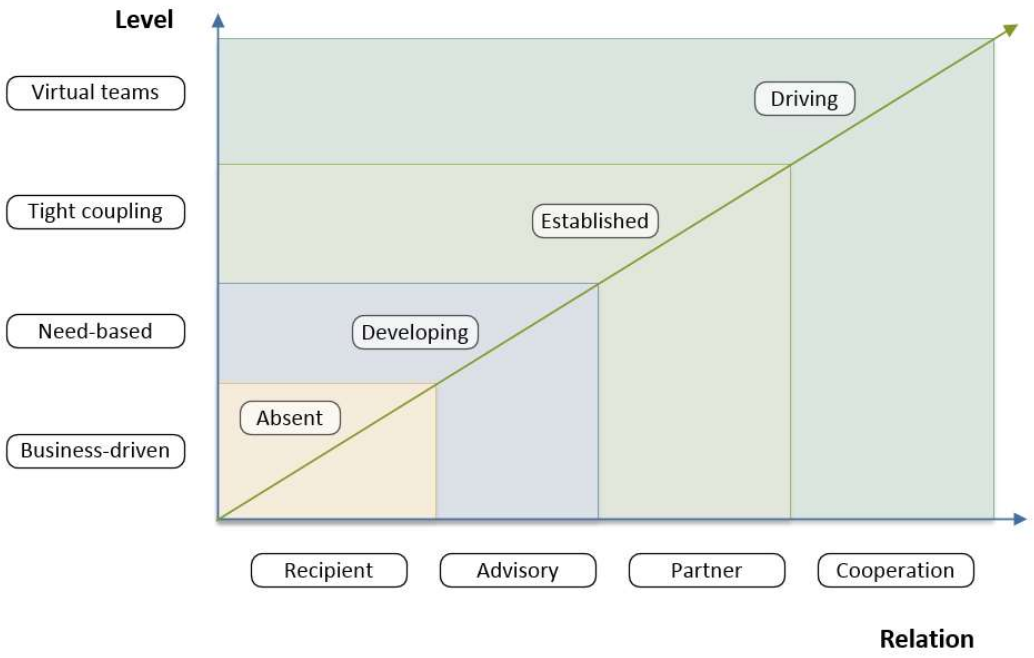

Figure 9. Maturity levels in relation between business and IT department (Haverblad 2007: 132).

As seen from Figure 9, maturity levels can be defined from the least developed to the most developed as follows: the recipient of the order who waits for a service request, advisor, partnership and interactive partnership. Different maturity levels can be stationed in either business-driven level, or need-based level, or tight coupling, or virtual team. The lowest level means that IT organization is first and foremost about receiving orders and relationships level is business-oriented. On the next level, there is advice giving relationship and it is need-based. The third level is described as partnership which is based on linking the partners. Highest maturity level is interactive partnership which is formed from virtual teams. It is important to acknowledge which maturity level one's own organization is. (Haverblad 2007: 132)

IT practice suggests that commitment to the cooperation with the clients is important. It is important to give time and listen to the client and one must cooperate with the client to resolve problems or carry through the needed measures. Clients can be external or from own organization, another department or from own departments another team. Sometimes to understand the client requirements it might be good idea to borrow client resources to make sure that both parties understand what the client actually needs and

wants. Sometimes the client does not know what or cannot explain what the requirements are but has some kind of vision and end goal in his or her mind. On what level the relationship is taken depends on both parties' common view. (Haverblad 2007:133)

One bad client relationship can cause more damage than ten good relationships produce synergy. Understanding about the costs that are ensued from relationship management is often lacking. Bad relationship, for example, in the support and end user clients, which can mean that the client is lost to another competing company. It is economically more profitable to maintain and manage the existing relations than to create new ones.

The person responsible for clients, service manager, is the contact person in IT operations. Service manager helps with the client requirements, open questions and with solving the problems that might arise. Service manager ensures that the IT needs of the clients are satisfied and makes sure that IT services are handled in a suitable manner (Haverblad 2007:134). Responsibilities of the Service manager are listed in Table 5 below.

Table 5. Responsibilites of the Service Manager (Haverblad 2007:136).

	Responsibilities of the Service Manager
1	is responsible for regular customer feedback
2	translates business requirements to "understandable" requirements
3	takes part in prioritization and implementation of new IT activities in core functions
4	recognizes new needs
5	negotiates and concludes service level agreements with clients
6	reports to clients based on service level agreements
7	is contact person to the clients and manages relationships
8	reports and explains IT costs to the client
9	updates clients about dysfunctions
10	takes the initiative to develop IT services

As seen from Table 5, the service manager is first of all responsible for relationships with the customers. Stakeholder relationship management is about client and supplier relations management. Goal is to build a long lasting cooperative relationship and to improve

continuously on the client and supplier relations by an open and constructive communication. Stakeholder relationships are also a resource to the company or internal functions. With good relations the different functions inside the company can be tied together creating better efficiency.

The relationships with the customers can be divided into different maturity levels and the target maturity level is based on what the both parties want to achieve with the relationship. This includes the relationship between core functions and IT functions. Bad client relationships have a tendency to create bigger negative impacts than bad internal client relationships. Bad internal client relationships have an effect on external relations. (Haverblad 2007:136–137) As the goal is to create a project model for information system construction in the case company, the following section discusses the commonly used models in information systems development.

4.3.5 Models of Information Systems Development

Software development and life cycle can be divided into different stages and it can be described with a flowchart. The most common flowchart is the so called waterfall model. There are several different versions of the model but in general you can usually see at least specification, planning, and implementation stages. Before specification stage there is often a preliminary analysis or a requirements study stage. (Boddy et al. 2005: 230) One version of a waterfall model is described in Figure 10.

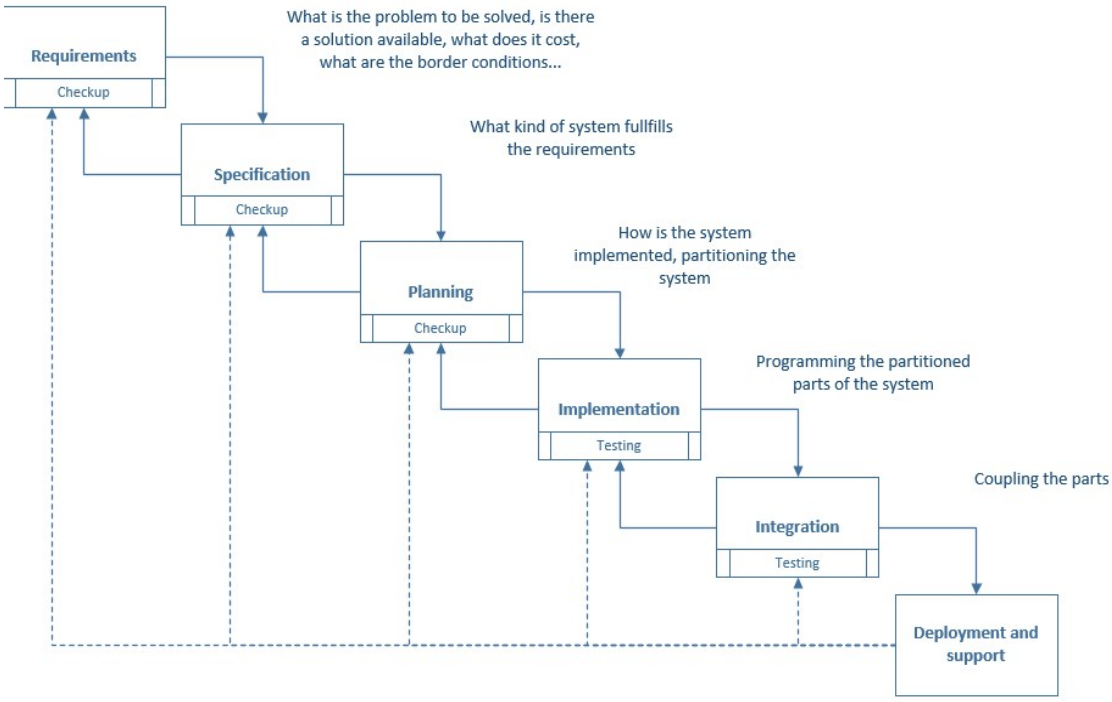

Figure 10. The traditional waterfall model of information systems development (Boddy et al. 2005: 230).

As seen from Figure 10, all stages include quality assurance measures such as inspections, reviews and testing. The goal is to weed out the errors from the system as early as possible. In the end of each stage there is a review session where the project status reviewed and confirmed that stage goals have been achieved and that the deliverables have been produced. (Haikala & Märijärvi 2006: 36–37)

However, practical software development can rarely progress by the book as per waterfall model because amongst other things part of the requirements are discovered during the project and they tend to change in the course of time. Waterfall model can still be considered as an actual operation model and is utilized as often as possible. (Haikala & Märijärvi 2006: 41)

In addition to the waterfall model, other common lifecycle models include prototype models and different incremental models like so called evolutionary delivery model. Prototype model, Figure 11, is meant as a working model in which some of the product features are tested before building the product. Prototypes are suitable particularly for testing solutions that require new technical features or when the client requirements are unclear.

Main uses for ready prototypes are: 1) as the prototype is ready a new system is implemented which is specified by the prototype once more which is developed right from the start and 2) prototype is developed to a fully established system. (Haikala & Märijärvi 2006: 42)

Prototyping has been proven to be especially handy when user interfaces are being specified. Additionally, performance analysis prototypes are useful when the final system is being tested with simulated workloads for new technical solutions on beforehand. The problem with prototyping is that the client might imagine that the prototype is practically complete system even though most of the work is yet to be done. Another problem might be ending up in a loop where the prototype is improved upon endlessly. (Boddy et al. 2005; Haikala & Märijärvi 2006: 43) Figure 11 shows an example of a system development done by prototyping.

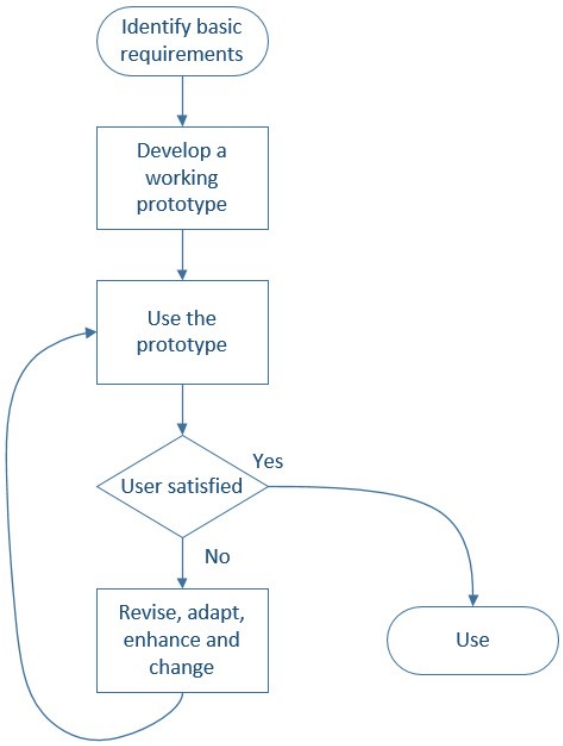

Figure 11. System development by prototyping (Boddy et al. 2005: 233).

Figure 11 demonstrates the application of EVO and spiral models application regarded as RUP process (Rational Unified Process). It is based on sequential iterations where

every unit forms its own small waterfall model: client requirement specification, planning, implementation and testing. Software development is divided into four main stages: inception, elaboration, construction and transition. Each stage consists of one or more iterations. In the inception stage the product concept is mapped out with different kinds of solutions. This stage emphasizes on the client requirements analysis and resembles traditional requirements stage. Elaboration stage is all about 'freezing' and implementing the products basic architecture. Freezing meaning in this case that the features agreed upon are locked and none are added unless the stage is revised. In construction stage a new so called beta version is produced and is released to a few selected clients or software testers. The end product of transition stage is the final system as well as the documentation, support, installation packages and license agreements. (Boddy et al. 2005: 229–236; Haikala & Märijärvi 2006: 45–47)

Another approach is to utilize best practices used in the ITIL framework which is covered in the next section. ITIL is like a cookbook for IT service management, where one takes the most suitable models for their needs. The models are then modified to meet their requirements.

4.3.6 Service Transition in ITIL

Service management concept was born in the work done for the ITIL (Information Technology Infrastructure Library) framework. ITIL is a set of concepts and practices (a framework) for IT services management, development and operations (Bhatia 2012: 201). ITIL service transition moves the new services and service changes to production. Service transition is made by first receiving a service design package (SDP) in the service design phase, then validates it making sure that it meets the business requirements and then deploys it to the production environment. The ITIL service transition includes a description of service knowledge management system (SKMS) that supports the organization's learning and helps to enhance the efficiency of all of the phases. SKMS supports decision making and enhances service management. (ITIL 2011: 155)

The role of Service transition is to make sure that the new, changed or removed services correspond to the business requirements documented in the service strategy and design phases. ITIL service transition includes development and enhancement frameworks for

the kind of capabilities, which enable the transition of new and changed services to supported environments. An example of process model in service transition in shown in Table 7 below.

Table 6. ITIL Change management – Service Transition (http://wiki.en.it-process-maps.com/index.php/Checklist_Request_for_Change_RFC)

ITIL Process: ITIL 2011 Service Transition - Change Management
Unique ID
Date of submission
Change Owner
Initiator of the Request for Change (RFC) *If not identical with Change Owner*
Proposed Change priority *May be overruled by Change Management during Change assessment*
Reference to Change Proposal *If the Change is related to a Change Proposal submitted at an earlier stage*
Description of the Change being applied for 1. Summary description 2. Business Case a. Reason for the Change b. Costs c. Benefits d. Consequences if the Change is not implemented e. References (e.g., to a Problem Record triggering this RFC) 3. Business areas on the client-side affected by the Change 4. Services affected by the Change 5. IT infrastructure components (CI 6. s) affected by the Change **7.** Technology aspects (is a new technology being introduced?)
Risks *Risks during the implementation* 1. Identified risks 2. Counter-measures (e.g., reversion procedure) 3. Back-out strategy
Time schedule *Predicted/suggested time schedule for the implementation*
Estimate of resources for the implementation 1. Required personnel resources (from which areas?) 2. Estimated work effort for the required personnel resources 3. Cost estimate (itemized for bigger Changes)
Budget *Statement as to whether a budget is allocated and cleared for this Change*
Additional supporting documents *If applicable, index of additional supporting documents*
Approval or rejection 1. Date 2. Person/body in charge of the approval 3. Change reviewers 4. Priority assigned by Change Management 5. Restrictions 6. If applicable, reasons for rejecting the RFC

As shown in Table 6, service transition includes the planning of the deployment, building, testing, evaluation and the deployment. This phase also assesses and evaluates the discontinuation of services and the transfer of a service to another provider.

Table 7. Gains achieved in service transition.

	Gains achieved in service transition
1	costs, timings, resource requirements and risk estimations have a better basis
2	there are more successful changes
3	delays caused by conflicts are reduced
4	time and resources used to manage test and pilot environments
5	stakeholder expectation management is enhanced
6	more trust is gained to the production of new and changed services which meet
7	the specified requirements
8	ensure that the new and changed services are administrable and cost efficient
	service asset and configuration management is enhanced

When the service transition is efficient, the following gains are achieved, as listed in Table 7 above.

4.4 Summary of Theory and Links to the CSA Results

This section summarizes the key theory issues in creating a project model for information system construction in the case company. It also links the theory (discussed in Section 4), the current state analysis (conducted in Section 3), points to the issues found in the company and their impact on the proposed solution.

As demonstrated in the existing knowledge section, companies and organizations use information systems to support, enhance and optimize their operations. Added value for the client is created in the company's value chain which is built into business processes. (Gupta 1996)

As per the case company's IT strategy, to improve the current efficiency, the IT service processes need to be put in a better order. In the vision of the case company´s IT department, it is stated: "IT department succeeds when it provides the right quality services

cost efficiently and leads business-oriented change projects successfully. IT that is competent, efficient and responsive to business changes produces and uses modern processes, services and technologies." (IT-strategia 2013) In line with the strategy, a new project model needs to be developed and taken into use in IT projects. The efficiency can be improved by adding transparency to the development projects.

A simple and clear prototype model fitting a small or medium sized organization, was chosen as the starting point for the project model. The simple and clear operation models enhance the productivity. Productivity creates competitive advantage and ultimately creates added value to the client. The prototype model is suitable for the case company, because the needs of the users are well known and it is possible to quickly organize a test case and the results can be reliably used. The waterfall-model would be too heavy for this purpose.

Moreover, to support the business growth, the case company´s main goal of the IT strategy is to introduce the IT governance. IT is steered in accordance with the IT governance developed in collaboration with the business. IT management must create its own model of decision-making as part of the IT governance. The development of communication skills is integrated into the IT governance. (IT-strategia 2013) This points to the need to choose an approach to IT governance, and this approach was selected to be ITIL.

ITIL is a set of concepts and practices (a framework) for IT services management, development and operations. (Bhatia 2012) The ITIL service transition includes a description of the service knowledge management system (SKMS) that supports the organization's learning and helps to enhance the efficiency of all of the phases. SKMS supports decision making and enhances service management. (ITIL 2011) ITIL service transition includes development and enhancement frameworks for the kind of capabilities, which enable the transition of new and changed services to supported environments. (ITIL 2011)

As the IT service processes of the case company are to be put in order to improve efficiency, the creation of service processes, training and break-in are the tangible goals. The project model created for the IT projects is to be introduced and trained in the business units when applicable. By adding transparency to the development, projects' effi-

ciency is improved. During the strategy period the existing, partially undocumented practices and process drafts are to be developed. (IT-strategia 2013) As a result, the project model proposed in this thesis includes, in accordance with the ITIL project model, three phases: design, validation and deployment.

The following Table 8 links the theory, current state analysis, the issues found in the company and the impact on the solution. It compares the theory and practice and how they fit together in the case company. The current state analysis (marked as CSA in Table 8 below) number refers to the earlier SW table (Table 2) weaknesses.

Table 8. Summary of theory issues.

Theory chapter	CSA	Issues	Impact on solution
4.1 How ICT supports business and strategy	1 3 5 6	Companies and organizations use information systems to support, enhance and optimize their operation. Added value created for client is created in company's value chain which is built on business processes. (Gupta 1996)	Productivity creates competitive advantage and ultimately creates added value to the client.
4.2 Characteristics of service organizations	1 2 3 4 5 6	Critical success factors are the service organizations operating processes, human resources and the professional competence, credibility, assertiveness and productivity. (Løwendahl 2000)	The project model was developed into a more communicative direction, which enables it to serve the IT department better.
4.3 Service implementation	1 3 4 5	Implementing a new information system is not only a technical task. Old business processes need to be reengineered. (Flodén 2013)	By creating a new model, the business processes are enhanced, the employee commitment will increase and the productivity increases.
4.3.1 Challenges in implementation of information systems	1 2 3 4	Some of the information system projects fail. Causes for failure are many. ICTs short history and culture, which has lasted only for few centuries, does not provide such fundamental experience that there is with other older fields of study. (Haikala & Märijärvi 2006)	The new model also notes the failed projects and enables learning from the mistakes made in the previous projects.
4.3.2 The external and internal context of change	3 4 5	Many external and internal factors of the organization effect on the implementation of an IT system. Also the success of past ICT projects has its own impact on the success of the new project. (Boddy et al. 2005)	The new model takes into account the failed projects and provides means for the organization to learn from the mistakes it has previously made.

4.3.3 Critical factors of information system projects	1 2 3 5	The first things while planning the project is to consider the objectives and constraints of the project. (Haikala & Märijärvi 2006)	The created model pays attention to the importance of planning, the objectives and highlights the importance of the launch of the project.
4.3.4 Project stakeholders and organizational communication	1 2 5 6	Stakeholders are persons and groups that have their own interests in the project and can affect the end result of the project. (Boddy et al. 2005) All stakeholders can not necessarily be recognized but the most important ones should be recognized in early stages of the project. (Haikala & Mikkonen 2011)	Several phases are created to the model which take into account the future users and other stakeholders opinions and user experiences. The end user is interviewed before the start of the project.
4.3.5 Models of information systems development	1 2 3 5	Prototype model is meant as a working model in which some of the product features are tested before building the product. Prototypes are suitable particularly for testing solutions that require new technical features or when the client requirements are unclear. (Haikala & Märijärvi 2006)	The prototype model was elected as a starting point rather than many heavier options. Speed and agility are the main arguments.
4.3.6 Service transition in ITIL	1 2 3 5 6	ITIL is a set of concepts and practices (a framework) for IT services management, development and operations. (Bhatia 2012)	The model includes three phases: design, validation and deployment.

As shown in Table 8, the first group of issues and their impact on the solution refer to the context factors related to IT and project challenges in the company. Research and business literature suggest that companies typically have various levels of readiness to create a successful IT project. Company culture, open information flow, attitudes, previous experiences, successes and failures as well as knowhow, leadership climate and usable technology create a framework to carry out IT projects. People also make the difference. Management, staff and stakeholders must be involved to support and implement the project. An IT project cannot be successful without the support of the management. Employees and the project owner as well as future users have to be included already in the planning phase. Stakeholders have to be noted and at least the most important ones need to be included and motivated to the project. Importance of openness and interactivity are stressed.

A second group of success factors consists of tools and how they are used. Planning, project management, resources, the technology used, IT infrastructure and the possible new technology are all influencing the project and its success. Resources can still be

split into parts like time, economy, quantitative and human resources that can be divided by competence. The values of these factors differ project by project and for the success of the project, it is important that these factors are carefully observed and noted already in the planning phase.

Next, when organizing the project, it is important to ensure the flow of information. A steering group is usually named for the project from the central stakeholders which are responsible for the project activities. The steering group will follow the project progress and confirm the central decisions. A project group and a manager are present on the supplier side as well. In terms of project's success, it is important to inform about the project progression and next steps. Without a clear and continuous communication, there will be uncertainty and vague information and rumors spreading in the organization.

In other words, stakeholders, information flow and stakeholders' different interests might cause problems. For this reason, every stakeholder interprets the information system project from their own point of view. The strong stakeholders should be paid attention to more than the weak ones. Project manager therefore needs to consider which stakeholders are worth the time and effort. When the project manager understands the importance of the stakeholders, one will find the suitable allies whose help might be needed in different phases of the project.

Finally, well-functioning business processes are more important than a more advanced information system. The worst case scenario is to use an advanced information system with bad business processes. The right kind of requirements and plausible problems should be identified in the beginning of the development process. It is a lot harder and more expensive to change a system after the transition to production than to change them in the beginning of the process.

These findings from both available knowledge and case company challenges are merged into the Proposal presented in the next section.

5 Project Model for Information System Construction

This section presents the proposal for the project model for information system construction. The main objective of thesis is to create **a tailored project model for information system construction**. This will be a daily tool to use and be seen as an important part of processes. The **expected outcome** of the thesis is a **project model with necessary templates** for future constructions and implementations of new information systems based on theory covered and own experience in the construction of an information system in live production environment.

5.1 Development of the Model for Information System Construction

The case company is an expert organization where inner flow of information and knowledge are vital. The company has grown rapidly in the recent years. Success of the business requires knowledgeable staff engaged in developing and using common information system. Deploying new information systems becomes easier when the users understand the importance of the software to the development of the business. The case company can be compared with a typical service organization in Løwendahl's criteria (chapter 4.2. page 15). Løwendahl (2000) considers that a service organization's most important success factors are processes, productivity, human resources, as well as their credibility and assertiveness, who need to serve clients and projects. According to Karimi et al's (2012) classification of organizations, the case company fits to category 3: 'IT resources to operation planning'. (Chapter 4.1. Figure 6).

Theory suggested by Salmela et al. (2010) categorizes the case company as an agile organization. Moreover, Salmela et al. has come to the conclusion that the fast implementation of small projects is as important as the big projects. (Salmela et al. 2010:86). This has been seen in practice in the case company as well. Small projects are ongoing all the time and they affect the daily operative functions.

Using the waterfall model to develop and implement information systems would in this case be too slow. Waterfall model requires too many phases to complete before one can see how the end product will show up. In the literature there are multiple different versions of a waterfall model from which in this thesis a model by Boddy et al. (2005) has been shown. As a result, Boddy's "System development by prototyping model", which is

a faster and more flexible model to implement software, is selected as a basis for the proposed model, since it makes a far more suitable model for the case company (chapter 4.3.5. page 28). Based on previous own experience, the current state analysis and Boddy's theory the model has been further enhanced to suit the case company better by adding processes. At this initial stage, the proposed model for the information system construction looks as shown in Figure 12 below.

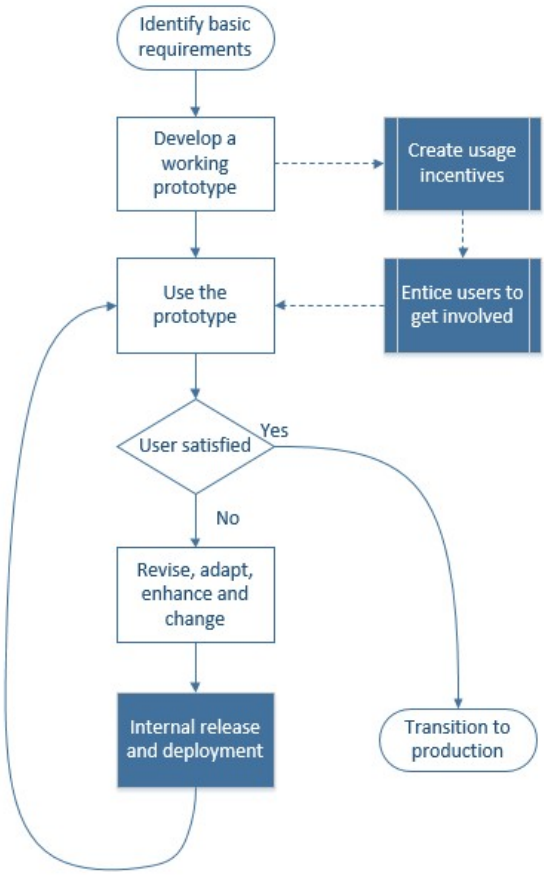

Figure 12. First iteration of the construction model based on Boddy's model.

The model presented in Figure 12 is adapted and enhanced from Boddy's model in Figure 11 (in Section 4). In this enhanced model, sub-processes **create usage incentives and commit the users to the project** have been added to Boddy´s model**.** Objective of the first added sub-process "Create usage incentives" is to create a common interest in the project. Objective of the second added sub-process "Entice users" is to create com-

mitment from the users to the project. Objective of the third added process “Internal release and deployment” is to accomplish managed internal introduction of the new information systems. With these sub-processes the future users are incentivized to try the new information system thus committing the users to the new mode of operation.

Further on, by utilizing the user experiences, a new prototype is developed for use in a selected pilot group, as shown in Figure 13 below.

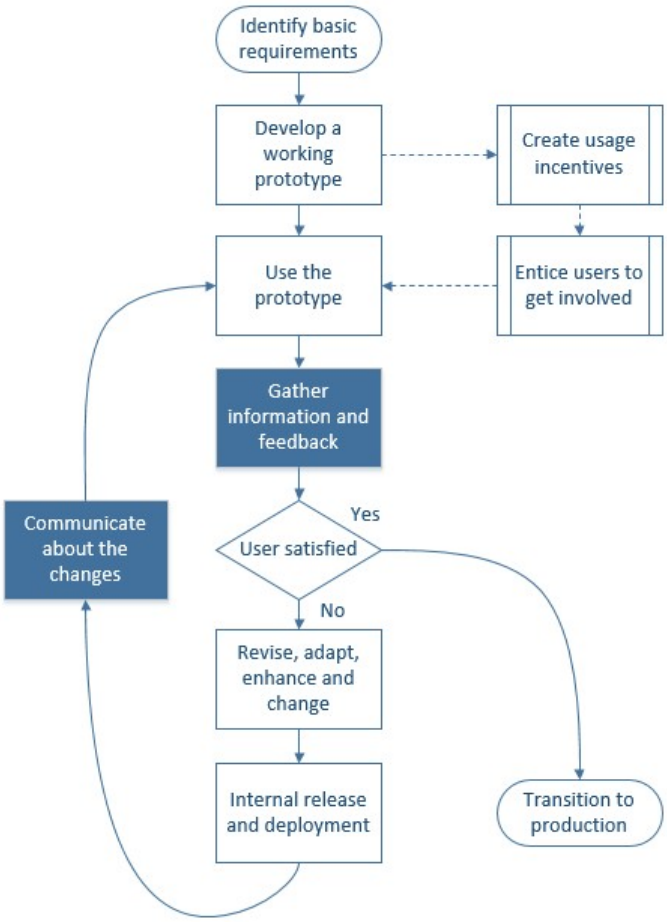

Figure 13. Second iteration of construction model based on Boddy’s model.

A second iteration of model, shown in Figure 13 above, was produced for service construction by further enhancing the model in Figure 13 based on early stage feedback. **A systematic information gathering and feedback process** has been added so that the feedback received from using the prototype can be gathered instead of receiving feedback randomly. Additionally, after the internal release and deployment, there is a new

phase added to **communicate about the changes.** Iterations are done as many times as needed and only when it is at a satisfactory level is it deployed to production environment.

5.2 Discussion on the Proposed Model

The proposed information system construction model supports the case company's main business processes and other operative functions. It also supports the case company's strategy and business goals. This model is not a strategy level model, but a model based on theory of operational models that is discussed on page 12 (Applicable theory chapter 4.1.). The benefits of the model to the business operation are intangible i.e., hard to measure. Intangible benefits gained from the project model are e.g., improvement in internal and external communication, improvement in customer satisfaction and increased operative flexibility. (Boddy et al. 2002: 106-109 and Kaplan & Norton 2004: 54-56 and 58-60.). Dos Santos & Sussman (2000) also note that, in many cases, the benefits are obtained as late as years after the new information system has been taken into production in the organization. Therefore, the benefits cannot be measured instantly at the case company either, instead they will be noted as years go by.

The reiterated release and deployment processes are now also responsible for training the end users and operating staff and circulating information and documentation of the newly deployed release.

6 Validation

This section discusses the results of the validation workshop that was held to validate the proposal that the thesis suggests, starting from the initial findings in the CSA, suggestions from the available knowledge, and up to the proposed model.

6.1 Validation of the Project Process, CSA Results and Approach to Model Building

The initial data about the current ways to operate was verified in the workshop. This included going through the strengths and weaknesses as well as the created project model and its functionality in the IT team of the case company. The list below indicates the items that were generally agreed upon during the workshop.

Table 9. Weaknesses in information system projects.

	Weaknesses in information system projects
1	A standardized project “start phase” missing
2	Missing template (see above)
3	Lack of clear reasoning for the project (Business case)
4	Projects and development are not clearly separated
5	Shared resources with several projects
6	IT management lacking information for prioritization
7	Lack of IT principles and governance

The participants in the validation agreed with the weaknesses identified in CSA. In addition, they pointed to a weakness missing in Section 3.2 which is “the lack of clear reasoning for the project”. The need for the project is not always clearly indicated to the IT team. The projects and developments resourcing is also often unclear, there are no proper guidelines for project scheduling and more importantly for how to prioritize projects. The projects that are presented to the IT team are not prioritized which leads to confusion when trying to schedule different tasks. Lack of IT principles and governance causes inefficiency and additional costs since no common principles to follow.

The participants in the validation also agreed with the strengths identified in CSA. Table 10 below shows the strengths as summarized by the validation participants.

Table 10. Strengths in information system construction projects.

	Strengths in information system construction projects
1	Competent team
2	Team spirit
3	Open and free communication
4	Supportive atmosphere
5	All round expertise instead of specific expertise
6	Excellent suppliers introducing best practices

Three additional strengths were found in addition to the proposed strengths in Section 3.2 Open and free communication expands the team competence. In the theory section 4.2, Løwendahl (2000) suggests that open atmosphere is a key success factor in a service organization because it improves utilization of human resources. Both the team itself and its clients benefit from this perk. A major strength as well is that all the employees in the team have good general knowledge of IT leading to smaller project groups requiring fewer experts of a certain field, especially when meetings are held. This does not mean that people are excluded from projects but to keep meetings efficient. Fewer participants are involved and others briefed and discussed with later. This leads to better optimized projects. More focused expertise to projects is bought from suppliers whose best practices and experience is thoroughly utilized.

Even though part of the strengths seems to be focused on human resources as opposed to project management habits, they were considered essential considering the company policies.

6.2 Validation of the Proposed Model

The participants in the validation session also gave feedback to the proposed model for the information system construction. Table 11 below shows their suggestions as summarized by the validation participants.

Table 11. Improvements found to prototype model process

	Improvements found to prototype model process
1	Prototype model process lacks an “Exit if not working” end route. Model needs a way to end the process when it is seen to be a non-required one, too complicated or demands too many resources.
2	The model needs to specify what an iteration consists of and the recommended duration of iteration.
3	For each process to nominate an owner.
4	In addition, the model needs to display the placement of the document templates that were created in the thesis

The first point that rose from the validation meeting was that there is no specified method to end a project gracefully if it is not coming along desirably. Further on, it was decided that an exit strategy is needed, so that the project would not enter a vague state in which no-one is sure what should be done with the project. Learning from mistakes is easier when the project is ended in decisive manner and the causes for the project’s failure are evaluated.

The second point is the need for further specifying what the iteration consists of and how much time it should take. The iteration needs to be specified more accurately so that the iterations, and therefore the project, can be resourced in sufficient detail.

The third point, to nominate owner for each process, is crucial. The tasks in a process cannot be scheduled with certainty, if a process does not have a nominated owner. In addition, without a nominated owner the process is left in an uncertain state. This leads to incomplete processes and might even lead to unsuccessful projects.

The fourth point relates to illustrating in which parts of the process the templates are used. This helps to guide the project participants to use the templates at the right time.

As suggested in the validation meeting, managing these four points should lead to better managed and organized IT projects. It was noted in the workshop that by adding these features the model can be brought into use. Therefore, these features were included in the model, and the final model based on the feedback is presented in Section 7.

7 Final Model and Templates

This section presents the final project model for information system construction that takes into account the results of the validation workshop. The section is divided into the proposed model and the recommendations for putting it into use.

7.1 Proposed Model and Templates

A final project model has been produced for information system construction by further enhancing the model in Figure 13 based on validation results. The model has changed its shape radically but still provides the same base functions plus the added functions.

As shown in Figure 14 below, the project model starts with **identifying basic requirements** where the project goals are set and defined. The model proceeds from there to **develop a working prototype**, in which an early prototype is created for testing. The two sub-processes, **create usage incentives** and **entice users to get involved**, are conducted to create sufficient interest towards the project in both the test users and the end users. Third and fourth main processes, **using the prototype** and **gathering information and feedback**, are all about testing and gathering essential information about the prototype and how it functions and how it should function when it is released to production environment. The third main process also starts the iterative model, where the prototype is constantly tested and improved upon. The **user satisfied** decision-making process is in a key role as the decision is made to release the information system into production. However, all major faults should be fixed before moving the system into production.

In this final model, the **Change Request** and **Release & Deployment** templates have also been positioned to the model. The templates in either case provide or receive new information to the responsible party of the process. (Importantly, the templates are not intended to be fully filled in before the project has been initiated. But both templates should be fully filled in before the project results are deployed into production). The Templates can be found in Appendix 1 and Appendix 2.

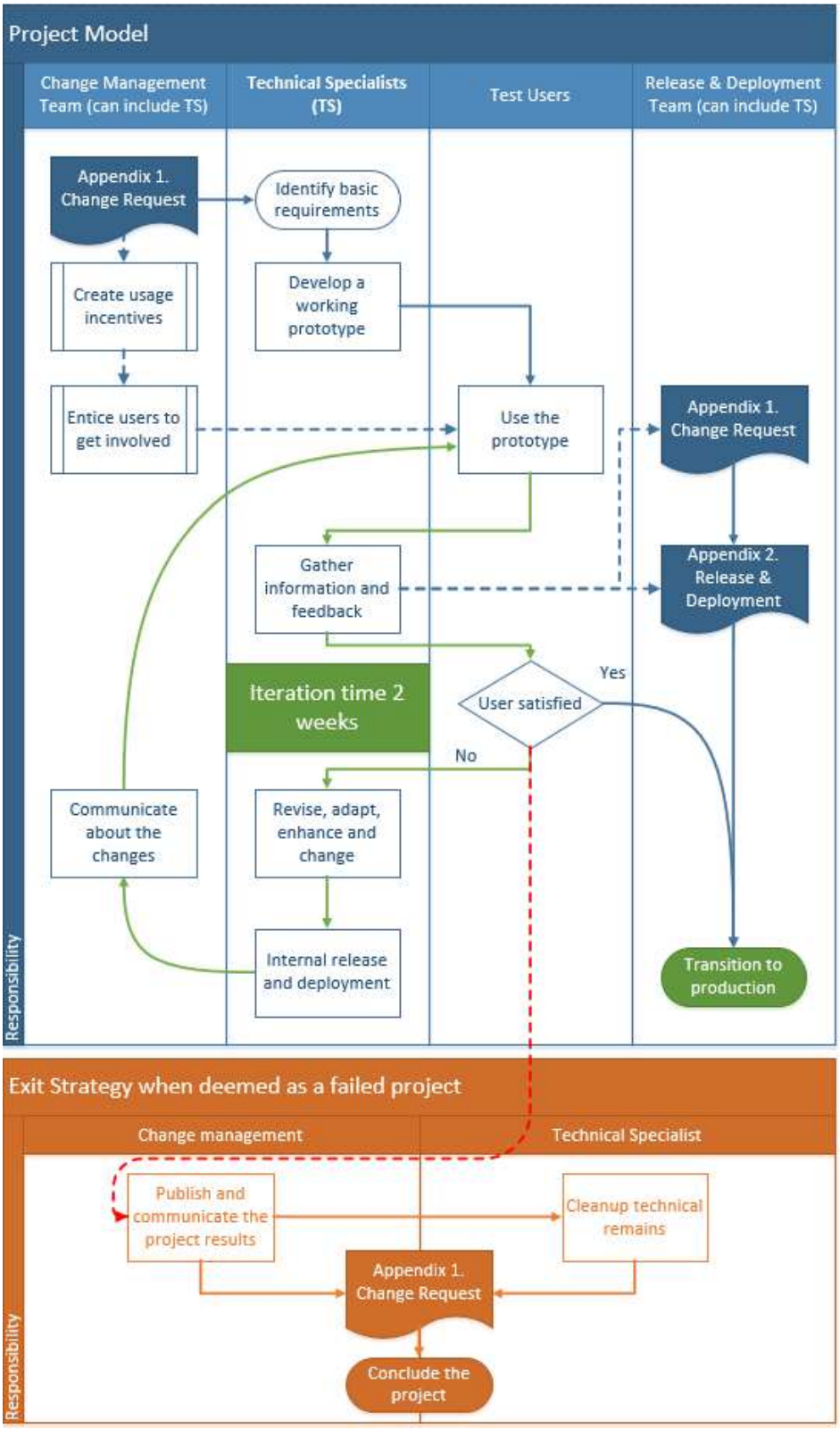

Figure 14. The final project model based on validation.

As shown in Figure 14 above, another change to the final model includes the swim lines. These lines provide a clear view on the different groups of stakeholders which are responsible for relevant processes. In the proposed model, these groups include Change Management Team, Technical Specialists, Test Users and Release & Deployment Team. Change Management Team is responsible for are managerial processes such as communicating with the users, gathering required information for the project and assigning tasks to the Technical Specialists. Technical Specialists are mainly responsible for the technical aspects such as developing, fixing and enhancing the information system. Test Users are responsible for testing and providing feedback about the information system. Release & Deployment Team handle the transition phase processes while moving to production environment.

Importantly, the **Change Management** and **Release & Deployment** can both include the technical specialists as well. Although these groups could include the test users as well, it is highly recommended that most of the test users are not involved in the project. Test users should be separate to catch all kind of issues that the project team might disregard and be blind to.

Next, the green arrows in Figure 14 represent an iteration circle which is now defined as two weeks. This time is more of a guideline than a rule. In the case company two weeks is close to an optimal time to get everything done without having to dedicate all the time for a single project. This amount of time also takes into account possible support requests from third party suppliers. If all the development would be done in house, the time would be adjusted to a week.

Another important change to the final model includes adding the **Exit Strategy**. The previous model did not include any options for an exit strategy i.e., to graciously fail a project. There are many reasons for including an exit strategy of which the most important to the case company are described in Table 12.

Table 12. Reasons for implementing an exit strategy (as summarized from CSA and validation discussion).

	Reasons for implementing an exit strategy
1	Encouraging innovativeness.
2	Reduce the fear of failure.
3	To decrease wasted time by trying to make a “good in theory, bad in practice” to work.
4	To remind that there are many solutions to problems. Choose the one that works best.

In this final model, the exit strategy was implemented to inspire innovativeness. The case company encourages the introduction of new modes of operation. Since the fear of failure harms the project’s efficiency and innovativeness, the goal is also to mitigate and reduce the fear of failure. The increased innovativeness easily leads to increased number of failures. The fear of failure often comes from the tight schedules which require success on the first try. With this fear being taken offline, the exit strategy enables bolder solutions. Often the ideas in the planning phase seem better than what they are in reality. What might sound good when planning the project, may not work in practice at all. Therefore, the plan should either be changed or the project should be stopped if the solutions do not seem work as intended in the context. These concerns are not taken into account in the final model, by introducing the exit strategy.

7.2 Recommendations for Taking the Model into Use

Base on the results of this study and the validation session, there is a number of recommendations that need to be taken into account, if the company plans to put this model into use at some point in the future.

First, in order to make the information system implementation projects successful in the case company in the future, cooperation between internal stakeholders needs to be enhanced. The IT operations should be taken into the project at an early phase according to the new operation model, and the business unit should specify the user and IT operations’ requirements co-operatively. Overlapping does not occur when the operation is transparent and the changes are properly communicated.

Second, IT system implementation requires good communication, documentation and clearly allocated responsibilities. The created templates, provided in Appendix 1 and 2, include the tools to provide one common approach to deploy information systems which ensures clear and consistent deployments. By including the future users in the testing process from the beginning, it can be ensured that the user requirements are taken into account.

Third, careful documentation for future projects could make it certain that similar projects are not made on unnecessarily. Such documentation can also be used for training and more effective communication in the next coming projects. Moreover, in this case, the training and communication material can also be found in one place.

Fourth, regarding the deployments of information systems, the deployments can be made step by step with a small pilot group which allows rapid customization of the system in an early phase to serve the future users better. Additionally, in this case, the risk of production being stopped because of a bug in software is avoided as the pilot group is testing the software beforehand instead of suddenly releasing the full information system to the whole company.

Finally, the information system can naturally also be deployed to all users at once if it is deemed to make sense for instance due to small target group.

8 Summary and Conclusions

This thesis focused on constructing the project model for the information system for use in the case company, developed on the example of building a communication system. The current key challenge of the study was to successfully implement and deploy the IT system in the company. In this thesis, an IT system for communication has been selected as a focus for development. The need for such a project model arose since previous IT implementation projects have not always been successful.

The main objective of the thesis was to create **a tailored project model for information system construction**. Such a model could be used as a daily tool to use and be seen as an important part of the processes. The **outcome** of the thesis is a **project model with the necessary templates** for new information system constructions and implementations. This model was developed based on the theory covered and own experience of the researcher in construction of an Information system in a live production environment.

To achieve this goal, this thesis investigated different project models in order to choose and create one to fit the IT management of the case company, developed on the example of one real life project. Project models were evaluated from several viewpoints and relevant theory was used to first choose a general model that fitted the purpose best. Based on the insight form the theory, Information system construction was found to be a complex topic which consists of multiple phases that often intertwine. To simplify, information system construction consists of planning, testing, releasing and in the end transitioning from an old information system to a new one. Based on suggestions from the available knowledge, the proposed project model was positioned in between the specification and the transition phases.

In addition to the available knowledge, the study also investigated the current state of constructing information systems in the case company. A workshop, where the current state of the case company was analyzed, was held to gain a better understanding of what kind of development needs were required. It was discovered that the case company lacks a common operating and documenting model for information system implementation projects. Lack of a common model means that every project is done differently, leading to different problems such as varied level of documentation, solving the same problems over and over and unstructured project implementation. In addition to the lack of

models, it was observed that the co-operation between business units and the IT management was lacking when acquiring new information systems. This combined with the scarce IT management resources causes multitude of problems such as lack of knowledge of the new systems and even more scarce resources that is caused by the inefficient knowledge transfer and poor documentation. Because of these problems, a common model was seen as a logical objective to be implemented.

From the literature, Boddy's "system development by prototyping" model was selected for further development, so that to serve as a basis for the project model. In the development stage, this model was enhanced and reiterated to tailor it to the case company's IT governance and fit to the full information system implementation process.

As a result of this study, the proposed project model includes 14 steps including the exit strategy, when the iteration is performed once. Each iteration adds six repeated steps. The model is built as a flow chart that includes swim lines that describes the stakeholders who are responsible for the processes. The model includes stakeholders which are the Change Management Team, Technical Specialists, Test Users and Release & Deployment Team. The client and other possible stakeholders are left outside the model but should be taken into account as well, but are outside of the scope of the model, as they cannot be held responsible for any of the processes. The model includes information gathering, communication, development, test use processes and iterative enhancement process cycles and the transition process as the goal of the model.

Additionally, the proposed project model also includes two templates to use with the model. The first template includes change management requirements and the second one release and deployment requirements. The two templates and the model together are tools to make sure that all parties involved in the deployment process as well as the ones that are directly affected speak the same technical language, provide the necessary information and take the necessary steps to complete the deployment so that the followed processes will start without unnecessary complications.

Moreover, some other important findings were made in the course of the study. First of all, it was revealed that mixed terminology used between different processes of development, IT administration and IT management in a project makes communication difficult. This can be seen when developers and system administrators work together on different

projects. To overcome this difficulty, in the future one must make sure that all parties use the same definitions. This is one of the main reasons why different frameworks, like ITIL, have been developed. Other recommendations based on the results include enhancing the co-operation between stakeholders, communication and documentation practices, allocating responsibilities distinctly, addition of pilot groups and utilizing the information systems that have been introduced where possible.

The proposed model was validated with the key stakeholders from both management and technical level in the IT management department. These stakeholders validated both the research process, results of the current state analysis and the proposed model, with some corrections and further suggestions. For example, the lack of exit strategy and iteration time. For the exit strategy they suggested that a specific way to end an unsuccessful project should be created in the event that the project is found to be unqualified in some crucial way. The target iteration time was decided together to be two weeks.

In conclusion, this project model for information system construction was created to bring structure to a growing company where the border of strict processes and models are becoming more important in the future as the company grows. This is to avoid complications while the company grows and information needs to be more structured. It is not meant to be an end all be all model, but more of a stepping stone in a growing company.

The weakness of the model is that it is not self-explanatory to use. It is not a tool that can be handed to a new employee and expect that it is fully understood right away. The same weakness is with the templates. One should expect a lot of questions when these kind of models and templates are introduced as tools, such as “why must we fill these templates, isn’t it unnecessary work?” and so on. One cannot expect that everyone can grasp the added value of the model at once. However, there are no simple models or solutions for information system construction available and in general they are meant for professionals and require education before implementation.

Additionally, one has to take into account that the model is not intended to be directly used as it is, but rather as a general guideline. If the model had to be followed strictly, the project would lose most of its fluidity, or smooth and easy flow. This flow can be considered more important than strict processes in small and medium sized companies. In very large companies the case would be the other way around, as the strict processes

become more important to keep the big picture as sensible as possible. In large companies, the same information is needed by many employees in contrast to smaller companies where only a few need the information. Therefore, in smaller companies the information does not need to be packaged as tightly into the processes as in larger companies.

Thus, as a result of this study, a project model for the construction of information systems has been created in accordance with the IT strategy of the case company. The project model created is a part of the IT governance that has been set as one of the main objectives of the IT the strategy. The project model in Figure 14 makes the proposal to the IT management of the case company to be introduced for the construction of new information systems. In the future, after gaining more experience in using the model, it can be further enhanced.

References

Alter, Steven. (1999). *Information Systems: A Management Perspective.* 3rd ed. Reading, MS, USA: Addison-Wesley.

Bhatia, Ashu. (2012). *Value Creation: Linking Information Technology and Business Strategy*. Dallas, Texas: Brown Books Publishing Group.

Blomkvist, Susanne. (2012). *Lean för effektiv kommunikation: En femstegsmodell för långsiktigt språkarbete.* Stockholm: Prodicta.

Boddy, D., Boonstra, A & Kennedy, G. (2002). *Managing Information Systems: An Organisational Perspective.* London, England: Financial Times Prentice Hall.

Boddy, D., Boonstra, A. & Kennedy, G. (2005). *Managing Information Systems: An Organisational Perspective.* 2nd ed. Harlow, Essex, England: Pearson Education Limited.

David, Werner. (1995). *Managing Company-Wide Communicaton*. London: Chapman & Hall.

Dos Santos, B. & Sussman, L. (2000). Improving the Return on IT Investment: The Productivity Paradox. *International Journal of Information Management,* 20: 6, 429–440.

Flodén, Jonas. (2013). *Essentials of Information Systems*. Lund, Sweden: Studentlitteratur AB.

Gupta, Uma G. (1996). *Management Information Systems: A Managerial Perspective.* Minneapolis. St. Paul: West Publishing Company.

Haikala, I. & Mikkonen, T. (2011). *Ohjelmistotuotannon käytännöt*. 12th ed. Helsinki: Talentum.

Haikala, I. & Märijärvi, J. (2006). *Ohjelmistotuotanto.* 11th ed. Helsinki: Talentum.

Hirsjärvi, S., Remes, P. & Sajavaara, P. (2004). *Tutki ja kirjoita*, 10th ed. Helsinki: Tammi.

Haverblad, Angelica. (2007). *IT Service Management I praktiken*. 2nd ed. Lund: Studentlitteratur AB.

ITIL Perustason käsikirja. (2013). London, England: TSO.

IT-strategia (2013). IT Strategy of the Case Company. [Company internal document], unpublished.

Johnson, J. David. (1993). *Organizational Communication Structure.* Norwood, NJ: Ablex Publishing.

Johnson, G. & Scholes, K. (2002). *Exploring Corporate Strategy*. 6th ed. Harlow, Essex, England: Pearson Education Limited.

Kaplan, R.S. & Norton, D.P. (2004). Strategiakartat: aineettoman pääoman muuttaminen mitattaviksi tuloksiksi. Helsinki: Talentum.

Karimi, J., Somers, T.M. & Gupta, Y.P. (2001). Impact of Information Technology Management Practices on Customer Service. *Journal of Management Information Systems.* 17 : 4, 125–158.

King, W. R. & Teo, T.S.H. (1996). Key Dimensions of Facilitators and Inhibitors for the Strategic Use of Information Technology. *Journal of Management Information Systems.* 12 : 4, 35–53.

Kouhi, M. (2013). Tuottava IT. Helsinki: Helsingin seudun kauppakamari / Helsingin Kamari Oy.

Laamanen, K. (2001). Johda liiketoimintaa prosessien verkkona. Helsinki: Laatukeskus Excellence Finland.

Lönnqvist, A. & Kujansivu P. (2005). Aineettoman pääoman johtaminen tietointensiivisessä palveluyrityksessä. In: *Tietointensiivinen palvelutoiminta, Näkökulmina kompleksisuus ja tiedonhallinta,* 55–73. Toim. Marjatta Maula & Mirva Peloniemi. Tampere: Tampere University of Technology and University of Tampere.

Løwendahl, Bente R. (2000). Strategic Management of Professional Service Firms. 2nd ed. Copenhagen: Handelshøjskolens Forlag.

Markus, M.L. & Benjamin, R.I. (1997). The Magic Bullet Theory in IT-Enabled Change. *MIT Sloan Management Review,* 38 : 2, 55 – 68.

Ojasalo, K., Moilanen, T. & Ritalahti, J. (2009). Kehittämistyön menetelmät: uudenlaista osaamista liiketoimintaan. Helsinki: Sanoma Pro.

Ojasalo, K., Moilanen, T. & Ritalahti, J. (2014). Kehittämistyön menetelmät: uudenlaista osaamista liiketoimintaan. Helsinki: Sanoma Pro.

Poertner, S. & Miller, K. M. (1996). The Art of Giving and Receiving Feedback. Amer Media.

Runebjörk, I. & Wendleby, M. (2013). Lean med hjärta och kreativitet: om autentiskt ledarskap och kommunikation. Stockholm: Ekerlid.

Salmela, H., Hallanoro, M., Sippa, S., Tapaninen, T. & Ylitalo, J. (2010). Ketterän orgaisaation IT. Helsinki: Talentum Media Oy.

Yin, R.K. cop. (2014). Case Study Research: Design and Methods, 5th ed. Los Angeles: SAGE.

Appendix 1.

Change Management Template

Change Management (CM): Project/Change/RFC X

General details

Project ID: XXXXXX	
Date of submission	*dd/mm/yyyy*
Owner of the Change	*Person responsible for the implementation*
Initiator of the Request for Change (RFC)	*Person that initiated the RFC*
Proposed Change priority	*Initiators proposed Change priority, assessed later by CM*
Reference to Change proposal	*If the Change has a related Change Proposal*

Description

Summary

A brief summary of the change

Business case

- *Reason for the change*
- *Costs*
- *Benefits*
- *Consequences if the Change is not implemented*
- *References e.g. to a problem record triggering this RFC*

Effects on

Business areas

List of business areas known to be affected as well as the ones that might be affected

Services

List of services known to be affected as well as the ones that might be affected

IT infrastructure

List of IT infrastructure known to be affected as well as the ones that might be affected

Technology

Is new technology being introduced?

What technology is used?

Risks

Risks during the implementation

Identified risks

List of identified risks

Counter-measures

Reversion procedures and other counter-measures

Back-out strategy

Back-out strategy described in required detail

Time schedule

Required personnel resources

Which areas of expertise?

Estimated work effort for the required personnel resources

*In person work days **(PWD)***

Cost estimate

Estimate of costs

Itemized for bigger Changes

Budget

Statement as to whether a budget is allocated and cleared for this Change

Additional supporting documents

If applicable, index of additional supporting documents

Approval or rejection

Approved / Rejected	
Date	*dd/mm/yyyy*
Person/body in charge of the approval	
Change reviewers	
Priority assigned by Change Management	
Restrictions	
If applicable, reasons for rejecting the RFC	

Appendix 2.

Release and Deployment Template

Release & Deployment: Project/Change/RFC X

Initial deployment plan

List of planned and running deployments

Listing all planned and running deployments to make sure that critical deployments do not overlap. All deployments should fit to a time that makes practical sense i.e. deployment of a file server before file sharing system.

Contents and description of deployments

Contents of the deployments should be listed and described so that the manager can keep track of change requests and time tables as well as plan future requirements with the executive committee.

Planned implementation date and short description of phases

Timetable should be as accurate as the change/project requires

Implementation phase

Timetable for development, configuration and other phases before testing phase

Test phase

Test phase timetable. Test phase and implementation can happen multiple times and dates should be specified for known phases and phases that might be required

Deployment

Deployment phase. Rollouts, fixes, initial support etc.

Other phases that might be required

Other specific phases that the change/project requires

Deployment checklist

Initiator of the change or request for change (RFC)

Who initiated the change or request for change? The change needs an internal client to be worth doing

Reason for change

Reason description and details that call for a change

Requirements

Technical specifications, human resources and other requirements

Effects upon

What systems, processes and other units does the change effect

Business areas

Core processes that are effected, processes that make the business valuable

IT Services

IT services that are effected, the services that IT operations provide for business units

IT Infrastructure components

IT infrastructure components that are effected i.e. the ones that make IT services and core processes functional

Service suppliers

External service providers that might be effected and need to be notified

Persons in charge of implementation

Owner

Owner

Assisting

Assisting persons

The persons in charge of implementation. Named persons need to be chosen, so that the questions regarding the implementation go to the right persons. In addition, like with all processes, implementation process requires an owner.

Present progress of the release and deployment

Current state of the release and deployments.

Task list, that include both the completed tasks as well as the tasks to be done

- *Task 1*
- *Task 2*
- *Task 3*

Appendix 3

Summary of Theory Issues

Theory chapter	CSA	Issues	Impact on solution
4.1 How ICT supports business and strategy	1 3 5 6	Companies and organizations use information systems to support, enhance and optimize their operation. Added value created for client is created in company's value chain which is built on business processes. (Gupta 1996) ICT solutions should support realization of organizations strategy. (Gupta 1996) Classifying the information system as strategic or operative is determined by what is achieved with the information system. (King & Teo 1996) Business strategy proceeds from current state and takes into account the client requirements and expectations and interacts with ICT strategy process. (Boddy et al. 2002) Benefits gained from IT technology can be divided into tangible and intangible benefits. Intangible assets rarely produce economical wealth directly but it rather has an indirect effect upon it through complicated causations. (Boddy et al. 2002; Kaplan & Norton 2004) In many cases the benefits are obtained as late as years after the new information system has been taken into production in the organization. This issue is known as technological productivity paradox phenomenon. (Dos Santos & Sussman 2000) ICT leadership conventions are different in between organizations. ICT creates and maintains service providers' competitive advantage and helps to improve client service. (Karimi et al. 2001)	A simple and clear prototype model, that fits a small or medium sized organization, was chosen as the starting point for the project model. The IT department produces the support services for the operative departments. The lacking guidance and operating models was discovered with the help of the current state analysis. The simple and clear operative models enhance the productivity. Productivity creates competitive advantage and ultimately creates added value to the client.
4.2 Characteristics of service organizations	1 2 3 4 5	Critical success factors are the service organizations operating processes, human resources and the professional competence, credibility, assertiveness and productivity. (Løwendahl 2000)	The internal flow of information is a critical success factor for a service organization. The

Theory chapter	CSA	Issues	Impact on solution
	6	The success of an information intensive service organization is dependent on intellectual capital and its management. Management of intellectual capital, and management of information intensive service organization is complicated. Therefore, a versatile information system is required to support the management. (Lönnqvist & Kujansivu 2005) The ability to implement small changes quickly is very central to the practice of organizations in which business processes are changing rapidly and are closely tied to IT services. The ability for continuous minor development is at least as important mutual skill as implementation of large projects. (Salmela et al. 2010)	project model was developed into a more communicative direction, which enables it to serve the IT department better. The case company and its IT department can be classified as a small or medium sized organization and therefore agility is vital to productivity, speed of service and quality.
4.3 Service implementation	1 3 4 5	Implementing a new information system is not only a technical task. Old business processes need to be reengineered. Business process reengineering is about rethinking and redesigning, so that the processes fit together with the new information system. Big part of the costs generates from the re-engineering when the organization and business processes are customized to the new information system, learning the new opportunities and training the users to use the new system. (Flodén 2013)	By creating a new model, the business processes are enhanced, the employee commitment will increase and the productivity increases.
4.3.1 Challenges in implementation of information systems	1 2 3 4	Some of the information system projects fail. Causes for failure are many. ICTs short history and culture, which has lasted only for few centuries, does not provide such fundamental experience that there is with other older fields of study. (Haikala & Märijärvi 2006) Human resources are in a key position. Utilization of new technologies requires versatile and advanced expertise in many areas of knowhow. (Boddy et al. 2005)	The created project model acts as a basis for the continuous development. The new model also notes the failed projects and enables learning from the mistakes made in the previous projects.
4.3.2 The external and internal context of change	3 4 5	Many external and internal factors of the organization effect on the implementation of an IT system. Also the success of past ICT projects has its own impact on the success of the new project. (Boddy et al. 2005)	The new model takes into account the failed projects and provides means for the organization to learn from the mistakes it has previously made.

Theory chapter	CSA	Issues	Impact on solution
4.3.3 Critical factors of information system projects	1 2 3 5	The first things while planning the project is to consider the objectives and constraints of the project. (Haikala & Märijärvi 2006) Project planning consists of organizing, focusing the objectives, analyzing the risks, choosing the technology and working methods to be used, designing the support functions, dividing the project into parts as well as scheduling the parts. The project plan is a tool to track the projects implementation. With it, it is possible to see the possible discrepancies and deviations in the projects timetable or in the use of resources as early as possible. (Haikala & Märijärvi 2005) Initiation of the project is a critical phase. The project participants need to know immediately in the initiation phase that they are part of the project. (Haikala & Märijärvi 2005) When the project ends, it is important to gather the key figures for the future projects: how did the workload and time estimates hold, amount of changes in definitions, error count in testing etc. (Haikala & Märijärvi 2005)	The created model pays attention to the importance of planning, the objectives and highlights the importance of the launch of the project. The endings of both successful and failed projects are also recorded.
4.3.4 Project stakeholders and organizational communication	1 2 5 6	Stakeholders are persons and groups that have their own interests in the project and can affect the end result of the project. (Boddy et al. 2005) All stakeholders can not necessarily be recognized but the most important ones should be recognized in early stages of the project. (Haikala & Mikkonen 2011) Software production is typically organized as projects. The information system is implemented in the project on the basis of the client's specified requirements. A client's needs are commonly fulfilled the better the more precisely the client's requirements are taken into account. On the other hand, the more customizations are made to the client's information systems the more administration is required. (Haikala & Mikkonen 2011)	Several phases are created to the model which take into account the future users and other stakeholders opinions and user experiences. The end user is interviewed before the start of the project. The clients (end user) opinion and experience is noted on multiple phases. This commits the user and eases the system introduction. The model emphasizes the taking into account the objectives and views of the future users and stakeholders.

Theory chapter	CSA	Issues	Impact on solution
		Information based technologies problem is that the typical IT management often does not see the information technologies as a service. Instead, IT is managed as administrative routines and the internal efficiency and costs are the main criteria. (Bhatia 2012) Project failures are generally dependent on already familiar reasons: lack of user input, incomplete requirements and specifications, changing requirements and lack of executive support. (Bhatia 2012) Software installation and preparation for operation are important, but is only half of a successful project. The other half is about change management and reorganizing work habits and processes so that the system will be used efficiently. (Kouhi 2013) Change management is mainly about communications and every significant project plan should include a communications plan. Continuous and planned communication are the cornerstones of good change management. Users, management and other stakeholders important to the project are to be kept informed about the progress of the project. (Kouhi 2013) Good information flow and communication are indispensable to organizational operations. The communication between stakeholders and project management needs to be verified to ensure success of a single project. (Runebjörk & Wendleby 2013; Blomkvist 2012) Stakeholder relationship management is about client and supplier relations management. Stakeholder relationships are also a resource to the company or internal functions. The relationships can be divided into different maturity levels and the target maturity level is based on what the both parties want to achieve with the relationship. This includes the relationship between core functions and IT functions. Bad internal client relationships have an effect on external relation. (Haverblad 2007)	The starting point is to serve users and benefitting the organization by increasing productivity. The model tries to avoid potential problems in advance by engaging users and managers and other stakeholders in start-up phase of the project, or before it. Change management and the importance of the information flow of knowledge-intensive expert organization have been the guiding principle in the development of the model. The model developed emphasizes the importance of communication and interaction among the project management and stakeholders.

Theory chapter	CSA	Issues	Impact on solution
4.3.5 Models of information systems development	1 2 3 5	Software development and life cycle can be divided into different stages and it can be described with a flowchart. The most common flowchart is the so called waterfall model. (Boddy et al. 2005) In addition to waterfall model other common lifecycle models include prototype models and different incremental models like so called evolutionary delivery model. Prototype model is meant as a working model in which some of the product features are tested before building the product. Prototypes are suitable particularly for testing solutions that require new technical features or when the client requirements are unclear. (Haikala & Märijärvi 2006) Prototyping has been proven to be especially handy when user interfaces are being specified. Additionally, performance analysis prototypes are useful when the final system is being tested with simulated workloads for new technical solutions on beforehand. (Boddy et al. 2005; Haikala & Märijärvi 2006) Application of EVO and spiral models application can be regarded as RUP process (Rational Unified Process). It is based on sequential iterations where every unit forms its own small waterfall model: client requirement specification, planning, implementation and testing. (Boddy et al. 2005; Haikala & Märijärvi 2006)	The prototype model was elected as a starting point rather than many heavier options. Speed and agility are the main arguments. The prototype model is suitable for the case company, because the needs of the users are well known and it is possible to quickly organize a test case and the results can be reliably used.
4.3.6 Service transition in ITIL	1 2 3 5 6	ITIL is a set of concepts and practices (a framework) for IT services management, development and operations. (Bhatia 2012) The ITIL service transition includes a description of service knowledge management system (SKMS) that supports the organization's learning and helps to enhance the efficiency of all of the phases. SKMS supports decision making and enhances service management. (ITIL 2011) ITIL service transition includes development and enhancement frameworks	The model includes three phases: design, validation and deployment.

Theory chapter	CSA	Issues	Impact on solution
		for the kind of capabilities, which enable the transition of new and changed services to supported environments. (ITIL 2011)	