Lappeenranta University of Technology
Faculty of Technology Management
Department of Industrial Management

DEVELOPMENT OF IT SERVICE MANAGEMENT IN A LARGE INTERNATIONAL COMPANY

Supervisor Professor Risto Salminen
Examiner Professor Hannele Lampela

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Kai Lempinen

ABSTRACT

Author: Kai Lempinen

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The purpose of this Master's thesis is to examine the IT Service Management (ITSM) capabilities of a large international company and develop a design for the IT Service Management of the company. The thesis consists of two parts: a literature review and a case study. The first part is the literature review. It examines different aspects of IT Service Management. The purpose of the literature review is to increase the credibility of the case study. In the case study, the IT Service Management of a large industrial company is assessed, and an improved design for IT Service Management is created. The services are limited to common IT services, and management is limited to operative management. To assess and develop the case company's IT Service Management, the IT organization and its ITSM capabilities are analyzed, and on the basis of the analyses, an improved IT Service Management model is created.

As a result of the analyses, it was found out that the management of the IT organization is function-oriented. Therefore, the organization needs a management model that breaks the functional borders and brings services to the center of management. The designed model aspires to achieve this by defining IT services and modeling management processes from the service perspective.

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Diplomityön tavoitteena on arvioida ja kehittää suuren kansainvälisen teollisuusyrityksen IT-palveluhallintaa. Työ koostuu kahdesta osiosta: kirjallisuuskatsauksesta ja case-tutkimuksesta. Ensimmäinen osio on kirjallisuuskatsaus. Siinä tarkastellaan IT-palveluiden hallintaan liittyviä asioita. Osion tarkoituksena on lisätä case-tutkimukseen uskottavuutta. Case-tutkimuksessa tutkitaan miten case-yrityksen IT-palveluita hallitaan ja miten niitä voidaan hallita paremmin. Palvelut rajataan konsernin yhteisiin IT-palveluihin ja niiden hallinta operatiiviseen palveluhallintaan. Case-yrityksen IT-palveluiden hallintaa arvioidaan ja kehitetään kirjallisuuskatsauksessa esitettyjen toimintatapojen mukaisesti. IT-organisaatio ja sen palveluhallinta kyvykkyydet analysoidaan ja analyysien perusteella organisaatiolle luodaan IT-palveluiden hallintamalli.

Analyysin tuloksena ilmeni, että organisaatiota on johdettu toimintolähtöisesti. Näin ollen, palveluiden hallinnan kannalta organisaation tärkein tavoite on rikkoa yksiköiden väliset rajat ja ohjata toiminta palvelulähtöiseksi. Luotu hallintamalli pyrkii tähän määrittelemällä palvelut ja kuvaamalla organisaation hallintaprosessit näiden palveluiden näkökulmasta.

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LIST OF ABBREVIATIONS & ANNOTATIONS

CI = Configuration Item

CMS = Configuration Management System

CMDB = Configuration Management Database

CMMI = Capability Maturity Model Integration

COBIT = Control Objectives for Information and related Technology

Common IT service = IT service that is available for all customers

IT = Information Technology

ITIL = Information Technology Infrastructure Library

ITSM = Information Technology Service Management

itSMF = information technology Service Management Forum

Key User = Support person in IT related issues

Known Error = An error that IT organization has identified and documented

OLA = Operating Level Agreement

PIR = Post Implementation Review

SLA = Service Level Agreement

TCO = Total Cost of Ownership

UC = Underpinning Contract

Value-supporting = Something that supports value creation

Value creation = Creating value by generating it or by emergence of it

WIBAS = WIBAS GmbH

1 INTRODUCTION

1.1 Background

Role of IT organization has expanded fast since the breakthrough of internet. Amount of information available for companies has grown and therefore also the administration of this information demands ever larger resources and investments. In the 21st century more and more companies have acknowledged that management of Information Technology needs to advance as the role of IT has grown larger and become more complex.

Different kinds of governance models have been developed to ease management of IT. Primary objective of these models is to increase manageability and transparency of IT organization. Governance models define how IT organization should be strategically and operatively managed. Many of the governance models are based on managing IT organization as a service provider. This kind of service-oriented management paradigm is called IT Service Management.

IT Service Management paradigm has existed for more than twenty years. However, fast development of IT environment has required extensive development of the paradigm that consequently has led to a lack of up-to-date case studies of IT Service Management development. This thesis is a case study of the development of IT Service Management based on a large international company.

1.2 Research objectives and limitations

Objective of this thesis is to assess and develop design for management of internal IT services of a large international company. Objective is limited to assessing and developing operative management of IT, as strategic management is on high level and development of operative management is believed to better utilize the potential of the IT organization. The scope of IT services is further limited to common IT services, which means IT services that are available for all employees of the corporation. Services are limited to common services as biggest benefit is ex-

pected to retain from developing them and development of services is easier to start from a manageable amount of services.

Research questions are:

1. How are the common IT services managed?
2. How can these services be managed better?

In the first question the purpose is to identify what kinds of services are provided and after that analyze management of these services. In the second question improvement suggestions for management of these IT services are sought

1.3 Research approach

Research approach is explained with the help of process chart in figure 1. The figure splits the structure of the report into phases that require different approaches. Input of the research is on the top level, actions on the second level and outcomes are on the bottom level.

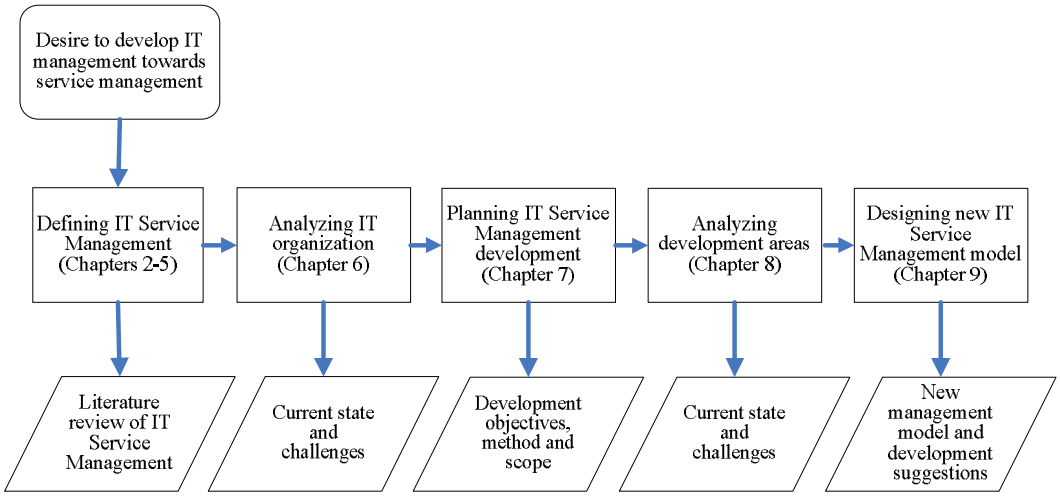

Figure 1. Thesis structure as a process

First of all the case company acknowledged desire to develop IT management towards service management. This was the input for the thesis. After that the researcher oriented himself towards IT Service Management and a literature review of the subject was created to attain comprehensive understanding of the field and

increase credibility for the case study. The literature review is based on academic studies, business studies and other relevant literature and information of IT Service Management. It contains three parts: IT management, service management and process management. IT management defines how IT should be managed. As explained later on IT Service Management paradigm is about managing IT organization with service and process management methods, therefore full chapters of service and process management are included in the literature review.

After the literature review the IT organization is analyzed. Data regarding the IT organization is gathered from interviews, workshops, observations and available company documents. With the help of the analysis and the literature review, plan for IT Service Management development is created. This plan contains objectives, method and scope for the development of IT Service Management capabilities.

After the plan for IT Service Management development is created, initial development areas are analyzed by gap analysis to clarify its current state and challenges. The gap analysis compared IT organizations IT Service Management capabilities to best practices of the field. Benchmark data for the analysis is covered in chapter 8.1 Industry best practices are gathered from academic and business studies, and from other relevant literature. After the benchmark data was gathered gap analysis was executed. For identifying the gaps between current state and industry best practices, interviews and workshops were held with strategic and operational management of IT organization as well as IT staff. Outcome of the analysis is broken down in chapter 8.2.

Based on the development objectives, gap analysis and theories introduced in the literature review, design improvements for IT Service Management are suggested in chapter 9. Also at this stage, IT management and staff were consulted. Finally, in chapter 10, results of the study are briefly explained and evaluated, and recommendations for further development and research are given.

1.4 Case company

The case company is a large international industrial company. Company's line of business is steel based component and raw material production for construction and engineering industries. It has operations in over twenty countries, mostly in northern and eastern parts of Europe. The annual turnover is around four billion euro and employee count around 15 000.

Company's strategy is to focus on profitable growth in the core markets in Nordic countries and Eastern Europe, based on the strong expertise and well established position. Strategy is stressing profitability in all operations. According to the strategy, product portfolio has been differentiated from major European competitors by focusing on more developed products and solutions, rather than commodity steel products.

2 IT MANAGEMENT

2.1 Strategic and operative management

IT management has two aspects: strategic IT management and operative IT management. Strategic IT management is based on the issue of how enterprise can create added value by using information technology. It includes areas like strategic planning and IT service portfolio management. Operative IT management is based on optimizing effectiveness and maximizing efficiency of IT operations to fulfill business demand as precisely as possible. (Buchta et al. 2007, p. 5, 84) Figure below describes how IT organization affects the enterprise. It has two objectives enabling value-creating activities and decreasing costs.

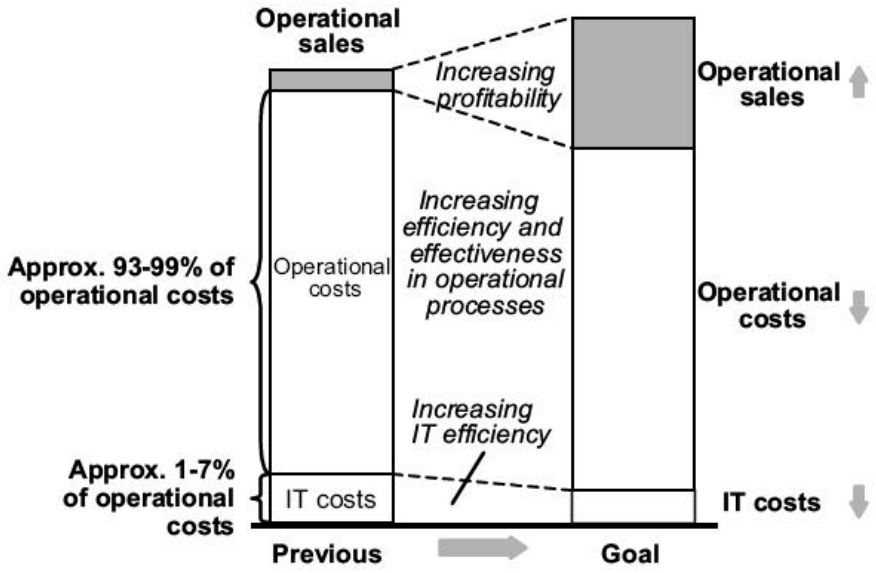

Figure 2. The value contribution of IT (A.T. Kearney)

2.2 IT governance

Traditionally IT has been perceived as a function that improves efficiency of business processes by automating manual activities with inward focused IT activities. IT organizations have been traditionally built around information technology that corporations have obtained. Since the breakthrough of internet the amount of information available for companies has exploded. Therefore also the role of IT in business has grown, new technologies have been adopted at a fast pace and the

headcount of IT organizations has grown. As a result of IT organizations development around technologies, they have become complex and difficult to manage. Nowadays, IT organizations offer business critical services and manage some of the biggest investments of companies. These activities are often run without clear financial definition what is to be attained for the invested money, whether it is a development project or maintenance task. (Debreceny & Gray 2009, p.8) This non-transparency hampers companies' assessment of performance of IT organization. As a result of difficulty to manage IT and its grown importance for business, governance frameworks for IT have gained popularity. (Ernest & Nisavic 2007, p. 387-8; Brenner et al. 2006, p. 133).

IT governance is an extension of the enterprise governance. Primary objective of IT governance is to define how IT organization should be strategically managed. It may also determine how operative management should be executed. Eventually it should specify how demand and supply of IT are organized (Buchta et al. 2007, p. 5, 84). Handful of different kind of IT governance frameworks has been designed. Effective application of a framework is responsibility of board of directors and executive management. (ITGI 2009) The frameworks have lots of similarities, like applying process management principals. (Brand & Boneen 2004, p. 18-35, ITSMF-NL) The most popular IT governance frameworks, according to study carried out by Debreceny and Gray (2009) are ITIL and COBIT. ITIL is an abbreviation of Information Technology Infrastructure Library developed by United Kingdom's Office of Government Commerce and COBIT is an abbreviation of Control Objectives for Information and related Technology. It is a framework developed by the Information Systems Audit and Control Association (ISACA), and the IT Governance Institute (ITGI). Basic principal of these frameworks is that IT organizations have human, software and hardware resources bound together by policies and procedures. (Debreceny & Gray 2009, p.2).

IT Service Management (ITSM) is a service-oriented approach to IT governance. ITIL is the de facto standard for IT Service Management (Behr & Spafford.

2004). IT Service Management is a management approach in which IT services are managed by set of management processes.

2.3 Fundamentals of IT Service Management

It is generally accepted that IT organizations are internal service providers and the provided services constitute of different kind of functional activities like maintenance of network connection, server, and application. Even though IT organizations are perceived as service providers, they are usually managed functionally. Functional management approach hinders providing IT services, as IT services usually require cross-functional activity. With a cohesive management approach capabilities of different functional teams, such as application and network team, can be better combined into valuable services. This is the essential idea of IT Service Management. (Sauve et al. 2006, p. 1) Eventually IT Service Management is a quality management approach that applies practices of service management and process management.

Drivers for IT Service Management (ITSM) are mostly the same as for IT governance models in general. However the service aspect of ITSM has increased its popularity as IT operations are easy to perceive as service operations. Lloyd et al. (2003, p.10) have listed some drivers that support implementation of IT Service Management. These drivers are:

- Business drivers
    - IT is considered as an enabler of business changes
    - Role of IT has grown, therefore more attention to reliability, availability, capacity and security is required.
    - IT performance is more visible and therefore outages and dissatisfactions become meeting issues
    - IT has to set up and manage business enabling technologies and services to fulfill business needs
    - IT must demonstrate value for money as other functions
    - In e-business IT is also part of the actual business

- Technological drivers
    - need to understand business operations and have capability to advice business on IT related issues
    - need to accommodate more technological changes in shorter cycle time
    - need to guarantee quality of services while absorbing more technology
    - need to ensure that quality of services matches business needs
    - need to bring escalating costs under control

Implementing ITSM can realize financial, employee, innovative and internal benefits directly or indirectly linked to business (Lloyd et al., 2003 p.10). ITSM also enhances co-operation and coordination between functional units. Co-operation is enhanced by (Lavikka et al. 2009, p. 136):

- providing common will to serve internal customers
- common understanding of what is important
- a common development projects towards better IT Service Management
- clarification of internal customership to all parties
- increasing communication between different units

Coordination between functional units is enhanced by standardization of services and the way of working. This kind of standardization improves coordination especially in the case of large organizations with lots of middle managers and when work of personnel is highly differentiated. (Mintzberg 1979, 1983)

2.4 Information Technology Infrastructure Library

The most popular framework for IT Service Management is called Information Technology Infrastructure Library, ITIL. It covers well all aspects of IT governance (Nabiollahi, A. & Bin Sahibuddin 2008, p. 6). ITIL is a de-facto standard for ITSM in Europe and its implementation has proved to be cost effective (Brenner et al.2006, p. 141; Hochstein et al. p4). ITIL is a summary of best practices for IT Service Management. It is produced by United Kingdom's Office of Govern-

ment Commerce. The framework is aligned with ISO 20000 standard. It covers the whole lifecycle of IT service. According to ITIL, the service lifecycle is divided into four phases: service strategy, service design, service transition and service operations. In addition to these four phases also continuous service improvement is important part of the service lifecycle. Figure below describes the service lifecycle.

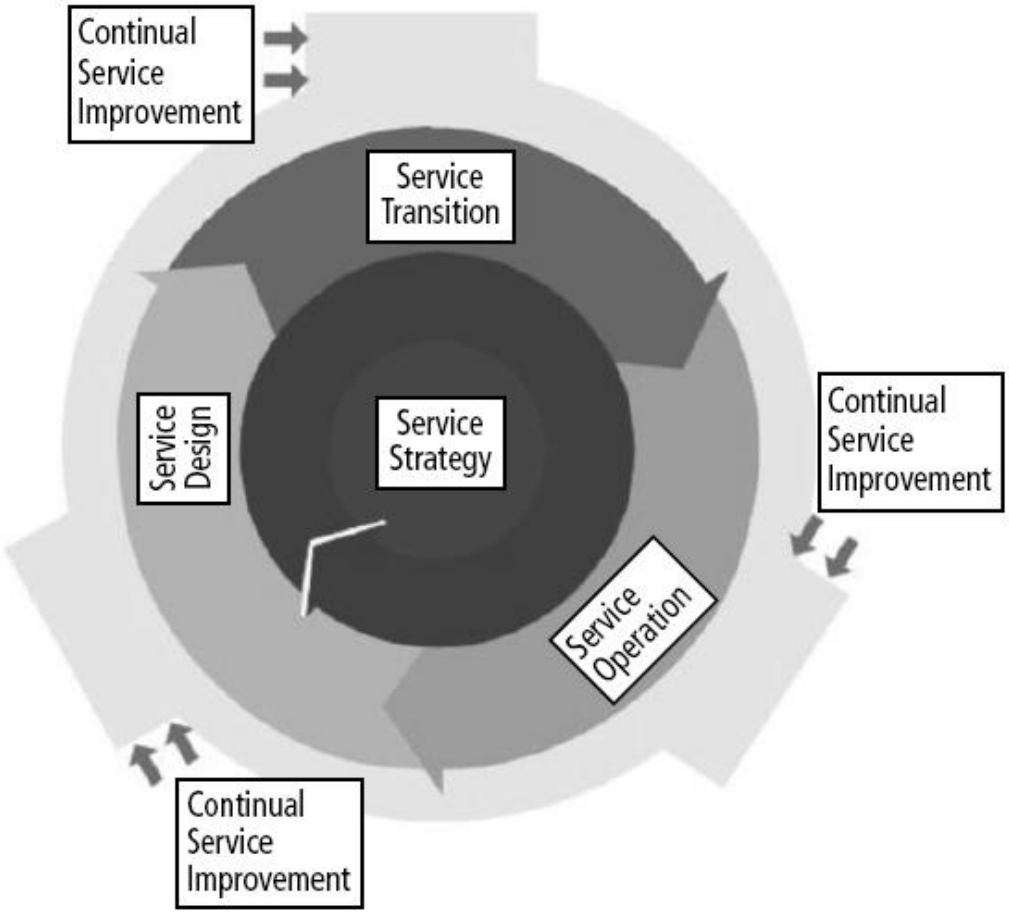

Figure 3. The service lifecycle (ITIL 2007a, p. 8)

As seen in the figure 3, the core of the service lifecycle is the company's service strategy. Service strategy describes how service management can be seen as strategic asset. On the next layer are service design, transition and operations. Service design provides guidance for design and deployment of services and service management processes. Service transition is the phase of lifecycle, where new or modified services are transferred to use. This phase includes management processes

for transition of new or changed services to use. Service operations phase is management of everyday IT service operations, such as Problem Management. This is the phase where the value is realized or lost. Purpose of the utmost layer, continual service improvement layer, is to improve services via improving service design, transition and operations activities. Overall, it is important to notice that as a process, service lifecycle is iterating on three different layers, trying to match business requirements as well as possible. (ITIL 2007d, p. 5 - 7)

As most of the theoretical frameworks, also ITIL has some deficiencies. First of all, it creates increased administrative burden. It is important to understand that ITIL is only a best practice framework. It is not best solution for everyone and implementing ITIL directly leads to a lack of innovation in IT Service Management. ITIL has also been blamed for being designed for consultants, with all the high level best practice instructions that are hard for companies to effectively exploit. By focusing too much on ITIL organization can take the attention from real objective of enhancing IT Service Management and focus to ITIL instead of ITSM improvements. Another deficiency is that some IT executives think that after being ITIL certified or after implementing ITIL approach, all IT organization's problems are solved. Implementing ITIL on top of a chaotic IT infrastructure can worsen organization's positions with the burden of complex ITIL procedures. ITIL can also create inertia, as it is a formal procedure and requires people to act according to new rules for it to work. In spite of containing continuous improvement process, ITIL does not address systematic prevention of incidents and problems at this time. The framework can also create arbitrary boundaries between IT units, like incident and Problem Management teams. (Addy 2007, p.5 - 6)

It is also important to realize, that ITIL being titled as best practice of ITSM is misleading, as if half of the companies use best practice it is only a good practice. It should not be followed blindly, but rather evaluated objectively. It's also important to remember that ITIL was created by British government for government officials to better manage IT, and public organizations in general do not outperform private institutions in running a business. In the light of this it can be said

that ITIL somewhat does not fulfill its goal of provisioning IT services effectively back to business goals. (Addy 2007, p.5 - 6)

There are general guidelines that help organizations decide, whether ITIL might be correct path for them or not. These guidelines help to define if and how ITIL can be the best approach for a company (Addy 2007, p. 6):

- Make your own assessment of ITSM approaches
- Don’t believe the hype, rather look at the facts and make own assessment
- Use ITIL as foundation for ITSM, don’t treat it as end-product
- Don’t change just for the sake of change - Know where you are and where you want to be
- Measure before, during and after process changes
- Keep it simple
- Always question the validity of the framework
- Aim for better than ITIL, aim for best solution for you

3 SERVICE MANAGEMENT

3.1 Service and its attributes

As IT Service Management paradigm is based on managing IT organization with service management and process management methods, it is important to deeply understand these management approaches. Service management helps to define what is the output of the IT organization and how should it be managed. To begin service management, the organization needs to understand what the provided services are. In spite of having many definitions, standard definition for service has not emerged. As a criticism for the variety of definitions Gummesson (1987) quoted unknown source to describe service as ”something which can be bought and sold but which you cannot drop on your feet”. This description underlines the abstract nature of a service. Services are easier to describe in predefined environment. (Fitzsimmons & Fitzsimmons 2006, p.4; Grönroos 2007, p. 51-53) ITIL has defined service as “means of delivering value to customer by facilitating outcomes customers want to achieve without ownership of costs and risks.” (ITIL 2007c, p.11)

When defining service, it is important to understand that services are not things, but processes that consist of set of activities (Grönroos 2007, p.53). Services have four distinctive characteristics: intangibility, inseparability, variability and perishability (Kotler & Keller 2009, p. 387).

As explained above, services are often abstract and intangible. Nonetheless service providers must be able to transform them into concrete benefits and a well-defined experience. (Kotler & Keller 2009, p. 387)

Inseparability refers to interaction of service provider and client. Unlike products, services are not usually produced in one place and consumed in another. Instead services are produced and consumed inseparable. Customer participates as a co-producer in the service production process. In the process customer and service provider co-operate to support customer’s value creation. If this relationship be-

tween customer and service provider is not satisfying for customer, it ends, as the customer turns to another service provider. Therefore it is important for service providers to pay attention to customer relationship. In addition companies can attain improved profits by deepening customer relationship via offering additional services such as delivery, installing, updating, maintenance or information service. (Grönroos 2007, p. 25 - 31; Kotler & Keller 2009, p. 387 - 392)

Services in general have variability. Good example is an analysis made by a doctor. To avoid variability service providers may offer service guarantees to reduce perception of risk by customers. Service variability can be decreased also by investing in good hiring and training procedures, standardizing service performance process and by monitoring and reacting to customer satisfaction. (Kotler & Keller 2009, p. 387 - 392) Service variability can also be caused by external factors. For example technology used by customer affects greatly on how IT services operate and how they are experienced by the customer. (Grönroos 2007, p. 25 - 31)

Perishability refers to the fact that services cannot be stored. Therefore managing demand of services is of high importance. To manage demand more efficiently companies can employ part-time employees, increase peak-time efficiency by allowing employees to perform only essential tasks, encourage in customer participation by use of self services, increase use of shared services and investing for future expansion. (Kotler & Keller 2009, p. 387 - 392; Grönroos 2007, p. 25 - 31)

Service can be categorized into different kinds of service and product mixes which are pure tangible good, tangible good with accompanying services, hybrid, major service with accompanying minor goods and services, and pure services. In addition to classifying intangibility of services Kotler advices to use five other distinctions to classify service. The distinctions are level of automation, type of service delivery process or processes, client’s presence, whether service fulfills personal or business need, profit or non-profit objective and ownership of service, whether its public or private. (Kotler & Keller 2009, p. 387 - 388)

Internal service is a service provided by company's internal entity for another internal entity. For example IT and HR organizations are both internal service providers and internal customers. Key benefits of improving quality of internal services include ; higher level of external customer satisfaction (Gremler et al. 1994, p. 54; Zeithaml et al. 2006) improved employee satisfaction, improved competitive position (Lings and Greenley 2005, p. 293 - 294) and improved financial performance (Heskett et al 1987, p.121 ; Heskett et al 2003). Study carried out by Johnston (2007, p.210) suggests that internal service providers have often internally-focused mind-set that hinders service delivery. Johnston (2007, p.210) also argues that internal services are often bi-directional.

Service value defines the definite significance of service. In ITIL service value is defined as a sum of service utility and service warranty. Service utility is what customer gets in terms of outcomes supported and constrains removed by service. Service warranty is how service is delivered. Service warranty defines the quality of service in terms of availability, capacity, continuity and security (Cartlidge et al. 2007, p.14)

Service logic provides understanding of service's role for customer and service provider. As a product supplier offers value-supporting resource for the customer's value creation, a service provider offers value-supporting process for the customer's value creation, which they co-produce. In other words, service provider offers and customer receives co-produced value-supporting process. (Grönroos 2007, p.55-56; Fitzsimmons & Fitzsimmons 2006, p. 21-23, 31) In this service logic context it is important to understand that customer does receive value from services, but for its value creation, services are only value-supporting processes.

3.2 Managing services

Service management is implemented in an environment where services are key to success. It is management of capabilities for providing value to customers in the form of service. Capabilities take form of functions and processes. Service management aims to cover customer requirements in a holistic and efficient manner

by taking into account the whole life-cycle of services. Service management is transforming resources to valuable services. (Grönroos 2007, p.53, 223; ITIL 2007a, p.15)

In service-oriented culture the traditional manufacturing key figures, such as production cost and internal efficiency do not govern strategic thinking. Instead company should focus on customers and how they view the service. It is important to remember that even tough most of the service might be invisible for the customer, it is the visible part of the service process that matters in the customer's mind. (Grönroos 2007, p.54) Internal efficiency should be given priority in the parts of the organization that are invisible to customer, whereas customers should have top priority in the interactive functions. Service management has some general characteristics such as (Grönroos 2007, p. 218 - 219, 223):

- understanding value that emerges for customer from the service
- understanding how customer perceives service quality and how it changes over time
- understanding how service providing organization (including people, technology and other resources) can produce and deliver the perceived quality
- understanding how service providing organization should be developed and managed to achieve the perceived quality

Service concept defines the purpose of serving something. It helps to visualize objective of service provider for itself and the customer. In the process of determining service concept, three different questions should be answered. Answers to these questions should be as concrete as possible. The questions are (Grönroos 2007, p.55-56):

- What processes in a customer's everyday operations the service aims at supporting?
- How this support helps the customer's value creation?
- With what kind of components, such as resources and processes, customer's process is supported?

3.3 Service offering

Organizations should make their service offering as visual as possible to make services as concrete and tangible for customers as possible. This can be achieved by listing or documenting offered services and providing this document to customers. (Fitszimmons & Fitszimmons 2006, p. 128-129)

According to Kotler & Keller (2009, p. 407), self-service technologies usually improve service quality and cost-efficiency and therefore should be embedded into service provision when possible. Self-service can be integrated to the service offering as often seen in the case of electronic commerce. Self-service technologies usually make service transactions more accurate, convenient, faster and less expensive. One of the biggest difficulties is convincing customers to use the self-service. Customers must have clear sense of their role in the self-service process, must see clear benefits of using it and must feel they have the ability to actually use it. (Meuter et al. 2005, p. 61 - 83)

4 PROCESS MANAGEMENT

4.1 Fundamentals of process management

There are several arguments for applying process management principles to IT management. Whereas service management helps to define what is the output of the IT organization and how should it be managed, applying process management methods increases the output efficiency and the quality of the output of the IT organization by standardizing and clarifying the way of working. In general, specific IT issues are perceived as complex and easily understood only by technical experts. For top management, understanding all aspects of technical solutions is not possible (Addy 2007, p.23). To ease management of IT as well as co-operation of different IT units, process management principals are recommended to be implemented.

Process is a combination of activities linked to each other and resources needed for the activity fulfillment. Process begins from input and ends to output. Input is something that is processed towards a desired state, which is called output. Any kind of activity can be described as a process. For enterprises the most important processes are the ones best describing the performance of the enterprise. These processes are often cited as “business processes”, “principal processes” or “key processes”. At best processes are described from customer to customer. (Laamanen & Tinnilä 2002, p. 61-63) Processes need to be defined, described and modeled, for example by drawing process charts and optionally a map of processes as well. These activities help to analyze the processes critically and thus improve the process management. (Laamanen & Tinnilä 2002, p. 75 - 83)

Process management is based on meeting customer requirements. It is a holistic approach to manage processes guided by the experts (Murto 1992, p. 31-32). By employing process management, a company can distribute work according to processes instead of functions. This improves efficiency as many activities today relate to a large network of entities within a company and therefore function based work distribution is inefficient. (Blåfield 1996, p. 29; Kvist et al. 1995, p. 13;

Laamanen & Tinnilä 2002, p. 9, 12) Processes allow organizations to align the way they work. Processes also enable organizations to address scalability and provide a way to incorporate knowledge of how to do things better. (Carnegie Mellon Software Engineering Institute 2006, p. 4)

Process descriptions contain all the information needed for a comprehension of a process. It usually includes the following details: resources used in the process, personnel, methods, tools, input or trigger, output and environmental description, boundaries and interfaces with other processes. Details are described in more detail in the table below. (Laamanen & Tinnilä 2002, p. 63; Becker et al 2003, p. 156)

Table 1. An example of items that can be included in the process description (Laamanen & Tinnilä 2002, p. 63)

Process description subject	**Defining questions for the subject**
Customers, their needs and requirements	• Who are the customers and key stakeholders? • How do they use the process output and what are their requirements?
Mission	• What is the mission of the process? • What are the critical success factors • How to measure the process performance?
Input, output and service	• What are the process input, output and service? • How to manage the information?
Process flow chart	• What are the critical activities? • How to visualize the process with a flowchart?
Responsibilities	• What are the most important roles and teams? • What are the most important activities and the critical decision to be made? • What are the policies or guidelines to be followed?

A process role refers to a person or another entity executing certain activity in the process. Usually role indicates the area of responsibilities for performing certain activities. Common roles are process owner, customer and supplier. One person may have multiple roles. (Laamanen & Tinnilä 2002, p. 72-73)

Process owner is responsible for the process. Sphere of responsibilities is not exclusive. It can include everything related to the operation of process and customer requirement fulfillment. Baseline for the responsibilities of the process owner is to ensure that process is performing according to agreed and documented process. Process owner participates often in designing the process and process metrics and he is the leader of process development team. It is important to have a clear division of responsibilities in the process. (Laamanen & Tinnilä 2002, p. 61-66; Keel et al 2007. p. 550)

4.2 Service delivery process

Service delivery process includes both production and delivery of the service. It is an interactive set of activities between service provider and customer. (Grönroos 2009, p.256) Service delivery process is executed within a delivery channel that consists of different organizations and interconnections among them. The channel often includes front-line employees of service provider along with outside agents and other intermediary organizations needed to reach the customer. Different organizations are connected by various information systems. Different kind of channels can be used to deliver a specific service. For example payment can be settled via bank office, payment machine or secure internet webpage. (Tinnilä 1997, p. 63) Figure 4 describes different types of service delivery channels.

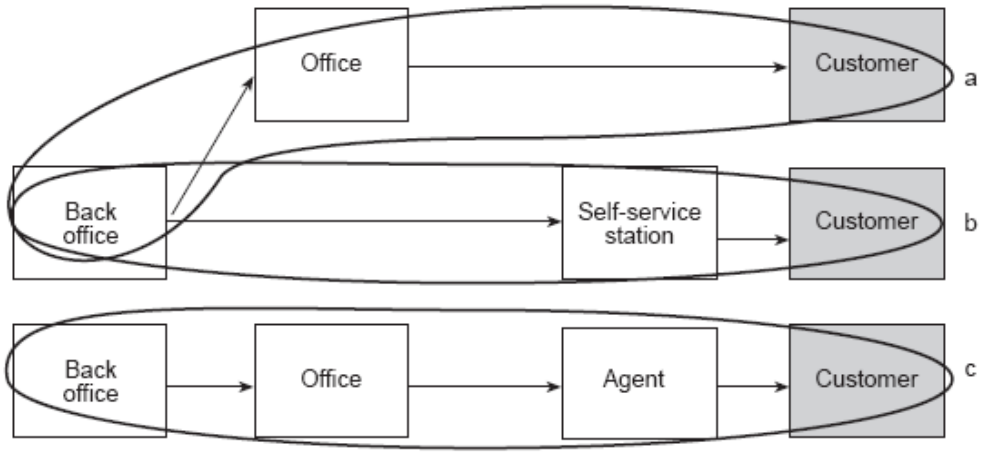

Figure 4. Different types of service delivery channels (Tinnilä 1997, p. 63)

4.3 Process perspective of IT Service Management

From the company perspective, IT Management is a support process for core process, such as sales management (Laamanen & Tinnilä 2002, p. 67). In IT Service Management, IT organization is treated as an internal service provider and company's functions and business divisions as internal customers. In this sense IT processes have the same characteristics as core business processes. Nonetheless, it is important to remember that IT organizations are not supposed to run like business, but to align to business needs. Processes are often identified to cover all aspects of the lifecycle of services. IT governance frameworks include strategic and operational processes. For a comprehensive ITSM solution strategic and operative processes should be managed. In this paper only operative processes are covered, as strategic management is on high level and development of operative management is believed to better utilize the potential of the IT organization.

IT Service Management processes are often interdependent. For example service request is first dealt with Service Request Management, then the service request might require change that is fulfilled by Change Management and the request would be closed by Service Request Management when it is fulfilled. Interdepen-

dence of IT Service Management processes is covered more specifically in chapter 8.1.10 Interrelationships of IT Service Management processes.

4.4 Process modeling

There are plenty of different kind of modeling approaches, such as flow chart technique, data flow diagrams, role activity diagrams, role interaction diagrams, Gantt chart, IDEF, Coloured Petri-net, Object oriented methods and workflow techniques (Aguilar-Savén 2004). In this thesis the process modeling is organized according to a process modeling instructions of the book *Process Management - A Guide for the Design of Business Processes (2003)*, written by Becker, Kugeler and Rosemann, which is explained below in detail. The instruction is chosen, because it provides comprehensive guidance for process modeling, and it is expected to fit smoothly in IT Service Management development.

According to Becker et al. (2003) process modeling contains the following steps: preparation, strategy and process framework, as-is modeling, to-be modeling, organizational structuring, implementation and continuous improvement. In the preparation phase questions such as, “What to model? For which purpose? How to model? What granularity level to model?”, are answered. Purpose of this phase is to clear the scope and tasks of the project. If top-down approach is chosen, then process modeling is derived from the organization strategy. At this point, process framework is designed on the highest level. Phase two of process modeling is called as-is modeling. This phase collects and models the actual processes in use. Purpose of this modeling is to get the process modeling team familiar with the modeling methods and tools. Analysis of as-is models reveals shortcomings and improvement potential in the process model. To-be modeling identifies the process improvements raised by the analysis. For the implementation of new processes usually some organizational changes are required. It should be done before implementation of the modeled to-be processes to the real world. In the implementation phase technical solution such as workflow management system or software like ERP is taken into use. After the implementation phase processes should be improved as requirements set by the organization and its environment

require. (Becker et al. 2003, p. 16 – 17, Born) The objective of this thesis is to design improvements for IT Service Management. Thus the focus is on the phases before implementation.

In the preparation phase, the reason for process modeling should be made clear. Organizations have variety of different reasons for process modeling. These can be for example: selection of ERP software based on processes of the company, model based customizing of ERP, software development, setting high-level design for workflow management, simulation for identification of weaknesses, improving knowledge management via transparency, benchmarking especially internal, achieving certification for example for quality management or process-oriented restructuring. (Becker et al. 2003, p. 43) Preparation includes also defining the roles of process modeling. Roles include for example designers, quality inspector and users of process models who need to understand how they work. There are plenty of different modeling perspectives and methods. The requirements of modeling techniques should be based on the identification of purposes and on the users and modelers involved in the process modeling. Corporation should also have common terminology for process modeling which should be decided in the preparation phase. (Becker et al. 2003, p. 50 - 51)

As-is modeling has four stages: preparation, identification and prioritization of areas, documentation of as-is models and consolidation of as-is models. In the preparation phase the level of detail for process models, relevant views and modeling rules should be decided. Also information sources should be separately identified to achieve holistic approach. (Becker et al. 2003, p. 109-110) Prioritization of process modeling can be based on productivity, cost-efficiency or reorganization of ineffectively executed processes. Consolidation of as-is processes is done to produce integrated as-is model for basis of to-be modeling. (Becker et al. 2003, p. 119) The following details should be collected for all processes within the project (Becker et al. 2003, p. 113-117):

- name and objective of the process
- whether process exists or is planned

- whether it is a core or supporting process
- extent to which the process is documented, how it was documented and when it was documented, documents and products of within process
- process owner if exists
- participating organizational units, number of different units and employees related to it
- technology including applications, databases and user interfaces in use
- connections to external business partners
- frequency of process, average lead time of process and variance
- error frequency of the process
- process costs
- need for reorganization including estimate how far the process can be incorporated in to-be model and whether it is suitable for to-be model design

Analysis of as-is models include the following stages: setting criteria for evaluation, analysis by use reference models and benchmarking, identification of weaknesses and potential improvements and immediate improvement actions. In the evaluation phase clear goals should be set, for example for performance or profitability goals. Also technical capability of IT organization, process organization and organizational structure of the company should be evaluated. (Becker et al. 2003, p. 122-133)

To-be modeling has seven stages: preparation, identification and draft creation, design, documentation, process simulation, integration of models. In the preparation phase to-be modeled views are chosen and degree of detail for them. In identification and draft creation core and support processes and their interrelationships are defined. It is not efficient to identify all of these interfaces between support and core processes, as for example legal activities emerge in all activities between market partners. In the draft creation either top-down or bottom up method can be used. Top down beginning from the strategic issues and bottom up from the practical issues such as available technology. In the design phase created as-is analysis should be used for guidance. Also the following principals should be used: paral-

lel processing of functions when resources are not shared should be favored over sequential as parallel enhances process, process should be executed by clear entity so that responsibilities can be given, process steps should be given self control to improve quality assurance, every process should have an internal customer that rates it if applicable, employees commitment for processes should be increased via transparency of tasks and affect of employees own contribution. Design phase also considers how to create variants, for example normal order and urgent order. The ideal models should also be kept in mind, because modeled processes are going to evolve over time and if there are no restrictions they can be developed towards ideal model. Process faults can be distinguished by using simulations. In the simulations as-is processes should be simulated with real data. In the integration stage individual models are integrated as modeling is completed (Becker et al. 2003, p. 137-159)

Process models usually involve three basic elements which are: functions like “order handling”, events like “order created” and connectors that connect functions and orders. There are also two basic notifications for this kind of event driven process chain: process begins and ends with at least one function in each end and event is never followed by splitting connectors such as XOR or OR. (Becker et al. 2003, p. 53 - 55)

4.5 Process improvement

Maintaining executive support is one of the most critical success factors for process improvements. Cross-functional nature of processes requires executives to bridge the organizational gaps to avoid process improvement becoming a paper exercise. Second success factor of process improvement is to define clear goals for the project. Goals should be achievable and they should show immediate benefit for the organization. According to Laamanen (2001, p.202) good goals are presented in numbers, have unit of measure and are fixed to time. Achievements should be measured against baseline. Third success factor is utilizing best practices as long as it meets organizational requirements. Fourth success factor is aligning process improvement with business objectives. Existing goals and objectives

should be taken into account when planning process improvements. (Ahern et al. 2004, p. 27 - 28, Laamanen 2001, p. 202)

4.5.1 Capability Maturity Model Integration

Capability Maturity Model Integration (CMMI) is a model that was originally created to assess and describe an organization's software development process. It is developed by Carnegie Mellon Software Engineering Institute. The framework has also been used in ITSM context. For example IT Service Management Forum (Cartridge et al. 2007, p.7) and Pink Elephant (2006, p.18) have suggested using CMMI for process improvements. CMMI should be used as a reference model for gap analysis. It does not tell how to implement improvements, instead it helps to identify where they are needed. CMMI suits better large than small organizations as it has rather rigid requirements for documentation and a step-by-step progress. (Kay 2005, p. 28) CMMI contains two approaches called continuous and staged representation. Continuous representation is focused on capabilities whereas staged utilizes maturity levels. Main difference between these approaches is that capability representation is more flexible where as staged representation gives clear instruction what needs to be done. (Carnegie Mellon Software Engineering Institute 2006, p. 11, 32)

CMMI model is composed of process areas. Organizations should focus their process improvements on manageable number of process areas at a time to make project goals achievable (Carnegie Mellon Software Engineering Institute 2006, p. 35). A process area consists of three general introductive sections: purpose statements, introductory notes and related process areas, plus two goals sections called specific and generic goals. Introductive sections describe the process area and goals specify the objectives of the process area. (Ahern et al. 2004, p. 65 - 68; Carnegie Mellon Software Engineering Institute 2006, p. 19) Figure 5 explains the relationships of different components of CMMI model.

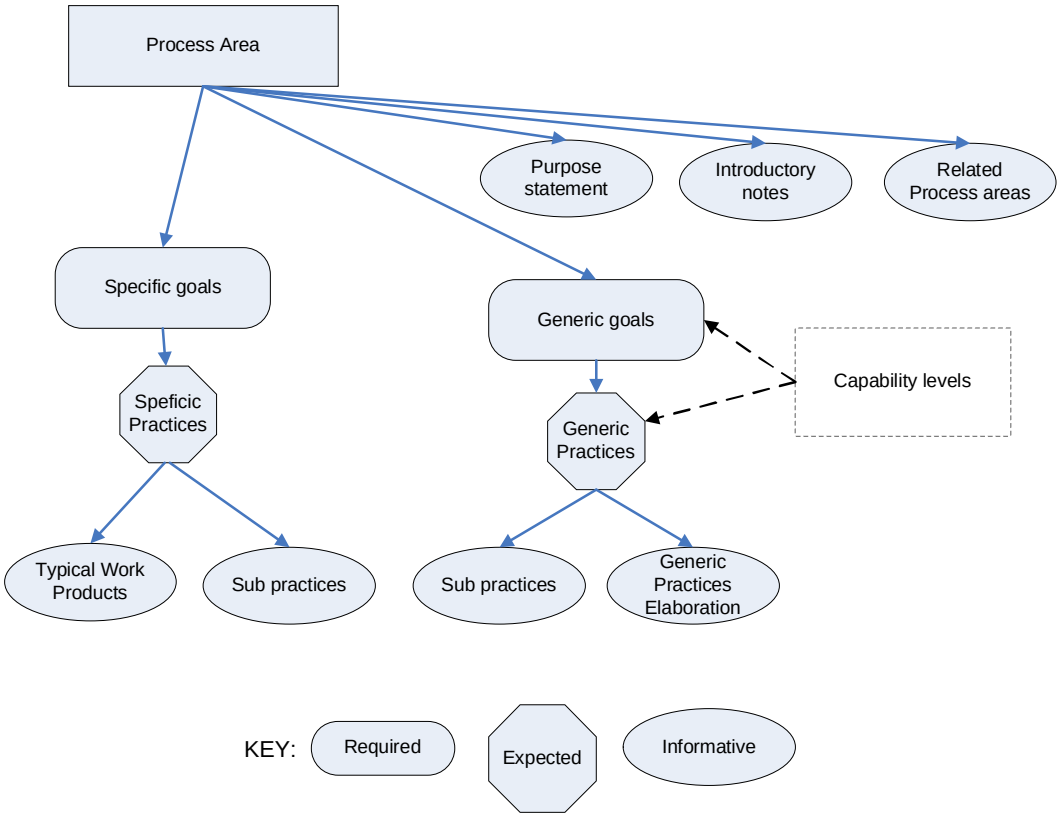

Figure 5. Relationship of CMMI components

Specific goals refer to goals that are relevant only for specific process area and generic goals apply to multiple process areas. Goals are divided into practices and they constitute of typical work products, sub practices and generic practice elaborations. Practices describe activity which is considered important in achieving a goal. Typical work product then lists sample output of practices, as exclusive list of work products is not reasonable to gather. Sub practices are detailed descriptions that provide guidance for implementing a practice, whereas generic practice elaborations provide guidance how a generic practice should be applied for the specific process. (Ahern et al. 2004, p. 65 - 68; Carnegie Mellon Software Engineering Institute 2006, p. 19 - 23)

As mentioned earlier, generic goals apply to all processes. They aim to institutionalize process areas. There are five different generic goals. They can be mapped to capability levels of continuous representation and maturity levels of staged re-

presentation. Generic goals are listed in the table 2. (Ahern et al. 2004, p. 90; Carnegie Mellon Software Engineering Institute 2006, p. 23)

In continuous representation, progression of process improvement is described in capability levels. Capability levels define the sophistication of an individual process area. In ITSM environment, process area can be a single ITSM process like Incident Management. There are six different capability levels, which are mapped to generic goals of process area, excluding first capability level. First capability level does not have goal as it is a baseline for unmanaged process. (Ahern et al. 2004, p. 93 - 94; Carnegie Mellon Software Engineering Institute 2006, p. 31) For IT organization to achieve an optimal solution, all ITSM processes should not be on capability level 5, because developing maturity of processes requires investments and therefore eventually return on investment will turn negative. ((Debreceny & Gray 2009, p.2)

Table 2. Map of generic goals and capability levels (Carnegie Mellon Software Engineering Institute 2006, p. 33-35)

Map of generic goals and capability levels			
No. (GG)	Generic goal	No. (CL)	Capability level
-	No goal as process is performed incompletely.	1	Incomplete
1	Achieve specific goals	2	Performed
2	Institutionalize a managed process	3	Managed
3	Institutionalize a defined process	4	Defined
4	Institutionalize a quantitatively managed process	5	Quantitatively managed
5	Institutionalize an optimized process	6	Optimizing

4.5.2 Applying Capability Maturity Model Integration to IT Service Management

Some generic models that combine ITSM and CMMI frameworks by facilitating staged representation exist. Applying staged representation of CMMI might not be

the best way to enforce ITSM as organizations have different functions and structures and therefore processes have different development priorities as suggested by Keel et al. (2007, p.550 - 551). For example one company may need well established Release Management as IT development is so intensive, whereas another might manage with only Change Management. Release Management is a process in which a lot of changes are implemented at the same time to enhance Change Management. Release Management also enables assessing effect of different changes to each other. In some of the staged representation of ITSM development of processes is done in the same pace. ITIL contains 23 processes. It is easy to make the conclusion that developing all these processes in the same phase is more likely to lead to bad than good result. As a result of above described considerations, staged representation it will not be covered in detail.

There are also many applications of continuous representation model and IT Service Management. For example IT Service Management Forum recommends using this type of model in IT Service Management improvement projects. CMMI capability levels according to itSMF have been described in the table 3.

Table 3. Capability levels in IT Service Management environment (Lloyd et al. 2003, p. 21 - 25)

Capability level	Definition on ITSM environment
1. Incomplete	Process is not managed.
2. Performed	Process recognition but limited management activity. Ad-hoc activities.
3. Managed	Little priority or resources, activities focus on process effectiveness but uncoordinated.
4. Defined	No IT wide acceptance. Process ownership in place. Focus on process efficiency and effectiveness. Reports and results are stored for future reference. Customer orientation.
5. Quantitatively managed	IT wide recognition & acceptance of process has service focus: is proactive with documented, established integration with other IT processes. Business focus.
6. Optimizing	Process has full recognition, strategic objectives and goals. It is aligned to overall strategic business and IT goals.

4.6 Process library

Process development and process management itself needs to be managed in orderly manner to increase effectiveness of utilization of process management principals. In this way the organizational process assets will provide long-term benefits. Process library should contain all process relevant assets to ease applying and developing processes. It also supports organizational learning. (Carnegie Mellon Software Engineering Institute 2006, p. 235-236)

All Organizations process assets should be maintained in process library. Process assets include for example process tailoring guidelines, process related documentation and data. It also includes documentation of process architecture that describes relations between processes and sub processes. For example ITIL supports lifecycle architecture, which is described on high-level in figure 3. Process library may also contain process performance related documentation. Often process charts do not give complete picture of different tasks, and therefore work instruc-

tions need to be maintained. Work instructions should be maintained in the process library to complete process charts. In addition to above mentioned assets, also training material, process development plans and guidelines for process roles should be maintained in the library (Carnegie Mellon Software Engineering Institute 2006, p. 235-236)

5 DEVELOPMENT OF IT SERVICE MANAGEMENT CAPABILITIES

5.1 IT Service Management program and projects

Implementing IT Service Management is usually an iterative process. ITSM program develops ITSM vision and schedules and approves ITSM projects. ITSM project consists of five logical steps: gap analysis of current versus pursued capabilities, planning the project, designing the solution, implementing the solution and evaluating the project. Most programs begin by focusing on one or two ITSM processes at first. One round usually takes from six to eleven months. (Pink Elephant 2006, p. 9; Lloyd et al. 2003, p. 2). Iterative ITSM development process is described in the figure below.

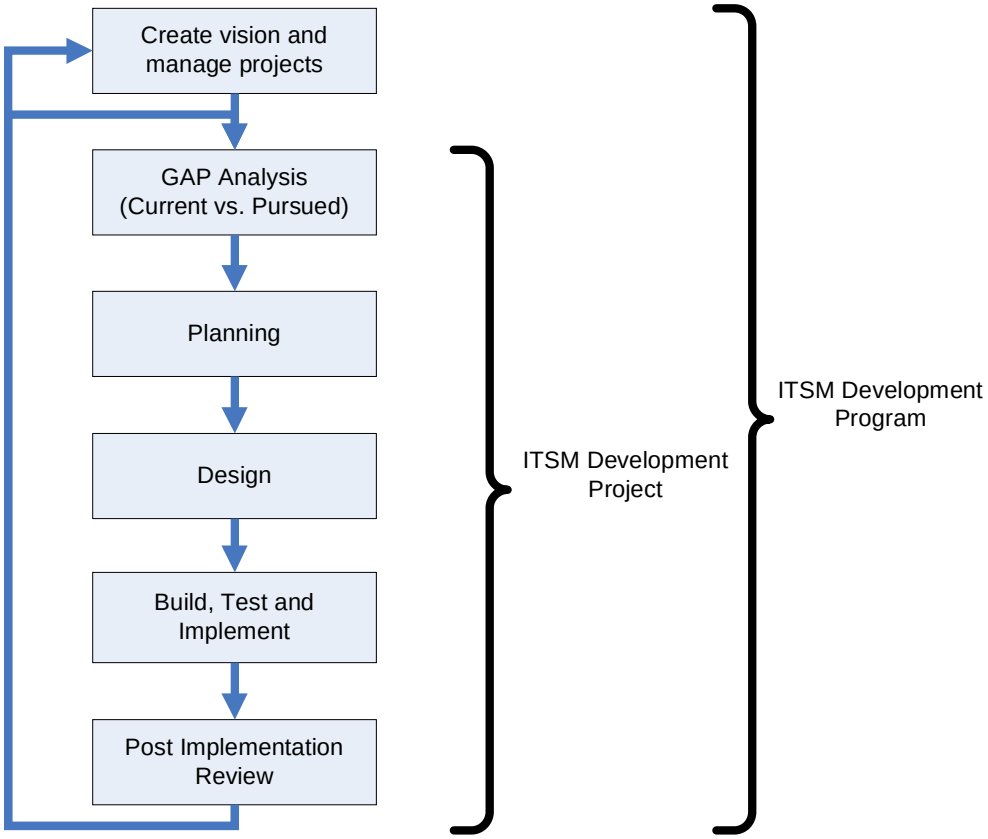

Figure 6. Iterative IT Service Management development process revised from Lloyd et al. (2003, p. 2)

IT Service Management Program should be directed to improve alignment of IT with business objectives. It should provide vision and leadership in maintaining strategic direction with clear goals towards the alignment and measurement of goal realization. ITSM improvements should educate IT staff to understand business needs and business to understand potential of IT. Information and communication should be made available to everyone who needs it and separately allocated time to familiarize with IT Service Management should be given as well as time for tracking technologies to identify opportunities for business. Also other methods should be considered to increase acceptance of innovations and new ways of working. (Lloyd et al. 2003, p. 13)

5.1.1 Vision of IT Service Management program

Establishing vision is a major contributor to success of ITSM implementation. It provides focus and sense of strategic direction for all participants. It helps to get all stakeholders together under common objectives. (Pink Elephant 2006, p. 9) Business and IT organization agree on requirements for ITSM project and identify pursued long-term benefits for all parties. (Keel et al. 2007, p.555-556)

Achieving vision can take years and ITSM processes often take a few iteration rounds. Organizations also have to identify concrete goals for each iteration round to motivate project team and to ease the evaluation of progress. This should not however jeopardize the long term objectives. (Pink Elephant 2006, p. 10; Lloyd et al. 2003, p. 13)

5.1.2 Gap analysis of IT Service Management capabilities

First stage of IT Service Management project is gap analysis that compares actual performance against potential performance of IT organization. Gap analysis helps to identify the areas that ought to be improved. It can focus on overall IT Service Management or on a specific IT Service Management area, like Incident Management. (Keel et al. 2007, p. 556; Pink Elephant 2006, p. 10 - 11)

First, ITSM project team must assess what is the current level of IT Service Management of the organization. Also customer view of IT is important to take into account. According to Keel (2007, p. 556), assessment should cover people, processes, technology, data. In addition also service aspect is important to evaluate in the gap analysis. After the assessment is done, it is compared to industry best practices. This comparison is the actual gap analysis that provides insight to areas that could be improved. For the comparison theoretical frameworks, such as Capability Maturity Model developed by *Carnegie Mellon Software Engineering Institute* can be applied. (Keel et al. 2007, p. 556; Pink Elephant 2006, p. 10 - 11; Lloyd 2003, p.16)

5.1.3 Planning

After the analysis is done, results are examined and requirements for the development project are identified. Required service improvements are documented in ITSM development plan in priority order. Plan contains detailed work plans and schedule. Without them the project is likely to fail. There are two basic approaches for ITSM project: top down approach and bottom up approach. Top down approach is focused on processes whereas bottom up is focused on building ITSM on current technology. Both of the approaches have common requirements. They require support from upper management, ability to provide tangible results in short term, clear communication plan advertising progress and dedicated project team. Approaches are illustrated in the figure 7. (Keel et al. 2007, p.556, 558; Pink Elephant 2006, p. 11; Lloyd et al. 2003, p. 13)

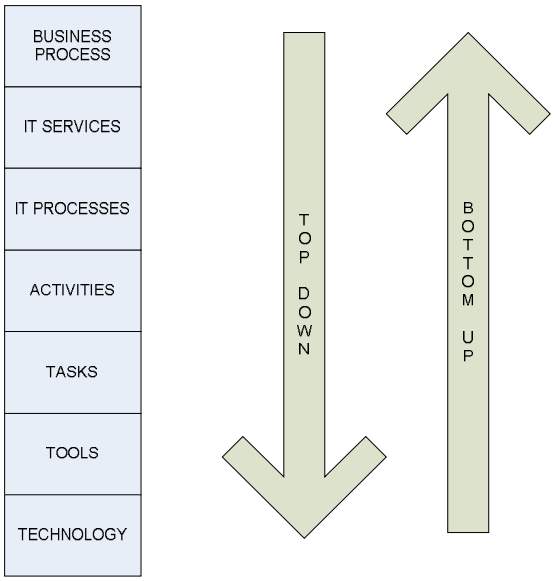

Figure 7. Development approaches (Keel et al. 2007, p.555-556).

In reality ITSM projects often support both approaches. In the top down approach IT services and service supporting processes are identified. Top down approach is recommended when (Keel et al. 2007, p.556-557):

- IT management processes are already defined and operational
- IT organization provides services to many customers
- Greater return on investment is expected from design of processes, roles and definitions, than from the use of old tools
- Common process design can be utilized to define a common toolset

Bottom up approach is less intensive and enables quick-wins by minimizing time for process design. The approach is based on the advantage of using current tools and capabilities. The project's objective, implementing service management, might face difficulties when in the planning phase focus is on tools and technology. On the other hand this is also a positive thing as IT staff is more comfortable and accepting when starting with technology and focusing on improving current practices rather than implementing new processes. In spite of technology focus in the planning phase, eventually the tools need to support the processes, not the other way around (Lloyd 2003, p. 32) Bottom up approach is suitable when (Keel et al. 2007, p.558):

- Organization is small and no documented processes are in place
- Number of customers is small
- Most tasks are performed by relatively small number of tools
- Use of generic or slightly tuned processes is acceptable
- Large investments in tools is not acceptable

5.1.4 Design

In the design stage improved solution is described. Changes to as-is solutions are described and change management activities for implementing the design are planned. After the design is validated next phase can begin. Design stage may include testing

In IT Service Management the design should take into account people, processes, technology and service aspects. It may include for example designing new services and processes, as well as designing technical information system solutions.

5.1.5 Build, test and implement

After the design is validated, the solution is built and tested. Solution is usually first built to test environment following the similar procedure as ERP development. If possible tests are approved, the ITSM solution enters control stage where it is deployed into live environment and measured. Procedures for building and testing depend on what kind of changes the ITSM implementation contains. (Pink Elephant 2006, p. 12)

This study does not examine these steps, because the objective of the thesis is to develop the design of IT Service Management, not build, test and implement it. Thus, the thesis will focus on steps before this phase of the development.

5.1.6 Post Implementation Review

After an ITSM development project, the success of the project should be measured. It is advised to be measured against concrete goals. Meeting the goals

should be reviewed in Post Implementation Review (PIR) The goals can be for example (Keel et al. 2007, p.558; Lloyd et al. 2003, p. 33 - 34):

- Decrease in IT costs for operational support
- Established and maintained service catalog
- Documented and operating IT Service Management processes
- Most of the services being supplied via SLAs
- Improvements in process metrics results
- Use of CMDB in IT management

After PIR is held, new assessment for the next iteration round can be carried out. If a comprehensive implementation containing all aspects of IT Service Management was executed, then continuous improvement processes should take care of the ITSM development.

5.2 Five aspects of IT Service Management development project

Usually IT organizations are functionally managed organizations with specific tools and processes. Unfortunately these tools and processes are often not suitable for service-oriented management. Therefore shifting from function-oriented to service-oriented management inflicts big challenges. (Keel et al. 2007, p.550)

Keel et al. (2007) have divided challenges that emerge in development of IT Service Management into four different aspects: processes, people, technology and data. Categorization is somewhat artificial as in reality the challenges often concern more than one of these areas. Nonetheless, the division clarifies different aspects of development of IT Service Management and therefore eases identifying areas that need to be improved or taken into account. (Keel et al. 2007, p.550) In addition to process, people, technology and data aspects, also service aspect is covered in this chapter. It is important to understand how organizations can develop quality of their services. To successfully cover all these aspects, ITSM development organization needs good project management skills.

5.2.1 Process aspect

IT organizations are usually using process management methods. Nonetheless, ITSM development usually requires extensive process remodeling because the existing processes are often described from technical or functional perspective instead of service perspective and therefore the existing processes do not serve service management that requires cross-functional activity as explained in the figure below.

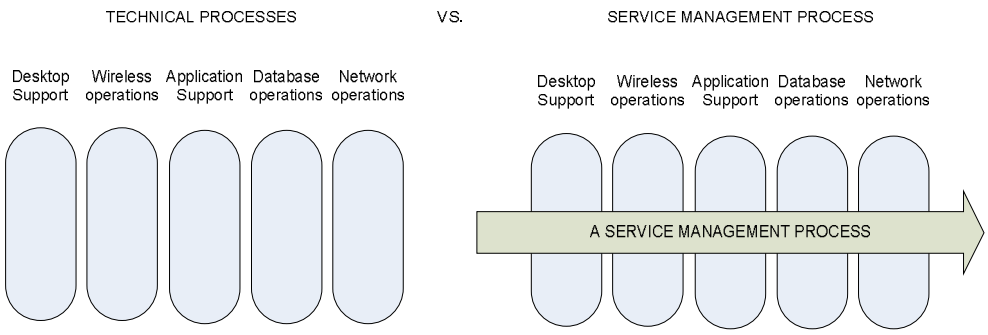

Figure 8. From technical focus to service focus.

For most of the organizations implementing cross-organizational processes may be the most difficult part of ITSM project. To achieve seamless cross-functional processes many fundamental changes need to be done. First of all repeatable processes need to be designed across organizational structures. Values, beliefs and culture need to be directed towards customer-focus. Integrated toolset that enables data exchange and workflow needs to be in place. Management must be committed to produce business focused IT services. (Lloyd et al. 2003, p. 31) Process implementations often require organizational change (Becker 2003, p. 17). Responsibilities for process owners and other roles need to be clear and understood and documented role descriptions for each role need to be maintained. Training of roles and process flows are required. In the implementation of ITSM processes these steps are required (Lloyd et al. 2003, p. 31; Keel et al. 2007, p.550):

- Defining process ownership
- Defining scope for each process
- Agreeing design for processes

- Setting up process metrics
- Designing and deploying technical infrastructure to support the processes
- Deciding schedule and priorities for process implementations
- Executing the implementation plan

There are different opinions what the implementation order of processes should be. It is also important to consider interrelationship of processes (Lloyd et al. 2003, p.28). Good practices suggest the following instructions (Keel et al. 2007, p.550):

- Implement first the processes that provide largest business benefits
- Start with those that provide rapid return on investment to users of IT
- Begin with Configuration Management and Change Management, as smooth execution of all other processes is dependent on Configuration Management, and Configuration Management is closely linked to Change Management
- Implement Incident Management first as this is the primary interface to end-users of IT
- Implement all ITSM processes parallel, as the processes are interdependent.

As well as knowing how ITSM development should be organized, it is also important to know what should be avoided. Here are some general mistakes done in ITSM development. (Lloyd et al. 2003, p. 12-13):

- Implementing Configuration Management Database without Change Management
- Charging for IT service provision as part of Financial management process without having Service Level Agreements in place
- Implementing Problem Management without Incident Management to provide accurate and complete incident data
- Attempting to implement processes through other processes rather than having a distinct project.

5.2.2 People aspect

Implementing ITSM affects organizational roles and day-to-day activities of IT staff. IT staff is not likely to change drastically, but new and altered responsibilities are going to be introduced. Also people have natural tendency to resist changes. Hence, the impact on people can be most difficult challenge in the project. Managers who implemented ITSM procedures reported spending 70-80 % of their time within the project working on organizational and staff related issues (Steinberg 2005). It is important to understand that ITSM implementation affects not only general IT staff, but also end-users, business unit IT staff, vendors, consultants and business partners. It is critical to define all the responsibilities clearly (Lloyd 2003, p. 31). Effect of new ITSM strategy has to be evaluated with all of these stakeholders before implementation. Training ITSM processes, procedures, tools, tasks and cultural aspects should be organized when the need for knowledge transferring emerges. ITSM implementation requires top-level commitment as the whole organization under it is to be reformed. (Keel et al. 2007, p.551; Brand & Boonen 2004, p. 142; Lloyd et al. 2003, p. 31)

5.2.3 Technology aspect

Phasing out as well as utilization of products and technologies is part of ITSM implementation. Adopting ITSM approach includes three major technology related components: Configuration Management Database also known as CMDB, Process-level automation and Task-level automation. CMDB offers invaluable data for IT staff to plan, organize and execute all activities needed for maintaining high quality IT services. CMDB describes the configurations of company's IT environment including data elements, such as laptops, servers and ownerships of these items etc. The configuration includes the data itself and interrelationship of CMDB data. It is often more efficient to maintain data in different locations, but there should be only one interface to end-user and CMDB should act as a master system for other databases. (Keel et al. 2007, p.553)

Most of the products used today to model process flows are based on so called Service Desk products that originally were designed to support Incident Manage-

ment and then were extended to change and Configuration Management. These products should contain at least some of these characters (Keel et al. 2007, p.553):

- be able to customize processes at task level
- be able to define roles and responsibilities
- have interface to CMDB
- support old resource- / technology-based management tools
- have scalability to size of the environment
- Have ready-made or possibility to create set of performance metrics for processes
- High level of availability and adaptability
- Different level of authorizations for data, for end-user, support groups, administrators

Task automation refers to harmonizing toolset for all applications based on ITSM processes. It is recommended to use common tools for example for Change Management on different platforms, such as Linux and Windows. Decision to use specific or general tool should be based on business needs. (Keel et al. 2007, p.554)

5.2.4 Data aspect

Challenges related to data emerge when Configuration Management is implemented. Configuration data is key to success in most of the other service management processes and therefore it is better to face these data-related challenges as early as possible. Data of CMDB should be well designed for it to help maintenance of IT services. Here is a short list of things to be taken into account (Keel et al. 2007, p.554):

- Component level of CI data
- Reconciliation of data from different data sources
- Determining what data should be stored in CMDB and what remotely in other databases that integrate to CMDB
- What data should be imported and what discovered in CMDB

CMDB should have data model that clearly defines CI types and their relationships. CI should be maintained on the lowest level that satisfies business needs. In reconciliation prioritization should be included to define the most accurate data. Data that changes infrequently should be imported to CMDB. This would include information such as model number and owner of the asset. Data that is volatile or needs to be very accurate should be maintained in own databases. There are three ways to populate CMDB with data: collection of data from existing sources, auto-discovery and manual entry. Manual entries should be minimized as most of the components are faster to find from existing databases or by discovery tool. (Keel et al. 2007, p.554; ITIL 2007d, p. 72 - 75)

5.2.5 Service aspect

Over the years IT organizations have grown and their sphere of responsibilities has widened. It is rather common that companies do not have clear picture of all services provided by their IT organization. In IT Service Management projects companies may have to define service offering. Generally this service offering in IT environment is called *IT service catalog*. This catalog provides central and accurate set of information on all services and it helps to develop service-focused culture (ITIL 2007b, p. 61). It is a list of services offered by service provider. For IT organizations service catalog represents interface with end-user. Ideally, when end-user selects a service from the catalog, a service request is created and handled by suitable IT service process. (Lindquist & al. 2007, p 435-436)

For service development, new ideas can originate for example from customers, front-line employees or technology. Services usually contain most of these functions: customer action, front-end action, back-office action and support functions. For example customer orders food from waitress who gives the order to kitchen that gets the raw materials from supplier. (Fitzsimmons & Fitzsimmons 2006, p. 78) For internal IT organizations it might be more important to define what is currently offered than develop new services. Nonetheless above mentioned people and entities should be consulted in the creation of services.

In addition to creating new services, IT Service Management projects aim to develop quality of existing services. Customers compare perceived service with expected service. If perceived service falls below expected service customers are disappointed (Kotler & Keller 2009, p. 392). Therefore it is important to understand the factors affecting the perceived service quality. According to academic research carried out by Berry, Parasuraman and Zeithaml (2003, p. 61 - 82), there are ten lesson for improving service quality: listening to customers' needs and perceptions, providing reliability, performing well in providing basic services, having holistic design for services, recovering fast from problems, surprising customers, demonstrate fairness to customers and employees, promote teamwork, regularly carry out employee researches and inspired servant leadership. Fitzsimmons (2006, p. 128-129) have divided service quality into five more distinctive dimensions. In service development services should be assessed against these quality dimensions. The dimensions are:

- Reliability, ability to perform promised service
- Responsiveness, willingness to help customers and provide prompt service
- Assurance, ability to assure customer of the ability to perform
- Empathy, ability to provide individual attention and solution to customer problem
- Tangibles, helps to visualize service for customer

In addition to the above mentioned service quality aspects, seven practices that well-managed service companies share have been identified by Kotler and Keller (2009, p. 402 - 407. These practices are:

- Strategic concept with clear sense of target customers and their needs
- Top-management commitment to service quality
- High service quality standards
- Use of self-service technologies
- Audit service performance
- Satisfy customer complaints by dealing with the situation on the spot
- Emphasize employee satisfaction as positive employee attitude promotes customer loyalty

Managing IT services from a holistic perspective requires seamless collaboration of infrastructure and application teams. Many of the IT organizations have separated these functions so clearly that it hampers achieving service level targets. IT organizations should instead see application team as a top layer of infrastructure and understand the handoffs that need to be made between application and infrastructure teams. This kind of management will lead to improvements in the service quality. Enterprise architects play important role in connecting these two functions to operate for common services. EA team should assure that business services operate as designed from application layer through the infrastructure layers. The design should promote cost-effective time-to-value, reuse, interoperability and manageability of business services. (Arraj 2009)

6 ANALYSIS OF THE CASE COMPANY'S IT ORGANIZATION

6.1 Recent history of the IT organization

In 2003 the case company redefined its strategy to become supplier of steel based solutions instead of being solely steel producer. As a result of change in the strategy, corporation has gone through a major change. New companies have joined and some of the old ones have been sold as they have not fitted the strategy anymore. Transformation led to a circumstance, where the case company contained a variety of different kind of subsidiaries with their own ways of working.

In 2004, the case company started new program to remove overlapping activities and harmonize its operations to improve monitoring and managing business operations. IT organization had a major role in this program to harmonize IT environment in a way that supports the business model. In the beginning the company contained more than 50 different ERP-systems and 13 different e-mail systems. Program ended successfully in 2008. As a result IT organization gained more centralized control over its services. Especially the role of Common IT Services, organizational unit of IT, which offers shared services that are available for all the business units and countries, strengthened. Centralized control lead to need for IT ERP system to support these IT services. In 2008 new IT ERP was purchased, which paved the way for implementing IT Service Management principals more thoroughly.

6.2 Structure and responsibilities of the organization

IT organization acts as an internal service provider. Demand for IT comes from business divisions and corporate functions. Customers of the IT organization are all employees with IT related needs, whether they are using company owned laptop, mobile phone or other asset provided by the IT organization. Roughly this means 4500 workers all over the world.

The IT organization has around 150 employees. Most of the services are outsourced to some extent, which multiplies the headcount of people working to pro-

vide IT services approximately two fold to three hundred people. Some of the partners have broad responsibilities and others are merely asset suppliers. Structure of the IT organization is rather complex. It has been developed to support the business operations as well as possible. Even though the IT organization is very close to the business units, the way of working is closer to function- than service-oriented. Organization consists of five different units: CIO Office, Common IT Services, Area IT Services, Project Services and Division IT. First four units contain IT staff that work under corporate functions. Fifth one, Division IT, is a scattered unit that contains IT staff that works for a business division, not for corporate functions. Figure below explains the relationship of the different units.

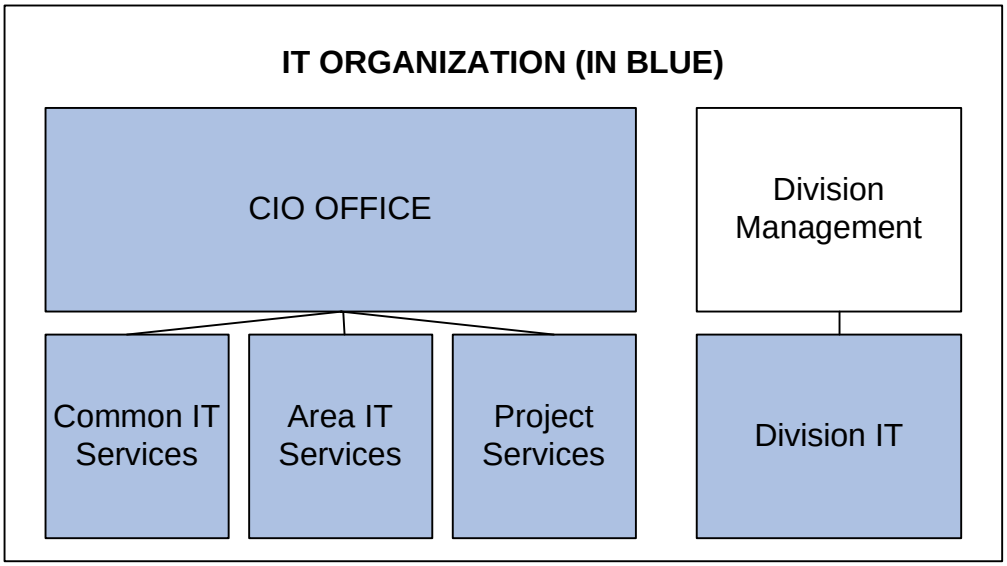

Figure 9. IT Organization of the case company

CIO Office is in charge of managing the IT organization. Its sphere of responsibilities include: constructing IT strategy, taking care of information security and enterprise application integration, ERP business process planning, Inter- and Intranet webpage creation and maintenance and financial controlling of IT organization. It contains five to ten people.

Common IT Service is a unit that maintains and develops all commonly shared services of IT. Unit's responsibilities include IT infrastructure, telecommunications, business applications and desktop services including all workplace tools

such as laptops and standard software such as MS Office. Employee count is around 30. Development of IT Service Management capabilities will concern services of this unit.

Project services unit orchestrates heaviest development projects of the IT organization. It mainly develops and implements information system projects, such as ERP or CRM implementation projects. This unit contains around 60 employees.

Area IT contains local personnel that executes day to day operations and is the first level support in IT issues. Area IT works in close collaboration with Common IT Services and Project Services. Area IT has been divided according to countries or market areas.

Division IT is an IT unit that contains all IT staff that work for a specific business division. Purpose of Division IT is to make sure IT organization provides IT services that fulfill business requirements for IT. It contains for example personnel for ERP development work to make sure that ERP solution fits business needs. Division IT managers represent customers of IT Organization.

6.3 Challenges and objectives

Overall the IT organization is working efficiently. Business operations are satisfied with the performance of IT, as development and maintenance of IT services have performed well. Nevertheless, economic recession is affecting IT organizations also and the business divisions demand cost savings. As a result of centralized management most of the costs incur from shared services offered by Common IT Services. Cost allocation for these services is currently difficult as the services themselves have not been identified completely and this is causing dissatisfaction by local IT units that are required to make cost savings. Obviously identifying IT services helps to allocate costs for them. However it is important to remember that commonly shared services do not bring least expensive solution for all units individually. Instead the objective is to decreases the cost for the shared services on corporate level.

Challenges for the IT organization emerge, as it is functionally managed and functional teams like application, network and infrastructure team have adopted own ways of management. Cross-functional activities, such as service delivery, do not always go as planned as functional responsibilities do not seamlessly cover the whole work stream for services. Process management has been applied, but processes are modeled separately for each team. Not in standardized way for the organization. This complicates the evaluation of all processes together and against each other, as well as co-operation between different processes. Also target setting is team based, which misdirects it from the overall goal of fulfilling business needs as efficiently as possible. In addition IT services are not maintained in a common place. This hinders customers understanding of responsibilities of IT organization.

Strategic objective of IT organization is to support growth of the company and enable the implementation of company's business model and processes throughout the corporation. As mentioned earlier, current economic recession has redirected IT organizations objectives. Importance of cost-efficiency has risen. This covers both maintenance and development work. In maintenance cost savings are pursued via more efficient working methods, for example by instructing staff to organize virtual meetings to cut traveling costs. Cost savings have become the main objective of new and on-going development projects as well. The economic situation has also acted as catalyst for some projects. Good example is IT Asset Management project, which has huge demand because of the expected cost savings.

7 IT SERVICE MANAGEMENT DEVELOPMENT PLAN

7.1 Objectives and development method

For the case company this is the first comprehensive effort to develop IT Service Management culture and capabilities. Consequently, as part of this thesis IT Service Management program was initiated. ITSM program objectives will be aligned with the strategy of the IT organization which is “support growth of the company and enable the implementation of company’s business model and processes throughout the corporation”. Also cost-efficiency is paid attention to in planning and developing IT Service Management.

First stage of the development was to develop vision and nominate leadership. Vision describes the long-term objectives of IT Service Management development. As a result of meetings with IT management, IT Service Management program manager was nominated and the following vision created: “Vision of the IT Service Management program is to redirect the organization from functional organization to a process-oriented service organization”. Common long-term objective for the program is to create transparent supply chain of IT services that increases overall manageability and effectiveness of IT services. Transparent supply chain is expected to enable better information management of IT operations for example for outsourcing decisions and incident handling. As long-term benefits to all parties, IT Service Management program is expected to ease managing, auditing and developing IT operations and therefore enable better alignment of IT with business objectives. IT program will constitute of iterative development rounds that are called ITSM projects.

As covered in chapter 6.3, services and service management processes are not commonly managed. Short-term objective that is pursued to achieve by first ITSM project, is to define and document IT services and operative management processes that best describe the performance of IT organization. From technology aspect current tools are mostly expected to be utilized more. Data is an important aspect in the first project, as more comprehensive use of CMDB data is one of the

goals. CMDB data is expected to increase effectiveness of IT management. Training employees will be planned in parallel with implementation plan and is not part of this thesis. Following good ITSM development practices, concrete goals were established to make the project more visual. Requirements for the first project, for which this paper aims to provide design solution, are:

- to provide service catalog and management procedures for it
- to provide documented and implemented IT Service Management processes with development suggestions for further development
- to utilize Configuration Management Database

After the requirements for the project were approved, a plan for achieving the goals was created. As no common IT process methodology existed, top down approach for developing IT Service Management was chosen. Plan included the following steps:

1) Defining IT services
2) Defining management processes for IT services
3) Analyzing management of IT services in respect to the processes
4) Designing IT Service Management approach
5) Implementing IT Service Management procedures
6) Evaluating success of the project

In the chapter 7.2, development scope, which includes IT services and management processes for them, is defined. After that gap analysis is used to analyze the management processes. In the gap analysis current state of the processes is compared to best practices covered in chapter 8.1. Results of the gap analysis are covered in chapter 8.2. According to the results of gap analysis, improved IT Service Management approach for the case company is designed. The design states what and how should be improved. It is described in the chapter 9. In addition, implementation and evaluation are part of the project. These parts are not covered in this thesis as the objective of the research is to provide solution, not implement or evaluate it.

7.2 Development scope

Development scope contains IT services and management processes for them. As described in the development plan, first IT services need to be identified and then the management processes. In the past, IT services have been documented, but defined services have not been used in operative work. The organization aspires to define exact IT services and make them concrete and measurable. However, in this stage it is more important to identify all service groups so that management processes for them can be identified. IT service groups were identified with the managers of functional IT units. Following service groups emerged:

- Information and Communication Technology tools
- Application services
- Access services
- Network services
- Hosting services
- Remote support
- Onsite support

Information and Communication Technology tools (ICT tools) refer to all standard software and hardware that is managed by IT organization. It includes for example laptops, MS office and email. Application services include all applications other than standard office software. It includes for example ERP and CRM applications. Access services manage access rights for all IT assets, such as intranet access, access to ICT tools and application services. Network services are services that enable access to network, whether it is internet or intranet, it is also supporting services for all applications. Hosting services includes hosting of applications and other assets requested by business, such as email. In addition to above mentioned services two supporting services, remote support and onsite support that provide support for customers, when they need help with one of the above mentioned services.

After defining IT services, IT service delivery process was modeled to help identify the operative management processes. Service delivery process is described in

the figure 10. IT organization's service delivery process has four main roles: customer, self-service station, service agent and back-office.

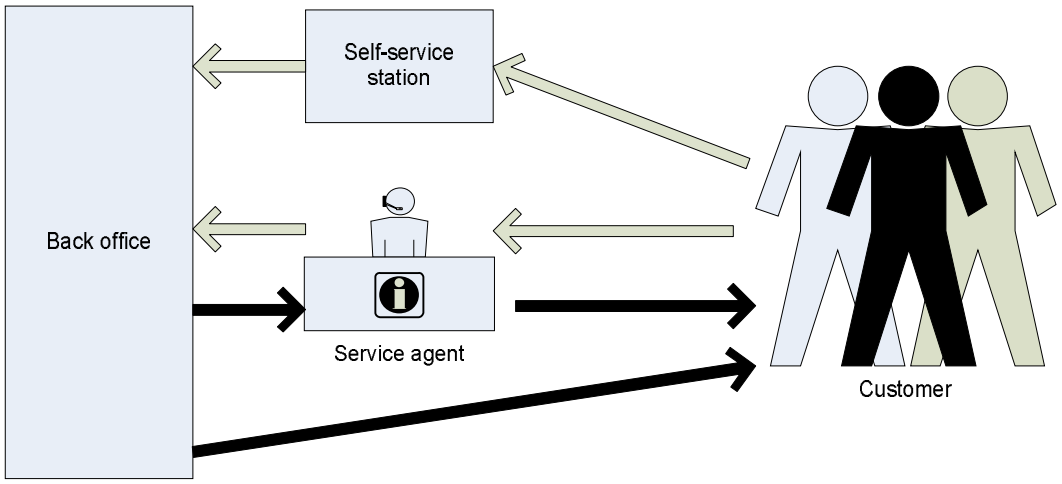

Figure 10. Service delivery process of IT organization

Customer orders service via self-service station or service agent. Service agent can fulfill the service request or it can allocate it to back-office. Back office contains different kind of support groups, such as network and server support. It fulfills the service request and replies directly or via service agent to customer. Purpose of the to-be process architecture is to describe service delivery process from customer to customer by IT service management processes including all different kind of service requests handled by IT organization.

After the service delivery process was drafted, investigation for operative management processes was started. Goal of the investigation was to identify management processes that best describe the performance of IT organization and realize the above described service delivery process. Data of current state was gathered from the company's intra webpage and by interviewing IT management. Overall capabilities of IT organization were compared to ITIL, CMMI and WIBAS practices. Also ITSM practices applicability to support IT organization's strategy, support growth of the company and enable the implementation of company's business model and processes throughout the corporation, was assessed. Nine service management processes emerged as the most important for the defined service

groups. Development of the nine processes in parallel is justified by the interdependencies of the processes in operative management. As a result of the interdependencies, establishing all of these processes in parallel is expected to create a better basis for IT Service Management development program, than by focusing on one or two processes and developing them further. The chosen processes were Service Catalog Management, Service Request Management, Incident Management, Problem Management, Change Management, Release Management, Configuration Management, IT Asset Management and Access Management.

8 THE GAP ANALYSIS

8.1 The benchmark data of the gap analysis

The benchmark data is a collection of industry best practices that is gathered from academic and business studies, and other relevant literature. Most prominent sources are ITIL framework, *Effective IT Service management* book by Rob Addy and articles of ITSM Watch columnist George Spafford.

Benchmark data covers the nine management processes that were scoped in the chapter 7.2 *Development scope*. The management processes are IT Service Catalog Management, Service Request Management, Incident Management, Problem Management, Change Management, Release Management, Configuration Management, IT Asset Management and Access Management

8.1.1 IT Service Catalog Management

In IT, service catalog usually refers to offered services and service portfolio to all services including future and obsolete services as well as services of service catalog. First step of managing service catalog is designing it. Service catalog should define what details, such as details of responsibility of service and statuses of service, is recorded for each service. (ITIL 2007b, p. 61)

Especially in IT, service can be constructed in many different ways. In the end it is the company that decides how to form a service within their organization. Also service catalog design should be decided according to the organization's needs, whether it is in the form of matrix, table or spreadsheet. When creating service catalog, customers and IT staff should be consulted to clarify the spectrum of services. One service may consist of many services. This kind of hierarchical approach helps to avoid confusion when creating service catalog. Service catalog should include all services, even supporting services that customers do not see, such as platform services. Service catalog should preferably be stored as a set of service Configuration Items As part of Configuration Management System, the service catalog can be used when analyzing for example incidents or upcoming

changes. While implementing service catalog, also service performance metrics can be applied. According to ITIL, service catalog should contain two aspects: business service catalog and technical service catalog. (Addy 2007, p.84; ITIL 2007b, p. 61-62, 259)

Business services describe service's relationship to business units and business processes. It is the customer view of the service catalog. It should tell the customer why they should buy the service and why they should buy it from internal service provider rather than external service provider. (ITIL 2007b, p. 62-63)

Technical services identify the technology required to support business services. They contain all supporting services and CIs needed to deliver business service. It should underpin rather than form separate part of service catalog. (ITIL 2007b, p. 62-63)

Creating service catalog is like rope-walking, one has to avoid documenting too many services to avoid too complex management but too few services do not serve the catalog either. Technical language should be kept to minimum. Often the practical implementation of the catalog is missing and therefore it does not become part of everyday IT Service Management. It is also highly important to consult all related parties what the catalog is all about. (Addy 2007, p. 85; ITIL 2007b, p. 65)

Establishing IT Service catalog improves overall service quality as it provides holistic design for services, tangibility of services and forms baseline for internal customer SLAs that lead to reliability improvements. It also enables the use of self-services and auditing service performance, which are common characteristics of well-managed service companies. (Kotler and Keller 2009, p. 402 - 407)

Once service catalog is created, it should be maintained by Change Management as a set of Configuration Items in Configuration Management Database (Addy 2007, p.84; ITIL 2007b, p. 61-62, 259). Service catalog should be available to

anyone within the organization with definitions and instructions (ITIL 2007b, p. 259; Addy 2007, p. 84).

8.1.2 Service Request Management

Service Request Management is a fundamental process in service delivery. It activates service delivery, allocates service request to other process if needed and finally closes the service request. Service request means a request placed upon the IT organization by the users of IT. These requests can be small changes like request to change password or request for information. ITIL (2007c, p. 46) recommends handling service requests separately from incident and Change Management as service requests have high frequency and usually don't contain large risks, therefore they would only disturb change and Incident Management processes. However, from holistic point of view incidents and change requests are specific service requests. Incident is a service request to help customer use specific IT asset or solve problem that customer has and change request is a request by customer to change something related to an IT service such as password or functionality of application. It is however important to classify incident and change requests as separate classes. Service Request Management process usually includes steps of the process chart below that is modified version of Service Request Management process of ITIL V3.

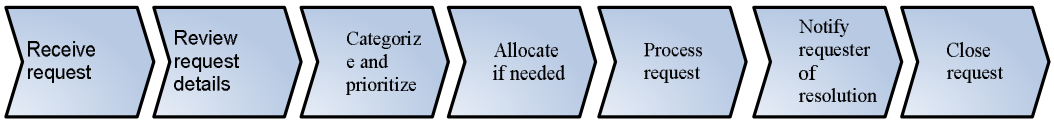

Figure 11. Service Request Management process

Service Request Management process contains the following roles: service requester, beneficiary of request, instant support, and service manager (Addy 2007, p. 106). For smooth Service Request Management, customer should have a graphical interface for requesting all services (Ludwig et al. 2007; Burns 2008). It should serve as single point of contact for all IT services. (ITIL 2007c, p.58) This user interface can be for example service catalog. Nonetheless service catalog is

unlikely to replace Service Desk. Instead it should ease the work of Service Desk. (Burns 2008, 2009) To achieve well functioning Service Request Management, all services should be standardized and standard fulfillment procedure should be documented (ITIL 2007c, p.58). Standardized requests and fulfillment procedure should answer to these questions (WIBAS 2008, p. 3-44; Addy 2007, p.107):

- What is requested?
- What is the urgency of request?
- Who is requester?
- What process or processes fulfill the request?
- To whom the request is assigned?
- What is the state of request including log of statuses of request.

8.1.3 Incident Management

Incident is an interruption to an IT service or reduction in the quality of IT service that occurs unplanned. Also failure of configuration item that has not affected any service yet is an incident. Purpose of Incident Management is to manage resolution process for incidents. Objective for the process is to restore normal operations as quickly as possible and minimize counter-productive impact on business operations. In other words, ensuring agreed level of quality and availability for services. (ITIL 2007c, p.46) Figure below explains Incident Management process it is formed from the basis of ITIL V3.

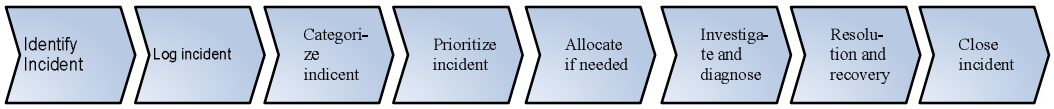

Figure 12. Incident Management process

Figure 12 identifies the different actions required in resolving incidents. First three steps define how incident should be approached - whether it is urgent or not, who does it affect and so on. In prioritization step, the impact should be evaluated from customer perspective not IT (Spafford 2009). After the incident has been identified, it is solved or allocated to a support group that can solve it. In case

none of the support groups can solve the incident, a problem record is created for it. (Addy 2007, p. 115; ITIL 2007c, p.46) Problems are thoroughly covered in chapter 8.1.4 *Problem Management*. Most of the incidents are caused by a change. Therefore, in the investigation and diagnosis phase, it is important to find out if something has changed to diagnose the root cause of the incident. (Spafford 2007, p.2) After the incident has been solved, incident resolution request is closed. This step informs end-users that the service is again online and functioning as it should (Spafford 2007, p.2). The process usually includes following roles: incident resolution requester, people impacted by incident, instant support, support group, incident manager and service manager. (Addy 2007, p. 115; ITIL 2007c, p.46)

To successfully manage the process, IT organization needs to have good service desk, clear targets in Service Level Agreements, staff with customer oriented attitude and technical knowledge, integrated support tools for controlling incident resolution process and Operating Level Agreements (OLA) and Underpinning Contracts (UC) that support the work of staff. ITIL (2007c, p.46) defines OLA as an agreement which defines operating level actions required by different functions. Functions can be for example IT and HR, or functions can refer to different units within IT, such as application team and infrastructure team. In addition to functions OLA can be an agreement between processes, such as incident and Change Management. UC is a document that defines targets and responsibilities required to meet SLAs (ITIL 2007c, p.46)

8.1.4 Problem Management

Problem is an unknown cause of one or more incidents. Problem Management's objective is to manage the lifecycle of problems and thus prevent and solve problems faster. Problem Management documents root causes of incidents and workarounds and resolutions for incidents. Problem Management ensures that resolutions are implemented in a correct way via change and Release Management. (ITIL 2007c, p.58-59; Addy 2007, 163 - 164) Figure 13 describes different phases of Problem Management process.

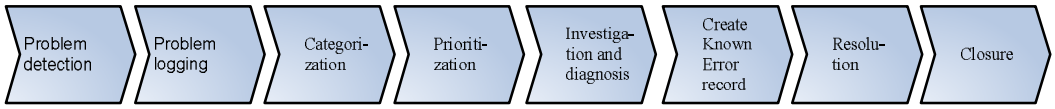

Figure 13. Problem Management process

Before the problem detection phase, the user usually encounters an error and incident is created. After analyzing the incident support groups agree that it is a problem and problem record is created. After problem is diagnosed a Known Error should be created. It can be created also earlier if needed. Known Errors should be kept in Known Error DB, to help incident and Problem Management. Finally when problem is resolved and resolution implemented the problem record can be closed.

Problems should be separated from major incidents. Incidents always have objective to restore service as soon as possible, whereas Problem Management has secondary priority on resolution speed and primary on finding the root cause and resolution for it. (WIBAS 2008, p. 45 - 47) Success of Problem Management is highly dependent on Incident Management as problems are often identified in Incident Management process. Therefore it is important that Incident Management and Problem Management tools have good interfaces and that incident records can be linked to problem records and vice versa. Also people working in Incident Management and Problem Management should have good and close relationship. Problem Management should pay special attention that business impact of problem resolution is well understood and IT staff have in general knowledge of business implications of IT services (ITIL 2007c, p.67-68) Key players in Problem Management are: person suggesting problem investigation, instant support, support group, specialists, investigator and problem manager. (Addy 2007, 167)

8.1.5 Change Management

Service organization's most important quality attribute is the ability to react to ever-changing requirements of the customers and environment (Salminen 2002, p. 143). This underlines the importance of well functioning Change Management. Changes arise for different kind of reasons. They can arise from proactive activi-

ties, such as from seeking business benefits or they can arise reactively, which means reacting to changing circumstances. Managing changes helps to optimize risk exposure and minimize negative impact and disruption to services. According to several studies around 80 percent of all critical outages can be traced to faulty Change Management (Ganek & Kloeckner 2007, p. 376; Spafford 2008,). Change Management process is described in figure 14.

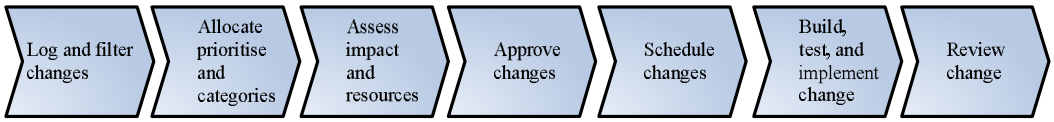

Figure 14. Change Management process

As described in the process chart above, first Change Management filters adequate change requests from inadequate ones. Then changes are categorized according to impact of change or type of change. After that Change Advisory Board (CAB) assess the risks of implementing the change against risks of not implementing it (Spafford 2008; ITIL 2007d, p. 58- 59). Roles within CAB should stay but people within it depend on requested change. CAB should contain representatives from all relevant stakeholders, such as IT organization, customer and supplier. Risk assessment is followed by approval procedure. Changes usually require business, technical and financial approvals. If a change is approved, Change Management needs to decide how exactly it should be implemented. (ITIL 2007d, p. 53- 54)

Emergency changes should also follow a formal procedure to minimize risks. For example testing procedure might be cut down before implementation of emergency change. In such case testing is recommended to carry out after the change has been implemented. Emergency change procedure should cover at least the most critical services. Maintenance of change procedures requires resources and therefore companies should assess themselves how detailed procedures are efficient for them. (Spafford 2008b) Risk assessment of emergency change is usually assessed

and approved by Emergency Change Advisory Board, ECAB. ECAB usually does not require attendance of all members of CAB.

Standard change refers to change that have been pre-approved., often because of frequency and a low risk factor. These changes do not need to follow a full change procedure. They can be regarded as normal service requests or have own change fulfillment procedure. List of changes that have been approved to be dealt as standard change should be listed, to speed up the change procedure. Even standard changes are not risk free always and therefore they should be recorded, to speed up possible incident resolution and provide performance data of standard change procedure (Addy 2007, p. 194) (Spafford 2008)

Two reviews are advised to be carried out for other than standard changes - one immediately after implementation, and another one 90 days after implementation. First review is operational and closes change request, whereas the second one determines whether the change was ultimately successful (Spafford 2008). Success of Change Management depends on the process's capability to fulfill customer's requirements, such as cost, quality and timeliness. Change Management is also dependent on Configuration Management and CMDB, to provide information about configurations that need to be verified before implementation. To avoid service disruptions business impact of changes need to be well understood. Change Management should assess the risk to IT service continuity, security, and capacity. It should also have good interface to Problem Management, to ease problem resolution. (ITIL 2007d, 42, 63-64; Addy 2007, p. 185 - 189)

8.1.6 Release Management

IT Organizations often struggle to define what the sphere of responsibilities for Release Management is. ITIL (2007d, p. 84) defines the purpose of Release Management to build, test and deliver updates and new services according to business requirements. Release Management offers consistent and auditable implementation of services. It should be considered when IT organization faces regularly a lot of changes for a certain asset to optimize implementation speed and risk exposure,

and to minimize costs. Usually this kind of setting emerges in application development work. Other situations where Release Management is recommended are (Addy 2007, p. 310):

- Implementation duration is long
- Change impacts large number of end points
- Different geographical locations affected
- Change is very complex

In the figure below release process is divided in to six steps: planning; design, build and configuration of release; accepting release; planning rollout; communicating, preparing and training release and finally distributing and installing release. In the planning phase a high level plan for release should be created. It usually includes acceptance criteria for release, tools, deliverables and implementation instructions. In the next phase changes are designed, built and configured. This phase should also include specific test plans and back-out procedure, for reverting release if possible. In the following phase release is accepted to be implemented. Testing procedure should be documented, it should explain what was tested, what not and what known defects does the release have. If release is not acceptable it can be postponed or cancelled. Release Management should not modify changes, it should be done under Change Management. (WIBAS 2008, p. 88 - 95) After approval, rollout plan, including timetable and action plans, is created. At this point release plan should be exact. Then release is publicized and end-users are informed of the future changes and possible constraints and service breaks. The final phase is taking the release into live environment. Before the implementation it should be confirmed that master copies of software are kept in database if the process affects software, changes to CMDB should be updated, intensive support resources for the service should be reserved and uncompleted work should be redone. (WIBAS 2008, p. 97 - 99)

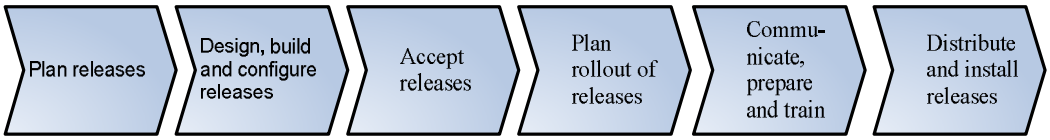

Figure 15. Release Management process

There are a handful of critical success factors for managing releases. First of all new or changed services under Release Management should be tested according to service design procedures. It is recommended to pilot deploy the service in testing environment and re-usable test models should be maintained for regression testing. After the release is carried out, planning for next release begins. For closing release different requirements can be set. They can be for example conditional or duration based. Conditional requirement can be for example completion of 95% of system changes or duration limit. (Addy 2007, p. 311; ITIL 2007d, p. 114)

8.1.7 Configuration Management

Configuration Management provides a logical model of IT environment for an IT organization. It describes relations of different IT assets and therefore eases monitoring IT service layers and their interconnectivity. For example, it describes applications relation to platform it is installed on, and again platforms relation to server it is installed on. From server IP-address can be looked up, and with IP-address server's place in the network can be located. Configurations are stored in Configuration Management Database (CMDB). Single object in CMDB is called Configuration Item (CI). CI can be a whole service constituting of IT components, supporting services or it can be single software module, depending on the organizations decision of level of data granularity. CIs should be managed on a level that supports operational stability of IT (BMC Software 2005, p.3). Spafford (2008c) recommends excluding desktop changes from Configuration Management, as they are often the most political and least controlled objects in the IT environment. Configuration Management enables efficient management of other IT Service Management processes, such as problem and Change Management. (ITIL 2007d, p. 65)

When implementing Configuration Management, the development team first needs to identify all data templates needed. In this context, template refers to a data table of CI. (Spafford 2008c) In other words, it describes all attributes of CI that have been decided to be included in Configuration Management. When designing attributes for templates, the need for Configuration Management data of other IT Service Management processes should be taken into account. Manually maintained data fields should be kept to minimum, to enable reasonable maintenance for them (Spafford 2008c). To improve service management, it is important to manage configurations from service perspective. Required templates should be identified as a result of following a top-down approach, starting from services, to untangle all needed CIs. When service CIs have been defined, components for them should be identified and so on, until the wanted level of data granularity has been achieved.

The templates are recommended to be kept in a common place. Addy (2007, p.235) refers to it as a catalog of CIs. All templates should have some common fields such as unique identification field, relation to other CIs, ownership of CI and information when it was implemented or last time updated. In template design it is important to keep both short-term and long-term perspective in mind (Spafford 2008c).

Configuration baseline describes the state of configuration of a specific set of CIs or all CIs in the CMDB. Baselines should be archived when configuration is in significant state and further use of the state is likely. For example, in the case of implementing new release of configuration to CMDB, baseline of old configuration works as a back-out procedure if release does not go as planned. Predominant configuration should always be baseline or baseline plus approved changes. Configuration audits should be performed regularly to verify that the configuration in real world and CMDB are synchronized. Baselines are utilized in configuration audits, for example baseline at development state vs. baseline of current state. (ITIL 2007d, p. 70)

For successful Configuration Management it is critical to use technology to automate CMDB management and to enforce configuration policies. Clear policies how fields are to be maintained should be decided to ease managing data at agreed level of detail. Common challenges in Configuration Management are bad data quality and too accurate data level. (ITIL 2007d, p. 83-84)

8.1.8 IT Asset Management

IT Asset Management (ITAM) is the end-to-end process managing assets from entering to exiting the organization (Addy 2007, p. 225). It provides fundamental basis for IT Service Management as it provides the information what the organization has in its estate (Kendler 2006, p.36). Scope of ITAM includes both software and hardware assets. ITAM activities include managing asset costs, contracts, asset usage and ownership throughout lifecycles. Purpose of ITAM is to lower total cost of ownership and acquisition cost of asset, reduce purchasing, improve accuracy of budgeting and planning and extend asset life. As described in figure 16, asset lifecycle can be divided into five steps: asset request, asset procurement, delivery, maintenance and disposal.

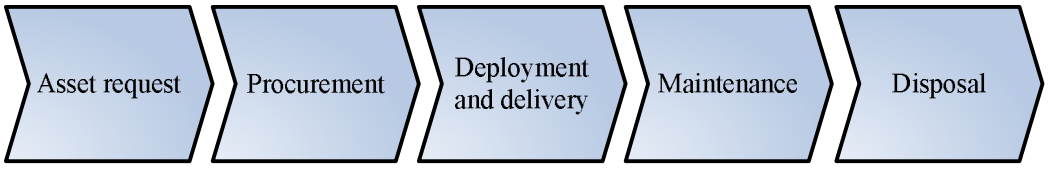

Figure 16. IT Asset Management process

For a successful IT Asset Management, it is critical to design workflows for all activities such as asset disposal. In addition, reliable data repository, such as CMDB, is needed for tracking assets. Therefore ITAM is highly dependent of change and Configuration Management. To achieve comprehensive and reliable data human errors should be avoided by automatic tracking of IT assets. (Addy, 2007, p. 226; Kendler 2006, p.36; BMC Software 2005, p.3; Spafford 2008d) Also it is important to take country-dependent restrictions such as legislation and taxation, into account in ITAM process. (Kamal & Petree 2006, p. 325-330)

8.1.9 Access Management

Access Management is the process of granting user rights for services. It also contains preventing access from non-authorized users. According to ITIL, Access Management is execution of policies and actions defined by Security and Availability Management. (ITIL 2007c, p.68) In the figure 17, high level Access Management process is described.

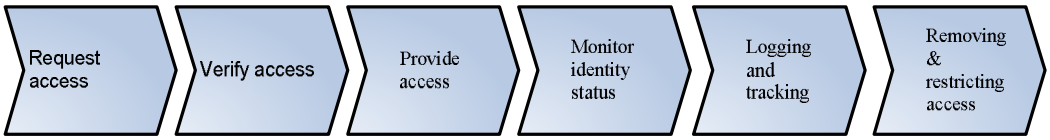

Figure 17. Access Management process

Access Management includes the following success factors: Ability to verify identity of access requester and access granter, ability to verify that user qualifies for access to a service, ability to link multiple access rights for a user, ability to determine changes in status of employee that affects the user rights, ability to manage changes in user rights, ability to restrict user rights and database for users and their user rights (ITIL 2007c, p.72)

8.1.10 Interrelationship of IT Service Management processes

Figure 18 explains the relationship of ITSM processes. All services start and end with Service Request Management process. After service request has been created it can be allocated to different processes. When resolution for service request has been implemented, the request can be closed.

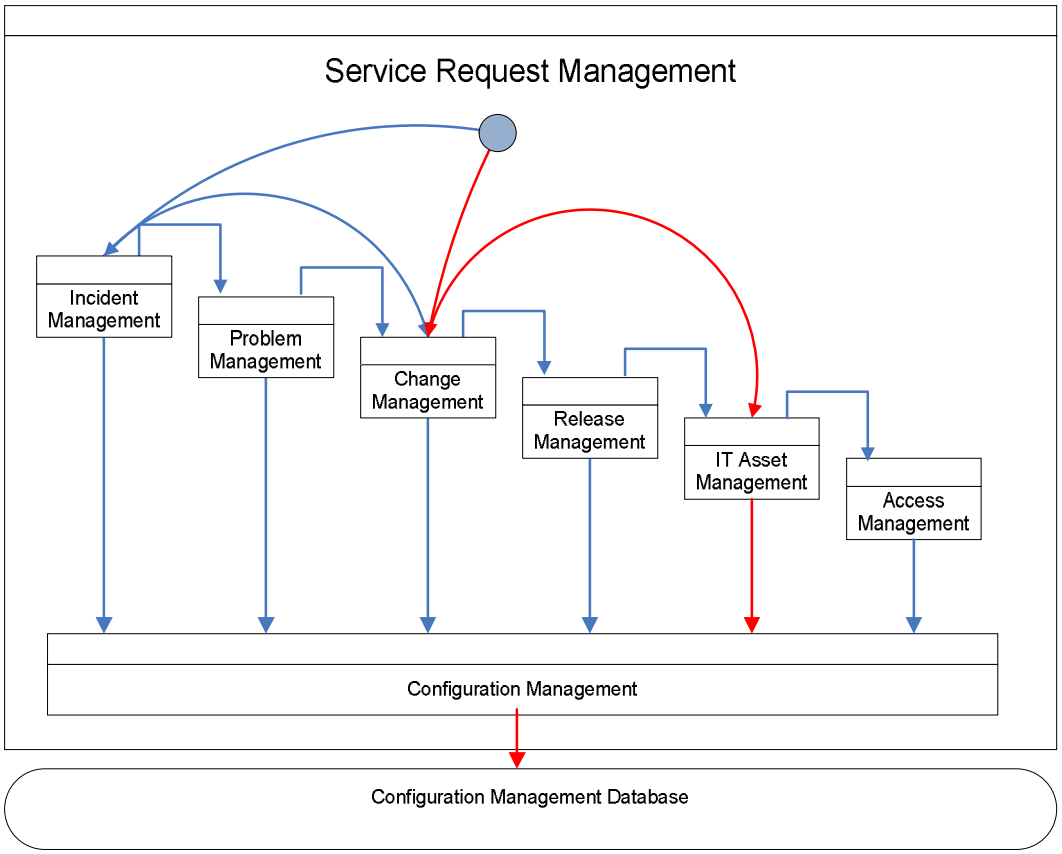

Figure 18. Initial process map for the nine IT Service Management processes

For example when employee accidentally pours coffee onto a laptop, he would call Service Desk and explain the situation. Service Desk then would create service request for local support to change laptop. Local support would install and deliver new laptop and take the broken one with them, update IT Asset Management system and close the service request. In the process figure above red arrows describe the *coffee on a laptop* scenario and blue arrows are other possible routes for service requests. The *coffee on a laptop* scenario would go roughly in the following way. First a service request is created in Service Request Management process, then service request is updated to request for change. Then request for change is evaluated by Change Management process. If Change Management approves the change, the request is forwarded to IT Asset management that picks up substitutive laptop, installs and delivers it to employee, and takes old laptop with them. Configuration Management then updates CMDB record for user and laptops. After request is fulfilled, Service Request Management closes the service request.

8.2 The analysis

The gap analysis is carried out by assessing corporation's performance against industry best practices. Each process is analyzed per process steps presented in chapter 8.1. Analysis includes current state, challenges and requirements for next capability level. Analysis is based on interviews and workshops held with IT management and staff.

Capability levels are assessed primarily according to CMMI and secondary according to itSMF capability levels. Specific goals have been applied from WIBAS's application of ITIL and CMMI and benchmark data of chapter 8.1. Standard design for processes does not exist in the IT organization. Therefore none of the management processes has achieved level four of CMMI - defined process. The processes have been developed to different capability levels as explained in the figure 19. Capability levels are subjective as CMMI and other ITSM theories have been applied. Purpose of the levels is to describe capabilities of different processes in relation to each other as well as quality of processes.

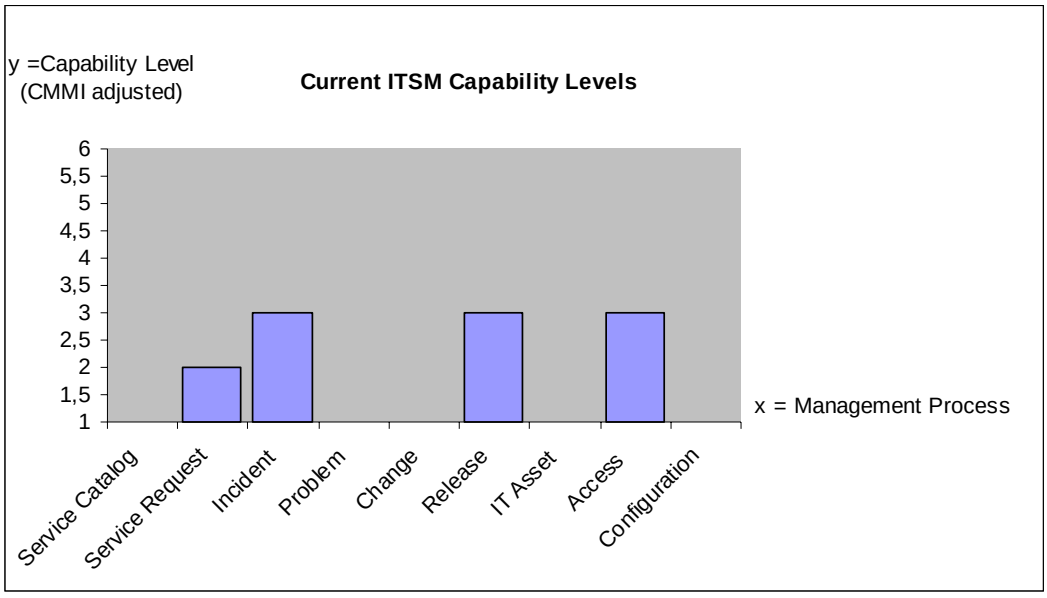

Figure 19. Identification of ITSM capabilities as a result of gap analysis

8.2.1 IT Service Catalog Management

As management of service catalog, does not exist as a process, it is on capability level incomplete. To achieve performed capability level organization needs to establish service catalog and maintenance procedures for it.

IT organization provides mix of services and products with services. The service offering has been documented, but it is no longer up-to-date as there has not been maintenance procedure for it. Documented services have been divided to application services, infrastructure services and network services according to functional units. Clear division between business and technical services has not been made and the documented services have not been presented to customer nor used in performance measurement. Therefore customer does not have complete picture what IT organization offers. Also performance of the services is not always clear for the customer.

The technological infrastructure for service catalog is already available, so additional investment for it is not needed. Customer aspect of the catalog can be created to intranet or to a self-service portal that is a add-on for IT ERP. Self-service portal is more expensive option as it has to be procured from supplier. Using the self-service module of IT ERP has the benefit of having pre-made interfaces to IT ERP. It also has some pre-established functions that would require coding if intranet catalog is chosen to be created. Good example of this kind of function is status tracking of service requests for customers. Even though the catalog can be created without external help, internal workforce is needed. Therefore proper business case for service catalog solution should be made. Plan for designing service catalog for shared services has been agreed on. IT ERP also supports creating technical aspect of the catalog to identify service configurations. It allows for example hierarchical structures for services, linking SLAs to services, different categories, priorities and states for services and different role-based views for example for management reports. IT ERP is the natural place for technical catalog as it is already integrated to supplier systems and is used as the tool to run Incident Management. It also contains CMDB to enable service configurations.

8.2.2 Service Request Management

Service Request Management is on the capability level two - performed process. Instead of service request process, service delivery processes have been modeled for different services such as access right request and incident resolution request. Estimating whether all service have delivery processes is difficult as standardized up-to-date service list is not available.

Main contact point for services is Service Desk. However it can not process all the requests, instead in some cases it recommends the user to use other service request function. For example IT assets are handled via Access Management application not via Service Desk. Service Desk has been outsourced and therefore instructions for the supplier should be well-defined to improve service fulfillment process. Correlation between quality of instruction and service quality has been acknowledged.

Service requests do not have formal prioritization. Also customer cannot follow-up service requests, nonetheless some services inform customer as request status changes. Customer is not always informed after resolution of the request. Also categorization is not functioning properly as incidents are not separated from service request at all.

The process is not reviewed and therefore it has not achieved capability level three. However, performance of delivery of individual services, such as application services, is monitored. Also customer has a possibility to disagree with resolution and give direct feedback for each service request. Service level agreements for customer have not been negotiated. Interfaces between different functional units and internal and external workforce are satisfying, but some difficulties exist. Measures for ensuring that only authorized people are allowed to request services are covered in chapter 8.2.9 Access Management

8.2.3 Incident Management

As a cornerstone of IT organizations maintenance work, Incident Management has been developed more than most of the other processes. Incident Management is on the level three - managed process. Specific goals are met and the process is planned and executed in accordance with clear policies. However, application team and infrastructure team do not share incidents, instead both teams have their own Incident Management procedures with own processes and modules within the IT ERP. Therefore the process has not achieved capability level four - defined process.

Application team finds logging of incidents unsatisfying as customers do not always give enough information for support groups to solve incidents and it makes incident resolution inefficient. Infrastructure team has similar kind of problem as incident resolution request form does not have obligatory fields.

As Service Desk has been outsourced, two systems are used for logging incidents. The systems are IT organization's IT ERP and information system of the supplier of Service Desk. Incidents that have been logged to suppliers system are transferred to IT ERP to maintain complete record of incidents. Integration between case company's and supplier's systems is not infallible and therefore has to be monitored.

Categorization is done according to service hierarchy of IT ERP. Harmonization of categories and service classes is needed when proper service catalog is implemented. Also application team has requested incident categorization by fault. Prioritization of incidents is in use. However, internal and external systems do not share common prioritization and this inflicts challenges. Categorization does not affect prioritization. IT ERP supports such functionality, but it is not expected to improve incident handling process.

Guidelines for allocating incidents have been defined, but there are also some deficiencies. If incident is identified of being other functions incident, then it is

transferred to the other module - for example from application team's module to infrastructure teams module. Application team has also defined critical incident and developed procedure for it. Infrastructure team does not currently have documentation of critical incident and procedure for resolving such, but a need has been acknowledged.

Resolution step is not functioning in all units as it should, as one partner system does not send resolution and closure message to customer. IT ERP also supports linking incidents, but closure of incidents is required to be done manually.

Customer does not have a possibility to follow-up incidents. For infrastructure incidents, status field does not update automatically and it only has options open and closed. Application team has also struggled with statuses as users are not constrained to use correct statuses. Application team has defined clear SLA targets with suppliers and they are also monitored, whereas infrastructure team does not monitor SLAs with suppliers. Feasibility study of using SLA targets in infrastructure services has been planned. Operating Level Agreements are in use between functions, but they have not been formally documented. Both teams have good relationship with suppliers and therefore problems with technical knowledge have been avoided. Underpinning Contracts are also in use with most important suppliers. Self-help tool for incident resolution is not offered, but some training material and other documentation is provided in company's intranet. Even though IT ERP supports Configuration Management, incidents are not integrated to CIs. Incidents are manually transferred to Change Management if required.

Performance of instant support for applications for example is hard to estimate directly as it is hard to convince staff to record all service request, such as a verbal request for transaction fastcode of an ERP system. Solution for measuring instant support is demanded and possible means are examined. Application team has set up a performance measurement system for incident handling, but infrastructure team hasn't. Also, as mentioned in the previous chapter, incidents are not sepa-

rated from other service request. Instead all service requests are dealt with as incidents. This distorts accuracy of performance measurement.

8.2.4 Problem Management

Case company's IT organization has not implemented Problem Management. Therefore, Problem Management is on the capability level one - Incomplete.

Main reason for Problem Management not being implemented is a lack of resources needed to maintain the process. Incident Management partners are using Problem Management for internal processes. For the case company they have not extended this service as it is not included in the SLAs. Also IT ERP supports Problem Management function. Basis for building Problem Management is good and solution for it is going to be designed. For achieving capability level two, the organization needs to design and implement procedures for logging, categorizing, prioritizing, analyzing, resolving and closing problems as well as for maintaining Known Error records and managing problems proactively.

8.2.5 Change Management

The process does not satisfy all specific goals of Change Management for IT organization as a whole. However, Project Services, which takes care of major application development, has a formal procedure for application changes that are in their range. Development of applications that are not in the range of Project Services and minor development of all applications is done by Common IT Services unit. Common IT Services does not have formal Change Management in use for application services, nor does it have it for infrastructure services. Therefore the process is on the capability level one – incomplete.

Changes are not recorded consistently and performance of Change Management is not evaluated by metrics or post implementation review except for Project Services. Common database for all changes does not exist and therefore holistic change monitoring is difficult. To achieve capability level two, organization needs to log and filter all changes and have clear risk management, allocation, implementation

and review procedures for changes. All of the Change Management roles, such as CAB, are not clear for staff.

8.2.6 Release Management

Release Management is on the capability level 3 – managed. Common IT Services has established Release Management for Project Services' application development. It has been specifically developed for development of main ERP system. The process has been well designed. It includes detailed instructions for planning, building and implementing release, as well as instructions for maintaining Release Management process.

Deficiency of Release Management is a lack of integration to CMDB. In other words, configurations that are changed as a result of a release are not automatically updated to CMDB. Also integration of Release Management and IT Asset Management needs to be planned.

Common IT Services does not have a lot of regular non-standard changes for specific assets and therefore demand for Release Management is minor. To achieve the fourth capability level, IT organization needs to establish organizational standards for the process and establish a process library to collect improvement information. After that Release Management process needs to be tailored according to agreed organizational guidelines.

8.2.7 Configuration Management

Configuration Management is on the capability level 1 – Incomplete. The process does not have a documented plan for populating and managing CMDB. Data has been gathered by inventory tools and some data has been transferred from other information systems.

As a part of IT Asset Management (ITAM) project, Configuration Management is going to be deployed more thoroughly. CI templates and CI attributes are going to be designed, but mainly from asset management perspective. Some CI templates

are created in ITAM project, but a common place or catalog for them is missing. Top-down approach has not been used as IT organization's services have not been defined yet. Other processes' need of Configuration Management data has not been analyzed. Design for configurations has been created under IT Asset Management project. IT service catalog is going to be implemented to CMDB in near future. After that configurations can be monitored according to top-down approach from service perspective. Performance measurement of Configuration Management is not in use.

For achieving capability level 2, performed process, IT organization needs to establish all relevant baselines, track and control changes that affect configuration, perform audits and establish configuration records to follow history of CIs.

8.2.8 IT Asset Management

IT Asset Management (ITAM) is on the capability level 1 – Incomplete. To achieve capability level two, performed process, organization needs to define procedures for the whole lifecycle of assets including: asset requests, procurement of assets, deployment and delivery of assets and maintenance and disposal of assets.

Demand for a common IT Asset Management solution has emerged. Therefore, a development project for establishing IT Asset Management was started. Project scope includes all IT assets, including all software licenses and hardware devices. Data of IT assets will be maintained in IT ERP, to help manage the assets. Flow charts for asset procurement, maintenance, deliver and disposal are going to be modeled to describe approved way of working.

8.2.9 Access Management

Access Management is on the capability level 3 – managed. The process is planned and executed in accordance with a common policy. For achieving fourth capability level, IT organization needs to establish organizational standards for processes and establish process library collect improvement information. After

that Access Management process needs to be tailored according to organizational guidelines.

Access Management has its own user interface. In other words, IT assets cannot be ordered from Service Desk, instead Service Desk advices to use Access Management application for acquiring IT assets. The application is used to verify identity of requester and granter. Decision for granting access is done by asset owner or supervisor. Access Management application has stiff hierarchy and therefore the user interface is not as simple as it could be. Identity statuses are monitored and critical combinations for user rights have been defined to pre-empt abuse of them. Sometimes access requests are categorized as incidents, because of the complexity of user interface. Mandatory asset ownership updating, including removal of obsolete access rights, is not done in employee exit process and therefore some licenses are assigned for people not employed by the case company anymore. For some assets, utilization rate is tracked and access rights removed from the customer if the asset is not used. Restricting access rights is application dependent.

9 SUGGESTED DESIGN IMPROVEMENTS

9.1 Justification of the design improvements

The suggested design has two major improvements: clear definition of services and standardized design for all IT Service Management processes. In the figure below enhanced capabilities are summarized. Purpose of the ITSM capability levels is to describe quality of different processes in ITSM adjusted CMMI scale.

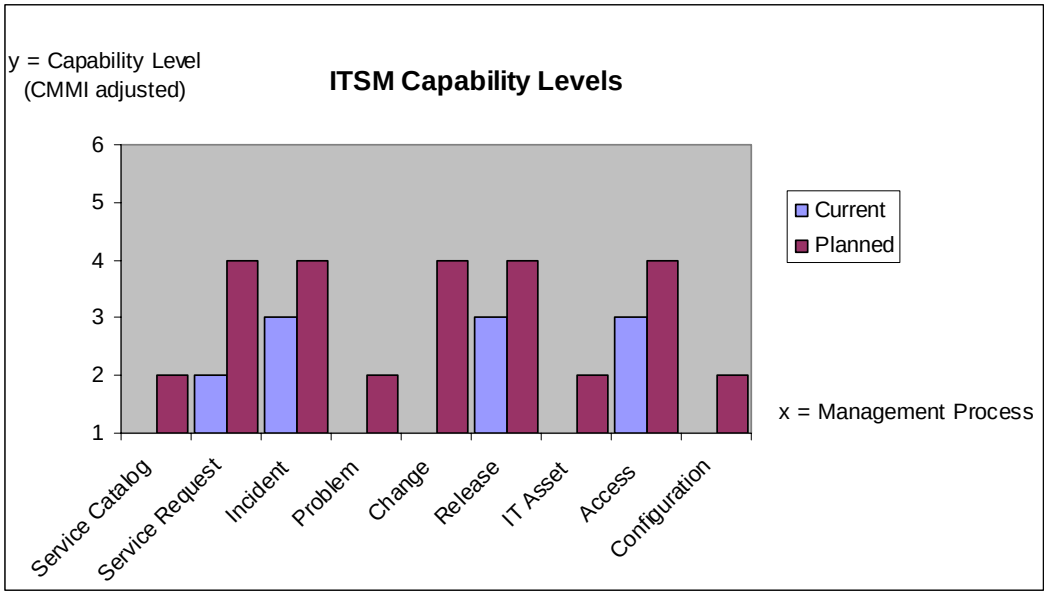

Figure 20. Current and planned capability levels

Designing IT Services is the primary enabler of IT Service Management culture and therefore pivotal design improvement. Process management then increases quality of these services. Process design includes a process map for ITSM that describes the process architecture of IT Service Management for the case company. Process design is tailored from the case company's process management standards. Design clearly states the purpose, inputs, activities, roles, measures, verification steps, outputs and interrelationships of different processes. It is expected to ease customizing IT ERP, simulate weaknesses in IT operations and hence identify new development issues and improve knowledge management of Common IT Services via process-oriented restructuring and organizational documentation. The

design also presents management approach for utilizing CMDB. In addition, suggestions for improving process performance are listed in the end of each process management chapter. IT management was consulted in the process of creating this management model.

9.2 Organizational improvements

Most important role is ITSM owner. ITSM owner is responsible for strategic management of IT services. He reports to top management of IT. He also ensures that all processes are performing as agreed and documented. ITSM owner's sphere of responsibilities includes both service and process perspectives.

From the service perspective two roles are required: service owner and service manager. Service owner orders and pays for a service and service manager guarantees that the service is delivered as agreed. Service owner also needs to approve all suggested changes regarding the service. Service manager manages the everyday operations related to the service. Service manager reports to the manager of service providing unit. For example, manager of ERP service, reports to manager of Common IT Services unit.

Management of ITSM processes is assigned to nine roles: ITAM manager, Application Incident manager, Infrastructure Incident manager, Change manager, Change manager, Access manager, Release manager, Configuration manager and Problem manager. Incident Management does not have single manager, but conflicts can be avoided as the final decision making power is on ITSM owner. Operating Level Agreement between Application and Infrastructure managers should be documented.

Additional roles for ITSM processes emerged. Roles are collected together in appendix 1. Most of the roles are executed by an IT staff member or IT support group.. Appropriate training should be scheduled for all IT staff working with the new processes. Also vendors and customers should be informed of the changes and if necessary trained for the new practices.

9.3 Service Catalog Management

Suggested design for service catalog includes, in ITIL terms, only business services. The catalog contains two dimensions for a service: service hierarchy, service details. The first dimension describes how services are grouped and second dimension, service details, describe all different details that services need to have.

Technical services are not modeled even though they were originally grouped in chapter *7.2 Development scope*. Reason for leaving technical services out is that business services can be directly linked to OLAs and supplier SLAs instead of linking them to artificial technical service before the link to supplier SLA. After all ITIL's technical services are only internal services for IT organization itself. Also performance measurement is more interested in performance of OLAs and SLAs than performance of artificial technical services. However, if IT organization finds technical services useful in the future, implementation of them afterwards should not be difficult as they are only configuration between services and single SLA contracts.

Services are structured hierarchically. Only the highest level of hierarchy is part of this design solution. As stated by Paul Burns (2009) it is better to define the exact service offering while implementing the catalog as some technical and other restrictions might be discovered. In the list below high level service hierarchy is described with exemplar services or sub category. Complete hierarchy is advised to be modeled while the service catalog is implemented.

- Application services
    - ERPs
    - CRM
    - Non-standard software
- Information and Communication Technology tools
    - Workstations
    - Standard office software

    - Shared equipment (printers and alike)
    - telephony
        - mobile
        - Business mobile phone
        - fixed line
        - telephone switchboard
    - Email & Calendar
- Access right services
    - set up user rights
    - change user login or password
    - restrict access
    - WLAN access
    - remote connection

All the services contain the following information: service group, service description, supporting services, service access point, service owner, service manager, end-user scope, service providing unit, business impact, business priority, Service Level Agreement, service hours, escalation path, reporting policies, last review date and outcome. Service catalog with exemplary services is in appendix 3.

Implementation of services should start as soon as possible, as development of other processes builds on these services. After implementation service catalog, services become visual for customer and IT staff. The service catalog works as a window for the corporation to observe performance of IT organization. Also IT organization will understand the quintessential objective of their work and act accordingly.

Service catalog is suggested to be implemented into IT ERP, as it functions as the engine of IT Organization. Customer-interface can be built to intranet webpage or as bought module of IT ERP. For deciding whether intranet webpage or IT ERP is a right choice for customer's service catalog, evaluation of the customer interfaces should be done. Customer interface should be extremely visual to enhance intui-

tive choosing of correct service group. Also service hierarchy should be flexible and the same services might be found from more than one service group, so that customers don't have to search the whole catalog to find a distinctive service. Search function could also be considered. As the catalog is going to be a pilot version, customers should be invited to further develop the catalog, for example by adding feedback and survey functions.

For maintenance of service catalog, performance monitoring and development procedures need to be clear. Performance monitoring can be done according to service hierarchy. Services performance can also be evaluated according to other management processes. For example efficiency of solving incidents related to CRM could be monitored or success rate of changes related to CRM. Service catalog is recommended to be maintained via Change Management. Service catalog achieved capability level 2, as it fulfills the specific objectives of the process.

9.4 IT Service Management process modeling

Good modeling principals were followed according to the theoretical process management framework of chapter 4. A map of processes and process charts were described and modeled.

After the identification of service management processes, a process modeling team was set up. It contained process designer, quality inspector and process managers. Top down mechanism was used in the process modeling starting from the process map of IT Service Management. Case company's business process modeling framework was used for benchmarking purposes and corporate terminology and rules for process modeling were applied.

The design includes three different description levels: process chart, concept chart and work instruction. All relevant views were listed with documentation explaining the objective of them. Then existing process charts were matched to process requirements. After that existing models were analyzed by using process models and modeling practices of ITIL, CMMI, WIBAS, Effective IT Service Manage-

ment book by Rob Addy (2007) and corporate business process development team, as references for benchmarking. Suitability of reuse was evaluated and potential improvements were identified. Some necessary and several useful variants were modeled. Distinctive service request concepts were necessary to model as customers have four different contact points for services. Several fulfillment concepts for Change, IT Asset, Access and Incident Management were designed to improve efficiency of these processes. For example, in Change Management it is necessary to separate standard changes from major changes as explained in the theory. Every activity was laid to a certain role to show person or entity responsible of it. After the processes were designed, quality inspector assessed them and corrections were made. After that process simulation for each IT service was carried out with the process manager and after the simulations were successfully executed, final validation by 2nd quality inspector was done. Simulation was done for services provided from or within Finland and therefore new requirements, which demand tuning the processes, are expected to emerge when the processes are implemented in other countries.

To improve handover between processes, clear Operating Level Agreements are advised to be implemented. Process objectives, input and output are described in the chapters below. Symbols used to describe process elements are described in Appendix 2. Entry and exit points also identify interfaces between different concepts. Appendix 2 also contains process chart and an exemplar concept chart to describe the process architecture.

9.5 IT Service Management process design

Designed ITSM Process map can be seen in below in the figure 21. Objective of it is to describe the overall goal of IT organization, delivering IT services, covering the process from customer to customer as advised by Laamanen & Tinnilä (2002, p. 75 - 83). Service delivery process contains those ITSM processes that participate directly in the service delivery. It is divided into three different steps: service request, request fulfillment and request closure. In addition to service delivery process, the process map contains supporting processes. Supporting processes par-

ticipate only indirectly supporting the service delivery process. As shown in the figure below, Service Request Management, Incident Management, Change Management, IT Asset Management and Access Management are fulfillment processes and Configuration Management, Release Management and Problem Management are supporting processes.

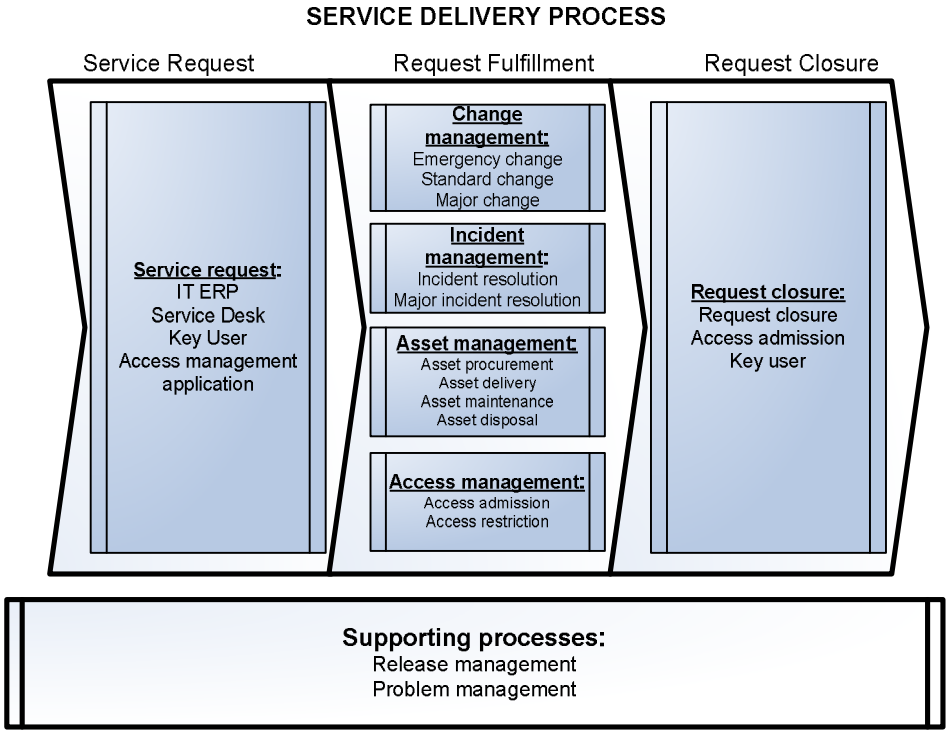

Figure 21 Process chart level

As can be seen from the figure above, none of the IT Service Management processes are modeled individually. Instead, Service Request Management is chosen as the high level perspective. Concept charts can be identified from process chart level. As figure 21 shows, altogether 18 concepts were modeled. Appendix 2 contains exemplar concept chart. In concept chart level, horizontal cross-functional flowchart design was chosen. Work instructions are linked to activities on concept chart level. For example if concept chart has an activity “closing service request”, work instruction will tell on detailed level how to close the service request. Work instruction is not format dependent. It can be for example written or presentation document.

Designed IT Service Management (ITSM) process management solution is suggested to be implemented as a part of corporate process library. For the corporation to achieve full benefits of ITSM process management solution, IT organization should apply it in training of new IT staff, development of IT services and performance measurement of IT organization.

9.6 Service Request Management

The core of IT Service Management is managing service request. Therefore, the whole process map is designed from Service Request Management point of view, as described in chapter 9.5 IT Service Management process design.

Service request are managed in the Service delivery process that contains three steps: requesting services, fulfilling requests and closing requests. First step is receiving service request. After that are the fulfillment concepts of Change, Incident, Asset and Access Management, and finally are the service request closing concepts. Objective of Service Request Management process is to fulfill requests according to agreements and have minimum amount of re-opened service request. Receiving and closing concepts have the sole objective to manage service requests. Performance of concepts and service delivery process are advised to be reviewed on monthly basis. Process achieved capability level four as it is standardized according to corporate standards and has clear objectives and ownership in place.

Service request concepts are IT ERP concept, Access Management application concept, Service Desk concept and Key User concept. Request closure concept is called Request closure concept. Service request concepts are named according to point of contacts for customer to request services. In other words customer can request service from Service Desk, by using Access Management Application, directly by typing request to IT ERP or by contacting Key User. Key User is a employee of IT organization. Role description of Key User is to support all other employees in IT related challenges. Service request concepts have three main ac-

tivities: logging requests, categorizing and prioritizing requests and fulfilling or allocating requests. Input is IT related need and output is allocated service request ticket or fulfilled request.

Requests have also three possible closures. All requests do not enter a service request concept, instead they can be closed before. First of all, if request is typed to IT ERP, it will be closed in the system as well. If however Key User solves the service request or service request is request for access to software, IT ERP does not receive service request and therefore it cannot be closed in the system. In the case of Access Management application, a formal service request is created and closed within the application, but the data is not updated to IT ERP. Key Users do not type request that they can solve themselves to IT ERP as it is seen inefficient to record them. Input is a request with resolution and output closed request and PIR for major incidents and new service request ticket if requester was not satisfied with the resolution of service request.

Other improvements that are recommended for the IT organization are:

1) Harmonization of service request categorization and prioritization
2) Implementation of follow up function for service request
3) Designing and implementing a common performance measurement system for service requests (requirement for next capability level)
4) Implementing SLAs for business
5) Setting up a common place for all Service Desk instructions within the IT organizations

9.7 Incident Management

Two Incident Management concepts were modeled: incident resolution concept and major incident resolution concept. Objectives of the concepts are to solve incidents as fast as possible with minimum harm to business and have as few reopened incidents as possible.

Incident resolution concept is the main channel for incidents. It has three major activities: reviewing ticket, investigating and diagnosing incident, and solving or reassigning incident. Major incident resolution concept has some differences compared to incident resolution concept. First of all, incident manager participates actively in the concept. The manager reviews tickets and if the criticality of incident is confirmed, organizes resolution group for the incident. None of the incidents are left open, instead, they are allocated to top management if resolution is not found within an appropriate time frame.

Incidents, excluding the ones that Key Users solve, are recorded as service request for IT ERP. Input, for the concepts is a service request categorized as incident or major incident. Outputs of the concepts are incident ticket updated with resolution or information explaining why it was not solved and possibly a change ticket if change is required to solve the incident. Incident Management achieves capability level four with this design, as it is standardized according to corporate standards and has clear objectives and ownership in place.

Other improvements that are recommended for the IT organization are:

1) Common performance measurement for IT organization
2) Harmonize categorization and prioritization of incidents
3) Clear SLAs for all purchased services
4) Implement formal OLAs
5) Use of knowledge management database

9.8 Problem Management

A single Problem Management concept was also designed. Objective of Problem Management is to detect underlying causes of incidents and resolve and prevent problems. Problem Management concept comes into play when the root cause of incident cannot be identified. Problem record is then created to IT ERP and matched to Known Error Database. If a match is found in the database, related incidents can be updated and closed, if open, and if not, then problem record will be in the queue waiting for investigation and diagnosis. If solution is found after

the investigation and diagnosis, problem ticket and related incidents are closed and the solution is implemented. If solution can not be found, Known Error record is created and problem ticket is updated and left open. Input for Problem Management is incident with unidentified root cause and output identified root cause and possibly a new Known Error record.

To achieve support from IT staff for allocating time for Problem Management, IT management should analyze IT organization for existing problems and solve one of them. And after the resolution of the problem, present how the problem solving eases overall work of IT organization. In this way it is easier to achieve support for allocating time for Problem Management. In addition it is important to allocate time for proactive Problem Management to analyze trends of incidents. To achieve capability level two the IT organization needs to also:

1) Develop work instructions for the processes
2) Establish database for problem records
3) Establish database for Known Errors

9.9 Change Management

Change requests are classified as standard, major and emergency change. Each change type has an specific concept. Objectives of Change Management are efficient and faultless implementation of changes and minimization of service outages. Standard changes are changes with preauthorized acceptance. All standard changes should be placed in a single document or database. Major change concept deals with changes that need additional authorization from CAB and service owner. As opposed to standard change, major change requires risk assessment, possible testing and post implementation review. Emergency change is a change with top priority. Concept is similar to major change concept, but lighter and faster to execute than major change. For example investigation approval is not needed and Change Advisory Board acts more quickly. Also as soon as decision on approval is done the change requester is called and notified of the resolution. Input for change concepts is a change record. Output of change concepts is approved or de-

clined change, possible implementation and updated change record. Designed process fulfills objectives of CMMI's *defined process*.

Other improvements that are recommended for the IT organization are:

1) Implement common database for changes
2) Create performance measurement system and monitor Change Management

9.10 Release Management

As mentioned earlier, Release Management procedure for ERP development has been modeled. The model was extended with minor modifications to be Release Management of the whole IT organization. Objective of Release Management process is same as with Change Management - efficient and faultless implementation of changes and to minimize service outages. Input for Release Management comes from the service owner. If a service owner sees a need for Release Management procedure it will be requested from release manager who plans the release and approves changes for it. After each release the service owner should consider whether to order another release or to implement changes without a release procedure. For example, when application does not need major development or the development proceeds in a slower pace, Release Management can be abolished. As explained, input for Release Management comes from service owner as a request for release with release date and output of the process is implemented release. With improved design, process fulfills objectives of CMMI's *defined process*.

Other improvements that are recommended for the IT organization are:

1) Utilize Configuration Management for Release Management
2) Record known defects as Known Errors, that are not solved before release goes into live environment, to Known Error Database
3) Measure efficiency of the process

9.11 Configuration Management

Purpose of Configuration Management is to ease understanding relationships and dependencies within the IT environment. Process chart for Configuration Management was not modeled, but in the ITSM process map it is included as a support process. Interfaces to CMDB are described in the process outcome line in the concept charts. For example when asset detail is updated or ticket is closed. Separate concept for Configuration Management was not modeled as the operative activities, modifying configurations go via Change Management or other service fulfillment process and auditing procedure was not modeled for any of the management processes.

Input for Configuration Management is a new, altered or faulty configuration item that has been identified. Modifying configuration follows standard or major change concept, depending on the severity of change. When a change happens, change implementer should consider whether it requires change to Template Catalog. If it does and change is approved, Template Catalog is updated. Template Catalog should be kept in the intranet or IT ERP for it to be available for all IT staff. Management of Template Catalog is a responsibility of the configuration manager. Output of Configuration Management is an updated configuration. Also auditing configuration, based on baselines, is a responsibility of the configuration manager. Different data cards will have different data owners that answer to configuration manager. Developing configuration is recommended to start from the services downward. Most of the data should be discovered by IT ERP's discovery tool and only necessary data imported. Designed process fulfills objectives of CMMI's *performed process*. Configuration should be done in the following phases:

1) Establish baselines
2) Establish clear goals for Configuration Management
3) Document new CI types to template catalog
    a. Identify CIs from IT services downwards
4) Audit configuration, update documentation and establish new baselines

9.12 IT Asset Management

Objective of IT Asset Management is to manage IT assets in cost-effective way. Four different concepts were modeled for IT Asset Management (ITAM): asset procurement, asset delivery, asset maintenance and asset disposal.

Objective of asset procurement is to make sure the asset delivery team has an asset to deliver. Input for asset procurement is an asset request ticket. Output of the concept is a reserved asset and updated asset request ticket.

Objective of the asset delivery concept is to deliver installed asset as soon as possible. Asset delivery concept receives updated service request from procurement concept and installs and delivers the asset to customer. Output of asset delivery concept is updated asset request and asset assigned to user in IT ERP.

Asset malfunction is managed as an incident, therefore input of asset maintenance concept comes from incident resolution concept. Objective of asset maintenance concept is to replace and repair malfunctioning asset according to Service Level Agreement. Output is a functional asset for end-user and updated asset data in IT ERP. Service request proceeds from asset maintenance concept to asset disposal, asset procurement or request closure concept, depending on whether the asset was fixed and if the end-user had a temporary asset or not.

An asset can be disposed from use as an output of Access restriction concept or asset maintenance concept. Objective of asset disposal is to stock all reusable assets and remove assets that are not stocked from inventory. Output of the concept is stocked or scrapped asset, depending on the condition of it.

Designed process fulfills objectives of CMMI's *performed process*. IT organizations should: identify all asset types and populate CMDB with asset data, simulate and revise process design to apply for all asset types and after the process has

been implemented performance measurement system and auditing procedures should be designed for it.

9.13 Access Management

Objective of Access Management is to grant access for authorized users and prevent access from non-authorized users. Separate models for granting and preventing access were designed. Access admission concept is for granting and access restriction concept is for preventing access. Access Management was tailored according to organization standards and therefore achieved the capability level four.

Access admission concept comes into play always when customer requests access to corporate-owned IT asset that requires approval from superior or another person. Such assets are, for example, additional office software, business applications and IT hardware like laptop and mobile phone. Input is an access request created by customer via Access Management application and output is granted or denied access. If the access request is request for software or hardware and the access has been granted, Access Management team will close the access ticket and create new ticket and assign it for delivering the asset.

Access restriction concept is used when restrictions or removal of access is needed. Input for the concept is a service request and output is a resolved service request with possible removal of access right.

Other improvements to Access Management that are recommended for the IT organization are:

1) Simplify hierarchy and naming of Access Management application
2) Transfer user right data to CMDB
3) Measure efficiency of Access Management

10 DISCUSSION AND CONCLUSIONS

10.1 Essential results

This was a case study based on a single company. Objective of the research was to evaluate current state and give suggestions to improve IT Service Management of the case company.

The first research question was “How are the common IT services managed?” The assessment of the current state was done by analyzing the IT organization in respect to IT Service Management principals explained in the literature review. The analysis revealed that:

- The service offering of the IT organization is not clearly documented
- Management of IT is not service-oriented, it is function-oriented
- Organizational guidelines for process management to support service management do not exist
- Performance measurement for the services is deficient

The second research question was “How can the common IT services be managed better?” The research argues that for improving management of the common IT services, the IT organization needs to:

- Clearly define the common IT services
- Implement common process management methods

Having concrete IT services is the primary enabler of IT Service Management culture for the customer and IT organization. By clearly defining the IT services, the organization is able to visualize what it produces. In addition the customer understands what it is paying for. Therefore, it is essential that the organization clearly defines and publishes the offered services. Implementing common process management approach increases quality and efficiency of the services, by defining common way of working for the IT organization. Common process management approach also supports further development of IT management. Therefore, the IT organization needs to implement common process management methods.

The need for defining the service offering and the common process architecture was concluded from the analysis of the IT organization. To specify these outcomes of the research, a development process, including defining development plan, analyzing development areas and designing an IT Service Management solution, was carried out. The development plan and analysis are covered in chapters 7 and 8. The concrete outcomes of the development process, that specify how to improve the management of IT services, are explained in chapter 9.

10.2 Evaluation of the research

To evaluate the quality of the research, weak and strong market tests can be applied (Kasanen et al. 1993, p. 253). If the process design and service catalog design are utilized by the organization, weak market test is passed, and if they improve financial performance of the organization, strong market test is passed.

Validity of the research can be evaluated against four criteria of soundness of a qualitative research (Lincoln & Cuba 1985, p. 189): credibility, transferability, dependability and conformability.

Credibility of this research was increased by the literature review in the beginning of the thesis and by active co-operation with the management of IT organization in every phase of the research. It is important to notice that customer perspective was not covered thoroughly in this study. This was suggested by the IT organization. Before implementing ITSM practices it is essential to hear also this party. Credibility was increased also by the use of different research methods such as interviews, workshops and observations.

Transferability of the results to new studies depends on how the new context is comparable to the context of this study. For example, for further research of ITSM of the case company this thesis will give a sound basis. Transferability was increased by detailed explanation of different phases of the study. Estimating transferability of the results to other organizations should be done carefully. IT Service

Management still remains rather distant paradigm for many companies. Hopefully, this study will give insight how IT Service Management capabilities can be assessed and developed.

Dependability of this study was increased by the fact that the researcher is an objective outsider for the case company. To meet conformability the methods of research, data collection and analysis were described in detail in the thesis.

10.3 Further actions and recommendations

For IT organization it is essential to implement the service catalog and ITSM processes to its daily operations to improve IT Service Management. As a further study for the case company new development areas could be examined. For example comprehensive performance measurement system for ITSM is currently lacking. From process aspect the thesis focused on setting up processes. Naturally, next step would be using them as part of everyday operations and modifying them as improvements are needed. Also, development of contract management, including OLAs, SLAs and UCs, as well as portfolio management, including obsolete, current and future services, could be studied.

ITSM paradigm contains many aspects that need more research. Success factors of ITSM as well as benefits of ITSM should be studied more to increase credibility of the paradigm. Also ITIL's status as the de facto standard of IT Service Management should be questioned. Large scale comparative study of ITSM frameworks would give an insight into whether the de facto status is well-deserved or not.

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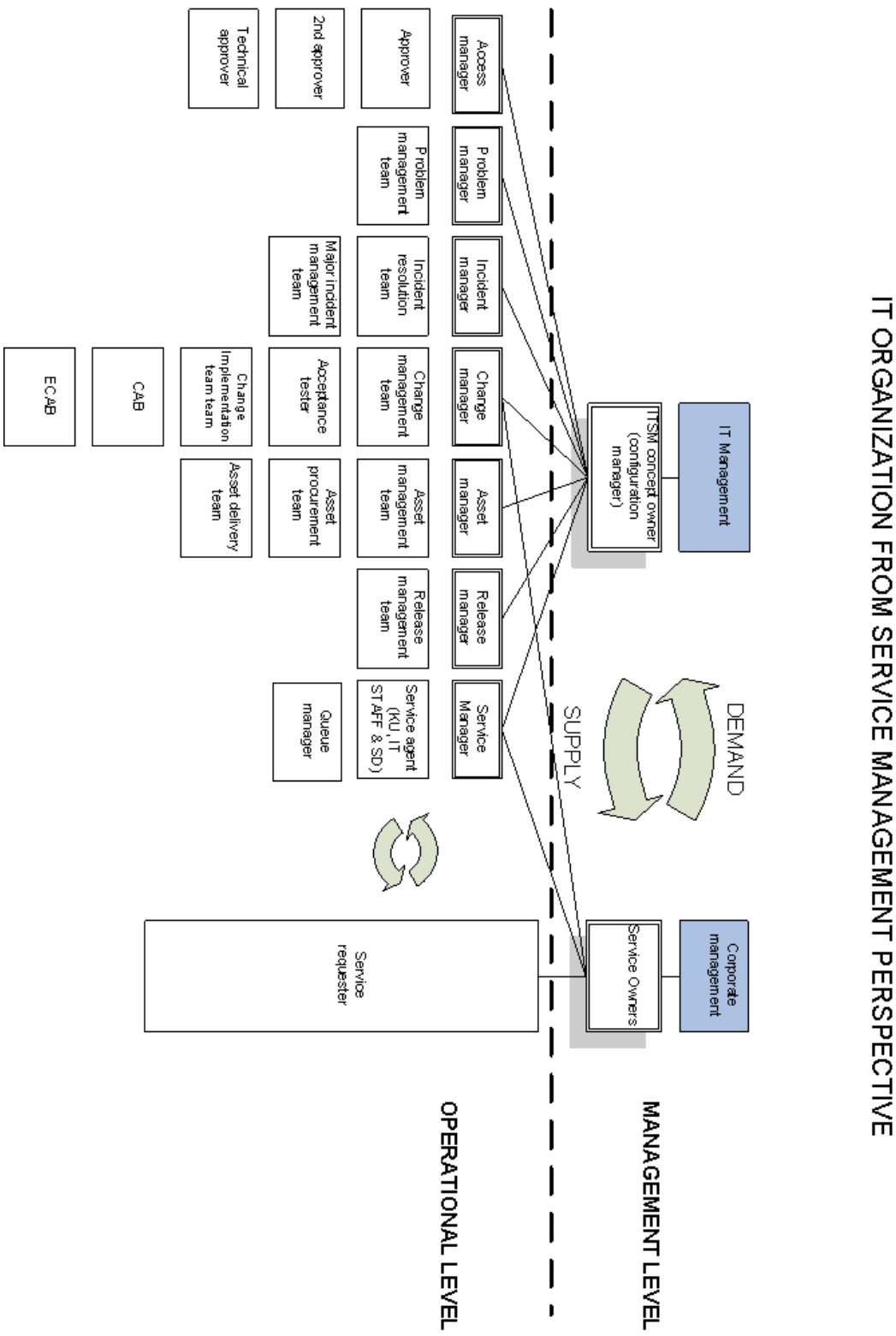
APPENDICES

APPENDIX 1: ORGANIZATION CHART



APPENDIX 2: PROCESS ELEMENTS AND PROCESS LEVELS

In this appendix process elements and process levels are described. Figure 1 shows symbols used in the process charts. Figure 2 and 3, describe high level and sub level of the process architecture. High level, that describes location of different concepts, is in figure 2. Purpose of figure 3 is to describe modeling technique of the sub level.

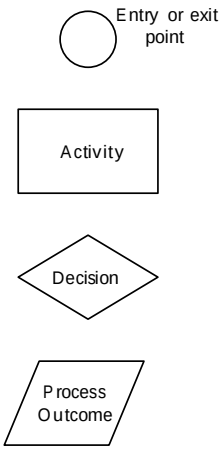


Figure 1. Process elements

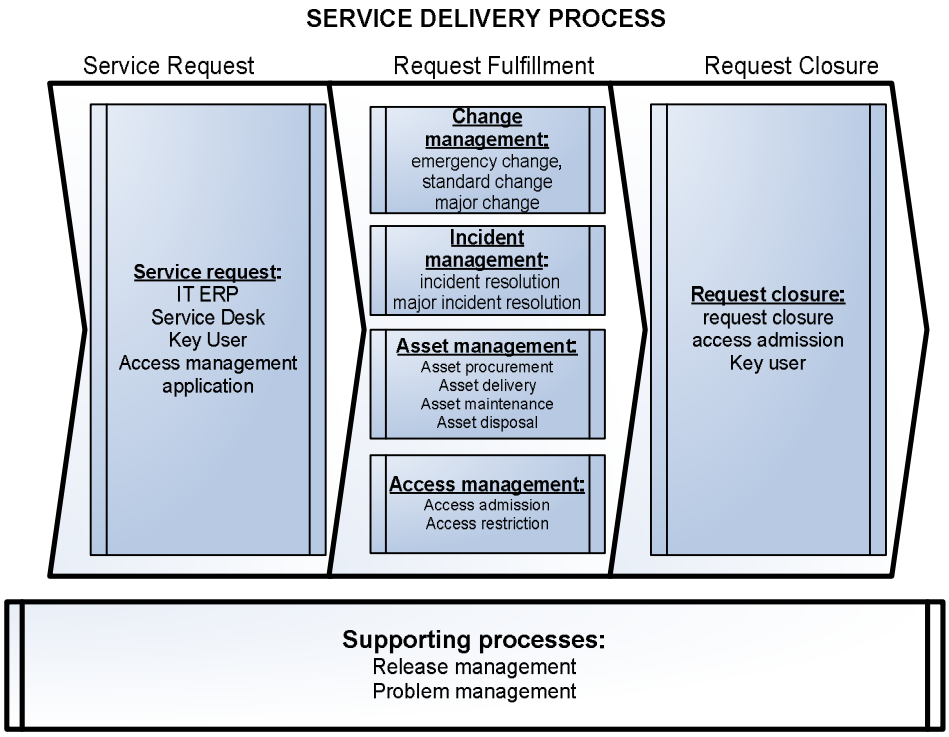


Figure 2. Process map

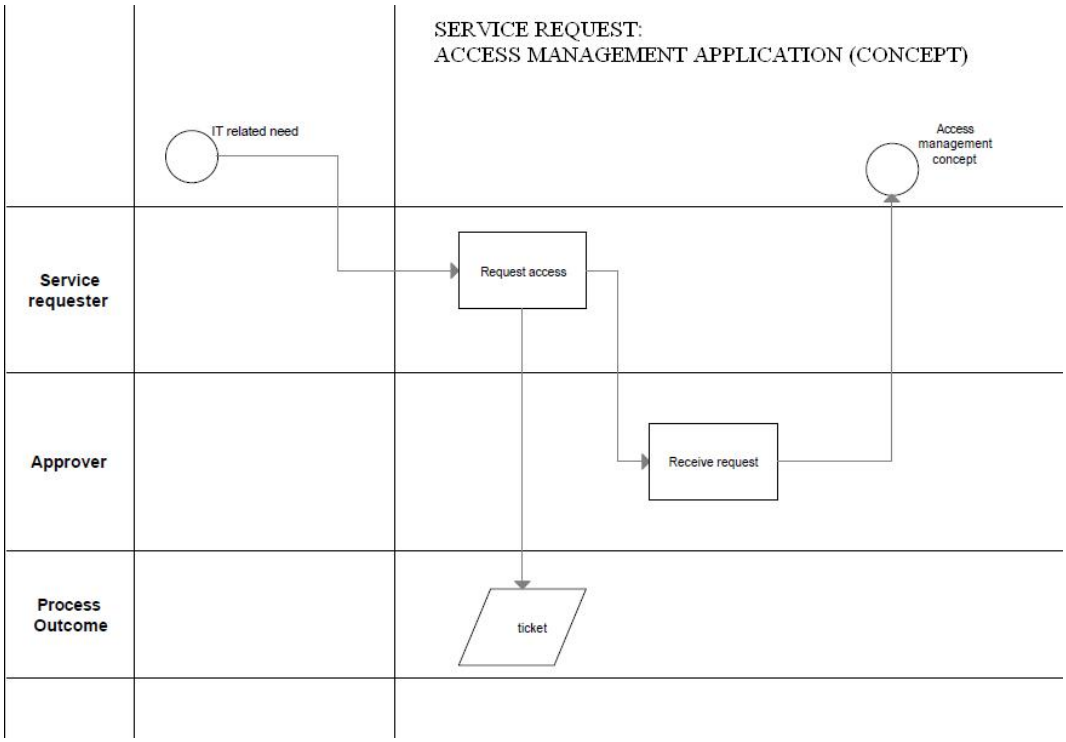


Figure 3. Service request: Access Management application concept

APPENDIX 3: EXEMPLAR SERVICE OF SERVICE CATALOG

Service Detail	**Exemplar service**
Service group	Application service
Service name	ERP
Service Description	Service of offering and supporting ERP application
Service access point	Request for new access right: Access Management application, Other service requests: Key User, Service Desk, IT ERP
Service owner	Don Draper
User business unit	Corporate functions, business divisions
Service provider	IT organization
Service manager	Lisa Layton
Business impact	critical
Business priority	high
SLAs and OLAs	Hosting service, network service, remote support, archiving
Service Hours	24 / 7
Escalation contacts	Key User / ERP support group / ERP manager / IT management
Type of service report	Monthly review
Review results	last review 1.4.2009
Security rating	High
Service metrics	not in use
Other	Modules in use: HR & Logistics