Development of ICT change management processes for Fläkt Woods Group

Pekka Saarimaa

Opinnäytetyö
Syyskuu 2011
Tietojärjestelmäosaaminen
Ylempi AMK
Tampereen ammattikorkeakoulu

TAMPEREEN AMMATTIKORKEAKOULU
Tampere University of Applied Sciences

TIIVISTELMÄ

Tampereen ammattikorkeakoulu
Tietojärjestelmäosaaminen
Ylempi AMK

SAARIMAA, PEKKA: Tieto- ja viestintätekniikan muutoshallinnan prosessien kehittäminen Fläkt Woods yhtymälle

Opinnäytetyö, 94 sivua
Marraskuu 2011

Tutkimus tehtiin kansainväliselle Fläkt Woods Group yhtymälle, osana kansainvälistä tietohallinnon kehitystyötä. Sen tarkoituksena oli kartoittaa, kuvata ja kehittää jaettujen palveluiden muutoksenhallinnan prosesseja. Kehitettäessä tuli ottaa huomioon niin tietojärjestelmäalan yleiset parhaat käytännöt kuten myös kohdeorganisaation yksilölliset tarpeet.

Tutkimus toteutettiin toiminnallisena case-tutkimuksena, jossa keskeisinä menetelminä käytettiin haastatteluja sekä tekstianalyysiä eli kvalitatiivisia tutkimusmetodeja. Haastateltavia oli yhteensä 11. Näistä viisi edusti konsernin tietohallintojohtoa sekä liiketoimintaa ja kuusi asiakkaita eli paikallisia tietohallinto-organisaatioita. Lisäksi käytettiin benchmarkingia, kun haastattelujen avulla kartoitettua lähtötilannetta verrattiin tekstianalyysin perusteella rakennettuun tavoitetilaan.

Tutkimuksen tuloksena saatiin kehitettyjen prosessien kuvaukset sekä tietohallinnon infrastruktuuripalvelujen muutoksenhallinnan prosessiopas Fläkt Woodsille. Tulokset eivät ole sellaisenaan yleistettävissä muihin organisaatiohin, sillä ne on rakennettu nimenomaan Fläkt Woods Groupin tarpeisiin. Tosin prosessioppaasta voi olla sellaisenaankin esimerkinomaista hyötyä muille organisaatiolle. Mikäli samankaltaisia tutkimuksia tulee enemmän, voisi niistä olla mahdollista yrittää etsiä ja rakentaa yleisemmällä tasolla pätevää konstruktiota. Jatkotutkimuksena yrityksen sisällä voisi olla ITIL:n kokonaisvaltaisempi käyttöönotto myös tapahtumien hallinnan ja konfiguraatiohallinnan tasolla.

Muutoksenhallinta, ICT, tietoverkko, Active Directory, ITIL

ABSTRACT

Tampereen Ammattikorkeakoulu
Tampere University of Applied Sciences
School of Business Administration
Master's Degree Programme in Information Systems Competence

SAARIMAA, PEKKA: Development of ICT Change Management Processes for Fläkt Woods Group

Master's Thesis, 94 pages
November 2011

This study was conducted for the international Fläkt Woods Group as part of the international information management services development. Its aim was to discover, chart and develop the change management processes for the shared ICT services. Best practices of the ICT area were to be applied into the unique requirements of the target organization.

The study was performed as action research case study, where the main study methods were qualitative methods of interviews and textual analysis. There were 11 interviewees in total. Five of these represented the information management executives of the corporation and six represented the local information management organizations. In addition, benchmarking was used when the initial state of the processes, mapped with the interviews, were compared to the best practices built by textual analysis.

The results of the study were the process descriptions of the target state of the processes as well as a guideline document for the information management infrastructure change management processes within Fläkt Woods. As such, the results are not ideally suited for generalization to other cases as they were built specifically for Fläkt Woods. However, the process guideline document could be of use to other organizations in a similar situation. If more similar studies were conducted, it would be possible to build a more generalized construct based on them. As a follow-up for this study within the organization, a study on a more complete implementation of ITIL for the organization, including incident management and configuration management, could be performed.

Change Management, ICT, computer networks, Active Directory, ITIL

CONTENTS

1 INTRODUCTION

1.1 Background

Fläkt Woods Group is a global corporate group that designs and manufactures air handling systems. The companies belonging to the group have manufacturing plants in 26 countries and sales offices in 30 countries, with a total of 3 500 employees. Of these 3 500 employees, less than 50 work within the information management (IM) function. A large number of those (over 20) only work in IM as a secondary role and perform only high level management tasks such as negotiating outsourcing agreements and financing PC procurement. Of the full time IM employees, most work within the line-of-business application management and development. Only a handful of people work within information and communication technology field (ICT). ICT covers infrastructure level computer technologies, such as networks, identity and access management systems, computer hardware and operating systems.

Fläkt Woods's business is structured into three independent business areas. These areas are Air Climate Systems (ACS), Ventilation Solutions (VS) and Global Industry and Infrastructure (GII). The IM function is aligned with this structure as well. Instead of a CIO, each business area has a business IM manager (BIM), who forms the business area IM unit (diagram 1) and reports to the SVP of the business area. Together they shape the IM strategy for the business area. All local legal entities within Fläkt Woods Group have their own IM service delivery strategies. Some deliver the services internally while some have them fully outsourced. A legal entity contains one or more of the business areas and a business area sprawls across multiple legal entities. This means that a single legal entity may have multiple business IM strategies and its IM organization may need to support end users from multiple business areas. Local entity IM is managed by one or more IM managers, who have the responsibility of single site's IM operations (IM site manager) or of multiple sites' IM operations (IM area manager).

All business IM services were allocated to one business area. If multiple businesses utilized this service, the other business areas were charged according to a service agreement between the businesses. All global ICT services were left outside the business units to be delivered by a central IM

function, managed by the central IM services manager (CIM). Together, the SVP of Finance (CFO), BIMs and the CIM form an IM council (IM Council Guidelines 2010). This council holds the authority usually associated with the CIO role. Its principal role is to ensure that IM is managed in a coordinated manner within the central and business IM services (IM Council Guidelines 2010). At the time of this thesis work, I was employed within the company as CIM.

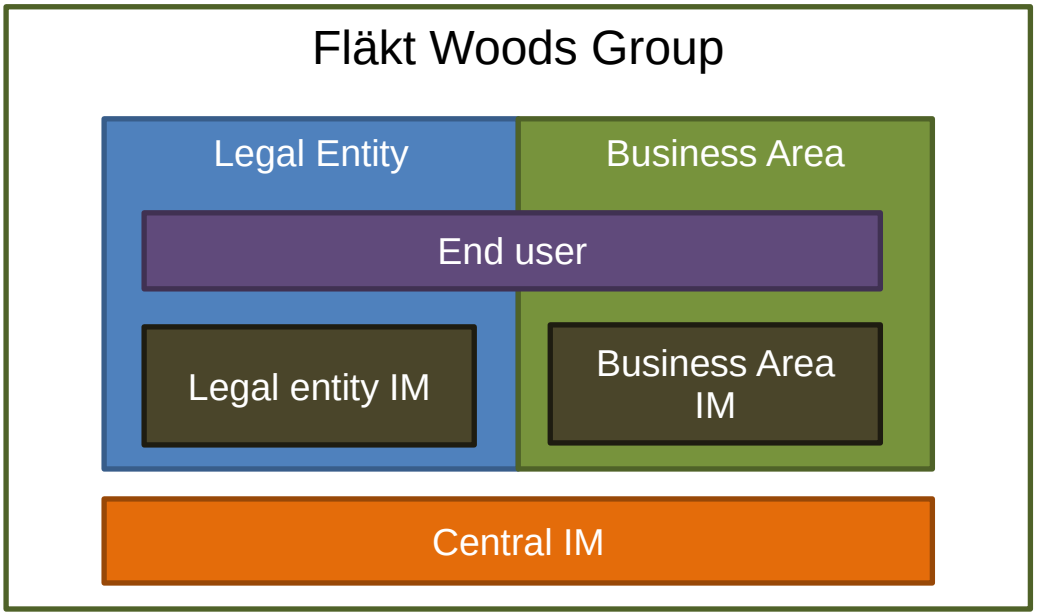


DIAGRAM 1. IM organizational structure within Fläkt Woods Group

1.2 Purpose and scope

The purpose of this thesis was to discover, map and develop the ICT infrastructure change management processes for Fläkt Woods Group. Change management means the collection of processes with which the target system is moved from one state to another. Change management in ICT includes processes such as adding or removing sites or companies from the group ICT infrastructure, upgrading the network connection speed or reliability on a site or adding or creating and modifying users and user access rights within the IT systems.

The infrastructure services chosen for this development were the global network as well as identity and access management (where Microsoft Active Directory was used). The global network operations were outsourced but the Active Directory was fully managed by Fläkt Woods's internal IT staff. As no formal processes for internal IM infrastructure change management had ever been designed or documented, it was also necessary to discover and map the

existing processes that could then form a starting point for the development work. Due to lack of deep technical skills of many persons within the Fläkt Woods's IM community, the process descriptions needed to aspire to good understandability even if the reader was not an IT professional. On the other hand, the goal was not to obfuscate all the technical information but to give enough information for people working in the central IM function to also drive the processes. Therefore a careful balance needed to be maintained between pure business processes and detailed technical processes.

The processes often involved various approvals and reviews in addition to the actual technical execution of the change. Without documented and applied change management processes, it was not possible to guarantee business alignment in the development of business support functions. For example, without a managed change process for data networks, a major upgrade of the data network infrastructure may have been performed on a site whose significance to the business was declining.

The research questions posed for this thesis were:

1. What are the best practices for process mapping and discovery of business processes and how can they be used to create the initial process descriptions in this case?
2. What are the best practices and process frameworks for managing change in ICT operations and how can they be used to create the developed processes in this case?

The main focus of the study was the second question. The main best practice that was consulted for this question was ITIL (IT Infrastructure Library) version 3 as it was the definite ICT process improvement framework that dealt with actual work processes.

1.3 Study strategy

The thesis was written as a case study, as it dealt with a problem in a single company and thus the results of the thesis were not applicable as such to wider contexts, even if the results might have helped other companies in a similar situation. The study was conducted as action research as its interest was to improve the work and work processes within the case company. The type of action research employed was the "project action research" as one of the main

purposes of the development work was to improve the quality of service within the Fläkt Woods central IM services. Due to time constraints regarding the development work, only a single iteration was possible in the scope of this thesis. The results of the study were process descriptions for the areas of change management studied as well as a general guideline for infrastructure change management within the company that can be used for further change management development work.

The study strategy was two-phased. The first question regarding the process discovery and mapping was answered mainly by conducting interviews with the IT staff within Fläkt Woods Group. The results also brought more clarity to the problem that was to be solved in the later stages of the study by highlighting how the current processes were perceived by the customers at local companies and how they could be improved from the customer perspective. The interviews were semi-structured with a ready list of questions, but the discussion was also allowed to branch off into other related subjects as well, as long as the overall subject stayed in focus. The process notation and mapping techniques were derived from business process mapping best practices by textual analysis.

The second question regarding the change management best practices was answered by first conducting a textual analysis of the industry best practices and their criticism as well as the current Fläkt Woods corporate policies regarding IT change management. The current processes were compared against these best practices by gap analysis, which is a form of benchmarking. Interviews were conducted with both the business IM managers and the volunteers from the first phase. The interviews were semi-structured, but similarly to the first phase, the conversation was also allowed to branch off into related subjects. Interviews of the business IM managers were used to bring in the management’s perspective regarding the objectives and priorities of the process development work.

1.4 Study process

The overall study process is show in diagram 2. The interviews for the first phase of the work were done in three parts. First the company CIO was interviewed regarding the change management processes in the areas of research in order to get the management’s perspective on what kinds of change processes existed. Then a group of volunteers, six persons, from within the

global IT community were interviewed on their views on how these processes are currently conducted. Based on these interviews, drafts of the processes were created. These drafts were then fine-tuned with subsequent rounds of interviews in which the current draft version, together with a list of questions regarding certain aspects of the processes, were used as the basis for the discussions. These questions were changed for each round so that the focus of the discussion was slightly different each time. The emphasis during these rounds was on the understandability of the process descriptions as well as on the relation of the process descriptions to the ways these processes were executed in real life.

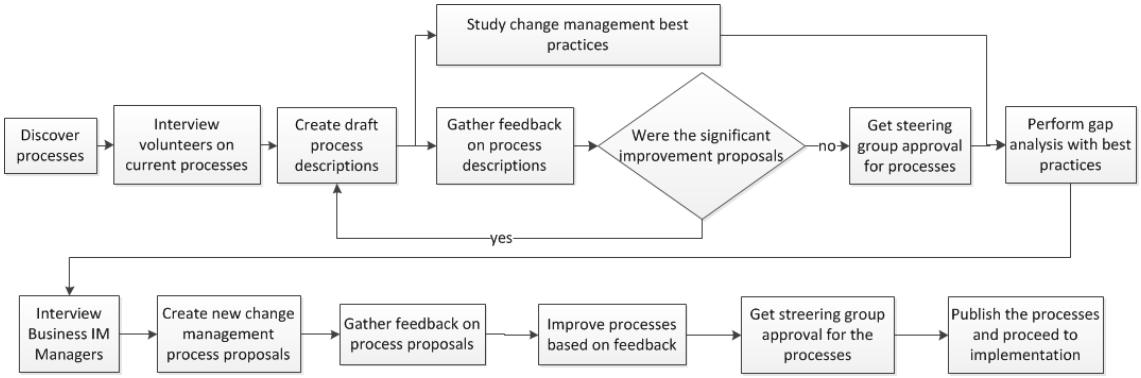


DIAGRAM 2. Study process

The textual analysis of the change management best practices material, ITIL (The Official Introduction... 2007;Service Transition 2007;Service Strategy 2007) and a book criticizing ITIL (Addy 2007), was conducted as the first step in the second phase. These two sources were contrasted with each other. The focus of this analysis was ITIL change management. On top of this the Fläkt Woods internal change management guidelines were introduced and analyzed regarding their differentiation from the ITIL guidelines.

The initial status of the change processes within the company, mapped earlier in the project, were benchmarked against ITIL best practices by means of gap analysis, combined with an email interview of the business IM managers regarding the relative importance of improving the current processes in the various areas of the gap analysis. At the same time, the business IM managers were interviewed regarding the various aspects of best practices, to which they provided implementation prioritization. These business IM managers were also

interviewed by telephone regarding their views on the key parts of ITIL implementation, such as approvals and risk assessments.

After the interviews, the processes were developed according to the results of the textual analysis, gap analysis and the interviews. This produced the first draft versions of the processes. These were then finalized after a series of interviews with the volunteers from the client organizations, similarly to the first phase. However, one of the volunteers had resigned from the company and this meant that only five people from the customer organizations were interviewed for this phase. Finally, the processes were approved by the IM Council and they were published on the company intranet.

2 PROCESS DISCOVERY

2.1 Defining scope

If any processes are ever to be improved, the first step is to discover what processes the organization has. This is called process discovery or process identification (Jacka & Keller 2002, 53). Laamanen (2007, 52) defines process discovery as identifying where each process starts and ends. A guiding principle should be that processes start and end with the customer (Laamanen 2007, 52). Jacka & Keller (2002, 58) expand this to the definition of all the customer interaction points in the process. They call these triggers, events that caused interaction. These define the scope of the process. Often these triggers are called “moments of truth”, because they define the customer experience of the organization. The customer bases his or her impression of the organization on the outcome of these moments (Jacka & Keller 2002, 58–59). They are often parts of a longer customer process, where the customer process and the organization's processes join (Laamanen 2007, 71).

An important part of the process discovery is the division of the discovered processes into core processes and supporting processes. Core processes produce value to the customer (Laamanen 2007, 54). Supporting processes allow these core processes to function but they do not directly produce added value to the customer (Laamanen 2007, 56). Jacka & Keller (2002) extend this definition. They split the core processes into two classes: customer facing processes that contain all the “moments of truth”, where customer interaction happens and transparent processes that should always be completely invisible for the customer (Jacka & Keller 2002, 58–59). Supporting processes are processes that exist in isolation from the core processes but which are still necessary for the organization (Jacka & Keller 2002, 63).

2.2 Naming processes

Choosing a descriptive name for a process is very important. The name is the first and most visible signal of what the process is about and why it exists. According to Laamanen (2007), the best way to name a process is to think about the purpose of the process. For example a better name for a process often called ”training” would be ”improving competence” because that is the purpose of training employees (Laamanen 2007, 59). Jacka & Keller (2002) emphasized the customer perspective and process triggers in the naming of

processes (Jacka & Keller 2002, 62). The process name should reflect what the customer sees the process accomplishing for him or her.

3 PROCESS MAPPING

3.1 Process descriptions

Mapping the business processes within a company is a process in itself. Its aim is to lay out the ”plot” of the business processes (Jacka & Keller 2002, 44–45). The focus in high-level business processes should always be in the human actors involved in the process, even if technology is used by humans during the process (Laamanen 2007, 80). The various actors within the processes should always be human and not computers or computer programs. Although the process diagrams play an important part in understanding the processes, describing them literally is vital for proper understanding. Laamanen (2007, 77) says that only engineers are fluent in reading diagrams and flowcharts built from processes. According to Jacka & Keller (2002, 89), certain basic elements of the processes always need to be taken into consideration during process mapping. These are listed in table 1.

TABLE 1. Process elements according to Jacka & Keller (2002, 102-105).

Element	**Explanation**
Process owner	Who is the owner of the process?
Triggers	What events occurring during the process have an effect on it? The most critical triggers are the ones that start and end the process.
Inputs and outputs	What piece of information starts the process (input) and what the process produces at the end (output).
Business Objectives	What business value is expected from the process? They need to be simple and measurable with a numeric goal attached to them so that it can be determined whether or not the process meets its business objectives.
Business Risk	What could go wrong in the process that would have a business impact and could prevent the business objectives from being reached.

Key Controls	What control processes were in place to mitigate the business risks?
Measure of success	What factors of the process are measured in order to determine how the process is performing?

Laamanen (2007, 78) had a somewhat different view of the basic elements of the process descriptions. He listed six key elements that must be discussed in process descriptions. These are shown in table 2.

TABLE 2. Process elements according to Laamanen (2007, 78).

Element	**Explanation**
Scope	What is the process used for and where does the process start and end?
Customers	Who are the customers of the process and what expectations do they have for the outputs and services of the process?
Objectives	What is the target of the process (why does it exist), what are the main success factors of the process and how is the process performance measured?
Inputs and outputs	What are the inputs and outputs of the processes, what services does the process offer and how is information managed during the process?
Process diagram	What type of mapping notation is used in the graphical representation of the process?
Roles and responsibilities	Who are the main actors (individuals or teams) that perform the activities of the processes?

Jacka & Keller (2002, 100) recommended recording these items in a special process profile work sheet. The work sheet makes it easier to identify and focus on the critical areas and to fit the process into its larger context. Laamanen, on

the other hand, did not mention any structured process sheets where this information should have been recorded. He only recommended that the process desciption text should never exceed the length of 4 pages (A4) and that it should follow an internally agreed structure and include the phases and aspects of the process that are vital for the success of the organization (Laamanen 2005, 76).

3.2 Mapping notations

3.2.1 Introduction

To accompany a textual description of a business process, a graphical diagram of the process is often used. It makes the process easier to grasp. Both Laamanen (2007, 79) and Jacka & Keller (2002, 131–132) preferred the use of simple process notations with only a few different symbols. Laamanen said that process notations could be used in both understanding and improving the process and that these have different requirements for the level of detail (Laamanen 2007, 81). This is because, primarily, process maps are tools of communication either internally or externally towards clients. When processes are improved, a greater level of detail needs to be used than if the aim is to only understand the process (Laamanen 2007, 81). Developing a process needs to include more details of the current state of the process in order to make sure all those details are accounted for in the new and developed process.

Jacka & Keller (2002, 132) proposed a notation where only three basic elements are used: a square to denote actions within the process, a diamond to denote decision points where the process flow could be forked and a connector arrow to represent the cause- and effect relationships and the general process flow. The main reason for this is that it allows post-it notes to be used in process mapping during the interviews. They allow for rapid prototyping of the processes where post-it notes represent activities, post-it notes turned to 45 degree angle represent decisions and arrows could be drawn between them with a pen to represent connectors.

There are, however, a few notation standards developed to be used when business processes and information systems meet. Their aim is to allow business consultants to design processes so that they can be more easily

translated into programs or other processes within in the information systems. In this thesis work, two of them were evaluated in more detail: UML and BPMN.

3.2.2 UML

UML is short for Unified Modeling Language and it is maintained by Object Management Group (OMG). Its most common use is in software modeling and design. It is used to capture software systems design models so that they can be translated into machine processes, such as program code (Russell, Aalst, ter Hofstede, Wohed 2006). Thus it is often seen as a very technically oriented notation language (White 2004). The latest version 2.0 from 2004 describes 13 different modeling notations. Russell et al. (2006) divide the modeling notations into three major categories:

1. Behavior diagrams
2. Interaction diagrams
3. Structure diagrams

The group of most interest for business process mapping is the first one, Behavior diagrams, and especially the Activity Diagram. Activity diagram is a flowchart meant for process modeling (Arlow, Neustadt 2006, 283). Example of it can be seen in diagram 3. In UML 1.4, it was just a modified state machine diagram but in 2.0 it is its own distinctive diagram type (Arlow, Neustadt 2006, 284). Activity diagrams are usually used to model various processes in object oriented programming, but it can also be used to model business processes (Arlow, Neustadt 2006, 285).

It can also be used to model business processes, usually in the context of software design. It is a very flexible diagram type and has intuitive semantics. However they are quite strict and do not leave much room to adapt them without deviating from the UML standard.

The UML 2.0 activity diagrams have the following basic elements (Ambler 2010):

1. Start / end nodes. Circles that mark the start and the end of the process.
2. Activity. Rounded rectangles representing activities that take place during the process.
3. Flow / Edge. Arrows in the diagram.

4. Fork / Join. Black bars that fork or join the process. Forks have one incoming and multiple outgoing flows. Join has multiple incoming and one outgoing flow.
5. Condition. Text on the flows that indicate conditions that must be fulfilled in order for the flow to activate.
6. Decision. Diamond shape with one incoming and multiple outgoing flows. The outgoing flows have conditions.
7. Merge. Diamond with multiple incoming and one outgoing flow. The process does not advance until the condition of the outgoing flow is fulfilled.
8. Partition. Separates activities of different actors of the process. Also known as a swim lane.
9. Sub-activity indicator. Rake in the bottom of the activity, symbolizing a subprocess.
10. Flow final. Circle with an X through it. Process stops at this point.

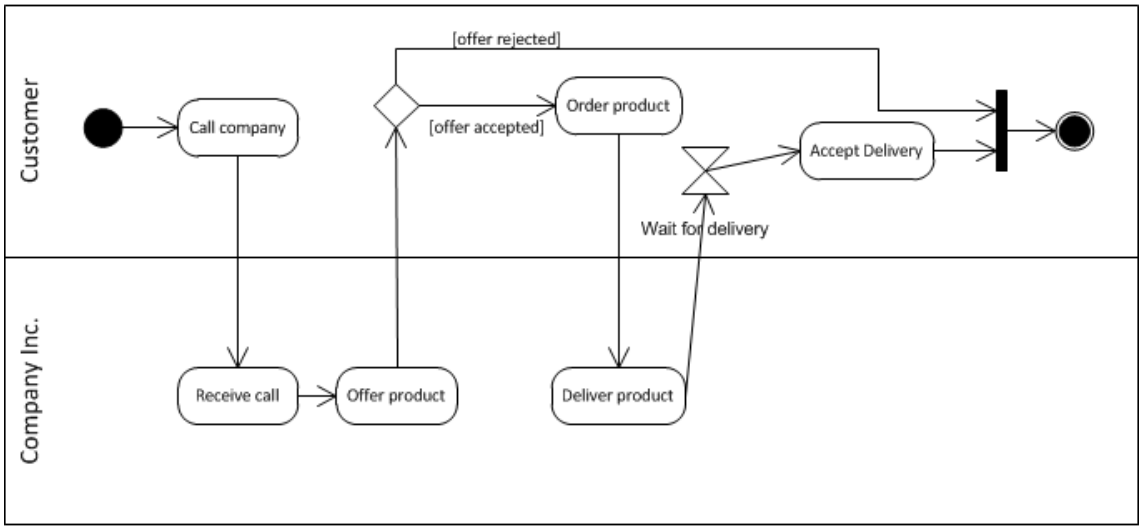


DIAGRAM 3. Example of a UML activity diagram

3.2.3 BPMN

Business Process Modeling Notation is maintained by the Business Process Management Initiative within the Object Management Group. Its current version is 2.0 which was released in January 2011. According to the BPMN standard 2.0 document, “BMPN creates a standardized bridge for the gap between the

business process design and process implementation.” (BPMN V2.0 2011, 1). An example of BMPN 2.0 diagram is shown in diagram 4.

BPMN as a notation consists of relatively few core elements that can be used. They are (BPMN V2.0 2011, 27–28):

1. Flow objects
2. Data
3. Connecting objects
4. Swim lanes
5. Artifacts

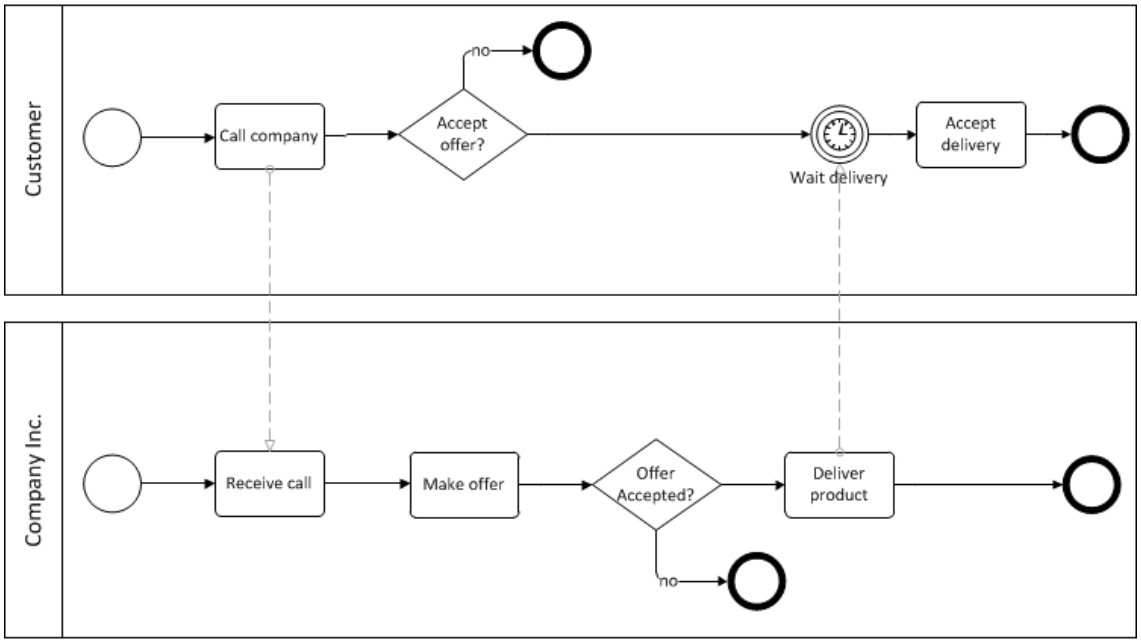


DIAGRAM 4. Example of a BPMN diagram

Flow objects and connecting objects are the basis of all BPMN process diagrams. Flow objects include activities, events and gateways (BPMN V2.0 2011, 27). Activities form the various steps in the process where actions are taken, such as “Send order confirmation”. Events are things that happen at the start, during or at the end of the process and they are classed accordingly as start, intermediate and ending events (BPMN V2.0 2011, 29). They affect the sequence or the timing of the activities in the process. Start events and end events are always used in every process mapped with BPMN and they represent the things that mark the start and end of the process. Gateways

control the process and are used to split and merge the process flows (BPMN V2.0 2011, 29).

Data objects can represent data objects, inputs, outputs and stores (BPMN V2.0 2011, 29). These can be, for example, order forms, invoices, databases or spreadsheets that are required for the process, are outputs of the process or are managed during the process. Instead of representing information systems as actors in the process, which is discouraged by Laamanen (2007, 80), they can be represented by data objects linked to various flow objects. Connecting objects include sequence flows, message flows, associations and data associations (BPMN V2.0 2011, 28). They connect all the other elements in the process together and represent the cause and effect relations that guide the process flow. Artifacts are provided by BPMN to allow for information that does not directly relate to the process flow to be attached to the process diagram. They can represent text annotations or groupings of other BPMN elements (BPMN V2.0 2011, 28).

All other core elements in BPMN are placed within swim lanes. Swim lanes represent the various roles or actors in the process; people or systems who perform actions during the flow of the business process. Swim lanes can be grouped into pools to represent independent groups or organizations of actors or participate in the process (BPMN V2.0 2011, 30). The process can not directly flow between these pools but message passing is used instead to synchronize the process flows and to indicate interactions between the organizations. All participating pools must also have their own process start events and end events.

BPMN has fewer core elements than UML activity diagrams. However, many of these core elements have variations (White 2004). For example gateways, which are used to split or merge the flow of the process, can have versions where the process always splits into two or more flows, or a version where a decision made caused only one of the possible process flows to activate. BPMN also allows for multiple ways of conveying certain types of information (Wohed, van der Aalst, Dumas, ter Hofstede, Russel 2006).

For example, the merging of process flows can be done in three different ways while still conforming to the BPMN notation standard (Diagram 5).

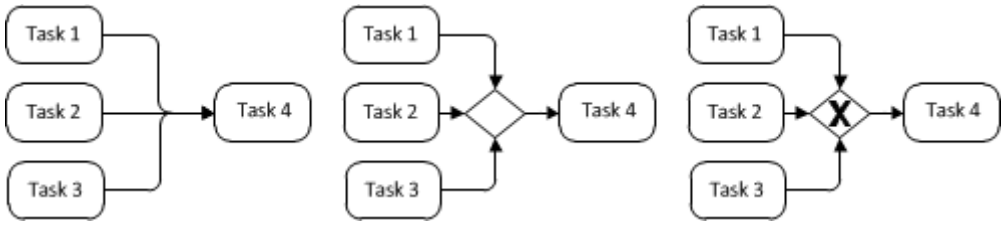


DIAGRAM 5. Various ways to merge process flows in BPMN (based on Wohed at al. 2006)

4 PROCESS DEVELOPMENT

4.1 ITIL and IT Service Management

4.1.1 Introduction

The IT Infrastructure Library (ITIL) framework is the best-known and most widely applied process framework in IT. It is maintained and developed by the Office of Government Commerce (OGC) in United Kingdom. According to OGC (2007a), it was originally born from the need of the UK government to increase its IT services efficiency. The government set out to document how the best and most successful companies managed their IT. This library of best practices eventually grew to over 40 books and awoke the interest of the UK IT service companies. The companies started a forum that is now known as the IT Service Management Forum (itSMF), where they could learn more best practices from each other. The library has since been revised twice to make it more business focused and to keep up with the developments in IT services (The Official Introduction... 2007, 3). The latest revision is ITIL v3 from 2007 and it consists of five volumes plus an introductory book.

ITIL is a service-oriented framework, thus requiring any organization that wishes to properly apply its methods in practice to first adopt service-oriented thinking regarding its IT functions. Therefore any process improvement project in the IT field that wishes to use the ITIL guidelines needs to be considered from the IT service management (ITSM) point of view. However, according to Addy (2007), ITIL should only be used as a starting point in the improvement of IT services in the business, as implementing documented and widely available best practices will only make the organization average in IT service management (Addy 2007, 6–7). As most of the benefits from ITIL come indirectly from the way it is implemented in an organization, ITIL can also be misimplemented in a way that hinders the business rather than helps it. As particular pitfalls, Addy (2007) mentions fifteen various ways in which ITIL can cause harm to the business against eleven ways in which ITIL can help the business to improve (Addy 2007, 2–6). Some of the cases are different views on the same characteristics of ITIL: for example, as an existing framework ITIL will save a lot of work when building up the blocks of ITSM in the organization, but at the same time it will also lock the organization into the ITIL way of doing things and may prevent new and innovative ideas from taking hold. Several of the cases against ITIL mentioned

by Addy (2007, 4–5) warn about thinking of it as a ready-made collection of processes that can be used as such and as a “silver bullet” that can solve all IT-related issues within the business. The biggest advantage of ITIL is the fact that it unifies the ITSM vocabulary (Addy 2007, 3). It allows for more efficient communication with both internal and external parties, as well as with business representatives. Another major advantage is that the terminology is process-oriented instead of technology-oriented and can be understood without a technical background.

ITIL defines a service as being the means to deliver value to customers without the need for the customers to carry the responsibility of specific costs and risks related to it (The Official Introduction... 2007, 5). This can be interpreted to mean that the IT organization manages the technical details and their associated costs and risks. The business will only carry the clearly defined and scoped overall risk and cost related to a service it acquires from the IT organization. Addy (2007, 30) defines an IT service as being a combination of processes, people and assets used to produce deliverables in accordance with set requirements. Processes are therefore a subset of services. Processes combine resources and inputs to give outputs and the process is guided by associated controls (Addy 2007, 30).

IT services for businesses are constantly changing. New services are introduced, existing ones operated and some are being upgraded or replaced by other services. All these steps from the moment a new service is envisioned to the time when it is permanently shut down are known as the service life-cycle. ITIL consists of five different parts that all deal with their respective parts in the service life-cycle and they all have a volume dedicated to them in ITILv3 (The Official Introduction... 2007, 6):

1. Service Strategy
2. Service Design
3. Service Transition
4. Service Operation
5. Continual Service Improvement

4.1.2 Service Strategy

Service strategy is the core of ITIL. It is the level where IT services and service processes are tied to the organizational business strategies and business goals (The Official Introduction... 2007, 11). Without service strategy the IT services produced for the organization do not aid it in achieving its strategic goals but at best cause unnecessary costs and at worst hinder or even act against the efforts to reach these goals (Service Strategy 2007, 4–5). Because of this, all service processes should have a measurable business impact against which the success of the service delivery can be judged.

If the organization is not yet running its IT operations in a service-oriented manner, the service strategy is the definite starting point. Without a service strategy, all the other improvement efforts in other parts of the service delivery chain are useless as their alignment with the organization's business goals cannot be managed.

4.1.3 Service Design

The various services offered by the IT organization are then defined in the service design part of the service life-cycle (The Official Introduction... 2007, 11). A very notable part of this is the service level management (SLM) in which the service levels and the metrics (key performance indicators, KPIs) used to measure the service are defined (The Official Introduction... 2007, 52–55). Service levels are used to define the levels of the various aspects of the service. They are often time-based agreements such as maximum allowed downtime, time to response to service requests and time to resolve requests (Addy 2007, 69).

Addy (2007) criticizes the service level agreements as being ”beating sticks” that the business customer or the service supplier can use in case of disagreements over service issues instead of being agreements that would facilitate IT-business alignment (Addy 2007, 12). Instead of using SLAs, Addy promotes a gradual build of trust between IT and business as the way to ensure the best possible starting point for IT-business alignment, where every new IT initiative is based on a past success and where a consistent level of service for end users must be maintained (Addy 2007, 13).

4.1.4 Service Transition

The service transition phase concentrates on successfully moving a new service into production use or successfully introducing changes and improvements to services already in use (The Official Introduction... 2007, 12). The core process in service transition is change management, but it also includes other important processes such as transition planning, asset and configuration management, release and deployment management as well as service testing and validation (The Official Introduction... 2007, 75). Service transition interfaces with all the other ITIL processes, as it is responsible for testing these as part of new service introduction or service process change (Service Transition 2007, 17).

Asset and configuration management, while a part of service transition, is an important part of all ITIL processes. The various systems and services involved in the final service delivery chain to the business are all interconnected on multiple levels (The Official Introduction... 2007, 83). For example a CRM service used on a remote site is dependent on the user PC hardware and software, the network infrastructure on the end user site, the network connection between the end user and server sites, the server site network infrastructure, the server hardware, the server operating system, the database server software and the application server software. Asset and configuration management is used to document and analyze the various devices, applications and other assets, known as configuration items (CI) and their dependencies (The Official Introduction... 2007, 83–84). This information is usually recorded in a configuration management system (CMS) (The Official Introduction... 2007, 84). It allows the different ITIL processes to assess the impacts of incidents, changes and other events to the various services and to better understand the various dependencies and cause and effect relationships between different services.

4.1.5 Service Operation

Service operation part of the life-cycle mainly concerns the day-to-day operation of services. The business value expectations set for the service in earlier phases is realized in service operation. The service desk is responsible for the most visible part of the service operation and of all IT functions within the organization. Incident management, request fulfillment and problem

management are examples of processes belonging to the service operation. (The Official Introduction... 2007, 94)

4.1.6 Continual Service Improvement

The continual service improvement (CSI) is a single process, where the data gathered from the various services as part of service operation is evaluated against the service level agreements. Its mission is to identify areas of improvement within the IT services, both in quality and cost-effectiveness, and to implement these improvements through change management to service operation, service design and service strategy. (The Official Introduction... 2007, 126)

4.1.7 Fläkt Woods's approach to service delivery

In Fläkt Woods, services delivered to the business are called applications. The most important of these are labeled business critical applications (IM Change Management 2009). The responsibility of these is given to application owners, who are responsible for the development of the applications and for establishing the necessary controls to ensure the business alignment of the application. They also need to maintain a list of the lower level applications/services which the business critical application is dependent on (IM Change Management 2009). This corresponds to maintaining the configuration items in a configuration management database as defined by ITIL. However the operational ownership of the application may be delegated to another person, known within Fläkt Woods as the system owner, who is responsible for keeping the application available as specified in the service level agreement (IM Change Management 2009). The ownership of the list of business critical applications (corresponding to the ITIL service catalog) is with the local IM manager (IM Change Management 2009). This also includes services actually delivered by other units within the group, such as the shared services delivered by the central IM services team.

The service strategy is defined in the Information Management Strategy document maintained by the senior business IM manager. It is split between two chapters of the document: IM Infrastructure Strategy and Application Architecture Strategy (Ellison 2011c). There is no overall end-to-end service strategy in Fläkt Woods. SLAs are defined as documents that describe the scope and the targeted availability of the service (IM Change Management

2009). It may also contain information on an agreed service window, during which service downtime is allowed (IM Change Management 2009). In Fläkt Woods, the overall service designs and SLAs are documented in the service descriptions that are published in the Fläkt Woods document management system M-Files. Each service has its own service description document.

4.2 ITIL Change Management

4.2.1 Purpose of change management

Unlike in business or organizational change management, the idea of ITIL change management is not just to make a change happen, but also to have a control process for all the changes that the various stakeholders of the service want to get done. ITIL defines that the purposes of change management are to ensure that all the procedures used in handling the changes are standardized across the organization, that all implemented changes are recorded in the asset and configuration management system used by the organization and that the overall business risk is optimized to a level the organization is comfortable with (The Official Introduction... 2007, 80).

The two core objectives for change management are efficient and error-free implementation of the required changes and the minimization of service disruptions caused by the changes. The success of the former can be appraised by comparing the status of the related configuration items against the objectives of the change request. The latter can be evaluated by counting the amount of incidents where the root cause has been analyzed to be related to the implemented change. (Addy 2007, 186)

The key players in the change management process are, according to Addy (2007, 188):

- Person requesting the change (requester/initiator)
- Request sponsor: On whose behalf has the request been raised? The requester may not be the one who wants the change to happen. For example the service desk may raise requests on behalf of users who cannot, for one reason or another, raise the requests themselves.
- Recipients (Beneficiaries): People who are directly affected by the change and intended to benefit from it.

- Approvers: Individuals who have the authority to approve or reject the change based on, for example, business alignment, financial or technical judgments.
- Change advisory/approval board (CAB): Group of people who gather to review and discuss the requested changes.
- Implementation group(s): Individual people or groups who implement specific tasks in the change. “The project team” of the change.
- Change manager: Person responsible for planning and scheduling the individual change in question. The “project manager” of the change.
- Change process owner: Person responsible for the change process design, performance and business alignment.
- Interested parties: People who need to be kept informed about the change request since they have an interest in the change or the systems, services, processes or hardware affected by the change.
- Affected users: All the users who are directly or indirectly impacted by the change.

4.2.2 Change Advisory/Approval Board

The change advisory/approval board (CAB) is a key player in the ITIL change management process. CAB is a group of people who meet on agreed intervals to review all the submitted change requests (Addy 2007, 201). It consists of the various stakeholders in the services to which the changes are being considered. It may have representatives of the business customers, end user groups, suppliers, third party contractors, technical consultants, or whoever is affected by the change requests under review (Service Transition 2007, 58). CAB may have the authority to approve and reject the various change requests, or it may only recommend the course of action regarding the various change requests to the change manager. In the former case CAB stands for “change approval board” and in the latter case for “change advisory board”. In large and complex changes, a single approval of the change by the CAB may not be enough (Addy 2007, 197). For example, a prestudy on the feasibility of the change might require a separate approval from the actual implementation of the change (Addy 2007, 198).

In case of emergency changes, a smaller CAB called emergency change approval board or ECAB may be called to convene (Service Transition 2007, 60). It consists of people who are available to review the change on a short notice and hold enough authority to either approve/reject the change or to give a recommendation to the change manager.

In Fläkt Woods, the change advisory board is called a local change management committee (IM Change Management 2009). Its role is defined in a more narrow sense than that of a CAB in general. It reviews the change requests, follows up on approved changes and ensures that information regarding the change is properly communicated to the organization. It is chaired by an application owner or a local IM site manager.

4.2.3 Steps in change management

Changes always start from a request for change (RFC) to a service or configuration item(s) (Service Transition 2007, 46). An RFC can be raised by an individual or a group that needs a change in the IT services, for example a business unit or a problem management team (Service Transition 2007, 50). The whole process is illustrated in diagram 6. For larger changes, a separate justification from business and financial perspectives may be needed (Service Transition 2007, 50). All RFCs should be recorded into a change management log and a unique identifier should be assigned to it (Service Transition 2007, 53). This record will be used to track the change request through its life-cycle.

Fläkt Woods's change management policy states that at least the following information shall be recorded into the change log: date of RFC submission, date of change implementation, owner contact information, nature of the change and an indication of whether the change was successful or not (IM Change Management 2009). The policy does not explicitly state what is meant by the nature of change. Also, the term "owner of the change" is somewhat ambiguous on its own without further explanation which is absent from the document. It could mean, for example, the person who requested the change (change requester/sponsor) or the person who manages the RFC (change manager). Neither ITIL (Service Transition 2007) nor Addy (2007) define explicitly what information should be recorded in an RFC document.

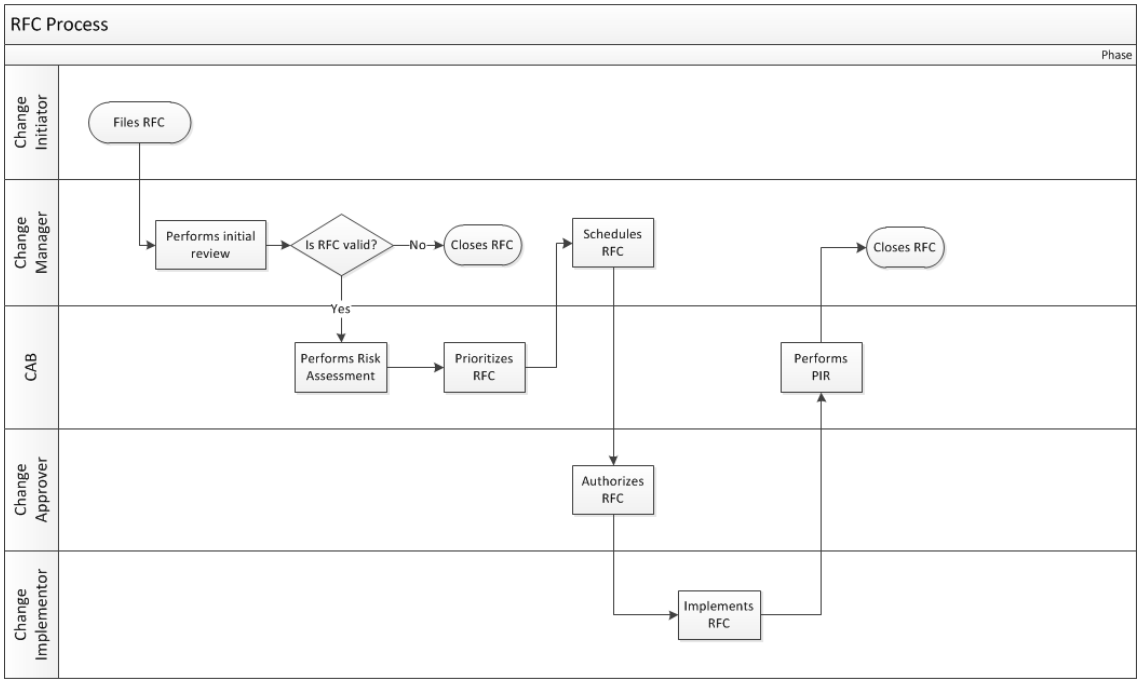


DIAGRAM 6. RFC process (based on Addy 2007, Service Transition 2007)

After the request has been logged, a short review of the change request must be made to filter out any changes that are obviously not implementable, are duplicates of another RFC already processed or have inadequate information for a proper assessment to be made (Service Transition 2007, 53). All invalid RFCs should be returned to the change requester together with rejection reasons and the requester can then file an appeal through normal management channels (Service Transition 2007, 53). Next, a thorough assessment of each change request must be performed in order to evaluate its risks and benefits and to prioritize the change. This must be performed by all members of the change authority (such as a CAB) and the members must be able to justify their case for rejection or approval of the change (Service Transition 2007, 55). They must consider the change from the perspectives represented by the “seven R” checklist of questions that must be answered during the assessment (The Official Introduction... 2007, 81):

- “Who RAISED the change?
- What is the REASON for the change?
- What is the RETURN required from the change?
- What are the RISKS involved in the change?
- What resources are REQUIRED to deliver the change?

- Who is RESPONSIBLE for the building, testing and implementation of the change?
- What is the RELATIONSHIP between this change and other changes?" (The Official Introduction... 2007, 81)

Before the change is moved to implementation, the last step is to seek final authorization for the change. The level of organization from where this authorization is sought depends on the anticipated business risk from the change, financial implications of the change and the scope of the change as well as the general organizational structure and culture (Service Transition 2007, 56). The lowest level is often the local business unit management and the highest level is the business executive board (Service Transition 2007, 57). After the change is implemented, a post implementation review (PIR) should be performed (Addy 2007, 214). All the data from the change process measurements and PIR is then fed into the CSI process. This ensures that the change process gets improved and more aligned with the business requirements.

4.2.4 Change categorization and approvals

ITIL categorizes the changes into three different types. These types are attached to predefined process models (The Official Introduction... 2007, 81–82):

- Standard change. Used when the change is well tested, occurs often, the process is pre-planned and pre-approved and the change is of low risk.
- Normal change. Used when change needs to go through the normal assessment and approval process.
- Emergency change. This change model can only be used when changes to services are needed to restore them into operation or to prevent an imminent service downtime from occurring. It is very important to differentiate technical emergencies from business emergencies. Changes caused by immediate business needs should still be handled as normal changes but with the highest priority (Service Transition 2007, 60). Also, an emergency change does not reduce the need to test and properly document the implemented changes or the need to seek business approval for the changes as the business will ultimately carry risks associated with emergency changes (Service Transition 2007, 60).

In Fläkt Woods, there are only two types of changes defined: scheduled changes and emergency changes (IM Change Management 2009). Scheduled changes cover both standard and normal changes. The scheduled changes should, if possible, occur within agreed service windows. Any changes outside normal service windows must go through a formal notification process and the organization must be informed at least five working days in advance of the change (IM Change Management 2009). Only changes that repair or prevent an immediate system failure or fix security vulnerability are allowed to pass as emergency changes (IM Change Management 2009).

Addy (2007) points out a defect in the ITIL way of dealing with standard changes: the risk assessment is left out (Addy 2007, 194). This criticism is directed towards the old ITIL version 2, which has a different classification in use, but the new version has only partly addressed this issue. ITIL version 3 refers to standard changes as being suitable only for changes of low risk (The Official Introduction... 2007, 81). It does also point out that there are no risk-free changes (Service Transition 2007, 54). However it does not stress the need to do a risk assessment individually for each standard change request. Addy (2007) proposes the following classification of change requests: like for like replacements, comparable replacements, upgrade component, downgrade component, addition, removal, modification – meta data, modification – configuration change, new installation and move (Addy 2007, 190–193). The only classes of changes where Addy (2007) suggests that automatic approvals without a separate risk assessment can be used are like for like replacements and new installations and even then only for the financial and logical (ie. can we afford it and does the change make overall sense) approvals (Addy 2007, 195). The change should still be evaluated in the technical sense (ie. is there a better way to implement the required change) (Addy 2007, 195,197). Other approvals required for each change are, according to Addy (2007, 197):

- Implementation approval: Is the plan plausible?
- Conditional approval: Change is approved if certain conditions are met. For example a server can be shut-down for change implementation only if there are no active users on the server at the time.

- Management Checkpoints: Approvals from management at set intervals. This ensures that management is aware of the state of the change.
- Point of no return validation: Checking that all actions planned for have been done before proceeding to actions that cannot be undone.
- Go/No-go decision points: Points of the change life-cycle where the change can be dropped or postponed with minimum impact.
- Production approval: Approval to bring a new service or service changes into production.

Change management interfaces closely with the ITIL release management and configuration management processes (Service Transition 2007, 45). Release management is used to roll out the approved changes into the organization and can thus even be considered to be a part of change management in many real life situations. Implementing a change often causes it to take immediate effect and thus both change and release occur in a single process. Configuration management is used to obtain and store information on the configuration items involved in the changes.

4.2.5 Change risk management

ITIL recommends a four category risk assessment to be made for each change (Service Transition 2007, 54). These categories, listed in table 3, are based on the potential impact of the risk on the business operations if it is realized and the probability of risk realization. It is important that the risks are assessed from the business perspective instead of the IT perspective as they can result in very different risk categorizations for the same changes (Service Transition 2007, 54).

TABLE 3. Categories of change risk assessment according to ITIL (Service Transition 2007, 54)

Category	**Impact**	**Probability**
1	High	High
2	High	Low
3	Low	High
4	Low	Low

Addy (2007) emphasizes the role of risk assessments in change management implementation plans for all but “the most trivial of actions” (Addy 2007, 206). He identifies five stages of risk assessment:

- Identifying hazards.
- Identifying the scope.
- Quantifying the risk.
- Defining controls to mitigate the risk.
- Identifying the remaining risk after mitigation actions.

Hazards are any type of circumstances that may cause negative consequences for the IT environment or business in general. They may be insecure or unstable systems, single points of failure in the service delivery chain, new technologies, untrained staff, etc... The scope correlates with the number of various other systems and users that could be impacted if the hazard realizes a risk. (Addy 2007, 206–207.)

When the hazard has been identified and scoped, the associated risk need to be quantified. Addy defines this as multiplying the severity of the risk with the likelihood of the risk being realized (Addy 2007, 207). These correlate with the ITIL definitions of risk impact and probability and could thus be seen as a more fine-grained categorization of the risk than that is suggested by the ITIL model. The severity of the risk can be defined by multiplying the scope of the risk with the level of disruption the risk could cause (Addy 2007, 207). Addy does not define what type of scale should be used to define the scope, severity or level of disruption related to the risk.

The types of controls that can be used to mitigate the risks posed by hazards during implementation are divided into physical and procedural controls (Addy 2007, 209). According to Addy (2007), physical controls include implementation of fault tolerance on hardware level, such as installing redundant network devices or servers, or restricting access to the premises where the hardware devices are located. Procedural controls cover data backup plans, peer reviews of performed work and proper testing plans, task delegation, running the old and changed system in parallel, communicating changes to end users, increasing service desk staffing, etc.. (Addy 2007, 209–210).

Residual risk is the risk that will remain regardless of implemented controls to mitigate them. Controls are never guaranteed to eliminate the risk completely and some risks may not be within the control of the organization. It is important that the business is aware of the full risk and worse case scenarios regarding the risk in order to fully understand the scale and effect of the planned change. (Addy 2007, 210.)

4.2.6 Change prioritization

All changes must be prioritized. The initial priority should have been assessed by the requester, but it may be modified during the RFC process. ITIL suggests four priorities, listed in table 4, for the change requests and divides them into two categories: corrective and enhancement changes. Corrective changes fix an identified problem in the IT environment which has a business impact. Changes that are meant to deliver additional value and benefits to the business are enhancement changes (Service Transition 2007, 55).

TABLE 4. Change request priorities (based on Service Transition 2007, 55)

Priority	**Corrective change**	**Enhancement change**
Immediate	Significant impact on business revenue or inability of the business to service customers	N/A
High	Severely affects a large number of users	Changes in legislation, important new business initiatives, enables quick wins for the business
Medium	No severe impact, but the problem must be solved before next service window or release	Supports business viability or planned business initiatives.
Low	No severe impact and the change can be implemented in normal service windows or release schedules	Usability improvements or new functionalities

When the change has been prioritized, it must be scheduled. All the changes are put into a change schedule (SC) (Service Transition 2007, 56). This is also known as the change calendar (Addy 2007, 204). ITIL recommends this calendar to only contain the changes approved for implementation and its stage of implementation (Service Transition 2007, 56). Addy (2007) has a broader view, suggesting that it describe all the upcoming changes in the IT environment

and their various stages in the approval and implementation process (Addy 2007, 204).

4.2.7 Change implementation

Finally the RFC is transferred over to the technical implementation team (Service Transition 2007, 57). The management of the execution of larger changes bears major resemblance to project management. In fact many project management techniques, such as Gantt charts and PERT diagrams are used in managing the work associated with complex changes (Addy 2007, 203).

As part of the implementation, the change must be tested and a back-out plan created by the implementation team, especially for complex and high-risk changes (Addy 2007, 211–212). Testing allows the implementation plan to be verified and any additional risk mitigation actions to be identified (Addy 2007, 211). In many cases, testing can be performed in a virtual environment so that the production environment is not affected and no break in production systems is needed for testing purposes. Another option that sometimes needs to be used is to build a secondary testing system side-by-side with the production system. A back-out plan is meant to allow return of operations in case of major issues in the change implementation that prevent the change from being carried out successfully (Addy 2007, 212). It can either result in complete back-out where the change is fully reverted, or in partial change implementation. The plan needs to be tied to checkpoints and milestones in the change process so that different back-out actions are taken based on what change plan steps had been completed when the back-out plan was initiated (Addy 2007, 212).

4.2.8 Measurement of the change process

In order to improve change processes within the organization, the processes must be measured. Measurement is important because without hard figures on the processes, none of the decisions made to improve them can be based on reality but on the individual perceptions of reality that may or may not conform to reality (Laamanen 2007, 149). Measurement is also a tool of communication. By measuring certain aspects of processes, a signal about the significance of those aspects is also sent into the organization (Laamanen 2007, 149–150). This will often result in the improvement of those aspects of the processes. Care must be taken in order to prevent this from resulting in degradation of performance in other important aspects of the processes. For example focusing

purely on lead time can cause the quality of the process outputs to drop as speed is perceived as being the only important aspect. Process lead time is the time it takes for a customer to receive the product or service ordered, measured from the date and time when the customer places the order (Womack & Jones, 2003).

The following metrics for assessment of the performance of the change processes are suggested by Addy (2007, 188): mumber of completed changes by change type, percentage of changes completed in schedule, percentage of changes completed within the budget, number of aborted changes, average change duration by type and the number of incidents associated with changes (Addy 2007, 188). Other metrics suggested by ITIL (Service Transition 2007) are the number of rejected RFCs due to incomplete information, ratio of unplanned vs. planned changes, end user satisfaction in the change process, number of changes tracked with automated tools, etc... (Service Transition 2007, 64-65). Key performance indicators can be created from these metrics, such as reductions in rates of unauthorized and unplanned changes (Service Transition 2007, 64). The importance of these numeric figures is especially high if the service is managed externally, since agreement penalties and bonuses are often tied to them.

PIR should also be performed. It is somewhat similar to a post mortem review (a review performed after major service outages), except that it needs to be done for all implemented changes, regardless of whether they were successful or not (Addy 2007, 214). PIR should answer to the questions of whether or not the change implementation was performed well or whether there were issues, what was done well and what was done badly, as well as what could be learned from the experience so that performance could be better next time (Addy 2007, 214). PIR can be seen as an important interface point between service transition and continual service improvement, where changes are reviewed and the resulting conclusions are passed onto the CSI process. PIR can complement the numeric figures provided by metrics with a deeper insight into the change process execution. It can also pick up issues that are not visible from the chosen metrics.

4.3 CobiT

Control Objectives for Information and Related Technologies, abbreviated as CobiT, is a maturity model for IT process management. It is maintained by IT Governance Institute (ITGI) and Information Systems Audit and Control Association (ISACA). Its current version is 4.1 and it was released in 2007 (COBIT 4.1 2007, 2). The purpose of CobiT is to ensure that IT strategies are properly aligned with business strategies and to ensure to the stakeholders that due care has been taken within the organization to mitigate the IT related risks (COBIT 4.1 2007, 9).

CobiT does not provide frameworks for actual IT process management that could be adopted as best practices in the operation of IT services. CobiT is aligned with much more abstract and higher level management, such as “defining strategic IT plans” (COBIT 4.1 2007, 29), “managing IT human resources” (COBIT 4.1 2007, 57) or “managing quality” (COBIT 4.1 2007, 59). Marquis (2006) defines the role of CobiT to be defining the key performance indicator targets against which ITIL processes are measured. It can be used effectively in feeding input into ITIL service strategy and service design processes as well as to govern the continual service improvement efforts. However, its direct input to service transition process development is limited.

5 CHANGE PROCESS DEPLOYMENT WITH SYSAID IT

5.1 Introduction to SysAid IT

Fläkt Woods chose SysAid IT as its global ITIL service desk tool in late 2009. Prior to this there had been various tools used in the local companies. SysAid was used by Fläkt Woods Ab in Sweden where it was first implemented in 2006 for incident management purposes (Ellison 2010). It is poised to become the only service desk system used within Fläkt Woods once the migration processes from the existing systems in other companies is completed. Fläkt Woods utilized the SysAid version 7.0, whereas the latest version as of November 2011 was 8.1 (SysAid Upgrades... 2011). There were no immediate plans for a version upgrade to be performed.

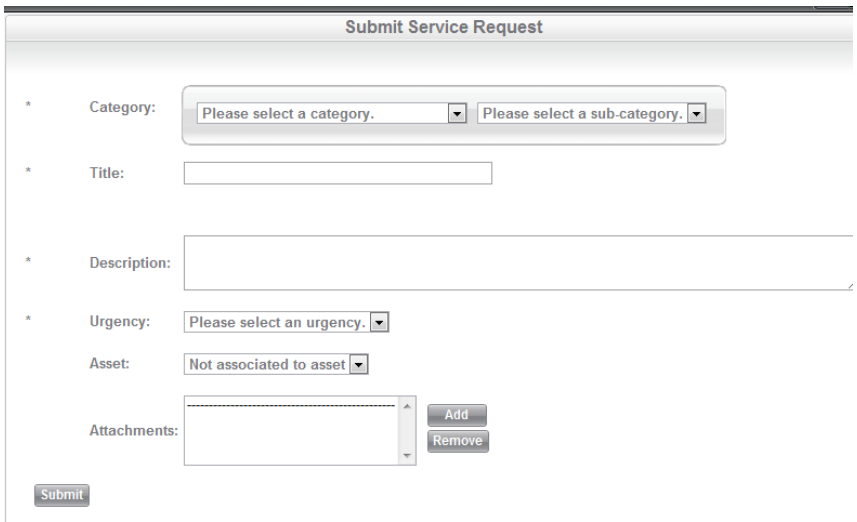
SysAid is developed and sold by an Israeli company called SysAid Technologies that was established in 2002 as Ilient (SysAid - About Us 2010). It is a web-based system that has its functionality built up from modules that provide the various parts needed in ITIL processes and other tools for the service desk, specifically for ITIL change management and problem management processes as well as for configuration management (SysAid Features 2010). However none of these ITIL modules were used in Fläkt Woods (Ellison 2010). Two versions of the product, “Pro” and “Enterprise”, are being sold by SysAid (Request a cost... 2011). Fläkt Woods has licensed the “Pro” edition. The enterprise edition offers additional modules such as the ITIL package, which is also sold separately for Pro-customers (Request a cost... 2011). It also offers more customization and integration functionalities when compared to the Pro-edition (SysAid User Manual... 2010, 138). SysAid supports provisioning users from an LDAP compliant directory service, so it is possible to integrate it seamlessly with corporate Active Directory (SysAid User Manual... 2010, p.38). It is also possible to implement single sign-on so that the company users do not have to login separately to SysAid in order to file service requests (SysAid User Manual... 2010, 43).

5.2 Service Requests in SysAid

In SysAid, all filed requests are called service requests (SR), regardless of whether the request is related to an incident, change request or is purely an informational request. The SRs can be filed in several different ways: through the SysAid end user portal (a web page, see picture 1), by calling to an

administrator, using a custom built web page or by sending an email to the service desk email address (SysAid User Manual... 2010, 71). If the end user calls an administrator, then the administrator will use a “phone call” page within SysAid to file the case on behalf of the caller (SysAid User Manual... 2010, 71). This allows for the request sponsor functionality referred to by Addy (2007, 188). The administrator can also file an SR independently or the SysAid monitoring module can automatically raise an SR (SysAid User Manual... 2010, 71). The SRs can be classified by using two or three level categorization (SysAid User Manual... 2010, 78). The SR can also be assigned an urgency level, which is the request initiator point of view for the priority of the SR. After the SR has been filed, it is placed on the list of new SRs. Based on its categorization, the SR can be automatically routed to the work list for a specified administrator or group of administrators (SysAid User Manual... 2010, 70). The initial expected time to repair for the SR is automatically set based on the category and urgency selected by the request initiator. The administrator can then change the priority after having reviewed the SR.

In Fläkt Woods, three urgency levels and four priorities have been defined. The urgencies reflect the business expectation of the SR repair time and they are “not urgent”, “urgent” and “extremely urgent”. The priorities are only numbered one to four, with “one” being the highest and “four” the lowest priority.



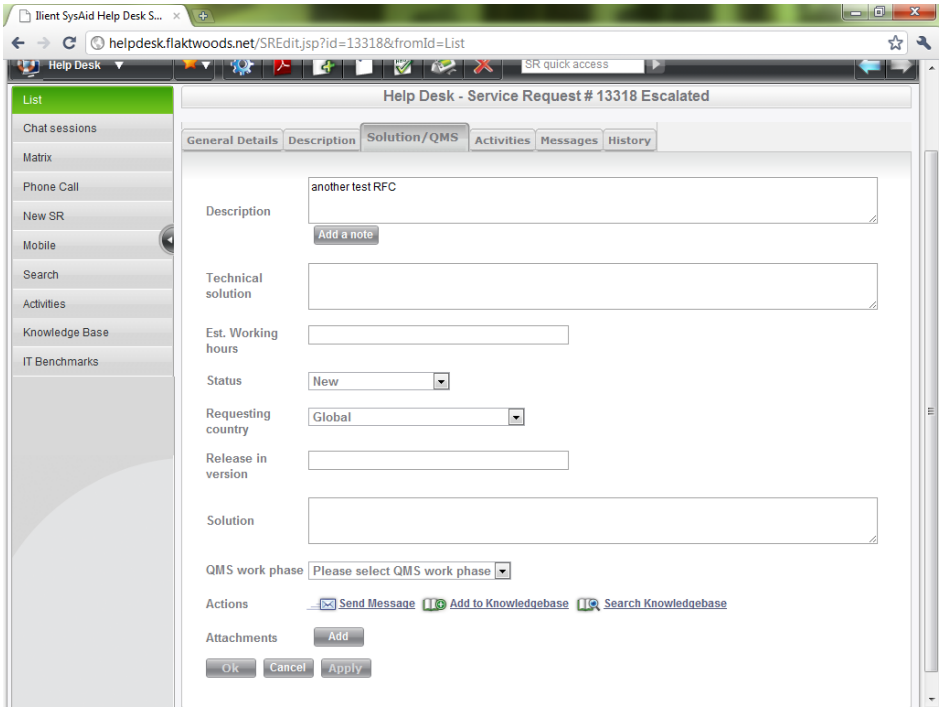
PICTURE 1. Filing a new service request in SysAid end user portal

SysAid supports two different user privilege levels: end users and administrators (SysAid User Manual... 2010, 22). In addition the extra modules can bring new roles, such as “change manager” from the ITIL package. End

users can file new SRs and follow up on their progress. Administrators can have several different access levels. All administrators are able to administer the SRs assigned to them. Additional privileges for administrators can then range up to full access to all components within SysAid (SysAid User Manual... 2010, 28-32). A specific type of administrator is a manager, who can access the manager dashboard to review SLAs and other reports on service desk performance (SysAid User Manual... 2010, 31).

5.3 Change Management in SysAid helpdesk without ITIL package

Fläkt Woods has implemented change management using the incident management functionality within SysAid (Ellison 2010). The changes are managed as incidents with some custom fields created for the change process requirements, as shown in picture 2. SysAid is very flexible in this regard and it allows customization of almost all forms displayed throughout the system, including the various tabs in the SR details view (SysAid User Manual... 2010, 133). Tabs can also be added, removed or renamed (SysAid User Manual... 2010, 57). This allows for any information required, such as the RFC status, to



be stored in relation to the RFC.

PICTURE 2. Change Management customizations for SysAid incident management

The RFCs are defined as their own service request categories, which have longer due dates for the various requests than those service requests categorized as incidents (Ellison 2011a). The RFCs prioritized as “1” are handled as emergency changes (Ellison 2011a). Different categories are also used to differentiate corrective change requests and enhancement change requests (Ellison 2011a). An example of the former is a category called “QMS BUG” and of the latter “QMS RFC”. Here “RFC” is mistakenly used to denote only enhancement changes, even though RFC should mean all change requests (Service Transition 2007, 46). Risk assessments are not stored in the RFC ticket, but to separate systems (Ellison 2011a). The various approvals needed for the RFCs are recorded by changing the “QMS work phase” field to the appropriate value once CAB has given its approval for the change (Ellison 2011a).

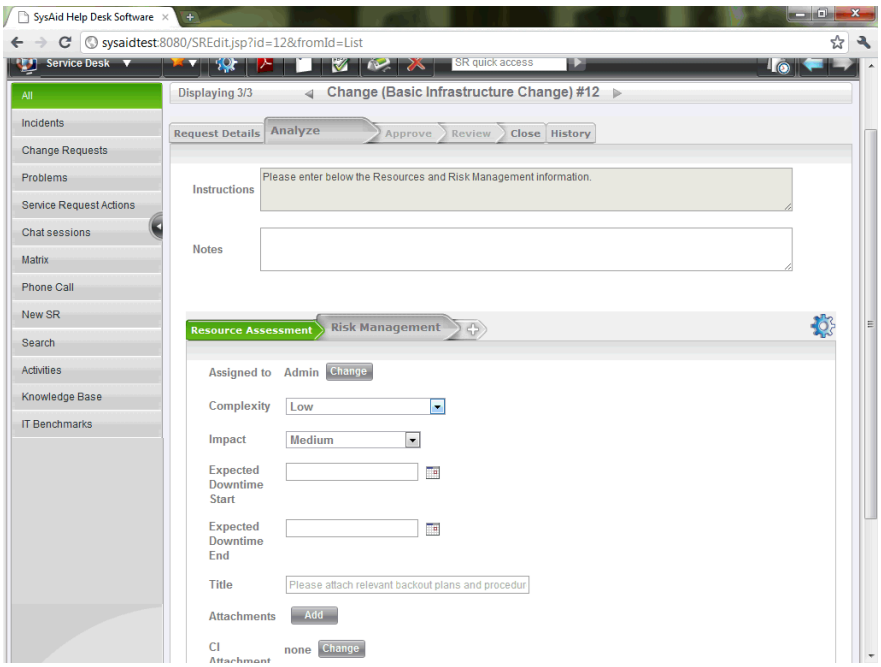
5.4 Change Management in SysAid ITIL package

When the SysAid ITIL package is used to manage the RFC, the start of the RFC process is similar to when the package is not in use. The user creates a service request, selects the appropriate category for it and the request is routed to the administrator in charge of the service in question. When the change manager notices that the service request is in fact a change request, the change manager can then create an RFC based on the service request on behalf of the user (Levy 2011). However, the enterprise edition of SysAid makes it possible to automate this RFC creation if a customization project is implemented with the SysAid professional services team (Levy 2011). The original SR status can then be automatically updated based on RFC status changes. This can be done by linking the RFC status changes with the incident status changes so that when RFC gets a particular status, the status of the incident from which the RFC originated from is updated according to set rules (SysAid ITIL Package... 2011, 32).

The change management process in the SysAid ITIL package is based on workflows and action items (SysAid ITIL Package... 2011, 7). The workflow is defined by the change sub-type (what kind of change is being managed) and contains the major steps in management of each RFC, such as “Analyze”, “Approve”, “Implement”, and “Review”. The action items are defined by a

change template and they contain the individual actions needed by each step in the management workflow (picture 3) (SysAid ITIL Package... 2011, 26–27).

For example, when approving a change, there may be several different types of approvals needed before the change can be forwarded to implementation. Each type of approval would have its own action item defined within the “Approve” workflow phase. The action items can be dependent upon each other. They can be activated upon completion of other action items, activated in parallel with other action items or activated only if properties of certain action items have desired values (SysAid ITIL Package... 2011, 18). These dependencies allow the change manager to enforce an orderly workflow in the management of the RFC. If no dependencies are defined for an action item, it will be enabled for completion as soon as the RFC is created from the template (SysAid ITIL Package... 2011, 18).



PICTURE 3. Analyze → Risk Management phase for an RFC in the SysAid ITIL package

However, the change process for an RFC can also be customized by the responsible change manager on per-change basis without affecting the template by adding, removing or modifying individual action items (SysAid ITIL Package... 2011, 19). This allows for flexibility concerning individual changes. For example additional approvals or risk assessments can be added if needed. The workflow tabs cannot be modified for a single change and either a new a

subtype must be created or an existing one modified to affect the workflow tabs (SysAid ITIL Package... 2011, 22). When an existing subtype is modified, the modification will immediately affect all change templates based on it as well as any active changes in progress.

The SysAid ITIL package has three types of user definitions to restrict their access to the change management system: change managers, administrators and end users. Change managers can open new RFCs from SRs, as well as create new templates and modify them to suit the needs of each change (SysAid ITIL Package... 2011, 16). Administrators can participate in the action items and view the RFC workflow (SysAid ITIL Package... 2011, 13). End users can file service requests through the end user portal and they can participate in the RFC process if action items are specifically assigned to them (SysAid ITIL Package... 2011, 12).

6 METHODS

6.1 Process discovery and naming

The process discovery process was started by defining the type of processes that were included. This was performed as part of the thesis work application (Saarimaa 2009), which was approved by the company management on 16.04.2009 (Sandell 2009a). This plan introduced seven process areas where the improvement work was planned to take place. In order to have the management perspective on the various processes that took place within these areas, an interview was held with the group CIO Lars Sandell on 11.12.2009. According to Sandell (2009), the most critical services to get under change management were basic network connectivity services, Active Directory administration and firewall services. Second on the priority list were anti-virus services and general application services (Sandell 2009b). This interview also produced the lists of processes within each of these areas.

After the first interview phase with the volunteers it was decided, due to the amount of work involved, to narrow the scope of the improvement efforts. The processes to be mapped and improved in the scope of the thesis work were to be the processes concerning Active Directory and the global network. The rest were left to be done later once experiences from these process areas were first gathered and analyzed.

The names of the discovered processes were prefixed with a three letter identification code. These codes were implemented in order to make referencing to the various processes easier during discussions and interviews. The initial letter in the code denotes either A for Active Directory or N for network. The numbers are incremental, starting from 01. However the processes are in no particular order. Subprocesses were denoted with a point, for example N01.1 would denote the first subprocess of the process N01.

- A01 Registering a service name.
- A02 Implementing a new AD site.
- A03 Giving domain administrative access
- A04 Installing a domain controller
- A05 Adding or modifying a group policy

- N01 Adding a site to the network
- N01.1 Enabling traffic routing to a local site or subnet
- N02 Changing the site bandwidth
- N03 Removing a site from the network
- N04 Changing traffic priorization rules

6.2 Process mapping

Interviews were the main avenue of input and knowledge from the organization in creating the process maps describing the initial situation within the company. The first questions were posed to the volunteers without any reference material and the initial process maps were drawn based on answers given to these questions and my own knowledge of the processes in question. These questions were for Active Directory:

1. Do you currently use the Fläkt Woods Active Directory? If not, what are you using?
2. How do you currently manage static DNS entries?
    a. Does it work properly or do you see room for improvement in the process
3. Whom do you request access if you need domain administrator access?
    a. In what kind of situations can you imagine you'd need this level of access?
4. When do you upgrade hardware of a server that runs as a domain controller?
    a. Do you know what to do when you need to upgrade it?
5. If you need to change an Active Directory group policy, how do you proceed?
    a. Do you know what Active Directory group policies are?
    b. Do you use them at all?
    c. Where do you see room for improvement in the process?

For network they were:

6. When you get a new site, either purchasing a company or establishing a new site, how do you proceed to get network connectivity on site?
    a. What were the stages in which you had to get directly involved in the install process?
7. If some sites on your responsibility area have a backup connection, how did you establish the process to get it installed?
    a. How did you identify the need for a backup connection?
8. Have you had the bandwidth changed or at least requested it?
    a. How did you identify the need?
    b. Have you only requested increases or decreases as well?
    c. Were the changes implemented or not?
    d. How were you informed during this process?
9. Have you removed some sites in your network?
    a. If yes, how was the process started?
    b. At what stages did your or a member of the local organization participate in the removal process?
10. Do/did you have networks that are not directly connected to the FWG network?
    a. How did you start the process of getting them connected?
    b. What stages required your direct intervention?
11. Have you requested change to the traffic prioritization to your site? Or has it been used to solve some problems you have had with the network?
    a. Do you know what is meant by traffic prioritization?
    b. Are you aware that this can be done?

These questions were sent to the volunteers beforehand and they were interviewed over telephone one volunteer at a time. The interviews were recorded for later reference. The initial process descriptions were created based on these interviews. Some parts of the process descriptions were also based on

the personal experiences of the writer. The target of these initial descriptions was not to be fully accurate presentations of the processes but starting points for further interviews with the volunteers.

After the initial drafts of the process maps and process descriptions were completed, three subsequent rounds of interviews were used to hone the process maps and descriptions. These rounds were meant to assist in the modification of the process descriptions to better reflect the real processes within the organization and to make the process maps and descriptions easier to understand. The next draft was always based on the input received from the previous draft and then the new draft was sent out for more input. Each draft round varied slightly in the type of input requested. The input was gathered by both email questionnaires and telephone interviews. All the rounds were conducted similarly to the initial round of interviews; the latest drafts of the process maps and descriptions, together with the questions, were sent to the volunteers about a week prior to the interviews taking place.

Questions for round 1:

1. Do you understand what this process does and how it ties to the business?
2. You find the process diagram understandable? Does it leave things unclear?
3. Can you follow the textual process description? If there are any unclear things left by the process diagram, does the textual description answer them?
4. Do the diagram and textual description give you a fully adequate view of the process or leave something to be desired?
5. Do you understand your role in these processes?
6. If you have experience of the process in question, does the description and diagram correspond to how things are done currently in Fläkt Woods? If not, how does the process description differ from reality? NOTE! This question is NOT about whether this is the correct or a good way to do things. It is about whether or not this is the way things are done currently in Fläkt Woods.

Questions for round 2:

1. Do you understand the process better or worse than before? (Compare with the first drafts sent out on 21.3.2010)
2. Do you find the business goals valid?
3. If you have experience of the processes in question, do the processes correspond to reality? (ie. how things are done currently)
4. How should the processes be changed to better serve you? Here you can give any proposals for improvement.

Questions for round 3:

1. Some processes have been renamed, rearranged and even one new process has been introduced (N05 Installing a backup connection to a site). Do you feel this arrangement to be better or worse than before?
2. The business goals have been revised. Please comment on them.
3. Are the processes still how you see the activities performed currently?
4. Any improvement suggestions for the next phase (where I will start to modify the processes to better suit our needs)

During the early feedback rounds it became obvious that the email questionnaires were not very good in gathering the type of deep feedback needed to improve the process descriptions. Because of this, the emphasis was placed on using the telephone interviews more extensively.

6.3 Process development

In the process development phase, new versions of all the mapped process profile worksheets, process descriptions and process diagrams were made. In order to regain the management's attention in the process development and to get input from the new IM management that started in early 2011, interviews were conducted with the business IM managers. Each BIM was given the process profile worksheets written as part of the process mapping and these questions were posed to them:

1. What is important in the process for my business? From the business perspective, what defines it as a success?

2. Are there some key performance indicators that would show whether the process is performing as it should from the business perspective?
3. What levels of approvals would my business want for these processes? Are financial/technical approvals separate?
4. Who do you see needing to participate in risk assessment for this type of change?

In addition to these questions, discussion on the processes and development goals in general was also allowed. This free discussion brought major insights into how the new IM management within Fläkt Woods viewed the central services change management.

To get a better perception of how the current processes differed from ITIL guidelines and where to focus the development efforts, the most important aspects of ITIL were listed and the level to which the current processes implement them was assessed. Then each of the three businesses was asked to list the importance of those various aspects from their perspective on a scale from one to three, where one meant “can do without”, two meant “should be implemented” and three meant “must be implemented”. As I was the only central IM representative in the entire group, I also added in my own prioritizations, equal to the businesses’ priorities.

The result, shown in table 5, was then used to decide whether to bring in certain ITIL elements to the process, especially in cases where they brought in management overhead that did not directly contribute to the process business goals. The single priority figure was calculated by adding all the priorities given together, dividing it by 4 and then rounding the result. “Current implementation” was based on an assessment of the process descriptions created in the mapping phase.

TABLE 5. Gap Analysis of the key areas in ITIL and FWG change processes

ITIL best practice	Priority	Current implementation in FWG
RFCs used to request changes	3	No formal RFC used. Some changes have documentation in email, some have nothing on record.
RFCs recorded in change log	3	No central log maintained for changes
Initial RFC review	3	Change requests are discussed with the

perfomed to drop RFCs that are not implementable, are duplicates of other RFCs or have missing information		requester but no formal process exists. Often original requests are very vague and the required details are requested afterwards during the process.
Persons needed to authorize the change are defined	3	Not formally. Larger changes are often discussed with business IM management.
Categorizing changes into standard, normal and emergency changes	3	No categorization performed.
Change manager nominated	3	Central IM Services Manager manages the changes. During his absence changes are often frozen. Some smaller changes may be managed by his deputy.
Worst case scenarios regarding the change are communicated to the customer	3	Communications towards stakeholders are not managed. Sometimes worst case scenarios are communicated, sometimes not.
Risk assessment performed for each change	2	No formal risk assessment performed on changes. In changes affecting key IM areas such as data centers, informal risk assessments based on “gut feeling” are sometimes performed.
Post implementation review is conducted	2	Only “post mortem” reviews conducted on critically failed changes that have caused major business disruption.
Emergency change process defined	2	No emergency change process defined.
Interested parties are appropriately kept informed during the change review and implementation	2	No formal process for pro-active communications to change stakeholders.
Changes are categorized to corrective and enhancement changes and prioritized accordingly to the associated criteria	2	No formal categorization. Corrective changes are often managed as incidents without any type of change management.
Change schedule is maintained	2	Individual major changes are scheduled, but no overall change schedule maintained.
Change approval board reviews change requests	2	CAB does not exist.

Seven Rs used in RFC assessment by the CAB	2	Not used.
Categorizing changes based on risk impact and probability	1	Not categorized formally.

Table 6 shows an overall implementation plan of the various aspects of ITIL elements during the process development. The plan is a combination of the capabilities of the process implementation tool, SysAid helpdesk, ITIL best practices for implementing these key areas and Fläkt Woods perspective derived from business IM manager interviews.

TABLE 6.Implementation plan for key areas in ITIL and FWG change processes

ITIL best practice	Priority	Plan of implementation for FWG
RFCs used to request changes	3	All change requests are managed through the SysAid system.
RFCs recorded in change log	3	Automatically maintained by SysAid
Initial RFC review performed to drop RFCs that are not implementable, are duplicates of other RFCs or have missing information.	3	The first action item on all RFCs is to review the RFC for these items. The review is performed by the change manager.
Persons needed to authorize the change are defined	3	Approvers are defined in the process description. For local approvals, the change requester has to sign-off the approval and take responsibility when the RFC is filed. Global approvals (by business IM managers, central IM service manager or SVPs) are built into the SysAid change process implementation.
Categorizing changes into standard, normal and emergency changes	3	None of the changes processed can be fast-tracked through pre-approvals. Therefore, the “standard” change category will not be used. Categorization to normal and emergency changes is done through prioritization. Changes prioritized as “immediate” are emergency changes. Other priorities classify as normal changes.
Change manager nominated	3	The person who converts the service request to an RFC is nominated as the change manager for the change. Most often

		this is the central IM services manager.
Worst case scenarios regarding the change are communicated to the customer	3	Some pre-identified risks and related worst case scenarios are listed in the service request form. If other major risks are identified as part of the risk assessment, the customer is notified of these.
Risk assessment performed for each change	2	Some pre-identified risks and related worst case scenarios are listed in the service request form. The orderer must sign-off that these risks are accounted for. A separate risk assessment is also performed at the global level to note any other risks that may not have been pre-identified.
Post implementation review is conducted	2	No change is allowed to be closed prior to a review having been conducted.
Emergency change process defined	2	A emergency process is defined for each process in the process description. RFCs originating from “extremely urgent” service requests are potentials for emergency changes. The decision lies with the change manager.
Interested parties are appropriately kept informed during the change review and implementation	2	Change requester and sponsor are automatically notified by SysAid. For other interested parties, the change manager shall email the report in PDF format available from SysAid manually when the RFC status changes. These parties must be explicitly named by the change requester when filing the RFC.
Changes are categorized to corrective and enhancement changes and prioritized accordingly to the associated criteria	2	Categorization performed by change manager as part of the RFC review using the ITIL criteria.
Change schedule is maintained	2	Not maintained. At the moment SysAid does not support this function and independent, manual maintenance is too labor-intensive. When the function is implemented in SysAid, it will be evaluated.
Change approval board reviews change requests	2	Four different CABs are formed to review the change requests. They are involved in most of the processes but some RFCs, where risks are predominantly local, can be approved by single approvers at the global level. The developed processes do not cover local approval processes.
Seven Rs used in RFC	2	CAB and approvers (in case CAB is not

assessment by the CAB		used in a process) are informed of the seven Rs principle.
Categorizing changes based on risk impact and probability	1	The customer is responsible for assessing local risks. The change will be categorized as part of the process based on other risks that were not part of the pre-identifed risks that the customer has signed off.

After the developed process descriptions were created based on the implementation plan, the processes were again given to the volunteers from the local IM organizations for review. Based on these interviews, the process descriptions were honed for final approval by the business IM managers. The questions posed to them regarding each of the processes were:

1. Do you understand what is expected of you as a customer in this process (during the process)?
2. Do you understand what pre-requisites are needed from you as a customer before you can start this process?
3. Are the added approvals and reviews beneficial or do they burden the process with unnecessary bureaucracy?

There was also one question asked regarding the overall process framework:

- Do you understand how these “a”, “b” and “c” processes are tied together?

6.4 Process deployment

Prior to this project, only one change process had been implemented in SysAid and it used the incident management work flow. This work flow was studied in order to map the capabilities of the tool behind it and then benchmarked against the change management guideline document (chapter 8.2). The most severe shortcoming in the basic incident management tool was that it did not implement any type of approvals work flow, which is critical for the correct assessment of the RFC and to record the decisions made. Based on this benchmark, shown in table 7, a decision was made to obtain a license for the SysAid ITIL package.

TABLE 7. Gap analysis between SysAid and SysAid ITIL package

Requirement	Current tool (SysAid vanilla)	SysAid with ITIL Package
RFC Status tracking	With customization	Yes
Workflow of actions and approvals	No	Yes
Custom data fields	Yes	Yes
RFC Prioritization	With customization	Yes
RFC Categorization	With customization	Yes
RFC Risk Assessment	With customization	Yes
Change Schedule/Calendar	Yes, as service requests	Yes, as service requests

The calendar functionality in SysAid was limited to service requests. Therefore RFCs could only be tracked as service requests, among other service requests such as incidents. An individual calendar for tracking just changes was not supported. Also only the due date of the service request could be tracked and no other dates that could be associated with an RFC, such as planned CAB review dates, etc.

7 RESULTS

The results chapter includes the three different types of results produced: List of processes discovered and developed (7.1), an example of a developed process (7.2) and the process development and deployment guidelines document (7.3). The guidelines document will be released separately within Fläkt Woods Group for all IM personnel. It details the commonalities shared by all the developed processes and lays the framework for future process development. The rest of the developed processes are on the attached CD-ROM disc in physical editions of the thesis and as attachments in electronic forms of the thesis. The file format for these files is PDF.

7.1 Process discovery

The following processes were developed as part of the project:

- A01 Registering a service name.
- A02a Designing a new AD site implementation
- A02b Implementing a new AD site
- A03 Giving domain administrative access
- A04 Installing a domain controller
- A05 Adding or modifying a group policy
- N01a Designing a new network connection
- N02b Implementing a new network connection
- N01c Enabling traffic routing to a local site or subnet
- N02a Designing a site bandwidth upgrade
- N02b Implementing a site bandwidth upgrade
- N03 Removing a site from the network
- N04 Changing traffic prioritization rules
- N05a Designing a backup connection to a site
- N05b Implementing a backup connection to a site

7.2 Process mapping

7.2.1 Mapping descriptions

All the process descriptions created consisted of a process profile worksheet, a full textual description and a graphical process diagram. The following elements described in chapter 4.1 were included in the process profile work sheet:

1. Process owner
2. Customer(s)
3. Roles and responsibilities
4. Scope
5. Inputs and Outputs
6. Business Goals
7. Business Risks
8. Key Controls
9. Measures of Success

7.2.2 Process map and description

All the processes had three parts in their documentation:

- Process profile worksheet
- Process description
- Process diagram

The process profile worksheet (table 8) included the key information relating to the process, such as the scope of the process, the various roles that participated in the process, the process inputs and outputs, business goals and risks, key controls and measures of success (also known as key performance indicators). The process description was a textual description of the process itself, which is from half a page to a page and a half long. The process diagram was a graphical flow chart of the process, drawn using the BPMN notation (diagram 7). The tasks and gateways in the process diagram were linked to the process description by numbering. The number, written in parentheses, in the process diagram corresponded to the part of the textual description discussing the activities related to the task or gateway.

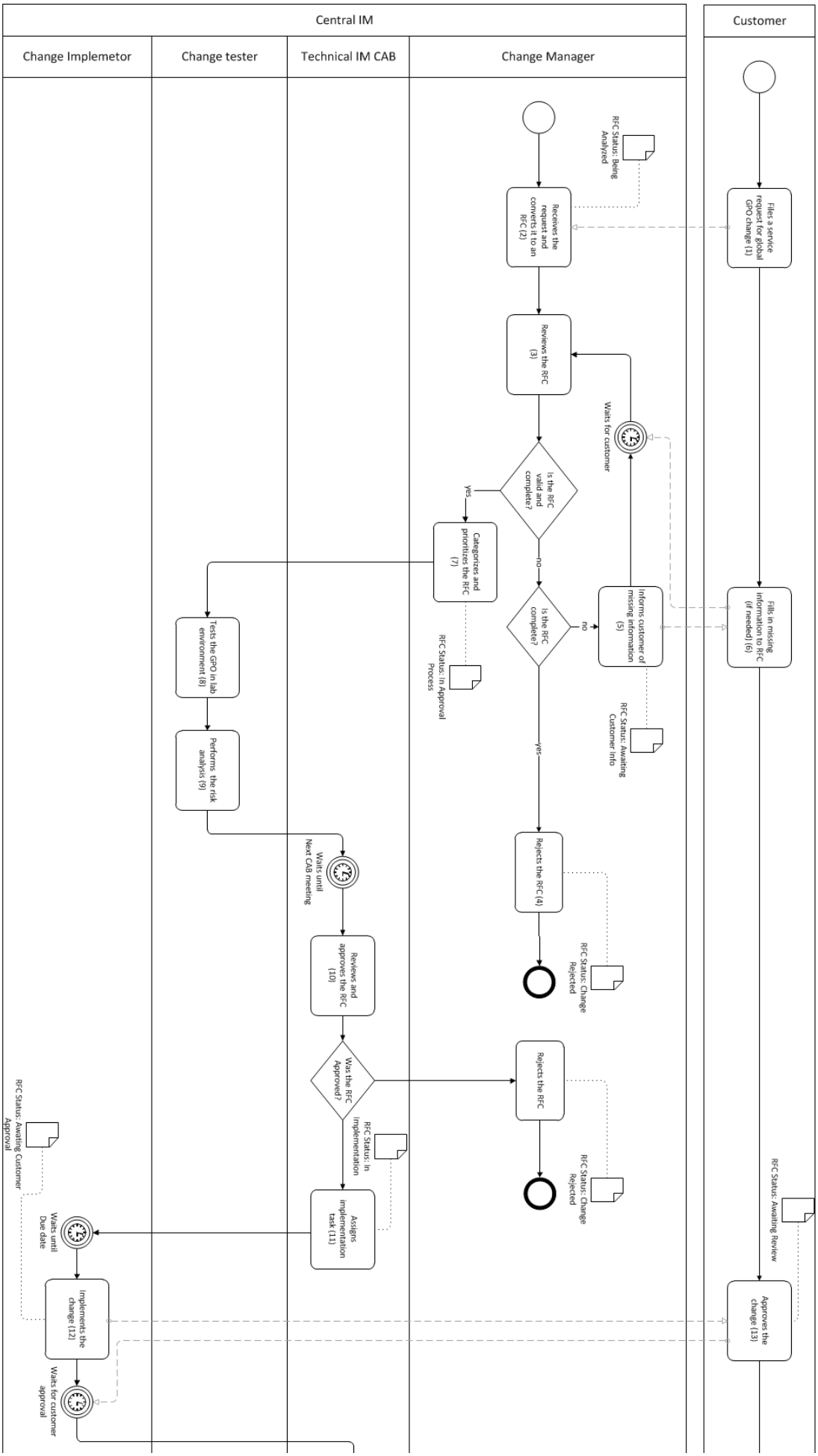
TABLE 8. Example of a developed process profile work sheet

<table>
<tr><th colspan="3">Process Profile Work Sheet</th></tr>
<tr><td colspan="2">Process name</td><td>Process owner</td></tr>
<tr><td colspan="2">A05 Adding or modifying a global group policy</td><td>Pekka Saarimaa</td></tr>
<tr><td colspan="3">Customer(s)</td></tr>
<tr><td colspan="3">Local IM management, Business IM Managers</td></tr>
<tr><td colspan="2">Scope</td><td>Roles and responsibilities</td></tr>
<tr><td colspan="2">The process target is to test and implement a global group policy object (GPO) in air5.flaktwoods.net Active Directory domain.

Start: The customer identifies a need to implement a group policy

End: The customer has verified the implementation of the new or modified group policy and the change has been reviewed in PIR.

Lead time: 15 business days</td><td>• Customer
• Change Manager
• Change Tester
• Change Implementor
• Technical IM CAB</td></tr>
<tr><td colspan="3">Inputs</td></tr>
<tr><td colspan="3">• Which policy is being modified
• What the desired setting is
• Is the policy mandatory (ie. a setting that cannot be overridden at the local level)
• When (date and time in GMT without DST) the policy must be implemented</td></tr>
<tr><td colspan="3">Outputs</td></tr>
<tr><td colspan="3">• A new domain group policy tested and implemented in the domain</td></tr>
<tr><td colspan="2">Business Goals</td><td>Business Risks</td></tr>
<tr><td colspan="2">• Implemented policies must not conflict with existing policies
• Policy must be implemented on the desired date (minding the lead time)</td><td>• Testing is not performed properly
• Testing resource is not explicitly assigned
• Implemented too early or too late
• LOCAL: Desired business effect not achieved</td></tr>
<tr><td colspan="3">Key Controls</td></tr>
<tr><td colspan="3">• Testing of the change is assigned to a change tester
• If the RFC is incomplete or the requested time less than standard lead time, RFC is rejected
• If change should be mandatory, IM Council CAB must review the RFC
• Change is reviewed in PIR
• LOCAL: Customer must confirm that desired business effect was achieved in local tests.</td></tr>
<tr><td colspan="3">Measures of success</td></tr>
<tr><td colspan="3">• Variance from the desired date
• Number of issues caused by the implemented policies</td></tr>
</table>


A05 Adding or modifying a global group policy
Central IM
Customer
Change Implemetor
Change tester
Technical IM CAB
Change Manager
Files a service request for global GPO change (1)
RFC Status: Being Analyzed
Receives the request and converts it to an RFC (2)
Reviews the RFC (3)
Waits for customer
Is the RFC valid and complete?
yes
no
Categorizes and prioritizes the RFC (7)
RFC Status: In Approval Process
Is the RFC complete?
no
Informs customer of missing information (5)
RFC Status: Awaiting Customer Info
Fills in missing information to RFC (if needed) (6)
yes
Rejects the RFC (4)
RFC Status: Change Rejected
Tests the GPO in lab environment (8)
Performs the risk analysis (9)
Waits until Next CAB meeting
Reviews and approves the RFC (10)
Was the RFC Approved?
Rejects the RFC
RFC Status: Change Rejected
RFC Status: In Implementation
Assigns implementation task (11)
RFC Status: Awaiting Review
Approves the change (13)
RFC Status: Awaiting Customer Approval
Waits until Due date
Implements the change (12)
Waits for customer approval

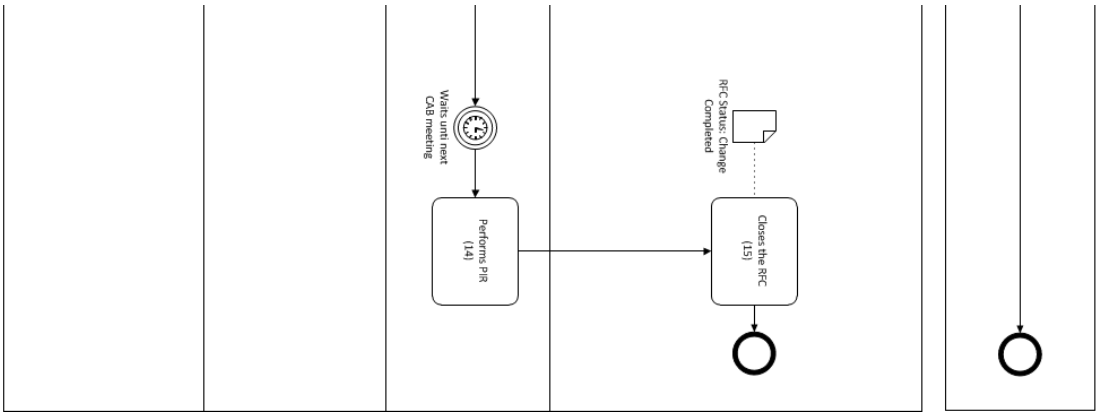


DIAGRAM 7. Example of a developed process flowchart

7.2.3 Example of process textual description

The customer's requirement for a group policy (GPO) may come from a need to alter the computer or user security policies (such as password and audit policies), system settings, service settings and user settings. The list of various settings can be downloaded from http://www.microsoft.com/downloads/details.aspx?FamilyID=18c90c80-8b0a-4906-a4f5-ff24cc2030fb&displaylang=en

After the customer has identified the need to implement a group policy, they will decide if the need is just local for them or if this policy needs to be implemented globally. This process only applies for changes that require global effect, because either the required policy can only be implemented at the global level (such as password policies), the policy needs to take effect on domain controllers or because there is a business requirement for global effect.

The process starts when the customer files the request for a global GPO change (1). An exact and unambiguous specification of the requested policy change must be attached to the request.

After the request has been filed, the change manager will convert it to an RFC (2) (RFC Status: Being Analyzed) and review it to make sure that all required information is present, the due date is not before the lead time and that no other RFC is currently being processed that affects the same policies (3). If the RFC is complete but fails any other test, it will be rejected (4). Implementation at lead time end is not acceptable since policy change at a wrong time is a major business risk. If the RFC is not complete, the change manager will notify the customer of this (5) (RFC Status: Awaiting customer info) and wait for the customer to amend the RFC (6).

If the RFC is valid, the change manager categorizes and prioritizes the RFC (7) (RFC Status: In Approval Process) and moves the change into testing, where the change tester will test the change in a lab environment (8). Based on the results of the test, the change tester will perform a risk analysis of the change (9). Risks that need special attention are

- Possible effects the change will have on domain controllers
- Effects on widely used configurations that have direct end-user impact such as wireless networks
- If the RFC requests the change to be mandatory, AD organizational units must be analyzed for existing GPOs that have the same policy but with different settings defined. The local administration of these organizational units must be contacted, the change discussed with them and their concerns added to the risk analysis.

After the risk analysis, the RFC is reviewed by the technical IM CAB (10). NOTE! If the policy should be set as mandatory, the IM Council CAB must review the RFC. They may reject the change or approve it for implementation. If the RFC is approved, the CAB will assign a change implementer to implement the change (11) (RFC Status: In Implementation). The change implementer waits until the change is due and implements the change (12) (RFC Status: Awaiting Customer Approval). Once the customer has approved the change (13) (RFC Status: Awaiting Review), it will be reviewed by the CAB in the next PIR (14) and closed by the change manager (15) (RFC Status: Closed Completed).

7.3 Process development and deployment guidelines

7.3.1 Change Management and IT Infrastructure Library

Change management means the collection of processes with which the target system is moved from the current state to another state, such as removing or adding network connections. Fläkt Woods Group central IM infrastructure change management is based on ITIL (IT Infrastructure Library), a collection of IT service management best practices maintained by British Office of Government Commerce.

ITIL defines that the management of IT within the organization has management of a collection of services which the IT organization provides for the end users.

Each service has a life-cycle during which the service is designed, implemented, operated and closed down. Change management concerns all the changes made to the service during its life-cycle, from initial release into production all the way to its closure.

7.3.2 Glossary

Some terms and abbreviations used in the change management process descriptions and the rest of this guideline document:

- RFC, Request for change: A document that is submitted by the change initiator and used to trace the progress of the change. All documentation related to the change, such as decisions regarding it, actions taken on it, etc.. will be contributed to the RFC. Due to the high prominence of RFC in the process, the change management process is sometimes also known as an RFC process.
- Change calendar: A list of all upcoming changes and their implementation status.
- CAB, Change approval board: Group of people who gather periodically to discuss the changes. It includes people from the various stakeholders at the group level. It will either reject or approve implementation of individual change requests. Sometimes the change initiator or sponsor is invited to a CAB meeting to explain his/her change request.
- Change manager: The person who is charged with the overall responsibility of executing the change management process. The change manager will perform the initial review of the RFCs, call together CAB meetings and delegate the execution of the change to the appropriate people. The change manager is the first point of contact to the change initiator for any questions regarding the change status and decisions.
- ECAB, Emergency change advisory board: A CAB that is quickly convened to decide on the implementation of an emergency change request. ECAB can often be a subset of the proper CAB since it needs to convene very quickly (often in matter of minutes or hours at maximum) and all the CAB members may not be available. For more info, see CAB and Emergency change.

- Emergency change: A change that needs to be immediately implemented in order to restore services to normal operation or to prevent an imminent service failure. Note that business emergencies are handled as normal changes (but on the highest priority). A short risk assessment is still necessary prior to change implementation.
- Hazard. A circumstance that contributes to the probability and/or impact of risk realization. Hazards can be inexperienced personnel executing the change, single points of failure in the service delivery chain, unknown service dependencies, etc.
- Interested parties: Any user within Fläkt Woods or an external supplier that must be notified when the RFC status changes.
- Normal change: A change that goes through the normal assessment and approval process.
- PIR, Post-implementation review: The CAB conducts a review on all the implemented change requests every time it convenes. The main purpose of a PIR is to learn from both successful and failed changes to perform better in the future. When a PIR is conducted after a catastrophically failed change or a major incident, it can also be known as a post-mortem review.
- Risk. An event that may occur during the execution of the change request that has a negative impact on the service delivery chain. An example of a risk could be that the network connection is closed down while there are still business operations on a site.
- SLA, Service Level Agreement: An agreement between the supplier and customer of a service that sets the level of service (according to an agreed measurement) that the supplier must provide. They can concern service availability, response times to incidents, lead times on change requests, etc…
- SR, Service Request. A request filed by the customer using the SysAid helpdesk tool. Can be an incident report, informational request or a change request (RFC).

7.3.3 Change Approval Boards

Due to the nature of business and IM organizations in Fläkt Woods, there will be 5 different CABs (shown in diagram 8).

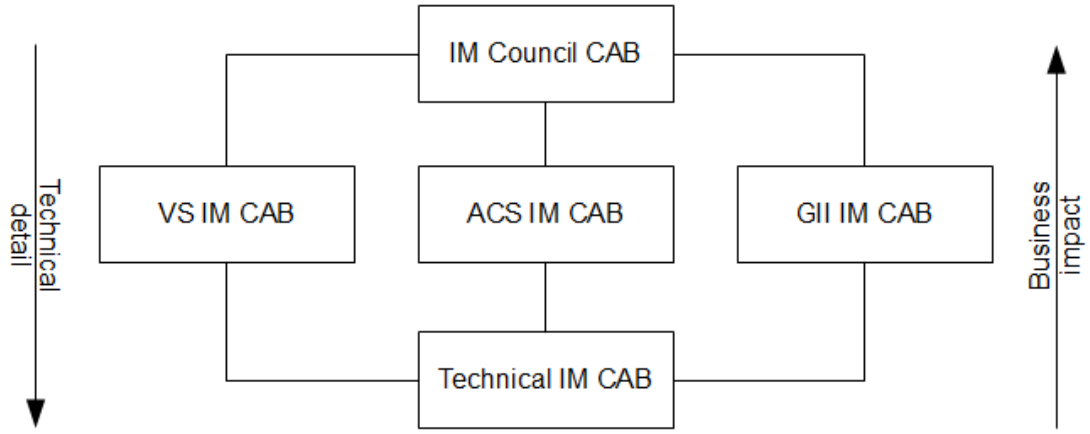


DIAGRAM 8. Arrangement of CABs in Fläkt Woods ICT infrastructure changes

The IM Council CAB is the same as the IM Council. Its domain is infrastructure changes that have major business effect all across Fläkt Woods Group. It meets three times per year as well as at need. Decisions include major changes to infrastructure where multiple businesses are affected (such as new data centers, major upgrades, etc..) or switching of the major underlying technologies or service providers. It only takes a stance on the business effects of the changes and has the financial authority to approve exceptions to the Central IM budget. This CAB has 6 members, one BIM from each business, SVP of finance for the group, central IM services manager and group applications manager.

GII, VS and ACS IM CABs consist of the relevant business's IM manager, central IM services manager and possible local business or local IM representatives. In some cases, also the SVP of the business area may attend. They discuss changes that have financial effects and pertain to one site or sites within one business, such as establishment of new sites, disconnecting sites, upgrading sites, etc.. If required, members from several business IM CABs can convene together (for example to discuss upgrading the network connection on a site with two businesses). If the business impact is deemed greater than originally expected or the business IM CABs fail to reach an agreement when

multiple businesses have different interests in a particular RFC, the Business IM CAB may also decide to bring the RFC into the decision list of the next IM Council CAB meeting.

The Technical IM Infrastructure CAB discusses the changes from a technical perspective. They may decide on the implementation of changes where the financial effect is within the agreed bounds of the Central IM Services budget. The CAB will also advise other CABs on the technical implications of the proposed changes. The relevant BIM will be informed of any decision made in the technical IM CAB and if needed, the BIM may raise the change to their relevant business CAB or the IM Council CAB. The members of the Fläkt Woods Technical IM Infrastructure CAB are Pekka Saarimaa (as CIM), Jesse Lahtela (for VS), Jan Hellkvist (for ACS) and James Vulicevic (for GII).

7.3.4 CAB meeting agenda

CAB meetings are held weekly (except for IM Council), but only if there are RFCs to be reviewed. Items pending PIR can wait until the next CAB meeting.

- Note all members present and absent
- Review of any emergency changes implemented since the last CAB meeting.
- PIR: Review of all changes implemented after the last CAB (with status: Awaiting Review). Decisions are needed for follow-up actions on at least all changes that either did not go well or went exceptionally well.
- Review of all RFCs submitted at least 2 Finnish business days (2 weeks for IM Council CABs) before the CAB meeting (with status: In Approval Process). All members need to have reviewed the changes beforehand using the seven Rs so that time can be devoted to problematic RFCs. Discussion on major RFCs submitted close to the deadline may be postponed to the next meeting.
- Review of the change calendar for all upcoming changes
- Closing the meeting

Unless particularly problematic issues are being discussed, the volume of RFCs is unusually high or emergency changes have been implemented, the CAB meeting should not take more than 10-15 minutes.

ECAB meetings are called together by the change manager, who will attempt to contact at least one other CAB member over the telephone or instant messaging. The approval decision is made immediately and the rest of the CAB is notified by email.

7.3.5 Generic process flow

The generic process flow for the management of all change requests is as detailed below. This process is a guideline to the actual implementation of the processes and not a framework to which all the process implementations must strictly adhere to.

1. The customer submits the RFC using the SysAid helpdesk tool. The RFC is created as an SR.
2. The change manager creates a new RFC based on the SR. The RFC priority is set to reflect the SR priority and the RFC due date is set to reflect the change lead time as assessed from change process class and priority. If the RFC priority is assessed as “immediate”, the SR priority is left as is. For other priorities, the SR priority is set to “Change Created”.
3. Change manager performs an initial review of the change to make sure the RFC is complete and valid. “Complete” means it contains all the information necessary to process the RFC. “Valid” means that the effect of the change cannot be achieved by lesser means, that the change is implementable (not requesting something known to be impossible to implement) and that the change is not a duplicate of another change already within the system. If the RFC is not valid, the change manager closes the RFC and informs the customer. If the RFC is not complete, the change manager requests the customer to amend the RFC with the missing information, after which the initial RFC review is conducted again.
4. The change manager categorizes and, if needed, adjusts the RFC priority. If the due date needs to be changed due to lead time considerations, the change manager changes it in BOTH the RFC and the original SR.
5. The change manager performs risk assessment for the change.
6. Depending on the process, the change manager can either directly approve or reject the change (skip to point 9), or put the RFC into the

decision list for the next relevant CAB meeting. The change manager may always ask the CAB to decide on the RFC, even if it is not required by the process.

7. If the change manager decides additional opinions or reviews are needed, he will request these from the parties deemed necessary (who will be invited to the CAB for this change).
8. The CAB members assess the change request and, if needed, discuss it in the CAB meeting.
9. The CAB members reject or approve the change in the CAB meeting. An exception is the technical CAB, which can only recommend RFC rejection or approval and the final authority lies either with a higher level CAB or the change manager.
10. The change is scheduled and implemented. In larger changes the CAB may review the status of the change periodically to make sure it is on schedule.
11. The customer needs to approve that the change is correctly implemented
12. The CAB discusses the change in a PIR (usually held in conjunction with the regular CAB meetings)
13. The change is closed.

There are two types of approvals for the change processes: pre-approvals and in-process approvals. Pre-approvals are approvals at the local level which the customer must have prior to filing the RFC. These may include approvals from local service owners whose services the requested change affects and from local business management regarding the RFC business case. In-process approvals mean the approvals given by the CABs and/or change approvers during the RFC process.

All emergency changes follow the same process work flow as normal changes. The only difference is that an ECAB meeting is quickly called to convene by the change manager instead of waiting for a normal CAB meeting. Also emergency changes need to be more thoroughly reviewed by the PIR, since it will be the only time the full CAB performs a review of the change.

7.3.6 Measurement of the change process

Each process has a standard lead time. The process delivery time is always measured against the requested date, the standard lead time or the next service window after standard lead time, depending on the change priority and risk assessment. Emergency changes are measured against the lead time of the originating SR. For high priority changes, the CAB may set a specific date against which the change is measured. Some changes can have precise dates and times when they should be implemented and an earlier or later implementation may be a significant business risk. If an RFC is submitted for this kind of change with a requested date shorter than the standard lead time, the RFC will be rejected. This is because simply implementing this change with the standard lead time has a high probability of realizing a related business risk. Instead the change initiator is asked to re-initiate the RFC with a new requested date and time.

The measurement always begins when a complete and valid RFC is submitted. It needs to have all the necessary details needed to assess, approve and implement the change. If any information is missing, the RFC will be set to “Awaiting Customer Info” status. Once the customer fills in the missing information, the RFC status is reset to “Being Analyzed” and the lead time measurement restarts.

Only the parts included in the Fläkt Woods Central IM or external supplier swim lanes will be included in the process measurement. Customer steps included in the process prior to RFC submission will not be included in any measurements. Customer steps included in the process after the process deliverable has been moved to customer for approval (RFC status is “Awaiting Customer Approval”) will not be included in the measurements. In addition, the numbers of change rejections will be measured per change process.

7.3.7 RFC statuses

The RFC can be in one of these statuses within the change management process:

- New: The change has been submitted but not yet looked at by the change manager. In this stage the RFC is still only recorded as a regular SR in SysAid.

- RFC Created: A change has been created from the incident and the incident is closed.
- Being Analyzed: The change manager has created the RFC from the change but it is waiting for futher analysis.
- Awaiting Customer Info: The RFC requires further customer input. Usually this is because the RFC has been submitted as incomplete and cannot be assessed and approved.
- In Approval Process: The change manager has validated the RFC and has notified the approver(s) about it. Approvers can be named persons or groups such as a CAB
- In Implementation: The CAB has approved the change for implementation. The implementation has been scheduled and may have been started.
- Awaiting Customer Approval: The change has been implemented and needs the customer to approve that it has been implemented as it should have been.
- Awaiting Review: The customer has approved the change and it is waiting for the PIR to be done by the CAB.
- Change Rejected: The RFC has been rejected either by the change manager during the initial review or the CAB during CAB review.
- Change Completed: The RFC has been implemented and the PIR has been conducted.

7.3.8 RFC risk management

Because many of the risks regarding RFC implementation mainly affect the customer and thus the risk mitigation actions for them should be performed by the customer, all RFC submission forms contain a clause saying that the customer is responsible for local risks. To help the customer, if there are common local risks associated with the RFC, they should be listed for the customer to consider. After the customer has signed off on the local risks, the remainder of the risks mainly concern Fläkt Woods's operations from the global perspective. These risks are managed within the RFC process by the central and business IM functions.

All RFCs (irrespective of their priority) must be assessed for risk. First, the risks need to be identified. To help in this, risks should be considered through hazards. Hazards are circumstances that might cause risks to be realized. Examples of hazards are tight schedules, inexperienced implementers, single points of failure in the service delivery chain, untested backup or restore procedures, novelty of the change, etc. After a hazard has been identified, the risks it might pose need to be considered and then those risks need to be listed and assessed for impact and probability. Impact should be assessed from the business perspective (and not the IT perspective). The following table 9 is the ITIL recommendation for risk categorization based on impact and probability.

TABLE 9. Risk categorization according to ITIL (Service Transition 2007, p.54)

Category	Impact	Probability
1	High	High
2	High	Low
3	Low	High
4	Low	Low

Impact is high if the realization of the risk causes notable financial losses or disruption of service for more than one person. Probability is high if there is a direct cause- and effect relationship between the hazard and the risk. For example, if a setting is changed on the system, the probability of risk realization is high for all services that are directly dependent on the setting and low for services that are dependent on the system being changed but not on the setting itself.

Certain change types have very similar risks between individual change implementations. These changes are pre-identified and documented in the change process description. It should be noted that risks related to not implementing a change are not assessed as change risks. Instead they affect the prioritization of the change.

7.3.9 Change Window for changes that can have global impact

Any changes that have a single risk in any of the categories 1-3 will be implemented during the agreed global change window. This change window is the second Saturday of each month, from 09:00 CET to 15:00 CET. Changes outside this window will require approval from the service owner, the IM

Business CAB or the IM Council CAB depending on the scope of the risk impact. The IM Business CAB can approve changes where risks are limited to its business area. This approval can be given as part of the CAB meeting where the change itself is approved.

7.3.10 RFC priorities

The RFC priority table (table 10) is directly taken from ITIL. Changes are either corrective or enhancement changes. Corrective changes are implemented to fix a defect in an operational system and are often derived from incident reports. Enhancement changes are responses to changing business requirements. According to these, the change is prioritized as Immediate, High, Medium or Low. If the process includes a CAB meeting prior to change implementation, changes prioritized as “Immediate” can be approved by an ECAB meeting. Other change priorities require a full CAB meeting, but in case of “High” priority changes this meeting takes place as soon as possible, outside normal meeting schedules. The categorization into corrective and enhancement changes is performed by the change manager when performing the initial RFC review.

TABLE 10. Change Priorities according to ITIL (Service Transition 2007, p.55) with lead times

Priority	Corrective change	Enhancement change
Immediate	Unavailability of service to a large number of users or during business critical dates (such as end of month).	N/A
Lead time	Decided by originating incident SLA	-
High	Severely affects a large number of users.	Changes in legislation, important new business initiatives, enables quick wins for the business, averts a high business risk.
Lead time	Decided by CAB	Decided by CAB
Medium	No severe impact, but the problem must be solved before next service window.	Supports business viability or planned business initiatives.
Lead time	Standard lead time	Standard lead time
Low	No severe impact and the change can be	Usability improvements or new functionalities.

	implemented in normal service windows.	
Lead time	Next service window after standard lead time	Next service window after standard lead time

Examples of incidents that can originate changes of “Immediate” classification could be any large BU or hub site network connection going down, unavailability of a customer-facing service or inability to log on to a bookkeeping application at the end of month. Corrective High priority changes could include incidents that cause major performance degradation to a large BU or hub site network, or domain controller being down on a major BU or hub site. High priority enhancement changes could be the processes related to an establishment of a new major business site. Lead time for high priority changes can be adjusted by the CAB. However, lead time adjustments do not affect third party lead times, unless the change processes can be prioritized with them in accordance with the SLA agreed with the third party.

If the change is of low risk and the change window policy does not affect it, the lead time is measured as listed in table 10. If the change is of higher risk with one or more risks in categories 1–3, then with the exception of emergency changes, the lead time is counted to the next change window after lead time (see chapters 7.3.8 and 7.3.9). For example, for a change with risk 2 and with standard lead time of 40 days, the effective lead time is 40–60 days, depending on when the next change window occurs after 40 days of RFC submission. If the service owner, the business IM CAB or the IM council CAB grants an exception to the change window policy for the change, then lead time is measured as listed in table 10.

7.3.11 Implementation tool

The change processes will be implemented using the SysAid Service Desk tool, accessed from http://helpdesk.flaktwoods.net.

Each RFC will be filed as a service request (SR). The different types of RFCs are defined by using the service request categorization and each has its own submission form template. Some RFC submission forms may have custom fields that indicate compulsory prerequisite information to the RFC process. Some forms may also have checklists which detail the various action items that

must be performed or information that must be acknowledged by the customer prior to filing the RFC. This required information is detailed in the individual process descriptions for each change process.

When filing the RFC, the customer must confirm that these action items have been performed and the information acknowledged. The information may include standard lead times, pre-identified risks or required approvals by the local management before the RFC can be submitted. The action items may include suggestions of various other avenues of lesser impact or cost that can be used to achieve the same effect as the RFC (such as identifying and preventing unnecessary network traffic on a site instead of filing a bandwidth upgrade RFC). Pre-identified risks are lists of common risks in the RFC process where the risk realization is mostly local to the customer and thus the mitigation efforts should also be taken by the customer themselves. An example could be that when the customer requests a site disconnection from the network, they must ensure that any services located on the site but also used elsewhere have proper migration or transfer plans in place.

SysAid also requires the customer to select urgency for the SR, which relates to the RFC priority. The urgencies selectable are “Extremely Urgent”, “Urgent” and “Not Urgent”. These three urgencies do not directly correspond to the four RFC priorities for corrective changes and the change manager needs to judge each case separately. Table 11 presents one possible mapping, but the criteria set in table 10 needs to be considered as the main guideline for setting the RFC priority. The mapping in table 11 should not be used for automatic assignment of priority.

TABLE 11. Correspondence guideline for SysAid and ITIL priorities

SysAid Urgency	ITIL Corrective Change Priority	ITIL Enhancement Change Priority
Extremely Urgent	Emergency	High
Urgent	High or Medium	Medium
Not Urgent	Medium or Low	Low

After the SR is filed, the SysAid system routes the SR to the relevant change manager. The change manager then creates a linked change request using the RFC template designed for the type of change requested. When the RFC status is updated later during the RFC life-cycle, the original SR status is automatically updated according to table 12. Of special note is that when the change progresses to “Awaiting Review” status, the SR will be closed because it marks the end of the process from the customer perspective.

TABLE 12. Correspondence of RFC Statuses and SR statuses

RFC status	Service request status
-	New
Being Analyzed	Change opened and being analyzed
Awaiting Customer Info	Awaiting Response
In Approval Process	Change opened and in approval process
In Implementation	Change Approved
Awaiting Customer Approval	Awaiting Response
Change Completed	Closed
Change Rejected	Change Rejected
Awaiting Review	Closed

7.3.12 Notifying interested parties

The SysAid tool does not provide facilities to automatically notify interested parties when the RFC status changes. Therefore this must be done manually by the change manager. The change manager must obtain a PDF report of the change (click on the Adobe Acrobat logo in the SysAid toolbar) and email the resulting PDF to interested parties. When submitting the RFC, the change initiator must explicitly state if the change has any interested parties other than the change initiator him/herself and what their email addresses are.

8 DISCUSSION

8.1 Process discovery

8.1.1 Scope and naming

Process discovery was conducted as an interview with Lars Sandell, who was the CIO of Fläkt Woods Group until the end of 2010. During the interview, various parts of the Fläkt Woods central IM infrastructure areas were discussed and the CIO was asked to give his view on what change processes existed within those areas. Both Laamanen (2007, 54) and Jacka & Keller (2002, 61-63) divided the organizational processes into core processes and supporting processes. However regarding Fläkt Woods IM infrastructure this division was not meaningful as they were all supporting processes from a business perspective where the customer was always another internal entity within the group. On the other hand, from the central IM perspective all were core processes as the customer was always involved in the process, even in more technical changes. Therefore all processes were managed as core processes.

The processes were initially scoped to start and end with customer, where the customer first identified the need for the change and submitted a change request. This was done in accordance with Laamanen (2007, 52). The process ended after the customer had accepted the process output. However, this was changed during process development by the addition of PIR into each process after customer acceptance. This was done in order to link the process to continual service improvement. Some processes also had other “moments of truth” where customer interactions happened during the process. A few processes, such as A02b “Implementing a new AD site”, had so many that the processes were verging on collaborative implementation rather than a traditional supplier-customer relationship. This was because the implementation responsibility was not solely on the supplier side but the customer also had a substantial role.

Several changes to the initial process names were made as a result of the three cycles of interviews performed during the process mapping phase. For example, a process originally discovered as “Upgrading domain controller hardware” was renamed as “Installing a domain controller” after the former name caused confusion in the interviews. Confusion was also caused by the process name “A01 Adding, Removing or Changing a static DNS entry”. In order to avoid

technical terms in the process names (Lindell 2010; Scovazzi & DallaMaria 2010), this was renamed as “A01 Registering a service name”. One process was also added. Originally adding a backup connection to a site was not listed as a process at all and including it into the technically similar process N01 would have made the process too complicated as well as confusing from a business perspective. Therefore it was added as a new process.

8.1.2 Process splits

As part of the process improvement, some processes were split into two different processes and both processes were built around their own RFCs. The process numbering was adjusted by adding a letter to the end of the process number instead of the second level number. This was to put emphasis on the fact that they were not sub-processes, but equal processes in a chain. The processes split were:

- “A02 Implementing a new AD site” was split into
    - A02a Designing a new AD site
    - A02b Implementing a new AD site
- “N01 Adding a new site to the network” was split into
    - N01a Designing a new network connection to a site
    - N01b Implementing a new network connection to a site
    - N01c Enabling traffic routing to a local site or subnet
- “N02 Upgrading site bandwidth” was split into
    - N02a Designing a site bandwidth upgrade
    - N02b Implementing a site bandwidth upgrade
- “N05 Installing a backup connection to a site” was split into
    - N05a Designing a backup connection to a site
    - N05b Implementing a backup connection to a site

The “a”-process contained the designing or quotation steps of the process and resulted in one or more recommendations documented in a design document. The latter “b”- and “c”-process(es) contained the actual implementation according to the design option chosen by the customer. In some cases the

customer could perform the “a”-process themselves using the documentation available and directly proceed into the latter process of implementation. In these cases however, the latter process conducted a more thorough review of the process inputs to ensure that the design documents produced by the customer contained all the necessary information to proceed with implementation.

These process splits were made to better manage customer expectations, in order to better accommodate the different customer cases and to make the customer better aware of the risks associated with the change. In several developed change processes, especially where external providers were involved, the change lead times might have varied considerably depending on the input. For example, ordering a VPN device in Finland for implementing a network connection to a small sales office and ordering a leased line to an Indian factory could have massive lead time differences. The average time for the former could have been three weeks, whereas the latter could have easily been five or six months. Therefore, to give the customer a better estimation of how long the actual change implementation would take, it was necessary to separate the change design to its own process.

With regards to different customer cases, some customers held considerable know-how as to what options were available for them to implement the business requirement, their delivery times and prices. For example, the customer might have submitted an identical change request previously. Sometimes the customer might only have the business requirements as a starting point for the change request and required considerable assistance in deciding what implementation strategy was in their best interest. According to Paul Ellison:

> One thing you may get here is the local competence level on local sites – – in certain circumstance you can put that responsibility on local organizations but in others you may have to step in to do it – –. So maybe you should have two pairs of templates here. One is for the analysis process, the information necessary for the analysis process (to determine the best connection options) as part of the input. (Paul Ellison 2011b.)

With the split processes, customers could, if they wanted to, utilize the central IM services in designing the RFC implementation plan. However if the customer already held the required knowledge needed to plan and budget the change, they could directly submit the implementation RFC.

8.2 Process mapping

8.2.1 Mapping notation

As a mapping notation, a freely interpreted BPMN notation was chosen. As Laamanen (2007, 79) notes, using a lot of symbols in the notation serves mainly to cause confusion in business-oriented people and should be avoided in general purpose process diagrams. However, in order to adequately describe the processes developed, some symbols are needed and for this purpose BPMN provides better means than UML activity diagrams. For example the wait events, where the process stops to wait for an outside signal, can be better represented in BPMN due to an easily understandable clock symbol than the two triangles vaguely resembling an hourglass in UML.

The following elements from BPMN where taken into use:

1. Flow objects
    a. Activities and subprocesses. Subprocesses were only used to denote other processes in the project scope.
    b. Simple gateways. The multiple uses of different AND, XOR, etc... gateway types were ignored for the sake of simplicity and a simple diamond shape was used.
    c. Start, end and intermediate wait events
2. Simple data objects to represent documents produced or used by various activities.
3. All connecting objects. Sequence flows, message flows and associations.
4. Artifacts to group and annotate the process flow.
5. Swim lanes

In order to keep the diagrams simple and to avoid having to use the gateway symbols excessively, implicit merge was always used when merging various process flows, even if the merge was not exactly parallel in nature. The implicit split was also used to denote parallel splits. To denote conditional splits, an empty diamond gateway was used, with the condition written inside the diamond and various results into the exiting sequence flows.

Different BPMN pools were used for the customer organization, Fläkt Woods central IM and external suppliers. This was made possible by the changes to

the organizational structure of the Fläkt Woods Group in 2011, where the organizational border between central IM and local business entities became more pronounced and clear. The early process diagrams did not separate Fläkt Woods's customer and central IM. Direct flow of the process between customer and central IM was replaced with message passing, in order to better conform with the BPMN standard and to make the points of interaction clearer. UML does not allow for the pooling of swim lanes with individual start and stop events for all pools and message passing to synchronize the activities between different pools. This would have made the presentation of organizational boundaries vaguer. BPMN represented this in a better fashion.

The key activities within each process were numbered sequentially. These numbers were also included in the textual process description to make it easier to follow the diagram and textual description side-by-side. These numbers were not in the original process diagrams drawn as part of the process mapping, but were proposed by Scovazzi (2010): "...insert some numbers in the flowchart so that the comments could be associated with the diagram..."

8.2.2 Mapping tools

Two tools were looked at for producing and maintaining the BPMN process diagrams: Microsoft Visio 2007 and Oryx Editor. Microsoft Visio is a general flow-charting application. The Object Management Group provides a BPMN stencil set for use with Visio 2002 and later versions. Oryx Editor is an open source web-based editor distributed under the MIT license by Potsdam University (Oryx-editor... 2009). It supports multiple business process mapping notations, BPMN among them.

During short testing sessions, the Oryx Editor was found to be substantially easier to use than Visio for BPMN modeling purposes. However, it was a cloud service with no ability to export saved process diagrams. Visio, even if a more complex and less user friendly program than Oryx, allowed for local saving of the produced work. Therefore MS Visio 2007 was selected as the tool used to create the needed diagrams during the process discovery and mapping phases. For the process development phase, the tool was upgraded to Visio 2010 Premium, as it has proper support for BPMN processes and offers several ease-of-use enhancements over Visio 2007 when creating process diagrams.

8.3 Process development

8.3.1 Terminology

There were multiple naming convention clashes between ITIL and the Fläkt Woods internal change management policy. For example, Fläkt Woods's documentation used "local change committee" instead of "change advisory board" defined by ITIL. As Addy (2007) remarked, the single most important contribution of ITIL is the vocabulary, which enables people from various backgrounds to understand each other when discussing IT service management (Addy 2007, 3). This was discussed with the Fläkt Woods CIO Lars Sandell and agreement was reached to move the language of the internal change management policy towards the ITIL terminology. It also meant that where no exceptions were made, ITIL vocabulary was used in the new process diagrams and descriptions.

However, some deviations to ITIL conventions were implemented. Instead of renaming "Global IM" as "Shared IM Services", it was named "Central IM Services". It was agreed that this deviation better reflected the role of the central IM services unit and it was clear enough for communication purposes. There were many IM services that were shared between the various business areas and legal entities, but these were not supplied by the central IM services unit, but the businesses' own internal IM organizations. It still reflected the ITIL naming standard, as "services" were previously called "applications" within Fläkt Woods. Also, to emphasize the business aspect of the processes, the term "customer" was used instead of ITIL-recommended "change requester" or "change sponsor".

8.3.2 Change management guidelines

Many of the process steps, such as the various pre- and post-implementation reviews and approvals included standard ITIL practices, which were adapted for use in Fläkt Woods. Also some elements such as references to the RFC life-cycle statuses were used similarly across all processes. It would have resulted in long and repetitive process descriptions to go through all of these in detail with every process. Therefore a general document called "Fläkt Woods Central IM Change Management Guidelines" (chapter 7.3) was produced as part of the process development.

In addition to describing how ITIL was adapted for Fläkt Woods and how ICT change management is executed with the SysAid tool, the guideline was also meant for all Fläkt Woods IM employees as an introduction to ITIL change management practices. Therefore it also contained those relevant parts of ITIL change management that were implemented as such as well as a short introduction to ITIL in general.

8.3.3 Adapting ITIL RFC life cycle

After the customer had submitted a new RFC, it was first reviewed by the change manager, as specified by ITIL (Service Transition 2007, 53). ITIL recommends that invalid RFCs should be rejected and returned to the customer, who can then appeal through management channels (Service Transition 2007, 53). In Fläkt Woods, all invalid changes were not rejected but a two-way policy was created instead. RFCs that were deemed to be non-implementable, such as being duplicates of existing RFCs or requesting impossible changes were closed and the customer notified of this. If the RFC only lacked sufficient information, it was not closed but the customer was asked to amend the RFC with more information. This approach was chosen to make the process more customer-oriented. According to Ellison (2011e) closing all non-complete RFCs and requiring the customer to re-submit them would have made the processes appear rigid and bureaucratic.

Change categorization into the ITIL model of standard, normal and emergency changes was only done through change prioritization. Changes that were prioritized as “immediate” were managed as emergency changes. All other changes were handled as normal changes. None of the changes were of a nature that could have been handled as standard changes without separate risk assessments or approvals. This was also in line with change categorization used previously in Fläkt Woods, documented in Fläkt Woods IM change management policy document. However, the Fläkt Woods model named standard changes as scheduled changes. It also lacked explicit prioritization rules of scheduled changes and the scheduled changes were managed equally irrespective of their business urgency. Thus the ITIL model was adopted for the developed processes instead of the model previously used in Fläkt Woods.

When the RFC was submitted, the SysAid tool allowed only for three urgency categories to be used, which were “Extremely Urgent”, “Urgent” and “Not

Urgent”. Since these did not directly correspond to the ITIL priorities, the definition of the RFC priority was left to the change manager and CAB to assess individually on each case. However a general guideline to help in this assessment was added in the deployment guidelines document. The lead times associated with the priorities were derived from the priority descriptions and Fläkt Woods’s practices, such as the change window policy.

The lead time for emergency corrective changes depended on the originating incident because emergency changes were performed to fix an incident. If the incident had no official SLA, the emergency change could not be measured against the incident SLA and thus it changed into a change of best effort. Changes of other priorities were handled differently depending on their assessed risk. This was due to high risk aversion within the company. All changes with a single risk in categories 1 to 3 were, by default, scheduled to take place at the next service window after the standard lead time on the change had expired. Any exceptions to this default scheduling policy had to be approved by the CAB at the time of change approval. In these cases, the CAB should also include the owner of the service being changed.

High priority change had a CAB meeting scheduled to take place as soon as possible outside regular meeting schedules in order to reduce the accrued lead time. Medium and low priority changes and their scheduling exceptions were approved according to CAB meeting schedules. The priority only affected the probability of approving a schedule exception. If the change had only risks in category 4, medium priority was given the standard lead time and low priority changes were implemented at the next service window after lead time expiry.

The categories proposed by Addy (2007, 190–193) were not used either, as a large part of the classification was already built into the process premises, such as “implementing a site bandwidth upgrade” or “implementing a new AD site”. However, this classification was used implicitly in several of the processes. For example the process N02b, “Implementing a site bandwidth upgrade”, splits into two based on the type of upgrade performed. In one of these types, the bandwidth upgrade was a relatively simple configuration change by the network provider regarding the connection port speed. This fits Addy’s definition of a “modification – configuration change”. The other type required a new line to be installed and then switched into production, replacing the old line. It fits Addy’s

“upgrade component” change type. In other processes this classification showed itself in the listed “special considerations” for assessing the change for approval or risk.

Previously there had been no formalized authorization process for any infrastructure changes, especially for those shared services that were fully managed internally such as Active Directory. It was therefore crucial to implement a CAB review of all the changes and this acceptance was built into all the new processes. Multiple CABs were founded to reflect the business structure of the company and to have the financial and technical approvals given at appropriate levels.

The various types of approvals listed by Addy (2007, 197) were implemented in a varied fashion. All CAB approvals were placed at go/no-go decision points in the change processes and consisted mostly of implementation approvals. Due to the relatively small scale of the processes, conditional approvals and management checkpoints were not necessary. Also explicit production approvals were only implemented in one process, A05 “Adding or modifying a global group policy”, where the policy is tested prior to CAB approval and the CAB approval is a go-ahead for moving the tested change into production.

The company structure was reflected in the division of change analysis, risk assessment and approval tasks. ITIL suggests that these should all be performed after the submitting of the RFC. However, this was not an optimal solution as the local organizational structures varied greatly with decision-making power in the company being spread across the local legal entities, which were also the customers of these change processes. Within the legal entities, some local IM managers held significant authority to approve investments even beyond their budget, whereas some IM managers needed to have all investments approved separately by the local business management (Ellison 2011b). This meant that the process could not assume certain approvals had been given. Therefore, when implementing the developed process, the RFC submission forms have to be designed so that the change initiator will be informed of what approvals are necessary and the responsibility of acquiring these approvals is pushed to the change initiator. It could be argued that all of these pre-approvals from local business management would qualify as production approvals as defined by Addy (2007, 197).

Exceptions were global level approvals within the central IM and the various IM CABs, which were built into the processes. These approvals concentrated on global effects of these changes within single or multiple business areas, global budgeting and business strategy conformance, as well as the global technical effects from an IM perspective. These global approvals were conducted using the seven Rs methodology introduced by ITIL. Due to the business structure of the group, there were several different CABs that approved changes. The CAB engaged in a specific process depended on the level of approval required for the change implementation.

Parts of the analysis tasks were also pushed to the customer in a similar way as approvals. All of the processes were ultimately aimed at business benefit, but in many cases the central IM role was almost purely in implementation or implementation coordination. The central IM could not be the ultimate judge of the business benefit in the various alternative approaches (Ellison 2011b). For example, the applications used in the IM service delivery varied greatly between the business areas and countries. These applications' network usage profiles could vary greatly and could only be understood by the local IM organization and very often even they might not have had a thorough understanding of it. Therefore it might be that a local entity IM department submitted a bandwidth upgrade request with the intention of improving the performance of a specific business application. However, due to the application's network usage profile the bandwidth upgrade would not have helped in achieving this goal. The central IM could offer assistance with analysis in these cases but could not take the final call on business benefit.

Risk management, which was performed for all changes as Addy (2007, 194) recommended, was handled in the same way as other analysis tasks. Many risks were such that they had purely local effects to the customer and thus could best be assessed and mitigated by the customer. Some IM organizations had technical knowledge and were able to assess the technical risks and requirements of the various changes, whereas some organizations utilized external consultancy (Ellison 2011b). This led to the recommendation of attaching lists of pre-identified risks to the RFC submission forms, helping the customer assess and mitigate risk. When the processes are implemented, the customer should also be encouraged to think of other possible risks to his local

business, as every change will be different and the listed risks may have missed crucial features unique to this change.

Without these actions, there was a risk that the customer might have assumed that the central IM took the responsibility of all risk assessment and mitigation actions, even for those risks that only had local significance. As Paul Ellison described risk management:

> They [customers] may assume that you've taken the risk mitigation into account and the risk assessment – –. Identify what the potential risks are and how they should be mitigated. And in the actual order you put in under the dotted line – – when they place the order they actually say in it that they've taken on board the risks – –. So you push the responsibility to them and get them sign off on it. (Paul Ellison 2011b.)

Therefore, when the customer submits the RFC, they will have to sign off that they have acknowledged the risks, both pre-identified and any other risk affecting them locally. They also have to sign that they have taken all possible mitigating actions and accepted the residual risk.

The risk assessment within the processes mainly focused on risks that had significance outside the domain of the customer, such as resourcing within central IM, inter-site dependencies or global technical implications. But local risks and other risks outside the jurisdiction of the central IM had to be considered, since it was possible that this particular RFC also had unique local risks that were not in the list of pre-identified risks the customer signed off, even if it was highly unlikely that the central IM could identify them. Each identified risk was categorized based on the ITIL recommendation (table 3), as it was a simple way of assessing the attention required to mitigate each risk. The risk categorization recommended by Addy (2007, 207) was deemed to be too complex and fine-grained by the senior business IM manager (Ellison 2011d).

The business IM managers of each business area were asked of their opinions regarding the required approval levels and risk management roles for each process. In case of disagreements, the majority won since Fläkt Woods had three business IM managers. If all BIMs disagreed on the approvals, the opinion of the senior BIM and project sponsor (Paul Ellison) prevailed.

For approvals, if the consensus for a particular process was that it required their approvals, then the business IM CAB was involved in the approvals. If the level

of approval was agreed to be the central IM manager, then technical IM CAB was involved. If only customer approval was deemed necessary, the change manager would perform the approval on behalf of central IM and then the technical IM CAB would be involved in the PIR. Even if CAB approval was not in the process, the change manager could nonetheless ask a suitable CAB to recommend RFC approval or rejection. This was to allow the change manager the possibility of a second opinion on change requests.

The change manager was always involved in the risk assessment. The change manager assessed all RFCs for resource and time related hazards. If CAB approval was used in the process, the CAB members also performed a risk assessment of the RFC from their perspective as part of the “seven Rs” assessment. Otherwise the BIM opinions on the risk assessment roles were implemented.

After the change implementation was completed, all changes were designed to require a customer approval, as per ITIL specifications (Service Transition 2007, 57). This also marked the end of the change process from the customer’s perspective. The CAB still performed a PIR, as Addy (2007, 214) recommended, for processes where the change was implemented. Design processes did not include a PIR but the design produced by the process was reviewed after implementation as part of the implementation process PIR. This was because PIR was, by definition, a post implementation review and the design processes did not implement any changes. The PIR could also include other stakeholders besides just the CAB members, such as change recipients or the change sponsor, if their input was required in the change review. When the change status was changed to “Awaiting Review”, it closed the related SR, thus stopping the SLA measurement.

All the developed processes included the release of the change into production. Thus any interfaces towards release management processes were not defined. As Fläkt Woods does not have a widely deployed configuration management in use, no interfaces towards configuration management were implemented. If and when a configuration management solution is deployed, these interfaces need to be added to the processes, particularly in the initial review, risk assessment and implementation activities. Initial review would use configuration management as a central location of information to make sure the change is

valid: that the systems it concerns exist and that the requested change can be implemented on them. In current processes this information needs to be acquired from varying sources, often from the system being changed itself. Risk assessment would use configuration management to better assess the system-wide effects that the change would have and implementation would use it to record the implemented change.

8.3.4 Process profile worksheet

The process work sheet was modified with the addition of a lead time specification. Lead time of the process is the expected time the process takes from the RFC being submitted to “Awaiting Customer Approval”, based on the time it takes to execute the individual actions within the process. The lead time is cited to the customer when the process is initiated and the process on-time delivery is measured against either the lead time or the desired time of implementation, whichever is later.

Otherwise the worksheet contents were updated to reflect the business goals for the developed processes based on the feedback received in the BIM interviews. For example, in process “N03 Removing a site from the network”, an additional business goal “No adverse effect elsewhere in the network” was added based on input from Rolf Beggerow and Anthony Simcox (Beggerow & Simcox 2011). Explicitly identified local risks and approvals were listed in the process profile worksheet business risks and key controls sections with a “LOCAL” prefix.

8.4 Conclusions

8.4.1 Results

The study set out to discover, map and develop the ICT change processes within Fläkt Woods Group. For the most part the goals set out were achieved. The largest challenges in the study were related to the process discovery phase, which reflected in the rest of the work. The discovery was performed between me and the then-CIO of the company and this resulted in a narrow technical view of the processes. Instead the process discovery should have involved a larger number of people involved in high level ICT management from the business side, such as the people who later became the business IM managers when the company was restructured. On a more positive note, an additional result, which was not the original intent of the study, was also produced: the

general change management guidelines for infrastructure changes within the company.

This work did not create any construct or method directly applicable outside Fläkt Woods Group. However, if other studies of similar purpose and scope are conducted in other companies, this study can act as a benchmark. When multiple similar studies have been conducted, an opportunity would arise for a more generalized construct regarding ITIL change management process design to be studied and built.

8.4.2 Work process

A major issue that affected the process discovery and mapping stages was that the organization was much dispersed geographically, preventing face-to-face meetings to map the processes. This, together with cultural differences, made it harder to maintain a scientific approach to the interviews. Physical meetings would have allowed for better introduction of the interviewees into the scientific process, the situation to be taken more seriously by the interviewees with proper preparatory work conducted and enabled other, more visual techniques to be used. With the telephone interviews, the interviewees sometimes had not reviewed the material discussed even though it was sent well beforehand. The reasons given were varied but most often it was lack of time due to other commitments. Another issue was that the mapped processes related to my own work activities. These prevented the use of many of the process mapping techniques recommended by Jacka and Keller (2002), mainly the post-it technique which requires the process mapper to be a third party with no direct role in executing the work in the processes.

Also implementing only part of the ITIL framework made it more difficult to define some areas where the change management interfaced with other areas of ITIL. This was evident in the definition of process measures and key performance indicators. These would require a proper IT service strategy, from where these indicators could be derived, to be in place. Now the measurements and indicators had to be defined independent of the overall IT environment and business targets. However, it is important to start somewhere. Starting with service strategy or design processes is more abstract and does not yield immediate, demonstrable benefits for an organization where the core business is not IT-related. As Addy (2007, 13) states, it is important to build trust between

the IT function and the rest of the business. In this case change management and incident management are the best starting points, as improving those offers the best chance to create positive IT experiences without large amounts of executive buy-in across the organization.

8.4.3 Organizational changes during the project

During the latter stages of the process development work, the Fläkt Woods business as a whole started a major restructuring. This also affected the development work, by causing delays and major changes in the way the business management gave input to it. The work became more complicated, as the development did not only have to take in the benchmarks from frameworks like ITIL but also to adjust the processes to work within the new company structure. It also created a gap between how the first parts of the development work (discovery and mapping) was done as part of the old organization and how the development was done as part of the new organization.

On the other hand it also more clearly separated the central IM functions from the business IM functions and made the interface between these more pronounced. This helped some aspects of the processes, such as the points where control was transferred between the local business IM and the central IM. It also provided a source of high-level business input for the process improvement: the business IM Managers representing the three business units. This led to changes in the process development targets. Instead of a combination of input from the CIO and local business units, most of the input came from the BIMs who had different views on and targets for the processes. They held both the business perspective and the approval authority for the project deliverables, which before was scattered between the CIO and the volunteer local business units. The local business units' IM managers were still asked for input during the process development, but their significance had decreased. Their input mainly affected small details and the overall finish and clarity of the process descriptions from the customer perspective instead of being instrumental in their development.

8.4.4 Further development

The results of this development work were the developed process descriptions for ICT change management within Fläkt Woods. The next step is to actually implement the processes using the SysAid tool, gather feedback and analyze

the results. This will undoubtedly also lead to some changes in the processes themselves, starting the cycle of continuous improvement. An important part of the process deployment is also the development of the document templates referred to in the process descriptions and the change management guidelines, such as the RFC submission form templates, fact finding documents and upgrade proposal documents. Unfortunately the SysAid tool places restrictions on process measurement. It can only measure SRs and not RFCs and thus the in-process definitions of lead time (for example process A01 has two different lead times) cannot be implemented. It means these must be monitored manually based on the SR reports.

There are also multiple other avenues of study open with regards to ICT process improvement within the company. ITIL offers a full service-oriented methodology of delivering value to the business through technology. This thesis only covered a small part of the whole delivery chain and the full value of it can only be realized if the rest of the ITIL framework is implemented. The next steps should be to look into service operations and implement proper incident and event management for these services. Also the change management efforts should be extended into other areas of both central IM services and business IM services. The central IM services that were considered for this work but dropped due to scope restrictions were centralized firewall services, collaboration services, centralized hosting services and anti-virus services.

Another venue of further development would be to investigate the feasibility and costs of implementing a comprehensive asset and configuration management in SysAid. According to OGC (2007a, 80) a key feature of ITIL is not only that all the procedures used in managing change are standardized across the organization, but that all implemented changes are recorded in the asset and configuration management system used by the organization. The SysAid tool already supports this (SysAid Features 2010), so the work would mainly involve creating an asset and configuration management strategy for the company: where would the asset or configuration information come from, how and who would be responsible for updating it, etc. Fläkt Woods already has other systems in place for this in a more limited scope (such as LANDesk for workstations and laptops), so the project should also look at the role of these systems in relation to SysAid. This would give better tools for the CAB to assess

the risks related to RFCs, not only within the context of the processes mapped and developed here, but in all implemented RFC processes.

Implementing the CobiT framework to govern the ITIL processes in Fläkt Woods is a possibility for a future development. Once the groundwork for ITIL has been laid through change and incident management and a good configuration and asset management system is in place, the focus should be shifted into the areas of service strategy, design and continual improvement. These areas require more business buy-in and in this CobiT can aid by helping to translate business goals into IT development goals.

9 SOURCES

9.1 Books

Addy, M. 2007. Effective IT Service Management: To ITIL and Beyond. Heidelberg: Springer.

Arlow, J., Neustadt, I. 2006. UML 2 and the Unfied Process, Second Edition: Practical Object Oriented Analysis and Design. Westford, MA: Addison-Wesley.

Laamanen, K. 2007. Johda liiketoimintaa prosessien verkkona – ideasta käytäntöön. 7.painos. Keuruu: Otava.

Jacka, M., Keller, P. 2002. Business Process Mapping: Improving Customer Satisfaction. New York: John Wiley & Sons Inc.

Office of Government Commerce 2007. The Official Introduction to the ITIL Service Lifecycle. London 2007.

Office of Government Commerce 2007. Service Transition. London 2007.

Office of Government Commerce 2007. Service Strategy. London 2007.

9.2 Online

Ambler, S. 2010. Introduction to UML 2 Activity Diagrams Printed on 16.11.2011. http://www.agilemodeling.com/artifacts/activityDiagram.htm

BPMN v2.0 2011. Object Management Group. Printed on 13.3.2011. http://www.omg.org/spec/BPMN/2.0/PDF/

CobiT 4.1 2007. IT Governance Institute. Printed on 2.11.2011. http://www.isaca.org/Knowledge-Center/cobit/Documents/CobiT_4.1.pdf

Marquis, H. 2006. COBIT and ITIL Printed on 17.5.2011. http://www.itsmsolutions.com/newsletters/DITYvol1iss1.htm

Oryx-editor: Web-based Graphical Business Process Editor 2009. Oryx. Online, printed on 16.11.2010. http://code.google.com/p/oryx-editor/

Russell, N., Allst, W.M.P, ter Hofstede, A.H.M & Wohed, P. 2006. On the Suitability of UML 2.0 Activity Diagrams for Business Process Modelling. Printed on 13.2.2010. http://crpit.com/confpapers/CRPITV53Russell.pdf. Volume 53 of CRPIT.

Request a cost proposal for SysAid 2011. SysAid. Printed on 17.11.2011. http://www.ilient.com/helpdesk-software-prices.htm

SysAid – About Us 2010. SysAid. Printed on 17.11.2011. http://www.sysaid.com/company.htm

SysAid Features 2010. SysAid. Printed on 17.11.2010. http://www.ilient.com/features.htm

SysAid ITIL Package Guide: Change Management, Problem Management and CMDB 2011. SysAid. Printed on 19.1.2011. http://lw5.ilient.com/down/ITIL%20Package.pdf

SysAid Upgrades & Updates 2011. SysAid. Printed on 17.11.2011. http://www.ilient.com/release-upgrades.htm

SysAid User Manual Release 7.0 2010. SysAid. 20.6.2010. Online, printed on 22.1.2011. http://www.ilient.com/down/SysAidUserManual.pdf

White, S. 2004. Workflow patterns with BPMN and UML. Printed on 14.2.2010. http://www.bpmn.org/Documents/Notations_and_Workflow_Patterns.pdf

Wohed, P., van der Aalst, W.M.P, Dumas, M., ter Hofstede, A.H.M. & Russel, N. 2006. On the Suitability of BPMN for Business Process Modelling. Printed on 9.1.2011. http://www.workflowpatterns.com/documentation/documents/BPMN-eval-BPM06.pdf

Womack, J., Jones, D. 2003. An outline of: Lean Thinking: Banish Waste and Create Wealth in Your Corporation. Printed on 3.7.2011. http://2ndbn5thmar.com/lean/Notes%20on%20Lean%20Thinking.pdf

9.3 Non-public

Beggerow, R. & Simcox, A. 2011. GII business IM manager interview. 6.3.2011.

Ellison, P. 2010. SysAid questions. Email. 24.8.2010.

Ellison, P. 2011a. Re: Fw: SysAid questions. Email. 27.1.2011.

Ellison, P. 2011b. Business IM Manager Interview. 2.2.2011.

Ellison, P. 2011c. FläktWoods Group Information Management Strategy 11.2.28.docx.

Ellison, P 2011d. RE: IMPORTANT! Questions regarding change management. Email, 19.7.2011.

Ellison, P 2011e. (no subject). Email. 21.10.2011.

Fläkt Woods 2009. IM Change Management Policy 1.0. 2.6.2009.

Fläkt Woods 2010. IM Council Guidelines. 13.12.2010.

Levy, W. 2011. Re: Regarding Service Request #333,651 Re: Your SysAid Enterprise Edition 30-Day Trial Ends Tomorrow! #333651. Email. 27.1.2011.

Lindell, H. 2010. Active Directory process draft 1 feedback interview. 25.3.2010.

Saarimaa, P. 2009. Designing infrastructure & services change and release management processes for a mid-sized international corporation. Liite A.

Sandell, L. 2009a. Email “Re: Ylempi AMK / MBA degree”. 16.04.2009.

Sandell, L. 2009b. Process discovery interview.

Scovazzi, L. & DallaMaria, G. 2010. Feedback on Active Directory process draft 1. Interview. 24.3.2010.