

Exploring an IT Service Change Management Process: A Case Study

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Abstract—IT service providers need effective methods for managing change requests and changes regarding provided IT services and the IT infrastructure. However, many IT service providers consider the implementation of a service-oriented change management process as a difficult task. This challenge has led us to examine the research problem: How to improve a change management process based on IT service management practices? The main contribution of this study is 1) to explore how an IT service provider organization in Finland has implemented a change management process, and 2) to identify what types of challenges are related to the transition process from traditional change management to service-oriented change management. Data for this study were collected by using a case study research method.

Keywords—change management; request for change; IT service

I. INTRODUCTION

Many IT service provider organizations are living under continuous change. Changes have effects on organizational structures, provided IT services, software products and systems, technologies, data networks, documentation and processes. A documented change management process plays an important role because changes need to be recorded, evaluated, authorized, prioritized, planned, tested, implemented, documented and reviewed in a controlled manner [1].

Improvement of change management is usually started from three main reasons. First, an organization may identify quality problems in change management activities, such as information on changes is never logged into the customer support tool, unauthorized changes are performed, or there is no defined process for handling changes that cause several different types of interpretations how changes can be handled. Second, a key customer may require that an IT provider should improve change management practices. Informing IT people on customer's requirements regarding change management is very effective way to motivate workers to follow change management procedures. Third, an organization may be interested in adopting a standard or a process framework that requires establishment or improvement of the documented change management process.

In this paper, we present results from a case study where the improvement of change management was triggered by the adoption of the ISO/IEC 20 000 service management

standard. The ISO/IEC 20 000 standard is aligned with IT Infrastructure Library best practices and consists of two parts: Part 1: Specification for service management (Shall requirements) [2], and Part 2: Code of practice for service management (Should requirements) [3].

IT organizations that aim to achieve ISO/IEC 20 00 shall very likely exploit the most widely used IT service management framework IT Infrastructure Library (ITIL) as guidelines in the process improvement work. ITIL is a collection of best practices for defining, designing, implementing, managing and monitoring IT services and IT service management processes [4]. ITIL defines service management as “the implementation and management of quality IT services that meet the needs of the business”. The service management section of the ITIL version 2 consists of two parts: Service Delivery and Service Support (including change management). In the ITIL version 3, change management is part of the Service Transition publication [1]. The main objective of the change management process is to ensure that standardised methods and procedures are used for efficient and prompt handling of all changes [5].

A. Related work

Much has been written about software maintenance and managing changes and defects. In the software engineering literature, change management is mainly focused on tracking changes to the technical artifacts (software components) [6]. Information on a change is captured by a software change order. Service-oriented change management covers both changes to technical configuration items (servers, desktops, software components) and changes to services and the service infrastructure. Lientz and Swanson [7] categorize software maintenance into four categories: adaptive, perfective, corrective and preventive.

Change management seems to be related to all of those four perspectives covering changes in the software environment, changes due to new user requirements, changes due to fixing errors, and changes that are made to prevent problems in the future. Implementation of changes as corrective actions can be seen as one way to prevent defects [8]. Requests for change are typical outputs from problem management and defect management process [9]. Bennett [10] states that

when software enters the servicing (software maturity) stage, only small tactical changes (patches, code changes) are possible. Wallmueller [11] considers change management activities as a subgroup of configuration management. He states that configuration control phase includes inputting change requests into the development process, controlling the processing of changes and tracing the changes to their closure.

Within service science and services computing, IT change management is part of the services operation phase in the services lifecycle [12]. There is a wide number of IT service management studies. Hochstein, Zarnekow and Brenner [13] have studied ITIL as a common-practice reference model in three case studies. Tan, Cater-Steel and Toleman [14] have identified six success factors in ITIL implementations: senior management support, project champion, relationships with tool vendors, change in corporate culture, project governance and execution and realisation of benefits. Additionally, Lahtela, Jäntti and Kaukola [15] have explored implementing an ITIL-based IT service management measurement system.

Pollard and Cater-Steel [16] report four interesting challenges in ITIL implementation: People do not understand that one person can hold many ITIL roles (hats), engaging the right people to make changes, gaining support from technical staff and measuring the ROI of ITIL implementation. Kapella [17] has presented a framework for incident management and problem management where known errors from problem management process should be implemented via change management process. Niessink and van Vliet have explored software maintenance from a service perspective [18] and reported that IT support organizations seem to have problems in the interface between incident management and problem management. Duffy and Denison [19] have presented a conceptual model of ITIL impacts on IT services.

Surprisingly few studies have dealt with IT service change management. Wickboldt et al. have studied IT change management from the risk analysis viewpoint [20]. They report that all requests for change must be submitted to the Change Advisory Board (CAB) to be analyzed, approved, and scheduled. We propose that a change manager should be able to preview low impact RFCs and authorize them instead of a formal CAB meeting in order to make handling the change more effective.

The ITIL change management process consists of the following activities (see Fig. 1). An organization must define separate procedures for handling standard changes and urgent (emergency) changes.

Change management is also clearly visible in the Control Objectives for IT and Related Technology (COBIT) framework. Manage Changes is one of the Acquire and Implement (AI) processes [21].

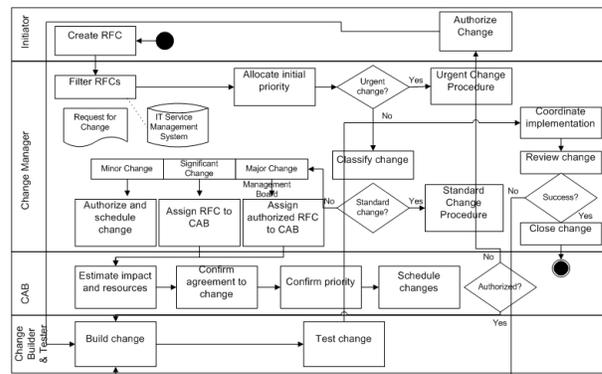


Figure 1. The change management process (adapted from [5])

B. Our Contribution

Surprisingly few studies have dealt with change management from IT service management perspective. This case study belongs to the results of KISMET (Keys to IT Service Management and Effective Transition of Services) research project at the University of Eastern Finland. A part of the research work was conducted during our previous research project MaISSI (Managing IT Services and Service Implementation) research project. The main contribution of this paper is to

- to explore how an IT service provider organization from healthcare domain in Finland has implemented a change management process, and
- to identify what types of challenges are related to the change management.

The results of this study are valuable for IT service provider organizations that are planning to implement IT service change management process or improve existing change management activities. The remainder of the paper is organized as follows. In Section II the research problem and research methods of this study are described. In Section III, we explore the change management process of the case organization. Section IV is the analysis. Finally, the discussion and the conclusions are given in Section V.

II. RESEARCH QUESTIONS & METHODOLOGY

A case study research method was used to answer the research problem: How to improve a change management process based on IT service management practices? Benbasat and Goldstein [22] report that a case study research is a viable research strategy to answer “how” and “why” research questions. According to Yin [23] a case study is “an empirical inquiry that investigates a contemporary phenomenon within its real-life context”. Additionally, a case study is defined as “a research strategy which focuses on understanding the dynamics present with single settings” [24]. The case study method was used to explore the current

state of change management process in the case organization and to identify process-related challenges.

The case study design included the following questions that were monitored during the study:

- How requests for change (RFCs) are handled?
- How the initial review of RFCs has been organized?
- How changes are approved for implementation?
- How changes are planned?
- How changes are implemented?
- How changes are monitored or handled after the implementation?
- What types of challenges are related to change management?

A. Case Organization and Data Collection Methods

The case organization is one of the KISMET research project's industrial partners. KISMET research team aims to help IT service providers in the adoption of IT service management methods and processes. Figure 2 describes the context of this study.

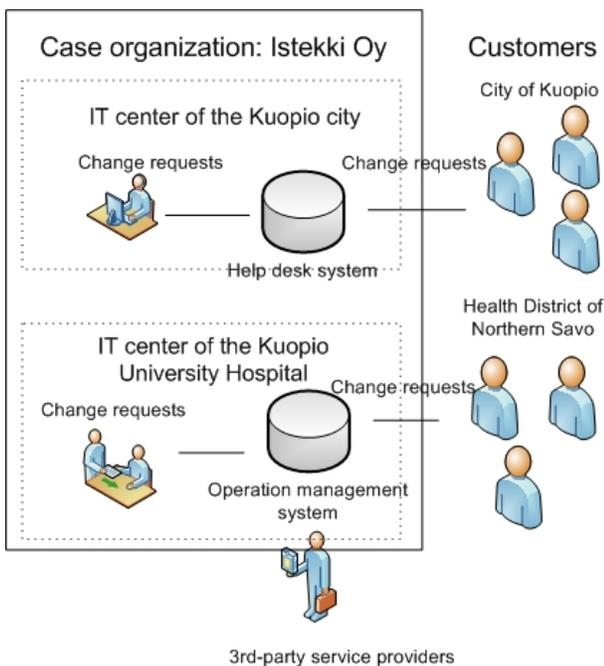


Figure 2. The case study context

Our case organization Istekki is an IT service provider company with 160 employees. Istekki provides IT and medical technology services to the city of Kuopio and Hospital District of Northern Savo. The case organization started ISO 20000 project around two years ago. The following data collection methods were used in the study:

- Participative observation
 - June 30, 2009: a meeting with a customer support tool development team

- August 25, 2009: a 'support process' training session in the case organized by a research team
- September 15, 2009: a change management meeting (incident, problem and change manager, business area manager)
- July 29 - August 12, 2010: theme interviews with 10 persons
- A case study writeup
- Internal documentation (a project plan of the standardization project, a system specification of the customer support tool)

Theme interviews were the main data collection method in this study. The following interview questions were selected with a customer manager and a change manager: what is the current state of change management, what types of challenges are related to change management, which metrics are used within change management process, are you familiar with ISO 20000 standard and ITIL framework? Interviewees (two per unit) were selected randomly from the following units: service desk, application support services, on site support services and IT technology services.

B. Data Analysis Method

In data analysis, we used a within-case analysis method that examines a case carefully as a stand-alone entity [24]. Interviews were recorded and the most important findings were stored in an Excel file. After the interview phase, results were analyzed and reported as a case study writeup by a computer science student. The case study database was created to ensure the traceability between data sources, meetings and findings. The case study database included memos from meetings with a case organization.

III. IT SERVICE CHANGE MANAGEMENT PROCESS

The main goal of this study was to explore the change management process in the case organization and identify the challenges regarding the current state of the process and the challenges related to the transition from traditional change management to service oriented change management.

A. Change Request Procedures

There are different types of change requests in different units. Interviewees had received change requests related to software, hardware, procedures and instructions. They had received change requests from service desk, customers, boss, colleagues, from their own working unit or they had identified a change target by themselves. Change requests usually come by phone, email or ticket systems (operational management system or help desk system). Many answers indicated that requests from customers would go through a service desk that assigns the requests to specialist teams if necessary. However, it is very common that customers contact specialists directly. There are different procedures

for recording change requests because there are no unified instructions. Change requests are recorded in ticket systems, in personal documents and some requests are not recorded at all.

Additionally, the quality of change recording varies a lot in the case organization. A part of the change requests include a very detailed description of a change while other change requests are written in a very general level. The quality of recording depends on the size of the change. Large changes are recorded more detailed than small changes.

B. Initial Assessment of Requests for Change

According to case study observations, RFCs are not classified systematically in the initial assessment phase. The classification is often based on the persons' own interpretations. Several interviewees felt that they do not have instructions how to classify RFCs and how they should react to certain types of changes. Although there is no systematic classification, the reaction time to problems in the customers' critical information systems is shorter than other problems. In some cases, a manager had defined which change requests are urgent.

The service desk tool includes some classification rules for change impact: makes user's work difficult, user cannot continue work, major incident. In case of an urgent change the reaction time is shorter and there will be more resources to solve this kind of changes. When an urgent change is needed, the RFC will not receive detailed assessment but a change is implemented as soon as possible. Small changes can be implemented quite freely. Thus, the person who implements the change is also responsible for the change. The scope of the change defines how detailed impact analysis is carried out for the RFC. For major changes one can estimate costs, service downtime, resources and risks. Change impact is often estimated with colleagues or with own team which results in a better overview of the issue.

C. Change Approval

The type of the RFC defines who is able to approve the change. Change approval can be made by a customer, a customer and a specialist together, a system main user, a service manager, own team, own manager, information system manager, a specialist or an RFC initiator. Information on the decision whether the change is accepted is usually not recorded in the service management system. Decision is typically informed by email or by phone. In some cases, all stakeholders had not received information. If the RFC is rejected, the decision is often not recorded but the initiator of RFC is informed. If the RFC is recorded in the service desk tool, the rejected RFC shall be closed and the reason for rejection can be added to the RFC record. Interviewees hoped that decision making on change approval should be flexible enough in order to avoid unnecessary waiting.

D. Planning of Change Implementation

Several interviewees stated that planning of the change implementation is carried out carefully but there are challenges in documenting. For large changes, detailed planning of implementation is carried out including resources, schedule, implementation method, implementation steps and effects. There are no templates for plans. Thus, their structure and content varies between teams. Implementation plans are located in email, shared folders or in own documents. There is no agreed place for planning documentation archives.

Implementation plans are not created for small changes. Some interviewees felt that in some cases it is waste of time to log changes to the system. However, other interviewees thought that planning should be detailed and it would be good to document also the small changes. It was noted that every person who is responsible for change implementation should take account in the backup and restoration plan in planning the implementation. Backup and restoration plans are typically not recorded anywhere or plans exist in the private folders.

E. Implementation of Change

Interview results indicate that there are several different methods to implement changes. Many interviewees stated that information on implemented changes is located in different places: personal documents, email messages, back office systems (for example, a hardware register), operation management tools, web sites and program code. There is no unified procedure how and where information on change implementations should be recorded. Bigger changes include a short description what was done and when. If necessary, information on a change is sent to appropriate stakeholders.

F. Post-Implementation Monitoring

The level of post-implementation monitoring of change depends on the type of the change and how active is the person who implemented the change. Quite often, there is no time for monitoring or monitoring is not possible. In these cases, post-implementation monitoring means that a customer contacts when a problem occurs.

After major changes the situation is strictly monitored and controlled and if necessary one can add resources. In case of a bigger change, a service can be monitored by technical monitoring tools. In some cases, IT provider can review the change with a customer whether a change has been successfully implemented. If the change had unexpected effects, the service can be restored to the initial state. In all cases, the restoration cannot be done. Large, failed changes should be reported to a manager level.

IV. ANALYSIS

Based on the case study results, the following strengths were identified regarding the case organization's change management process:

- There is a change manager role with documented responsibilities
- A description of the change management process exists
- Change management and maintenance work is carried out carefully by specialists
- There are two tools that support recording RFCs and change details in a basic level
- There are defined workflows for different types of changes: small changes, emergency changes, major changes and development ideas.
- There is a list of planned metrics for change management.

In contrast to strengths, the following key challenges can be identified in the case organization's change management:

- Lack of unified change management methods
- Lack of centralized point for change requests
- Poor documentation of how to record changes
- Lack of resources (more time should be allocated to improvement of the change management procedures)
- The service desk tool does not provide enough support for change management at the moment
- The issues defined in the theoretical process description are not applied in practice
- Knowledge sharing problems on planned or implemented changes
- Change requests come as a surprise which causes challenges for resource planning.
- It is difficult to identify the connection between a new incident and a recently made change.
- Sometimes IT people have to carry out changes that are not well planned.
- Unclear responsibilities of change management.
- The organization has two locations and two business areas which causes challenges in decision making regarding changes.

Many answers indicated that maintenance and change work is carried out carefully and in a professional way in the case organization. Additionally, the service desk tools support recording service requests and part of the RFCs are logged into the tools. The organization has planned and documented a change management process based on ISO 20 000 and ITIL concepts. The process description includes a description of the change management goals, roles, responsibilities, activities, the lifecycle of the change (with change status options), the content of the change record, process metrics and process relationships to other ISO 20 000 processes. The organization has a change manager that is responsible for improving the process. However, the introduction of the process in the practice seems to be a big challenge in the near future. According to our observations, a change advisory board has been in a pilot use for some products.

The major challenges are related to guidance how changes should be recorded, classified and documented. There are people who do not understand the difference between service requests and change requests. This is clearly a challenge that is related to the transition process from traditional change management to service-oriented change management. Thus, these support requests are handled in the same way although they have different workflows. The process description has been made in one organizational unit and it does not address well the needs of another unit. Knowledge sharing problems on planned or implemented changes refers to the point that all the RFC/change-related information should be stored in the service desk tool instead of private files to improve the data availability. According to some interviewees, the tool does not support the change management enough, for example, in producing measurement reports.

Besides identified challenges, this study resulted in several useful process improvement suggestions. More resources should be allocated for improving change management procedures. More attention should be placed in informing IT people of change management practices and responsibilities and the existence of a process description. Informing could be done, for example, in weekly team meetings. The change management process description should be updated in the cooperation between representatives from both organizational units. Perhaps, in the future, they could have only one tool for managing changes. If the business domains of two units are very different, two or more change managers might be needed.

V. DISCUSSION AND CONCLUSION

This study aimed to answer the following research problem: How to improve a change management process based on IT service management practices? The main contribution of this study was to present 1) to explore how an IT service provider organization in Finland has implemented a change management process, and 2) to identify what types of challenges are related to change management. Data for this study were collected using a case study method.

First, we described the change management practices of the case organization. We focused on exploring change request procedures, initial assessment of requests for change, change approval, planning of change implementation, implementation of change, and post-implementation. Second, we presented challenges related to change management. Key challenges were related to lack of instructions how to record and classify RFCs, lack of unified change management methods, poor understanding of the difference between service requests and change requests, and knowledge sharing of change-related information.

There are several limitations to this study. First, data were collected from one IT service provider organization by using qualitative research methods such as interviews. More IT people, process managers and customers could

have been interviewed. Second, the case organization was not randomly selected but selected from the partner pool of the MaISSI project. Thus, the selection method was the convenience sampling method. Third, the case study does not allow us to generalize our research results. However, we can use our results to expand the theory of IT service change management. Further research is needed to examine introduction of change management tools, processes and methods in IT service companies.

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REFERENCES

- [1] Office of Government Commerce, *ITIL Service Transition*. The Stationary Office, UK, 2007.
- [2] ISO/IEC 20000, *IT Service Management, Part 1: Specification for service management*. ISO/IEC JTC1/SC7 Secretariat, 2005.
- [3] ISO/IEC 20000b, *IT Service Management, Part 2: Code of practice for service management*. ISO/IEC JTC1/SC7 Secretariat, 2005.
- [4] Office of Government Commerce, *ITIL Service Operation*. The Stationary Office, UK, 2007.
- [5] OGC, *ITIL Service Support*. The Stationary Office, UK, 2002.
- [6] W. Royce, *Software Project Management: A Unified Framework*. Addison-Wesley, 1998.
- [7] B. P. Lientz and E. B. Swanson, *Software Maintenance Management*. Boston, MA, USA: Addison-Wesley Longman Publishing Co., Inc., 1980.
- [8] R. G. Mays, C. L. Jones, G. J. Holloway, and D. P. Studinski, "Experiences with defect prevention," *IBM Syst. J.*, vol. 29, no. 1, pp. 4–32, 1990.
- [9] Quality Assurance Institute, "A software defect management process," Research Report number 8, 1995.
- [10] K. H. Bennett and V. T. Rajlich, "Software maintenance and evolution: a roadmap," in *ICSE '00: Proceedings of the Conference on The Future of Software Engineering*. New York, NY, USA: ACM Press, 2000, pp. 73–87.
- [11] E. Wallmueller, *Software quality assurance: A practical approach*. Prentice Hall International, 1994.
- [12] L.-J. Zhang, J. Zhang, and H. Cai, *Services Computing*. Tsinghua University Press, Beijing and Springer-Verlag GmbH Berlin Heidelberg, 2007.
- [13] A. Hochstein, R. Zarnkow, and W. Brenner, "Itil as common practice reference model for it service management: Formal assessment and implications for practice," in *EEE '05: Proceedings of the 2005 IEEE International Conference on e-Technology, e-Commerce and e-Service (EEE'05) on e-Technology, e-Commerce and e-Service*. Washington, DC, USA: IEEE Computer Society, 2005, pp. 704–710.
- [14] W.-G. Tan, A. Cater-Steel, and M. Toleman, "Implementing it service management: A case study focussing on critical success factors," *Journal of Computer Information Systems*, vol. 50, no. 2, 2009.
- [15] A. Lahtela, M. Jäntti, and J. Kaukola, "Implementing an itil-based it service management measurement system," in *Proceedings of the 4th International Conference on Digital Society*. St. Maarten, Netherlands Antilles: IEEE Computer Society, February 2010, pp. 249–254.
- [16] C. Pollard and A. Cater-Steel, "Justifications, strategies, and critical success factors in successful itil implementations in u.s. and australian companies: An exploratory study," *Information Systems Management*, vol. 26, no. 2, pp. 164–175, 2009.
- [17] V. Kapella, "A framework for incident and problem management," International Network Services whitepaper, 2003.
- [18] F. Niessink and H. van Vliet, "Software maintenance from a service perspective," *Journal of Software Maintenance*, vol. 12, no. 2, pp. 103–120, March/April 2000.
- [19] K. Duffy and B. Denison, "Using itil to improve it services," in *AMCIS08: Proceedings of the Fourteenth American Conference on Information Systems 2008*. Toronto, Canada: Association for Information Systems, 2008.
- [20] J. A. Wickboldt, G. S. Machado, W. L. da Costa Cordeiro, R. C. Lunardi, A. D. dos Santos, F. G. Andreis, C. B. Both, L. Z. Granville, L. P. Gaspary, C. Bartolini, and D. Trastour, "A solution to support risk analysis on it change management," in *IM'09: Proceedings of the 11th IFIP/IEEE international conference on Symposium on Integrated Network Management*. Piscataway, NJ, USA: IEEE Press, 2009, pp. 445–452.
- [21] COBIT 4.1, *Control Objectives for Information and related Technology: COBIT 4.1*. IT Governance Institute, 2007.
- [22] I. Benbasat, D. K. Goldstein, and M. Mead, "The case research strategy in studies of information systems," *MIS Q.*, vol. 11, no. 3, pp. 369–386, 1987.
- [23] R. Yin, *Case Study Research: Design and Methods*. Beverly Hills, CA: Sage Publishing, 1994.
- [24] K. Eisenhardt, "Building theories from case study research," *Academy of Management Review*, vol. 14, pp. 532–550, 1989.