Challenges and Problems in Release Management Process: A Case Study

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***Abstract*—The IT Infrastructure Library (ITIL) is the most widely used IT service management framework and a de facto standard. ITIL provides instructions for IT service providers and organizations how to design, manage and support IT services. However, adopting best practices of ITIL can be difficult for many IT companies. The main contribution of this paper is to present challenges and problems that were identified during a case study focusing on improvement of the release management process. Key challenges included the lack of process description, too high release distribution rate, and poor traceability between incident records and release records.**

***Keywords*—IT Service Management; ITIL; Release Management.**

I. Introduction

Release management includes people, functions, systems and activities to plan, package, build, test and deploy software and hardware releases effectively into production [1]. The goal is to deploy release packages into target environments (test environments or production environments) successfully and on schedule. In the current IT world, release management is very challenging due to high volume of release packages, a large number of customers with different environments and needs, and demanding service availability requirements.

In many IT companies, the *release management process* is performed as an ad hoc process without a defined process description. Although there are process frameworks (ITIL, ISO 20 000, and COBIT) available to support the establishment of the release management process, implementing a process in practice is difficult.

Release management plays an important role in the *IT service management*. The IT service management is the discipline that strives to better the alignment of IT efforts to business needs and to manage the efficient providing of IT services with guaranteed quality [2]. The *IT Infrastructure Library* (ITIL) is the most widely used framework for IT service management. It has reached a status of a de facto standard. The service support processes of ITIL are represented in Figure 1 and it shows how they work in practice. In the ITIL version 2 they are incident management, problem management, change management, configuration management, and release management.

First, software releases are needed to implement solutions to incidents and problems as bug fixes. Incidents are reported to the service desk by customers and users and they may address a potential software or hardware problem. According to the ITIL, a *problem* is "an unknown cause of one or more incidents" [1]. A CMU report defines a software problem in turn as "a human encounter with software that causes difficulty, doubt, or uncertainty in the use or examination of the software" [3]. Second, software releases are needed to implement the changes that add new features to the systems. The application management [4] or product development teams are typically responsible for building, testing, and deploying the release packages. In practice, it is difficult to separate change management and release management processes from each other [5].

Previous studies on release management have dealt with outlining a model of the release management process [6], discussed how release management can be applied for component-based software [7], studied the implementation of release management together with change management in the context of air traffic control system [8], examined release management practices in service development within a web service project [9], and proposed an economic model for software release decisions [10]. Additionally, release management has been examined from patch management perspective [11]. Patch management can be seen as a part of the release management. However, above mentioned studies do not provide an adequate view on the challenges that may arise in performing the release management for IT services.

A. Our Contribution

This paper is a part of the results of KISMET (Keys to IT Service Management and Effective Transition of Services) project and MaISSI (Managing IT Services and Service Implementation) project at the School of Computing, University of Eastern Finland, Finland. The KISMET project focuses on improving IT service transition processes (change management, configuration management and release management) while the emphasis of MaISSI project work was in the service support (service desk, incident management and problem management). Both of the projects are funded by the Finnish Funding Agency for Technology and Innovation (TEKES), the European Regional Development Fund (ERDF) and industrial partners.

The work in our research projects are divided into pilot

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projects and the pilot for improving the release management process was one of the pilot projects. The main contribution of this paper, based on the pilot, is to describe the identified challenges and problems in the release management process and propose solutions to these identified challenges.

II. Research Questions and Methods

The research problem of this study is:

- What kind of challenges and problems exists in performing the release management process?

The research problem was addressed by the application service manager of the case organization. In this study, both case study research methods [12] and action research methods [13] were used to answer the research problem.

A. Case Organization

Our case organization for this pilot is a medium size business unit with around 100 employees providing high quality IT services for its customers. The IT service management staff of the case organization reported that the release management process was not effective enough and there were some problems and challenges within the process. Therefore, improvement of the release management process was considered as a very important improvement target in the case organization and was selected to one of the main topics for the pilot project.

IT service support processes are part of the case organization's ITIL-based business framework. Figure 1 shows how the IT service support processes of the framework work in generally. Service desk in the first-line support acts as a *single point of contact* (SPOC) for customers and users. The service desk assigns the incident to the second-line support which in turn assigns the case to the third-line support, if necessary. When the incident is resolved and closed, the release management implements a release and sends it to the customer. All these processes are connected to configuration management that handles all configuration items (CIs) and records them in the configuration management database (CMDB).

The pilot project between the research team and the case organization was carried out in the years 2009-2010. The main goal of the pilot project was to identify the challenges and problems from the case organization's ITIL-based release management process and propose solutions to these challenges.

III. Challenges and Problems in Release Management Process

The pilot research team identified the following challenges and problems in the case organization's release management process during the pilot project:

1) **There is no specified release management process.**
   The process is performed in various ways between products and different customers.
2) **The release manager role is unclear.**
   Nobody knows who the release manager is because there isn't any specified release manager.
3) **The customer doesn't know what the release contains.**

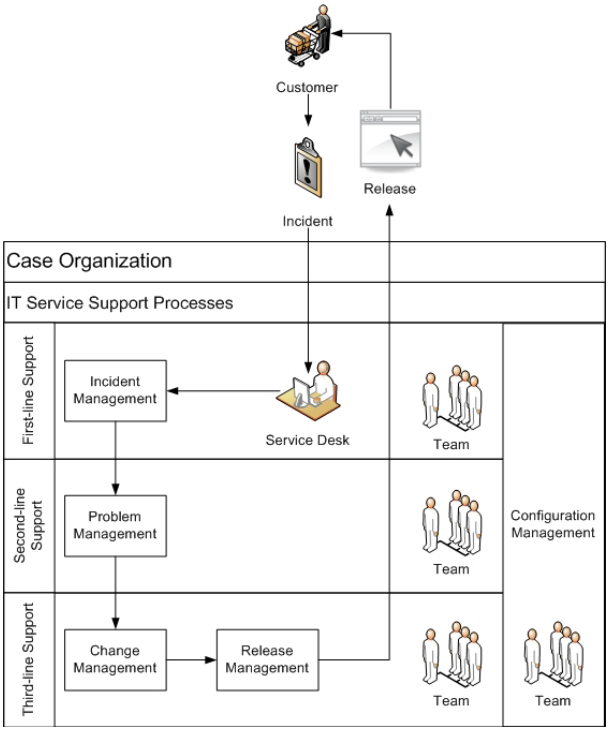

Figure 1. IT service support processes of the case organization.

The release note, that is send with the release to the customer is usually incomplete. The note doesn't describe very well what has been fixed with the release.

4) **The release distribution rate is too high.**
   Customers receive too many release packages per week.
5) **The customer thinks that the service provider can't test or inspect all the test cases.**
   The release testing is done with hurry and with scarce resources.
6) **There should be more test environments in test process.**
   The lack of test environments creates bugs in releases.
7) **The change management of test environments is insufficient.**
   Documentation related to test environments (for example, implemented changes) are poorly updated.
8) **Problems in version management.**
   There seems to be no detailed information on the versions that different customers have.
9) **The case organization does not have any specified "release jury".**
   Releases are installed to the production environment too easily without a proper inspection between the service provider and the customer.

A. Proposed Solutions

The pilot research team proposed solutions for the identified challenges and problems in the case organization:

1) **There is no specified release management process.**

The release management process should be described and streamlined to assure that everyone in the case organization knows the process. The ITIL-based release management process, which the pilot research team created for the case organization, is presented in Figure 2. The process is explained later in the paper.

2) **The release manager role is unclear.**
Someone should be named for the role of release manager. Additionally, the role's assignments and responsibilities should be described.
3) **The customer doesn't know what the release contains.**
The link between fixed incidents that the release will erase and incidents that the customer has created should be described exactly in the release note that is sent with the release to the customer. The release note should be written so that the customer understands it (with customer's "own language").
4) **The release distribution rate is too high.**
The release windows, which decide the time when the release should be installed to the customer's production environment, should be agreed between the service provider and the customer, for example big releases monthly and smaller releases weekly.
5) **The customer thinks that the service provider can't test or inspect all the test cases.**
The test process, which is partly done inside the release management process, should be developed. The process should be described and taught to product testers. Additionally, the test results should be introduced to the customer. The test process is presented in Figure 3.
6) **There should be more test environments in test process.**
The need of more test environments should be investigated. The ideal situation is that for every production environment there would be an identical test environment. In practice, this is quite impossible because there are so many different customers with different products and versions.
7) **The change management of test environments is insufficient.**
Every change, that is done to a particular test environment, should be documented properly. In this way, all changes are traceable and up to date.
8) **Problems in version management.**
All the versions of different products should be documented to a customer-specific list, which tells to the service provider the installed production versions that the customer has.
9) **The case organization does not have any specified "release jury".**
There is a need for a specific jury that inspect releases before they are installed into production. The "release jury" consists of the members who are connected to the release management process (at least the release manager, the change manager and the customer).

The description of the release management process in Figure 2 is based on the ITIL-framework [14]. At the top of the process is the release manager who is responsible for the process and the process is closely connected to change management, service level management and configuration management. Change management is usually the place where the need for a building a release is identified and decided. Especially the *Change Management Board* (CAB) has an important role for the release management. It will, for example decide on what the release should include. The service level management includes the *Service Level Agreements* (SLA) that the service provider and the customer have agreed. The SLA defines the dates for release windows and informs the service provider and the customer when releases are installed to production. The configuration management is the place where all the data, components, CIs and versions for the release management process are stored (Configuration Management Database, CMDB and Definitive Media Library, DML).

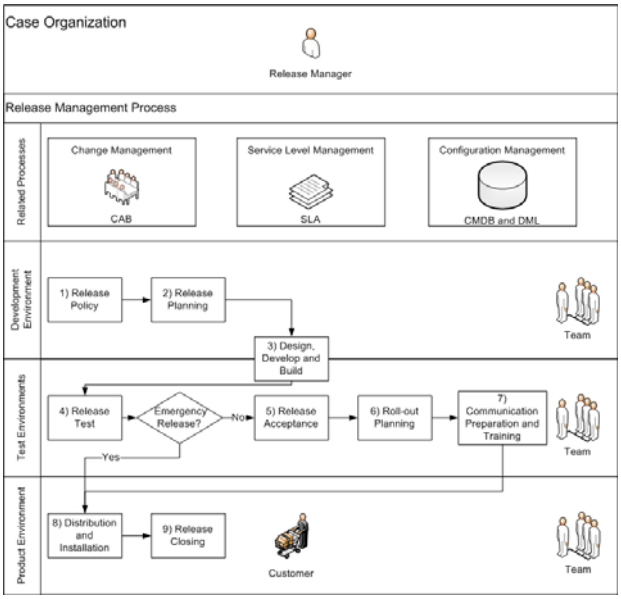

Figure 2. Release management process.

The release management process itself consists from nine different parts:

1) Release Policy
2) Release Planning
3) Design, Develop and Build
4) Release Test
5) Release Acceptance
6) Roll-out Planning
7) Communication Preparation and Training
8) Distribution and Installation
9) Release Closing

The release policy defines the methods how the release will be build, configured, and installed into the production environment. It will also tell how the release should be numbered, named and who are responsible for the release.

After the release policy is defined, the release planning is started ending to the release building phase where the release is bundled up from different components. After the release has been built, it will be tested as in Figure 3, which introduces how the release test is done during the release management process and who are responsible for it. The basic idea of the release test is that the whole release and its test cases are tested and inspected properly. The release test is accepted by the customer and the test manager.

After the testing phase the decision is made whether the release will be implemented as an emergency release or not. If the release is an emergency release, it will be implemented directly into the customer's production environment and the release is closed. Otherwise, the release has to be accepted by the release manager, by the change manager, and by the customer (release jury). If the release is accepted, the roll-out of the release has to be planned together with the service provider and the customer. The roll-out planning includes timetables and plan of actions for the release installation. Finally, trainings have to be organized before the release is installed to the customer's production environment and the release is closed.

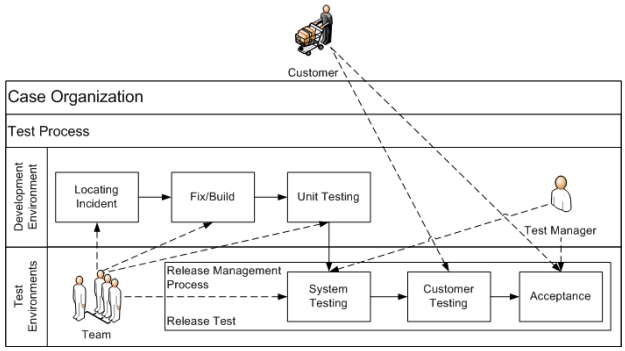

Figure 3. Test process.

IV. Conclusion

This study aimed to answer the research problem: What kind of challenges and problems exists in performing the release management process? Both case study research methods and action research methods were applied for a single case: a medium size business unit providing high quality IT services.

The main contribution of this study was to present nine most important challenges regarding the release management process identified during a case study. Additionally, we introduced solutions to these challenges by providing practical guidelines how to implement an ITIL-based release management process and how it should be performed. A well defined release management process shall increase the quality of the release planning, building, testing, and deployment activities and shall likely reduce the number of the incidents and problems occurred after installation into the customer's production environment. We have received very positive feedback on the case study from the case organization. They have also started the implementation of the proposed solutions.

However, there are some limitations to this study. The study was carried out in one business unit of the case organization. The data were collected from a few employees in the case organization. More interviews and discussions with the product development staff responsible for release building should have been carried out. Further work could focus on examining release management challenges in other IT service provider organizations or IT departments of IT customer organizations.

Acknowledgment

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