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Orchestration of Service Design and Service Transition

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***Abstract*—Standardized service management processes and organizations allow the implementation of changes to service offerings as part of an integrated and ISO 20.000 certified service management system. Two different models for the process-based orchestration of changes to services are presented addressing the Service Design and Service Transition phases of ITIL V3. The models are evaluated in a real life scenario and discussed in the context of a medium-sized company.**

I. Introduction

EVERY company offering services as their main product depends on a working set of business processes for the service management discipline – especially in the case of highly automated services.

A common framework to address the challenges of (IT) service management is available as IT Infrastructure Library (ITIL, [1], [2]) and since late 2005 it is possible to certify the management of IT services (i.e. the organization and its service management processes) according to the international standard ISO 20.000 [3]. In that way organizations ensure that all service management processes defined in the ITIL "good practice" framework are implemented. In addition to the well-known Service Operations processes this certification also requires a working implementation of the service management processes for the complete service lifecycle: Service Strategy, Continual Service Improvement, Service Design and Service Transition.

However, the detailed business process design needs to be developed by each organization. The individual processes vary vastly in the complexity of their respective tasks, e. g. repetitive well-structured processes (incident and event management) or highly creative tasks (e. g. the design of new services or major service changes). The safe and timely implementation of service changes is increasingly becoming a vital part of the service offering (and also a significant expense). This emphasizes the importance of the Service Design and Service Transition processes. Each service change includes not only technical changes but may also introduce changes to the supporting service operations processes and the work of the specialists involved.

In this paper we describe and evaluate two different models for the orchestration of changes to services. In sections II and III we describe each of the two implementations of the service design and service transition phases [4] of ITIL V3 as used in a ISO 20.000 certified service management system at Toll Collect GmbH. Since the initial implementation in 2007 we have gathered experience with more than 1000 service changes allowing us to compare and evaluate both models using a case study approach [20] given in section IV.

Toll Collect GmbH provides the business services for the German electronic toll for heavy trucks involving more than 50 IT services ranging from standard IT applications (e.g. central billing processes, customer relationship management, and document management) to highly service-specific customer processes. The major IT services involve a 24 by 7 setup in a fault tolerant environment consisting of several hundred servers communicating with more than 650.000 units in the field. Regular updates due to changes in the road network are modelled and transferred via GSM networks. Overall the Toll Collect system is the 11th largest federal income source and collected 4.6 billion € in 2010 [5] at an overall quality level of better than 99.75% accuracy.

A. Changing the Service

In the Toll Collect example the overall service is in one sense almost static (i. e. the collection of the German truck toll) yet many minor and some large changes have been incorporated into the system over the last years.

These *service changes* were implemented according to the established service management processes in an ISO 20.000 certified environment. Since the initial certification in 2007 more than 10 major releases, 1.000 medium sized service changes and more than 10.000 minor changes have been deployed, including completely new systems and requirements, updates to all parts of the technology stack and some bugfixes.

Since *changing the service* is in practice a daily recurring task it should not be necessary to implement it as a standalone project but rather according to a pre-defined process covering the service design and service transition phases of ITIL V3.

B. Service Design and Service Transition

The service design phase covers all aspects of new or changed services: portfolio, architecture, processes and metrics [4], [7]. In technology-driven services it interfaces between the software development and the service operations processes via the service transition phase.

Major service changes typically have many properties of a project (e. g. involving a large number of people for a limited amount of time a unique and singular purpose, [6]) and are therefore typically organized as projects. However, within the service management processes themselves every service change triggers similar questions:

- does the scope of the processes change?
- should the staffing for the processes be changed?
- are there new requirements for data handling (e.g. concerning the configuration management database or service catalogue [10])?
- is the basic information complete (e.g. concerning the change advisory board, additional incident escalation rules, etc.)?
- are there changes to the processes' input or output?

In the Toll Collect example these questions are summarized in process-specific checklists – sufficient to handle medium-sized service changes without the involvement of the process specialists. However, large-scale service changes (releases) and some medium sized service changes will usually cover topics that can only be resolved by the process specialists, e. g. adapting the service catalogue in accordance to the configuration management database [9] or changing the underlying sourcing contracts [10], [11], [12]. Especially highly standardized processes (e. g. incident management) need to be adjusted in the case of service changes.

Designing the service management processes for the Toll Collect system first lead to two major choices:

- how to handle process changes resulting from service changes
- how to organize service changes to assure safe, timely and complete implementation.

With respect to possible process changes there are basically three distinct possibilities:

1) Process changes as projects

Any change to the existing service management processes is handled as a (independent) project, completely external to the service management processes and organization. This approach leverages the strengths of project management [6].

2) Process change as process

Since changes to existing processes are frequently occurring tasks in many quality management systems the implementation of process changes is in a strict sense rather a process in its own right than a series of independent projects. Both ITIL V3 and ISO 20.000 propose the implementation of a process dedicated to the improvement of the service management system (continual service improvement, [4],[7]) based on well-established quality management principles (e. g. the Deming-cycle [13], [14]).

3) Process change as integral part of all processes

In addition to the classical quality management approach towards service improvements it is possible to separate changes to a process from mere "configuration" of the process due to changes in the services supported. To facilitate this distinction we choose to enhance each service management process to encompass a dedicated part for the service design and the service transition phase (see fig. 1).

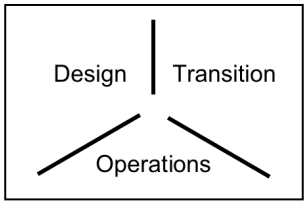

Figure 1: Process design includes tasks for every service management phase

Accordingly changing the service becomes a common task within each process – albeit a specialist's task.

Implementing the design and transition phase within each service management process has the advantage of keeping the process' responsibility in a single place – comparable to the proper design of classes in object oriented programming [15]. Overall the ISO 20.000 compliant service management process model consists (in the given example) of 17 processes. Each process is focused to have a single responsibility and the ability to perform all tasks required to fulfil the responsibility (e. g. by collaborating with other processes by pre-defined interfaces).

The orchestration of all processes and their respective activities within the service design and transition phases remains as the challenge in the design of a viable service management process model. In the example we decided against the implementation of cascaded interfaces, i.e. we do not treat service changes as "torch relay". In the Toll Collect example two different orchestration models have been implemented subsequently within the ISO 20.000 certified service management system.

The following two sections give a description of the two orchestration models followed by a section evaluating the benefits and strengths of each model.

II. Hub-and-Spoke Model

The model first implemented establishes two central hubs– one responsible for the service design phase, the other responsible for the service transition phase (see fig. 2).

The overall control of the service design phase resides with the service management process. It creates the design of the service change and delegates possible process changes and the configuration of the service management processes to each process via the service design hub.

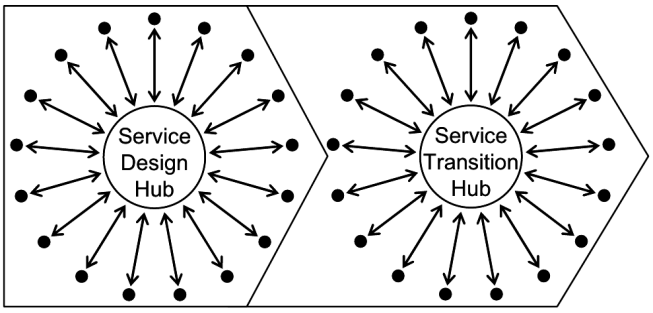

Figure 2: Hub-and-spoke model with dedicated process hubs for the orchestration of the service design and service transition phase

In practice most tasks regarding the service management processes can be resolved within a single process (e. g. enhancing the change advisory board). Therefore in most cases there is no need of two or more processes to collaborate (clearly a consequence of a successful separation of concerns [16]).

However, non-local changes to the processes can occur (e. g. changes to the service catalogue and configuration management database). Lacking the "torch relay" interfaces between processes these non-local changes need to be reflected back to the service design hub. Its responsibility is to resolve the non-local process change by involving all affected processes (and negotiating their requirements in the context of the service change).

In the Toll Collect example two separate hubs were implemented – one for the service design phase, the other for the service transition phase. This choice is obvious because the design phase emphasises different skills than the transition phase. As a consequence the organizations staffing each hub can make use of specialists very efficiently since each hub concentrates on one specialized responsibility. However, the resulting handover introduces an additional challenge and is a possible source of errors.

III. One-Stop-Shop Model

An alternative approach is also used in the Toll Collect example: the separation into two hubs with distinct responsibilities is abandoned in favour of a single point with overall implementation responsibility (for the whole service design and transition phase of a given service change). Accompanied by a minor change to combine the tasks of the service design and transition phases within each process (see fig. 3) this allows for a single hub within the service management process to orchestrate the complete service design and transition of a service change. The specialized tasks of each process remain unchanged (within each process).

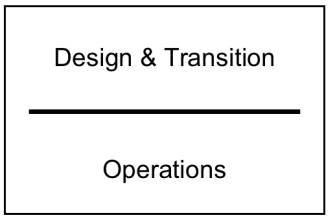

Figure 3: Process design with combined activities from the service design and transition phases

As a consequence the responsibility for a service change remains continuously with a single orchestration hub (fig. 4) and therefore possibly with a single organization (or even person). However, this alternative service management model creates different demands for skill-set of the people involved. Rather than using specialists for the design phase and different specialists for transition phase, this model requires a combination of both in a single process role (and possibly organization or person).

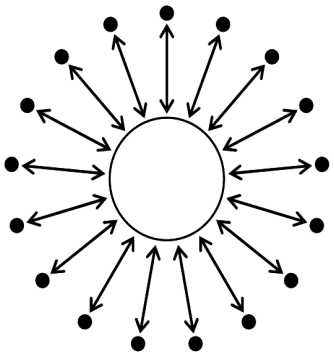

Figure 4: One-stop-shop model with a single process hub for the service design and transition phases

IV. Model Evaluation

The scenario of more than ten major service changes and more than 1.000 medium-sized ones suggests using a service management system that treats service changes as a standard and frequently recurring transaction. Consequently in the Toll Collect example changes to a service and its related processes are implemented as an integral part of the service management processes. This follows well-established practices from object-oriented programming [17], e.g. focussing on clearly defined responsibilities and a separation of concerns.

The missing link is the orchestration of a single given service change across all service management processes and across the service design and transition phases to yield a new service offering smoothly rendered by the standard service operations processes. From a control point-of-view we decided against a "torch relay" approach in the design and transition phases: processes are not allowed to forward tasks. Using the experience of almost daily service changes since the initial certification in 2007 we have gathered extensive experience with the two different models of orchestration allowing us to evaluate the two models.

A. Hub and Spoke Model

The main benefit of the "hub-and-spoke" approach is a further degree of abstraction allowing for an efficient assignment of specialists: Not only is the orchestration of service changes concentrated within one process (the one responsible for service offerings and service changes) but rather an additional separation into two different responsibilities (i.e. for a successful design phase and a successful transition phase) is directly implemented into the service management system. Depending on the size of the underlying service management organization this can lead to the introduction of too many process roles (e. g. a role each for resolving incidents, the design phase and the transition phase of the incident management process). Therefore even a clearly defined and simple process model can put too many process roles on a single person.

As a benefit, the separation and specialisation between the service design and service transition phases introduces an additional handover that allows for an improved planning (in

the sense of sub-projects and an intermediate milestone). It can of course also introduce the need for additional documentation and pose new communication problems.

B. One-Stop-Shop Model

To address these issues we evolved the service management process model in the example to emphasize end-to-end responsibility. The responsibility stays within one place (even one process role and preferably one person) for the whole service change. At any given time there is a single responsible process role (person) for each given service change, the responsibility rests with the same role (person) until the successful completion of the service transition phase. This minor change to the underlying service management process model allows eliminating many process roles by combining the previously distinct roles for the service design and the service transition phase in each of the 17 service management processes. In practice this distinction was mostly theoretical since most often both roles were delegated to the same process specialist (e. g. the incident management specialist for service design and the one for service transition were two distinct roles delegated to the same person).

From the customers' point-of-view the "one-stop-shop" model produces better and more dependable results (as seen by internal customer reviews [18], [19]) – in accordance with theoretical expectations when introducing a "case worker" approach in a business process reengineering scenario [8].

In that way service changes as creative human tasks are transformed into a more generic combined task of design and transition. This is in contrast to the "hub-and-spoke" model which favoured the more efficient use of specialists within the design and transition phase of service changes.

V. Conclusion

The business of rendering service for a customer is (regardless of the level of technology involved) mostly a people business. The design of the underlying service management process determines the successful service operation. Real-life services routinely require many changes – even large-scale changes are no exception – often involving the cooperation or even change of the established service management processes necessary for to day-to-day service operations. We showed how to incorporate service and process changes into the service management system following simple lessons from object-oriented software engineering. The challenge is to orchestrate the processes involved in the service change across all phases. Two different models of orchestration were shown in the context of a ISO 20.000 certified service management organization. Starting from the "hub-and-spoke" model with separate responsibilities for the design and transition phase we have shown a model tailored to fit small and medium sized organizations by emphasizing end-to-end responsibility.

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