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Bridging On-site Practices and Design Principles for Service Development

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Abstract

The significance of collaboration between developers and operators has increased through service lifecycles, as they are expected to explore their clients' pains and co-create new ICT systems for their business opportunities through a number of trials. However, such agile development has caused conflicts with the conventional development management, which assumes waterfall development. This development process is administrated by the progress of documents statuses, such as created, reviewed, updated, and finalized, at development sites. This paper introduces a document-concern-design model to indicate developers their associated tasks to update specific sections of documents during their repetitive work between development and operation. The model incorporates three domains - document review process, concern, and design principle - with linking them one-by-one and form a single structure. This procedure enables to adapt any on-site local rule of design and development. Hence, the system can be introduced to any developers' site with little adaptation cost. Then, this mechanism can accelerate various collaborative activities between developers and operators and guide their deliverables.

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Keywords: DevOps (development and operation); design principles; collaboration; concerns; tasks

1. Introduction

ICT (information and communication technologies) service providers have provided systems integration services to their clients. Systems engineers implement software components, build on-premise ICT system infrastructures with hardware products, and support ICT system troubles in operation. The clients expect a high degree of perfection of the functions of ICT system infrastructure as the result of integration services. However, their expectation has changed from implementation and integration to valuable experiences through ICT service lifecycle, as such infrastructures can be easily integrated with software and hardware functions from cloud services [1]: infrastructure as a service (IaaS), platform as a service (PaaS) and software as a service (SaaS) (Fig.1).

While a number of such cloud services have been marketed, systems engineers are urged to extend their roles from the middle to early and later phases of service lifecycle; designing conceptual service systems and improving the services for the next generation (Fig.2). These phases require continuous practices of hypothesis and verification to lift recently emerged business and technical constraints. However, this process is irreconcilable with the waterfall development process management, which is in widespread use in business.

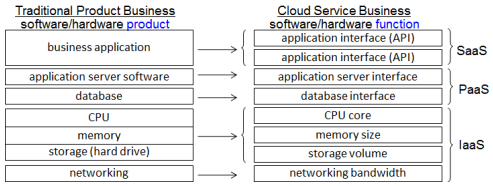

Fig. 1 Cloud services

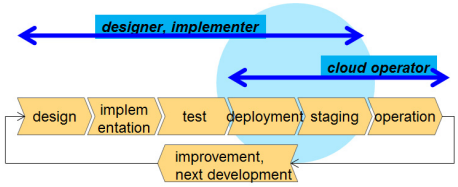

Fig.2 Service practitioners' role through lifecycle

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The continuous practices will go back and forth. For example, the position of development progress will go back to earlier phases when revising specification become imperative after a prototype evaluation. Such iterative work can be done with a group of developers and operators. Their co-creative activities and culture has become significant, and symbolized as 'DevOps' [2-3]. However, this iterative and gradual progress in collaboration is hard to administrate under the conventional ways of project management, which assumes that development progress should follow waterfall models.

Advancement of projects are typically monitored by the completion of tasks in a structured task set i.e. work-breakdown-structure (WBS), and by decisive milestones of document reviews and approvals. However, such inflexible procedures cannot be applicable to development sites as it is. The adaptation work by modifying and realigning the standard WBS is costly for them. Therefore, it is urgent to provide mechanisms to developers, operators and administrators for task and document control.

2. Related Work

2.1. Lifecycle Management for ICT Infrastructure Services

Lifecycle management approaches for ICT infrastructure services have presented best practices of service delivery and discuss how service development and operation phases can be streamlined and what targets the service practitioners should pursue in each phase. ITIL (IT Infrastructure Library) [4], COBIT (Control objectives for information and related technology) [5], and IT4IT (IT for IT) [6] are lifecycle management frameworks for ICT services, though their deliverables arise from a difference in management angles.

2.2. ITIL

ITIL is a series of documents, which are used to aid the implementation of a lifecycle framework for IT (information technology) service management. This customizable framework defines how service management is applied within an organization. It is also aligned with the international standard, ISO 20000 [7]. ITIL is organized into a series of five elements: service strategy, service design, service transition, service operation and continual service improvement. These elements in turn describe a closed loop feedback system, which provides feedback throughout all stages of the lifecycle. The ITIL books for each element provide best practices and disciplines behind them to provide ICT services effectively; thereby ITIL does not provide concrete tasks or procedures. They are vested in the discretion of individual practitioner's interpretation.

2.3. COBIT

COBIT is an ICT governance framework and supporting toolset, which allows managers to bridge the gap between control requirements, technical issues and business risks. COBIT enables clear policy development and good practice for ICT control throughout organizations. COBIT emphasizes regulatory compliance, helps organizations to increase the value attained from ICT, enables alignment and simplifies implementation of the enterprises' ICT governance and control framework. COBIT refers to organization, though it does not give much thought to individual actions in organizations.

2.4. IT4IT

IT4IT defines reference architectural standards, which comprises a reference architecture and a value chain-based operating model for managing the business of information technology. A value chain is a series of activities that an organization performs to deliver valuable products and services. While products pass through activities of a chain in order, the products gain value at each activity. Introducing a framework of this value chain to ICT providers will help identify the activities that are especially important for the advancement of strategy and attainment of goals.

The value chain is grouped into two main categories of activities: (1) primary activities, which are concerned with the production or delivery of goods/services, and (2) supporting activities, which facilitate the efficiency and effectiveness of the primary activities.

The IT4IT standard breaks down the value chain into four value streams to help adoptability of the IT4IT reference architecture. Each value stream represents a key area of value that ICT provides the comprehensive service lifecycle. The four primary value streams are (1) strategy to portfolio, (2) requirement to deploy, (3) request to fulfill, and (4) detect to correct. The primary value streams for the ICT value chain generally align to what ICT traditionally calls plan, build, deliver, and run. When it is used with an ICT value chain-based model, this is transformed into plan, source, offer, and manage. These value streams have vital roles in helping to holistically run the whole service lifecycle.

In this way, IT4IT examines the activities through lifecycle. However, the discussion about activities of each value stream is abstract and there still exists gaps to the practices at development sites, where document-based project management is expected.

As observed above, the previous work does not describe tangible practices but shows ideal practices to be followed through lifecycle. Hence, service practitioners have to bridge the gap between conventional project management and the frameworks by their interpretation and experiences.

3. Guiding Platform for DevOps Practices

3.1. Document, Concern and Design Principles

To provide mechanism about controlling tasks and documents to developers, operators and administrators, the authors focus on the relationships between documents, tasks of concerns and design principles.

Document-based project management leads directly to quality control of services. Development documents are developed and reviewed by practitioners and managers,