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## Mapping ITIL Services to Ontology-Based Model to More Use in Enterprises

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### Abstract

The IT Infrastructure Library (ITIL) is the most widely accepted approach to IT service management in the world. ITIL provides a cohesive set of best practice, drawn from the public and private sectors internationally. ITIL is divided to several sub sets as named services. In the other hand, the Semantic Web is a *web of data* that enables machines to understand the semantics, or meaning, of information on the World Wide Web. This paper introduces an ontology-based framework to improve the computer understanding from ITIL services. We map ITIL services to same semantic web form of them. This idea helps developers to feel free in research about ITIL changes and helps enterprises to employment ITIL facility. We also maintain obtained ontology-base model to servers in the Internet to use by enterprises easily.

**Key words:** ITIL, IT, Semantic Web, Ontology-base.

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### 1. Introduction

The IT Infrastructure Library (ITIL) [1] presents a comprehensive set of guidelines for defining, designing, implementing and maintaining management processes for IT services from an organizational (people) as well as from a technical (systems) perspective. The ITIL methodology is generally applicable in IT across industries and hence suited for establishing reusable practices. Introducing and implementing ITIL-based processes for IT management is a people-intensive task involving domain expertise from ITIL consultants. It furthermore requires detailed knowledge of the industry in which a client is active and of the specific circumstances of a particular client's business and IT environment. IT service providers have established practices to help clients introduce ITIL-based processes in IT environments.

### 2. Overview of the ITIL v3 library

ITIL is used by organizations worldwide to establish and improve capabilities in service management. ISO/IEC 20000 provides a formal and universal standard for organizations

seeking to have their service management capabilities audited and certified. While ISO/IEC 20000 is a standard to be achieved and maintained, ITIL offers a body of knowledge useful for achieving the standard. The ITIL Library has the following components:

- *The ITIL Core*

ITIL core consists of the best practice guidance applicable to all types of organizations who provide services to a business.

- *The ITIL Complementary Guidance*

The ITIL Complementary Guidance consist of complementary set of publications with guidance specific to industry sectors, organization types, operating models, and technology architectures [2]. The ITIL Core consists of five publications (Figure 1).

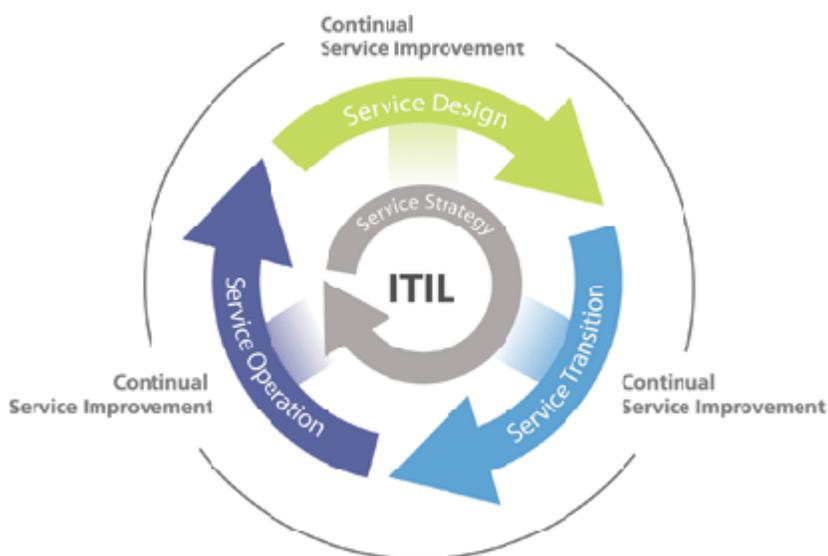


Figure 1. The ITIL Services [3]

### 2.1. Service Strategy

As the center and origin point of the ITIL Service Lifecycle, the ITIL Service Strategy provides guidance on clarification and prioritization of service-provider investments in services. More generally, Service Strategy focuses on helping IT organizations improve and develop over the long term. The Service strategy provides guidance on how to design, develop, and implement service management not only as an organizational capability but also as a strategic asset. Guidance is provided on the principles underpinning the practice of service management that are useful for developing service management policies, guidelines and processes across the ITIL Service Lifecycle[2].

### 2.2. Service Design

The Service Design provides guidance for the design and development of services and service management processes. It covers design principles and methods for converting strategic objectives into portfolios of services and service assets. The scope of Service Design is not limited to new services. It includes the changes and improvements necessary to increase or maintain value to customers over the lifecycle of services, the continuity of services,

achievement of service levels, and conformance to standards and regulations. It guides organizations on how to develop design capabilities for service management [4].

### **2.3. Service Transition**

The Service Transition provides guidance for the development and improvement of capabilities for transitioning new and changed services into operations. This publication provides guidance on how the requirements of Service strategy encoded in Service design are effectively realized in Service operation while controlling the risks of failure and disruption [5].

### **2.4. Service Operation**

Best practice for achieving the delivery of agreed levels of services both to end-users and the customers (where "customers" refer to those individuals who pay for the service and negotiate the SLAs). Service operation, as described in the ITIL Service Operation is the part of the lifecycle where the services and value is actually directly delivered. Also the monitoring of problems and balance between service reliability and cost etc. are considered. The functions include technical management, application management, operations management and Service Desk as well as, responsibilities for staff engaging in Service Operation [6].

### **2.5. Continual Service Improvement**

Aligning and realigning IT services to changing business needs (because standstill implies decline). Continual Service Improvement defined in the ITIL Continual Service Improvement aims to align and realign IT Services to changing business needs by identifying and implementing improvements to the IT services that support the Business Processes. The perspective of CSI on improvement is the business perspective of service quality, even though CSI aims to improve process effectiveness, efficiency and cost effectiveness of the IT processes through the whole lifecycle. To manage improvement, CSI should clearly define what should be controlled and measured [7].

## **3. Overview of the Semantic Web**

The Semantic Web is a "web of data" that enables machines to understand the semantics, or meaning, of information on the World Wide Web [8]. It extends the network of hyperlinked human-readable web pages by inserting machine-readable metadata about pages and how they are related to each other, enabling automated agents to access the Web more intelligently and perform tasks on behalf of users. The term was coined by Tim Berners-Lee [9], the inventor of the World Wide Web and director of the World Wide Web Consortium, which oversees the development of proposed Semantic Web standards. He defines the Semantic Web as "a web of data that can be processed directly and indirectly by machines." The term "Semantic Web" is often used more specifically to refer to the formats and technologies that enable it [10]. These technologies include the Resource Description Framework (RDF), a variety of data interchange formats (e.g. RDF/XML, N3, Turtle, N-Triples), and notations such as RDF Schema (RDFS) and the Web Ontology Language (OWL), all of which are intended to provide a formal description of concepts, terms, and relationships within a given knowledge domain.

## **4. Our Proposed Approach**

One of area that appear original in ITIL scope, convert ITIL services to forms which Computers able to analyze them. Also, enterprises (with ITIL services support) must be able to repair their foundations in essential and basic changes. We suggest mapping all of ITIL services to ontology-base form (RDF documents). We consider our idea in two sections. In subsection 4.1 we propose convert ITIL services to ontology model of them and at subsection 4.2 we suggest place servers to easily access by enterprises.

#### 4.1. Mapping ITIL Service to Ontology Model

In this section we convert some ITIL service to ontology form. Because the number of ITIL services is high, we only consider our proposed approach in service strategy and service design.

##### 4.1.1. Mapping ITIL Service Strategy

Due to the very flat structure of the ITIL, we were able to map it to the ontology using RDF language. The below statement describe the role of service strategy:

*As the center and origin point of the ITIL Service Lifecycle, the ITIL Service Strategy provides guidance on clarification and prioritization of service-provider investments in services [2].*

With carefully studies of above statement and determine the subject, predicate and object of this statement, it can be mapped to below RDF language:

```
<rdf:RDF
xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
<rdf:Description rdf:about='ITIL Service Strategy'>
  <Provides>
    <rdf:bag rdf:ID='Guidance'
      <rdf:li rdf:resource='clarification of service-provider
        investments' />
      <rdf:li rdf:resource='prioritization of service-provider
        investments' />
    </rdf:bag>
  </Provides>
</rdf:Description>
</rdf:RDF>
```

Figure2 shows the graph model of above RDF language.

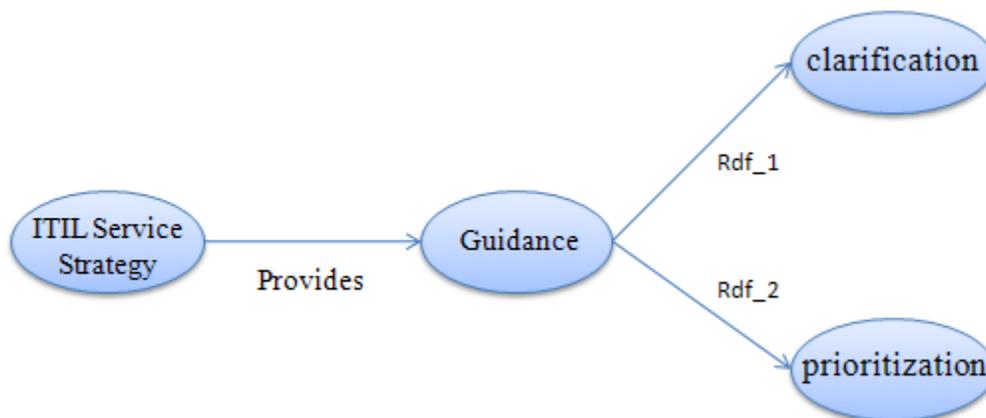


Figure 2. Graph model of RDF language of Service Strategy

#### 4.1.2. Mapping ITIL Service Design

The other service that is provided by ITIL is service Design. The below statement describe the role of service design:

*The Service Design provides guidance for the design and development of services and service management processes. It covers design principles and methods for converting strategic objectives into portfolios of services and service assets [4].*

This statement can be mapping to below RDF language:

```

<rdf:RDF
xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
<rdf:Description rdf:about='ITIL Service Design'>
  <Provides>
    <rdf:bag rdf:ID='Guidance'
      <rdf:li rdf.resource='design of services' />
      <rdf:li rdf.resource='development of services' />
    </rdf:bag>
  </provide>
  <Provides>
    <Cover>
      <rdf:bag rdf:ID='Design'
        <rdf:li rdf.resource=' principles' />
        <rdf:li rdf.resource=' methods' />
        <rdf:li rdf.resource=' converting strategic objectives into
        portfolios of services and service assets' />
      </rdf:bag>
    </Cover>
  </Provides>
</rdf:Description>
</rdf:RDF>
  
```

Figure3 shows the graph model of above RDF document.

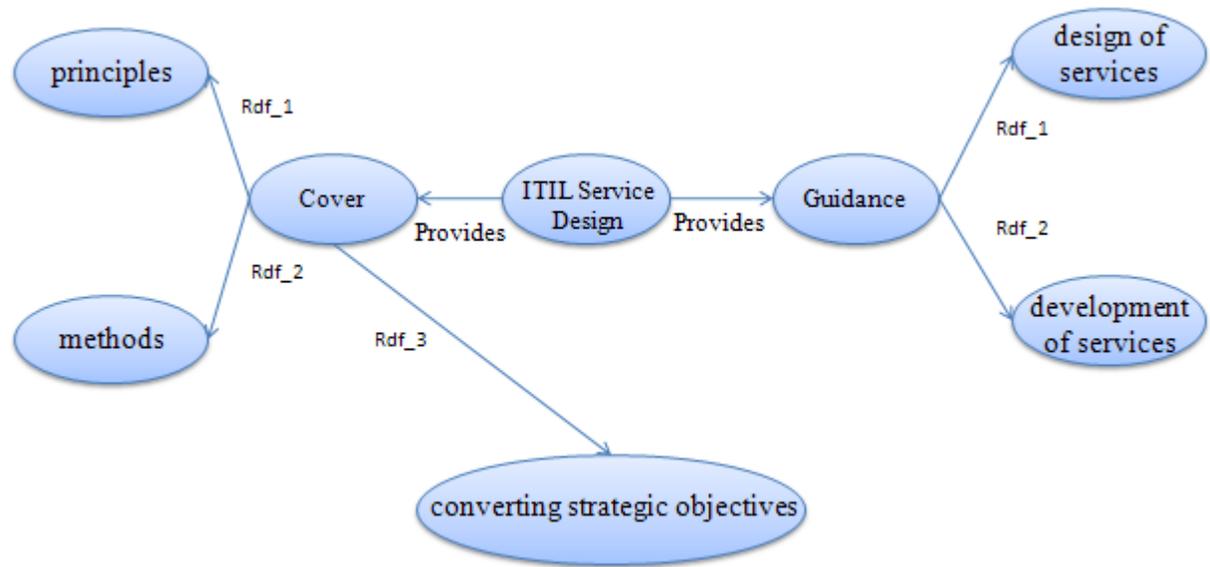


Figure 3. Graph model of RDF document of Service Design

Other services also can be mapped to RDF model that we do not consider them. These mapping have several advantage:

1. Standardized ITIL services by using RDF language.
2. Possibility to use reasoners to generate new roles on existing facts facility.
3. Because the ontology is used in enterprises documentations, the proof of unclear roles have been increased.
4. This approach can be used in other standards in IT management such as COBIT [11], ISMS [12] and etc.

Also the table of mapping ITIL services to ontology-base model shows in table1.

Table 1. Mapping ITIL Services to Ontology-Base Model

ITIL Service	RDF Language (Ontology-Based Model)
Service Strategy	Ontology-Based Service Strategy
Service Design	Ontology-Based Service Design
Service Transition	Ontology-Based Service Transition
Service Operation	Ontology-Based Service Operation
Continual Service Improvement	Ontology-Based Continual Service Improvement
...	...

## 4.2. Collaboration Environment for ITIL

When the logic view creates between ITIL services in the World, the collaborative environment can be assumed for enhancing enterprises flexibilities and they are able to use each other's experiences [13]. Several servers can be established in the Internet and ontology-base ITIL services can be placed in them. These servers are updated with central institutes (ITIL service providers) and all enterprises can use ontology-based ITIL via Internet instead of traditional existed methods in establishment the ITIL. Figure4 shows the collaboration platform between enterprises.

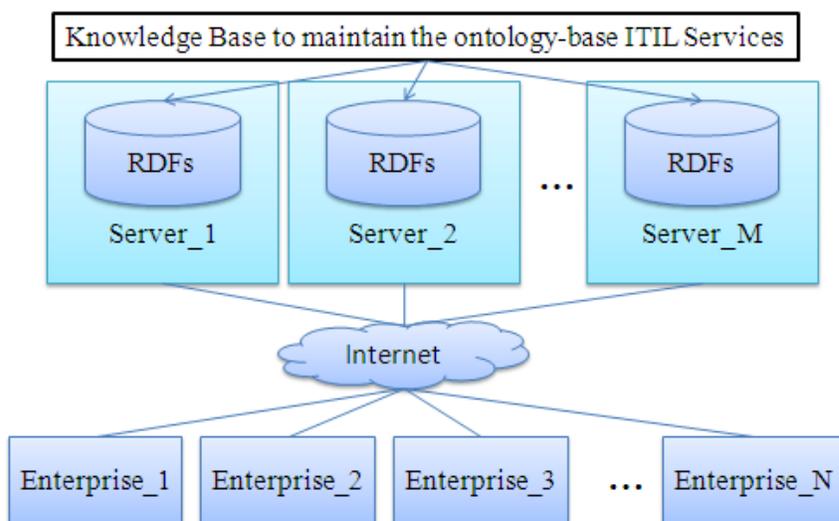


Figure 4. Creation Collaboration Platform between Enterprises by Using Servers to Maintain Ontology-based ITIL services

## 5. Conclusions

In this paper we studied ITIL services such as service strategy, service design etc that were be used in the enterprises management and also we considered Semantic Web structures. We proposed map all ITIL services to ontology-base model by RDF language. The most advantage of this approach was standardization of ITIL processes and generation new enterprises roles facility and encouraged the researchers to mapping other IT management standards. We also suggested maintaining obtained ontology-base model of ITIL services at servers in the Internet to use by enterprises easily.

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