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## Requirement negotiation process for the design of cooperative services

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#### ABSTRACT

Many manufacturers are focusing more on services provided through products recently, and cooperate with some partner companies to provide competitive services. For the design of those services, it is important to satisfy not only service receivers, but also the cooperating service providers. The authors suggest a method to represent service provider's value and cost of a designed service based on the service design methods of Service Engineering. In addition, the authors suggest a method to adjust the specifications of a designed service in order to fulfil the requirements of both service providers and service receivers simultaneously.

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#### 1. Introduction

Manufacturers have been focusing more on services provided through products than on products themselves in the recent years. Following this trend, many companies cooperate or strengthen the relationship with other companies to provide various and more competitive services. For the design of attractive cooperative services, it is important to satisfy not only service receivers, but also the cooperating service providers who have different senses of value for the contents and the supply method of their own service. However, there are few standard methods to represent service provider's requirements for its service and to design it to fulfil them.

Therefore, the authors suggest a method to represent service provider's value and cost of a designed service based on the service design methods of Service Engineering [1]. In addition, the authors suggest a method to adjust the specifications of a designed service in order to fulfil the requirements of both service providers and service receivers simultaneously from the aspects of their values and costs.

#### 2. Cooperative services and related studies

#### 2.1. Complexity of cooperative services

The importance of service has been increasing in the manufacturing industry. To provide a competitive service, various

*E-mail addresses:* watanabe-kentaro@sd.tmu.ac.jp (K. Watanabe), kimita-kouji@sd.tmu.ac.jp (K. Kimita), yoshiki-shimomura@center.tmu.ac.jp (Y. Shimomura). collaborations among companies with different specialties have been promoted, such as the cooperation between a hardware company and a software company, or between a manufacturer and retailers. Unlike the hierarchical relationship which used to be common in the manufacturing industry, this new type of collaboration has the following characteristics.

• Equal partnership

In the aforementioned collaboration, the relationship among cooperating companies is relatively equal, since each company tends to have its own strength and not to have a strong binding power to each other. Therefore, a service designer should take the requirements of each company more into consideration.

• Multiple and interrelated requirements

For the design of a successful service, a service designer should grasp multiple requirements of each stakeholder and reflect them to a designed service. Furthermore, the requirements of stakeholders often interrelate and even conflict. A service designer should design a service to satisfy those requirements by prioritizing and adjusting them.

To overcome such complexity of cooperative services, the support for service design, especially for the requirement description and negotiation of a service, is necessary.

#### 2.2. Related studies

Studies on service design and development started in the service marketing and management field first. There are various important researches on the process expression of services [2] and design processes [3]. Based on these fundamental studies, the studies on Product-Service Systems (PSS) have been attracting considerable attention. PSS is a specific type of value proposition

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that a business offers to its clients, consisting of a mix of tangible products and intangible services designed and combined so that they jointly are capable of fulfilling final customer needs [4]. There are several approaches to design a service in the PSS researches. For example, the qualitative analysis of the value characteristics and environmental impact of the classified PSS types [5] and the design methodology which focuses on the communicational, social and economic aspects of a service [6] have been proposed. Although these studies point out the importance of multidimensional evaluation on design solutions in service design, concrete methods for requirement negotiation to fulfil the needs of service providers and receivers simultaneously haven't been discussed sufficiently.

The interesting approach to deal with a service from the system engineering viewpoint is requirements engineering [7]. Especially, the viewpoint oriented requirements engineering describes the multiple stakeholders' requirements and applies them to the design of systems [7,8]. However, the viewpoint of requirements engineering is basically on the systems composed of hardware and software. For the design of cooperative services, interactions among humans or among corporations should be considered also.

#### 2.3. Service Engineering

Service Engineering, an engineering approach to develop the design methodology of a service [1] is also one of few studies focusing on the design of a service with multiple stakeholders. The following design methods have been proposed to describe a cooperative service.

#### 1. Receiver's State Parameter (RSP)

In Service Engineering, a service is defined as an activity of a service provider to change a service receiver's state [1]. To express a service receiver's state, Receiver's State Parameter (RSP) has been proposed. An RSP is a target parameter of a service and also represents a service receiver's requirement.

#### 2. Service models

In Service Engineering, several models have been proposed to describe a complex structure of a service.

A flow model is a model to describe the agents who participate in a service and their relationship [1]. In a flow model, a service is described like chains of agents, and can be decomposed into sub-services from one provider to one receiver (Fig. 1). An intermediate agent, who mediates a sub-service to another receiver, can be identified as a service provider or a service receiver depending on the focused sub-service.

A service designer describes functions and the realization structure of each sub-service in a view model [1]. Fig. 2 shows the basic composition of a view model. A view model expresses the influence of a service to an RSP as a parameter map of function parameters (FPs). The realization structure of a



Fig. 1. RSPs and flow model.



service consists of various entities to realize a service, such as products, human resources, and software. A service designer can verify the influence of a service with a view model and evaluate the satisfaction of each service receiver with RSPs [9].

By means of RSPs and service models, a service designer can describe the whole picture of a cooperative service and evaluate it from the aspects of service receivers. However, the existing methods of Service Engineering do not take requirements of service providers into consideration for service design. For the design of a successful service, a service designer should realize the simultaneous satisfaction of both service providers and receivers. Hence, the authors propose a design method to describe a service provider's requirements and to perform the requirement negotiation among service providers and receivers.

#### 3. Evaluation standards of a service provider

#### 3.1. Evaluation viewpoints for service design

As is reported above, a service operated by multiple service providers can be described as a set of sub-services which shows the interactions between a certain service provider and a service receiver. The evaluation with RSPs for each sub-service is performed from the viewpoint of service receivers. The authors call this viewpoint "receiver's view". On the other hand, a service designer should care about how a service provider experiences a service, also. The authors call it "provider's view".

Fig. 3 shows the influences of a service perceived from these two viewpoints. Though the main activity of a service is performed by a service provider, a service receiver should act corresponding to the provider's activity in most cases. Thus, a service in Fig. 3 is described as the bi-directional activities of both a service provider and a service receiver to each other, which are described as two horizontal arrows. Those activities are commonly perceived from one agent as value and from the other as cost, or vice versa. Though some activities may be perceived as value for both a service provider and a service receiver, the balance of value and cost for them is important. As for a service operated by multiple stakeholders, the satisfaction of every stakeholder should be considered.

From the provider's view, two types of influences are perceived. The first type is an influence by providing a service which is described as an arrow to a service receiver. The typical influence of this type is the decrease of tangible resources to provide a service, such as the number of usable rental cars in a rental car service. The learning effect to provide a certain service can be considered as a Download English Version:

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