

# Towards a model of services based on co-creation, abstraction and restriction

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**Abstract.** The term service is today defined and used in a multitude of ways, and there is no usage characteristic that is common for all of these ways. As a consequence natural language terms used for describing services are ambiguous and often misleading. The lack of a common agreed upon definition of the term makes it difficult to understand and classify services as well as distinguish them from non-service concepts. In this paper, we do not propose a new definition of service but a model of services that helps in analysing the concept. The model is based on three perspectives: service as a means for co-creation of value, service as a means for abstraction, and service as a means for providing restricted access to resources.

**Keywords:** service, service model, service definition, service resource, service process, service delivery, Resource-Event-Agent ontology, Hohfeld's classification of Rights, conceptual modeling.

## 1 Introduction

The increasing interest in services has created a multitude of alternative views and definitions, often conflicting, of the service concept. What constitutes a service is still a matter of debate, in industry as well as in various research communities. The lack of a common view of the service concept makes it difficult to reason about, describe and classify services in a uniform way. One approach to structuring services is to divide them into business services and software services. [OA06, Pr04, UN08] focus on a business service perspective, while [WS04] have a software service perspective. New methods have also been proposed to structure systems by means of service architectures [Er07, Ag08, Zi04]. For example, in the view of Papazoglou and Van den Heuvel [PH06], (software) service design and development is about identifying the right services, organizing them in a manageable hierarchy of composite services and choreographing them together for supporting a business process. However, identifying the right services, or classifying them, is a difficult task due to the aforementioned lack of a common view of the service concept.

One attempt to defining services has focused on identifying properties (such as intangibility, inseparability, heterogeneity, and perishability [Zei85]) that distinguish them from other kinds of resources. However, [Edv05, Gol00, SF06, Fe09] and others have argued that this approach is problematic in that the suggested properties are neither necessary nor sufficient in terms of defining a service. For example, not only

services are intangible but also other kinds of resources, such as information and IPRs. Heterogeneity can be observed also in the production of certain goods and information, such as handicraft objects and newspaper articles.

An alternative to identifying services by internal properties that uniquely distinguish them from other kinds of resources is to view services as perspectives on the use and offering of resources [Edv05]. Thus, the focus is shifted from the internal characteristics of resources to their context of use and exchange. This view is shared by the Unified Services Theory [SF06], which also bases its definition of services on the use and exchange of resources; here service processes are processes where customers always provide significant input resources, as opposed to non-service processes where customers only select what output resources to buy and pay for.

Services may also be understood as a means for abstraction. A common view found in [WS04, OA06, Pr04, Lusch08, UN08] is services as an abstraction of activities that once started will achieve some user goal, usually defined as a change of state in (user) resources. [Fe09], however, argues that a service cannot be defined only in terms of resource changing activities. An example is a snow removal service, which only guarantees to keep some streets from snow. If it does not snow, no service will be delivered, yet the streets are indeed free from snow. The paradox is that sometimes the terms of a service can be honoured even if no service is actually delivered, i.e. no activity has been executed. It can be observed that many categories of services are analogous to this example, for instance health care and fire brigade-services.

An often mentioned advantage of services is that the management (infrastructure, maintenance, technology, etc.) of resources are moved from customer to provider [NESSI11]. This is a consequence of the principle that service provision does not entail ownership transfer [NESSI11], [Zei85]. The concept of service can in fact be used as a means for providing restricted resource access without ownership transfer [BAJ10].

The diversity of service views and definitions, and the fact that these views are often conflicting, suggest that a multi perspective approach is required. We will follow this line of reasoning and introduce a number of service *perspectives* rather than propose a single service definition. We identify three main service perspectives from the literature introduced in the previous sections: service as a means for co-creation of value [SF06, Lusch08], service as a means for abstraction [WS04, OA06, Pr04, Lusch08, UN08], and service as a means for providing resource access without ownership transfer [Zei85, BAJ10]. The purpose of the paper is to propose a conceptual model of services based on these three perspectives. The model has its theoretical foundation in the REA ontology [Mc82] and Hohfeld's classification of rights, [Hoh78]. REA is used because it is a well established ontology of business collaboration with the basic view that resources are exchanged between agents according to agreements. Hohfeld's classification of rights is used as means for analysing what kinds of rights are transferred in exchanges of services and other kinds of resources. The work reported here builds on the work of [BAJ10], which is also based on a multi perspective view of analysing services. The main differences are (i): a new foundation for the model based on distinguishing between service as a resource and service as a process, (ii) the alignment of the model concepts with the core REA-

model, (iii) a new analysis of the fulfillment of service deliveries versus deliveries of goods.

The remainder of this paper is structured as follows. In Section 2, we briefly outline the main points of the REA ontology and Hohfeld's classification of rights. In Section 3, we introduce the three perspectives of services and elaborate them together with their corresponding conceptual models in Sections 4, 5 and 6. In Section 7, we discuss related work and conclude the paper.

## 2 The REA Ontology and Hohfeld's Classification of Rights

The REA (Resource-Event-Agent) ontology was originally formulated in [Mc82] and developed further in a series of papers, e.g. [Ge99, Hr06]. The ontology is based on the core concepts of resources, events, and agents, which are described in the following subsections.

### 2.1 Resources

A resource is something that is of value for at least one agent, e.g., a car, Internet access, or a stream of music. Based on the degree to which a resource is tied to an agent, resources can be classified into three categories: independent resources, internal resources, and shared resources.

An *independent resource* is a resource that can exist independently of any agent. In other words, an independent resource can exist even if it is unrelated to any agent. Typical examples of independent resources are physical objects, land, and information.

An *internal resource* is a resource that is existence dependent on one single agent. If the agent ceases to exist, so does the internal resource. Examples of internal resources are capabilities, skills, knowledge, memories, and experiences. These kinds of resources are dependent on individuals, but in a transferred sense they can also be dependent on organisations. Furthermore, for organisations even processes, practices and procedures can be seen as internal resources. A characteristic of an internal resource is that it is not an economic resource, i.e. non tradable.

A *shared resource* is a resource that is existence dependent on two or more agents. The most common shared resources are relationships and rights. Some relationships are narrow in scope and primarily govern and regulate activities for some particular resource(s), e.g. ownership of goods or a purchase order. Other relationships have a wider scope, e.g. a marriage or an employment relationship that includes a number of rights. Rights will be further discussed in Section 2.4.

### 2.2 Conversion Processes

Resources are not unchanging but can be transformed, i.e. they can be produced, modified, used, or consumed. Resources are transformed in so called conversion processes consisting of conversion events. A *conversion event* represents a

transformation of a single resource. If the conversion event creates a new resource or increases the value of an existing resource, we say that the conversion event is a *production event*. If the conversion event consumes a resource or decreases the value of a resource without consuming it, we say that the conversion event is a *consumption event* or a *usage event*, respectively. Usage events are using resources that may be reused in several conversion events, (similar to the concept of ‘assets’ [Fo97]), while consumption events use up resources (similar to the concept of ‘consumables’ [Fo97]). Examples of conversion events are the production of bread, the repair of a car, and the consumption of a liter of fuel.

A *conversion process* is a set of conversion events including at least one production event and at least one consumption or usage event. The latter requirement expresses a duality relationship between production and consumption/usage events, stating that in order to produce or improve some resource, other resources have to be used or consumed in the process. For example, in order to produce a car, a number of other resources have to be used, such as steel, knowledge, and labour.

### 2.3 Exchange processes

Resources can also be exchanged between agents, which occur in exchange processes consisting of exchange events. An *exchange event* is the transfer of rights on some resource to or from an agent. If the exchange event means that the agent receives rights on a resource, we call the event a *take event*. If the exchange event means that the agent gives up rights on a resource, we call the event a *give event*.

An *exchange process* is a set of exchange events including at least one give event and one take event. Similarly to conversion processes, this requirement expresses a duality relationship between take and give events - in order to receive a resource, an agent has to give up some other resource. For example, in a purchase (an exchange process) a buying agent has to provide money to receive some goods. Two exchange events take place in this process: one where the amount of money is decreased (a give event) and another where the amount of goods is increased (a take event). It should be observed that the same resource can participate in different roles in different types of events. For example, a machine is first acquired (take event), then employed in production (usage event), and finally sold (give event).

### 2.4 Hohfeld’s Classification of Rights

In the sections above, we have used the notion of rights in an informal way. As a more precise understanding of rights will be required for characterizing different kinds of resources and exchanges, we here introduce a rights classification based on the work of W. N. Hohfeld, [Hoh78], who identified four broad categories of rights: claims, privileges, powers, and immunities.

- One agent has a *claim* on another agent if the second agent is required to act in a certain way for the benefit of the first agent, typically by carrying out some action. Conversely, the second agent is said to have a duty, or an obligation, to the first

agent. An example is a person who has a claim on another person to pay an amount of money, implying that the other person has a duty to pay the amount.

- An agent has a *privilege* on an action if she is free to carry out that action without any interference from the environment in which the action is to be carried out. By environments is here meant social structures such as states, organizations or even families. Some examples of privileges are free speech and the fact that a person owning some property has privileges to use it in various ways.
- A *power* is the ability of an agent to create or modify a relationship. An example is that a person owning a piece of land has the power to sell it to someone else, thereby creating a new ownership relationship for that piece of land.
- An *immunity* refers to the restriction of power of one agent in terms of creating formal relationships on behalf of another agent. For example, a native people may hold immunity towards state legislation concerning their property rights, meaning that the state does not have the power to enforce laws that modify existing property rights. We will not make use of immunities in this paper.

Most relationships are governed by a combination of several of these rights. For example, owning a car means to have privileges on using it and also the power to lend or sell it, i.e. creating new ownerships involving other agents.

## 2.5 Offerings, Commitments, and Contracts

Exchange processes can be governed by agreements that specify when and how resources are to be exchanged. The two most important types of agreements are offerings and contracts consisting of commitments. A *commitment* on a resource type is a duty for an agent to carry out a conversion or exchange event for an instance of that resource type. For example, an agent may have a duty towards another agent to transfer the ownership (an exchange event) of a car (instance of a car type) to that agent. A *contract* is a collection of commitments and possibly additional rules governing their interrelationships.

An *offering* for a resource type is a conditional obligation for one agent to some community of agents to enter into a commitment for that resource type. For example, an agent may provide an offering for a certain car model, meaning that she is prepared to sell cars of that model, i.e. enter into commitments for the car model. An offering is similar to a commitment but differs from it by not being binding until another agent has accepted it. Thus, when an offering is accepted, it will result in a commitment. A set of offerings can be collected into a *bundled offering*, analogously to a contract.

Fig. 1 summarises the notions introduced so far in the form of a UML class diagram. In the following sections, we will suggest further analysis and specialisations of these notions in order to clarify the different perspectives on services. Almost all of the concepts in the conceptual model presented here may exist on both a knowledge level and an operational level. According to [Fo97], the operational level models concrete, tangible individuals in a domain, while the knowledge level models information structures that characterize categories of individuals on the operational level. The diagrams of figure 1 through 6 hence distinguish between concepts such as Resource Types (categories of Resources such as Car model, Agent type, Real Estate) and Resource (specific and often tangible

concepts like a specific car or a concrete piece of land), Event Types and Events, and so forth for every concept in the model. Due to space limitations, we include both knowledge and operational level concepts in the diagrams only when both concepts are required to illustrate a focal point in the model.

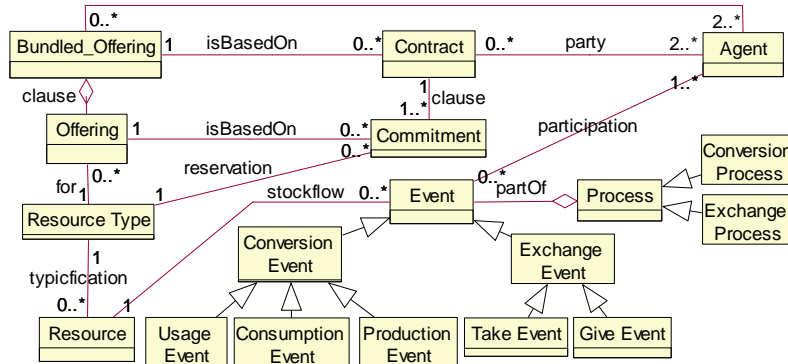


Fig. 1 REA ontology (adopted and extended from <http://reatechnology.com/what-is-rea.html>).

### 3 Service Perspectives

In the following sections, we will introduce a conceptual model for services. The model does not propose a single service definition but instead suggests a number of service perspectives based on the ways resources can be used and exchanged. This approach is reflected in the model, which does not include the term “service” but instead a family of related terms, including “service resource”, “service offering”, and “capability”. We have identified three main perspectives on “service”: service as a means for co-creation of value [SF06, Lusch08], service as means for abstraction [WS04, OA06, Pr04, Lusch08, UN08], and service as a means for providing resource access without ownership transfer [Zei85, BAJ10]:

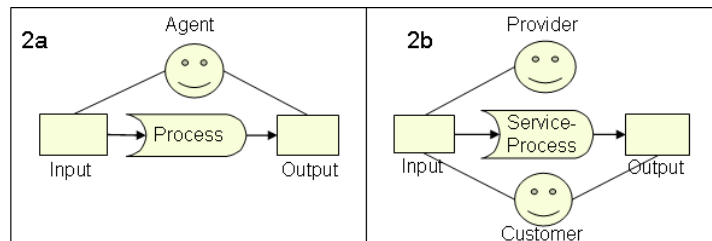
- Service as a means for *co-creation of value*. For most kinds of goods, customers are not involved in their production. Instead, goods are produced internally at a supplier who later on sells the goods to a customer who uses them without the involvement of the supplier. In contrast, services are created and used in an interaction between supplier and customer.
- Service as a means for *abstraction*. Services can provide an abstraction mechanism, where resources are specified through their function and not their construction. In other words, a resource is defined in terms of the effects it has in a process, not in terms of its properties or constituents. For example, a hair dressing service can be defined in terms of the effects it has on someone’s hair, not in terms of the resources being used in the execution of the service, such as scissors or electric machines.

- Service as a means for providing *restricted resource access*. An agent can provide access to some of her resources to another agent by transferring the ownership of them. However, such an ownership transfer may in some situations be undesirable or even legally impossible. Thus, there is a need for a way of offering access to resources without transferring ownership, and services provide a mechanism for this purpose. For example, instead of selling people, labour services are sold, and instead of selling cars, car rental services are provided.

The model, based on these three perspectives, will be presented in a series of diagrams, all of which have the REA ontology as their point of departure. Fig. 2 and 3 show services as co-creation of value, while Fig. 4 and Fig. 5 show services as abstraction mechanisms and how services may provide resource access without ownership transfer. The last one, Fig. 6, shows how access to resources is fulfilled.

#### 4 Service as a Means for Co-creation

For a typical goods producing company, its interactions with customers can be quite limited. Without any involvement of the customers, the company procures raw materials and other assets from suppliers, uses these resources to produce goods to be sold, and distributes the goods to retailers and other outlets. The only role of the customer is to select which goods to purchase and pay for them. Thus, the company carries out a conversion process in isolation transforming input resources to output resources, see Fig. 2a.



**Fig. 2.** Single agent process versus service-process.

In contrast to a goods producing company, a service provider always has to work closely with its customers. In fact, a service can never be carried out by a provider in isolation, as it always requires a customer to take part in the process. In such a service process, the provider and the customer together co-create value, as both of them provide resources to be used or consumed in the process. For example, in a photo sharing service, the service provider will supply hardware and software, while the customer will provide photos and labour. Together, they engage in a process that results in value for the customer, shareable photo albums. This situation can be compared to that of a hardware supplier, who produces computers in isolation from the customer, who will later on buy the finished product and use it without any interaction with the supplier. Pictorially, a service process can be viewed as in Fig.

2b, which shows how both a service provider and a customer jointly contribute to the service process that produces an output for the benefit of the customer.

In order to make the concept of service as co-creation more precise, it is useful to distinguish between service as a process and service as a resource. The word “service” is sometimes used to denote a process, e.g., in the phrase “Today, our company carried out 25 car repair services”. In other cases, “service” is used to denote a resource, e.g., “Our company offers car repair services for the fixed price of 200 euros”.

A *service process*, see Fig. 3, is a conversion process that uses or consumes resources from two agents, called provider and customer, and produces resources that are under the control of the customer, i.e. the customer has rights on these resources. The provider in the service process has to actively participate in the process, while the customer may be passive. For example, a customer driving a borrowed car is not a service process, while a customer being driven by (a representative of) the provider is. Thus, a service process differs from other processes in three ways. First, some of the input resources are under the control of one agent, the provider, while the output resources are under the control of another agent, the customer. This means that the provider uses or consumes her resources in the service process for the benefit of another agent. Secondly, not only the provider but also the customer provides resources as input to the service process. Thirdly, the provider actively takes part in the service process.

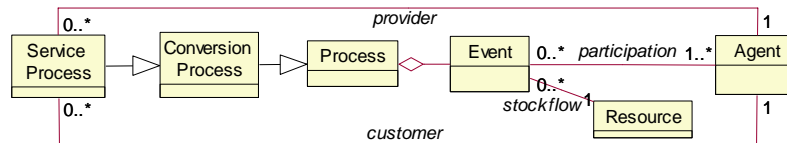


Fig. 3 REA-ontology from Fig. 1 expanded with Service Process to highlight co-creation of value between provider and customer.

## 5 Service as a Means for Abstraction

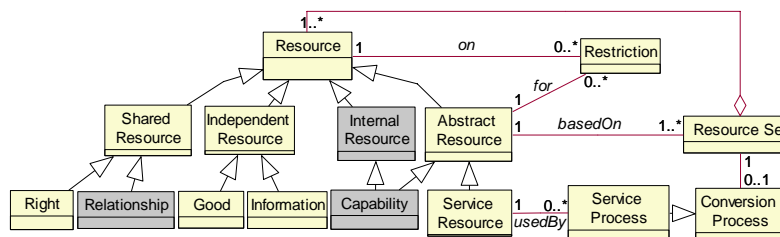


Fig. 4 Service as an abstraction mechanism (mainly non-economic resources in grey).

When offering resources, it may seem preferable to provide as much information as possible about them. However, being able to specify resources in an abstract way provides several advantages. It becomes easier for a provider to describe the benefits



of an offering when she can focus on the effects of the resource offered and abstract away from its accidental features. The provider can address the needs and wants of the customer and clarify how these are fulfilled by her offering without going into detail about its composition. Furthermore, the provider does not have to commit to any specific way of delivering her offering; instead, she can choose to allocate the resources needed in a flexible and dynamic way.

A *service resource* is an abstract resource that is defined only through its use and effects in a service process, i.e. what changes it can bring to other resources when consumed in such a process. For example, a hair cut service is defined through the effects it has on the hair style of a person. It is not defined by means of the concrete resources used when cutting the hair, such as labour, scissors and shampoo. Rather, the concrete resources to be used are left unspecified and can change over time. On one day the hair dresser may use scissors and shampoo and on another day an electric machine and soap, but in both cases he provides a hair cut service. Thus, the same service resource can be based on different sets of other resources, as shown in Fig. 4, and when it is consumed exactly one of these resource sets will be used.

Although the possibility to specify resources in an abstract manner is a key advantage of using the notion of service resources, there are cases where it is preferable to be more concrete. In particular, it may be desirable to put constraints on the resource sets on which a service resource can be based. For example, a hair dresser may offer a “hair dyeing” service and declare that it is based only on colouring products with environmentally friendly ingredients. In this case, the service resource would be defined not only through its use and effects but also through constraints on the resource sets on which it can be based. In Fig. 4, the class Restriction is used to represent such constraints.

While the notion of service resources primarily is useful for providing interfaces between agents in the context of resource exchanges, the related notion of capability can help to structure an organization internally. A *capability* is an internal resource that is defined through the conversion processes in which it can be used. Similarly to a service resource, a capability is abstract in the sense that it is not defined in terms of its properties and components, but by its use and the effects it can produce. In contrast to a service resource, a capability can be used in any process, not only in a service process. Thus, a capability of an agent can be used to produce something that is under the control of that agent. Furthermore, a capability is not an economic resource, i.e., it cannot be traded. Instead, a capability is internal to an agent, meaning that it is dependent on some agent possessing the capability and can be used only when that agent is present. Some examples of capabilities are the ability to provide cloud storage, to offer university level teaching in Chemistry, or to support marketing campaigns. As in these examples, capabilities are often broadly and vaguely delimited, thereby specifying in general terms what an agent is able to accomplish. Service resources, on the other hand, are typically more precisely delimited as they are to be traded. Therefore, service resources are often used to externalise capabilities by exposing some parts of them.

## 6 Service as a Means for Providing Restricted Resource Access

When satisfying a need, an agent can often choose between using a service or some other kind of resource, like goods or information. Using a service instead of another kind of resource provides several benefits, as the service consumer does not own the service. This means that she does not need to take on typical ownership responsibilities, like infrastructure management, integration, and maintenance. Instead, she can focus on how to make use of the service for satisfying her needs. For example, a person can satisfy her transportation needs either by buying and driving a car or by using a taxi service. In the former case, she will own the car required for the transportation, meaning that she will be responsible for cleaning it, repairing it, getting the right insurances, and many other infrastructure and maintenance tasks. When using a taxi service, on the other hand, she does not have to care about any of these responsibilities but can focus solely on how to use the taxi to best satisfy her transportation needs. Thus, services provide a convenient way of offering and accessing resources by allowing agents to use them without owning them.

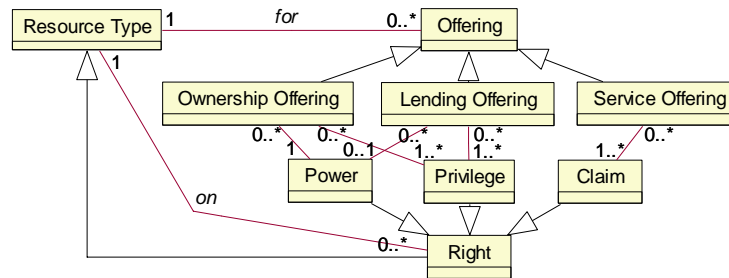


Fig. 5 Service as a means for restricted access provisioning.

Fig. 5 depicts three different ways for an Agent to make its resources available to other agents through offerings:

- an agent may offer to sell a resource to another agent, i.e. to transfer the ownership of the resource to the other agent, as modelled by Ownership Offering. A transfer of ownership means that a number of rights are transferred from seller to buyer, in Fig. 5 modelled by the class Right. The rights transferred include powers and privileges according to Hohfeld's classification of rights in section 2.4. As an example, an agent offering to sell a book to a customer means that the agent is offering the customer privileges to use the book as well as the power to transfer the ownership of the book to yet another agent if she so wishes.
- an agent may offer to lend a resource or provide access to it in a Lending Offering. This means to offer an agent to get certain privileges on the resource for a period of time but without getting any ownership, i.e. the borrower is not granted the power to change the ownership of the resource. Optionally, the borrower may get some other powers, such as lending the resource to a third agent.
- an agent may make a Service Offering to a potential customer, which is the most abstract way of providing access to an agent's resources. A service offering means that the provider offers to use some of her service resources in a service process

that will benefit the customer. In this case, the provider “stands between” the customer and the concrete resources to be used in the service process. Effectively the provider restricts access to these resources. In particular, the customer is not offered any powers or privileges on any concrete resources. Instead, she is offered a claim on the provider to contribute to a certain service process.

In the next section we will analyse under which types of conditions the rights of an offering are actually transferred to fulfill what the providing agent is offering the customer.

### 6.1 Fulfilling Commitments

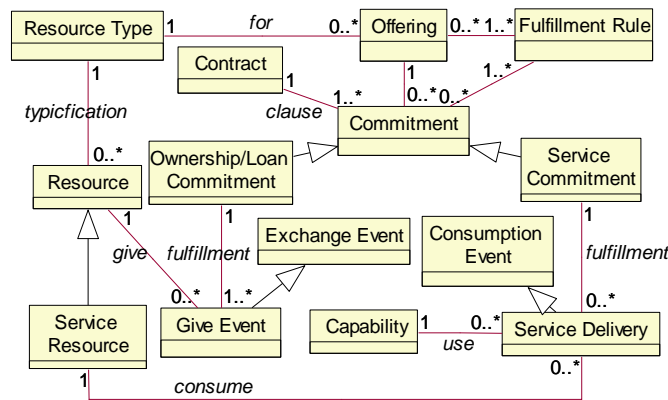


Fig. 6 Access provisioning fulfilled (agent relationships removed for simplicity).

When offerings are accepted, they will result in commitments and contracts, see Fig. 6. Service offerings will result in service commitments, while ownership or loan offerings result in ownership/loan commitments. When commitments have been established, the providing agent is obliged to fulfill them by carrying out conversion and/or exchange events that consume and/or transfer the (committed) resources to the receiving agent.

Commitments can be fulfilled in different ways depending on the kind of offering they are based on:

- An ownership/loan commitment is fulfilled by an agent carrying out a give event, where the agent gives rights (privileges and/or powers) on the committed resource to another agent.
- A service commitment is fulfilled by an agent carrying out a consumption event, where the committed service resource is consumed in a service process. Such a consumption event is called a service delivery. Thus, a service commitment becomes fulfilled through an agent using her own resources in order to benefit another agent, i.e. the resources on which the service resource is based.

Summarising, a service commitment is fulfilled by an agent consuming and using her own resources, while an ownership/loan commitment is fulfilled by an agent giving away rights.

Every commitment is associated to a *fulfillment rule* that specifies one or several time points before which the commitment has to be fulfilled, see class Fulfillment Rule in Fig. 6. In many cases, this rule is simply an absolute time point, e.g. “15 Feb 2013”. We refer to this type of rule as an *absolute fulfillment rule*, which specifies an absolute time point before which a commitment has to be fulfilled. In more complex cases, a fulfillment rule can include various environmental factors, e.g. “within four hours after more than 5 cm of snow has fallen at any time during 2013” or “when the customer has received a certain diagnosis”. A characteristic of this latter type of rule is that it is conditional. A *conditional fulfillment rule* describes under which conditions the provider has to fulfill a commitment. For example, in offerings of insurances of burglary or health-care, the customer does not always get access to the rights offered. To receive ownership of money as compensation for lost goods in case of a burglary or to receive a treatment service in case of health-care, a burglary has to occur or the customer has to become ill.

A commitment is said to be violated at a certain time point if (one of) the time point(s) given by its fulfillment rule has passed and the commitment is not fulfilled. As a contract contains a number of commitments, a contract is said to be violated at a certain time point if any of its commitments has been violated at that time point.

We are now in a position to resolve the apparent paradox of the snow ploughing case presented in Section 1. The key to the solution is to distinguish between service deliveries and service contracts. A service contract can be respected, i.e. not violated, even though none of its commitments is ever fulfilled. This is exactly what would happen in the case where no snow falls during a winter. As there is no snow, no commitment will ever need to be fulfilled, i.e. no service resource will be consumed. Still, the service contract is respected, as no commitment is ever violated. An equivalent example is the service resource health-care, where the service contract is respected if either the customer does not fall ill and no service delivery is required, or if the customer does fall ill and a service delivery actually occurs. Returning to the discussion above, we observe that service contracts containing conditional fulfillment rules may be respected even though no service deliveries ever occur.

## 7 Concluding Remarks

In this paper, we have proposed a conceptual model of the notion of service. A main characteristic of the model is that it describes services from three perspectives - service as a means for co-creation of value, for abstraction, and for access restriction. The work was in part motivated by a problem posed in [Fe09]. The issue there was how to view a service where the terms of the service could be honored even if no service is actually delivered. The apparent paradox was resolved by distinguishing between service contracts and service deliveries. The work is moreover motivated by the assumption that co-creation of value is fundamental for services as argued in

[SF06], in other words, taking into account only one agent's perspective at a time is not sufficient when modeling services.

Our three perspectives can be compared to those introduced in [ABG04]. There the chosen perspectives are called 'service value', 'service offering', and 'service process'. The service value perspective is analogous to our abstraction perspective, where a service is described by the effects it produces, but it also contains elements from our co-production perspective. The service offering perspective is related to our view of services as a means for restricted access to resources. The service process perspective describes how a service offering is put into operation, but in contrast to our proposal the authors do not investigate realization issues in detail.

In the context of SOA, OASIS acknowledges that services are not only a technical but also a social concept [OA06]. It is stated that many, if not most, effects that are desired in the use of SOA-based systems are actually social effects rather than physical ones. When a customer 'tells' an airline service that it 'confirms' the purchase of the ticket it is simultaneously a communication and a service action – two ways of understanding the same event, both actions, one layered on top of the other, but with independent semantics" [OA06, p.32]. Compared to our three perspective view, OASIS focuses on abstraction and access restriction (of mainly software services). Lusch [Lusch08], on the other hand, emphasizes the co-creation of value perspective and argues that it is paramount for a so called service-dominant logic, which can be contrasted with a goods-dominant logic.

An additional motivation for the work presented here was inspired by a language problem identified by Wittgenstein [Wit33]. He contends that a word is defined by its use, that it can be used in different ways, and that there is no usage characteristic that is common for all these ways. He likens the different uses with a family of meanings of the word. In the context of services, this is particularly problematic since no common agreed upon definition of the term exists and the natural language terms used are often misleading. Analysing services along the dimensions co-creation, abstraction and restriction mechanisms makes it possible to distinguish between similarly labeled but different concepts. For instance, a 'health care- insurance-service' is different from a 'burglar insurance service' (the latter refers to the dimension of customer participation and hence is not a service process). The analysis also shows that it is not meaningful to classify entire industrial sectors such as entertainment, restaurants, insurance, rental-services, etc. as belonging to the service sector. Any industrial sector rather offers service resources as well as other kinds of resources. Our analysis can be used as an instrument to classify what resources and processes in the sectors that are service resources and service processes, respectively.

In addition to their theoretical contributions, we believe that the results of the paper will find applications in structuring service descriptions and developing service classifications. Further research will investigate these issues as well as consolidate the proposed model.

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