Unified Service Description Language (USDL) Participants Module

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Abstract. This document describes the Participants Module in the third version of the Unified Service Description Language (USDL). USDL was developed as a holistic approach to describe entities provisioned into service networks; an approach, which considers and connects business, operational (functional) and technical aspects of service description. The Participants Module covers concepts that relate to the actors participating in the network provisioning, delivery and consumption of services and service bundles.

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1 Introduction

As outlined in the central document of this series *"USDL Overview"*, services are becoming the backbone for electronic commerce. Especially the trend to provision IT-based services outside company "firewalls" with the help of intermediaries is on the increase, as it allows organizations to take new opportunities relatively quickly. In this context services are seen as tradable entities that constitute a well-defined, encapsulated, reusable and business-aligned set of capabilities. The term business service is used for such services, in order to distinguish them from other types, e.g., those that are provided in a service-oriented IT infrastructure within an organization.

The Unified Service Description Language (USDL) defines a way to describe services from a business and operational point of view and align this with the technical perspective. While the latter is captured quite well by existing service description languages, USDL explicitly enables to express business characteristics set by an organization. Their purpose is to provide means for consumers to invoke and use business services, and for intermediaries to (re)use and repurpose services. A detailed explanation of the scope and objectives of USDL is given in *"USDL Overview"*.

USDL on a whole is made up of a set of modules, each addressing different aspects of the overall service description. Modularization was introduced to improve readability of the model, which drastically grew in size compared to its predecessor. The modules have dependencies among each other (shown in Figure 1), as they may reuse concepts from other modules. Currently, there are 9 modules in the set that constitutes USDL version 3.0.

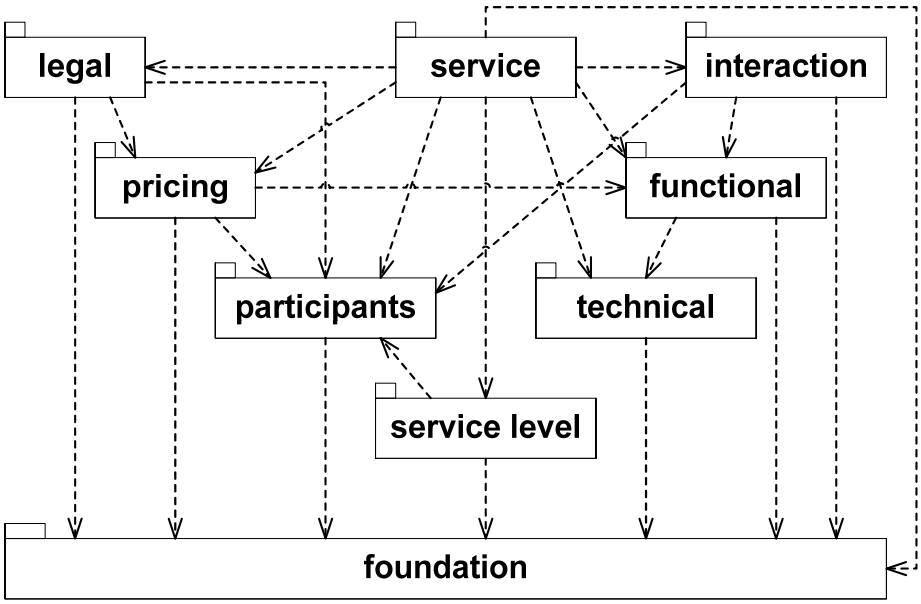

Figure 1 Packages comprising the USDL model and their dependencies (represented as arrows)

About this document

The USDL meta-model is formally defined in Ecore (the meta-modeling language of EMF), with each USDL module being captured in a separate package. This document is one in a series of USDL documents and covers the Participants Module defined in package “participants”. The series also includes:

- *USDL Overview*
- *Module-specific documentation of the modules Foundation, Service, Functional, Technical, Interaction, Pricing, Service Level, and Legal*

The document only provides insights into the concepts of the Participants Module. For a complete overview of USDL it is recommended to also consider the other documents of the series.

2 Overview

2.1 Introduction to the Participants Module

The provisioning, trade, delivery and consumption of services or service bundles through service networks are all part of a process that potentially involves a multitude of parties or actors. The one actor that holds governance and operational responsibility for a service is commonly referred to as *service provider*. It controls how the service is provisioned to consumers, e.g., what are the organizational and system resources used, or how it is implemented. In most cases the provider will also act as the trading partner to consumers and define business aspects of delivery. However, there are scenarios in which this function is performed by another legal entity – here called a *business owner*. This could be, for example, a national subsidiary of a multi-national organization (providing the service).

Especially in diversified service networks, there are often entities other than the provider that hold stakes in a service. For example, composite services are aggregations that comprise services from different providers. Each aggregated provider performs part of the composite service and hence becomes a stakeholder of the composite. This is due to the fact that it is the providers, who largely control the terms of engagement with aggregators regarding the re-use or re-purposing of their services. In other words, they have a certain influence on the composite service. Further examples of stakeholders include regulation bodies, such as governments or industry associations, which have the authority to prescribe certain aspects of service delivery. There are also third-party providers of delivery functions (e.g., billing or authentication) that can be orchestrated with a service enabling the outsourcing of these functions. All these actors are associated with dedicated parts of the provisioning and delivery of a service and are summarized here under the term *stakeholder*.

A group of actors similar to stakeholders are *intermediaries*. Like providers of delivery functions, they, too, provide value-adding services. The difference is that they are involved in the provisioning and delivery of services on a holistic level, i.e., the operations they perform encompass the entire service, not just a partial function.

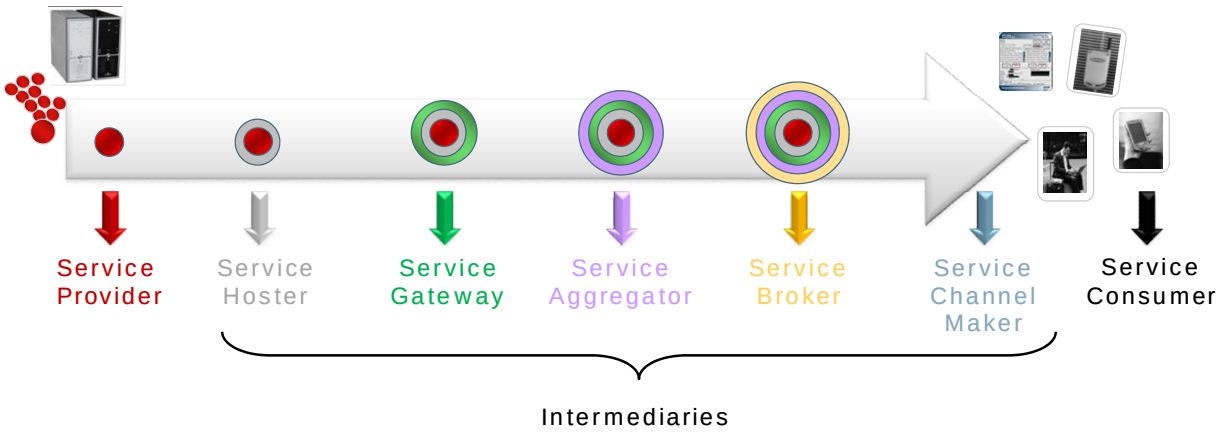

Figure 2 Roles in the SAP Research Business Web and Internet of Services activities.

In the context of the Internet of Services and Business Web activities spearheaded by SAP Research, specific intermediaries are introduced (cf. Figure 2). These intermediaries have to be understood as one possible set of architectural roles, with each role conceptualizing a certain behavior or mode of operation requiring a specific set of applications and tools. Parties act in one or several of these roles while operating in service networks. Please note: For the use of USDL it is not required to follow this role model.

The *Service Hoster* is an example for an intermediary that catalogues special types of services, namely infrastructure-as-a-service and platform-as-a-service offerings (commonly termed *cloud computing services*). It also provides means to uniformly interface with the providers of these services, i.e. re-hosts services through cloud computing environments. Likewise, the *Service Gateway* is a specific intermediary that provides interoperability through cataloguing and interfacing with a choice of a 3rd Party B2B gateway, which provide services like message translation and store-forward processing. The *Service Aggregator* provides added value by packaging and combining services. In addition, the *Service Broker* cares for central service publication, discovery, and ordering. Finally, the *Service Channel Maker* is positioned at the consumer end of the service provisioning chain where services are channeled into user environments and consumed.

2.2 General Module Information

Parameters of the package that captures the module

- Namespace: *http://internet-of-services.com/usdl/modules/participant*
- Name: *participant*

The remainder of this section describes the classes and enumerations that are part of the package. A class diagram of the package is depicted in Figure 3. The diagram shows which associations are compositions and which ones are normal relationships. Associations not shown are assumed to be of type composition by default.

Note: Example fragments are provided for some of the classes. In order to improve readability they are presented in XML-based pseudo syntax. This is NOT the official USDL syntax, which is still under development. However, there currently exists a serialization format that is XMI-based and supported through a USDL editor developed by SAP Research.

2.3 Module Dependencies

In order to understand concepts from referenced USDL modules in detail, it is recommended to read the following documents, which cover other USDL modules:

- Foundation
- Service

A quick overview of the concepts used in the Participants Module is given below. This will avoid extensive jumping between documents.

Name	Type	Module	Description
NetworkProvisionedEntity	Abstract EClass	Service	The central concept of the USDL model that represents all entities provisioned into a service network, e.g. service or service bundle
IdentifiableElement	Abstract EClass	Foundation	Serves as the super type of all USDL classes that can be uniquely identified, either globally or within a certain namespace
Description	EClass	Foundation	A generic concept that provides various information elements to describe objects of USDL classes
Agent	Abstract EClass	Foundation	Serves as the super type of all concrete objects that can participate in the delivery of a network provisioned entity
Organization	EClass	Foundation	A concept that represents institutional legal entities
Person	EClass	Foundation	A concept that represents human legal entities
Classification	EClass	Foundation	A generic concept that can be used to classify USDL objects into defined classification systems

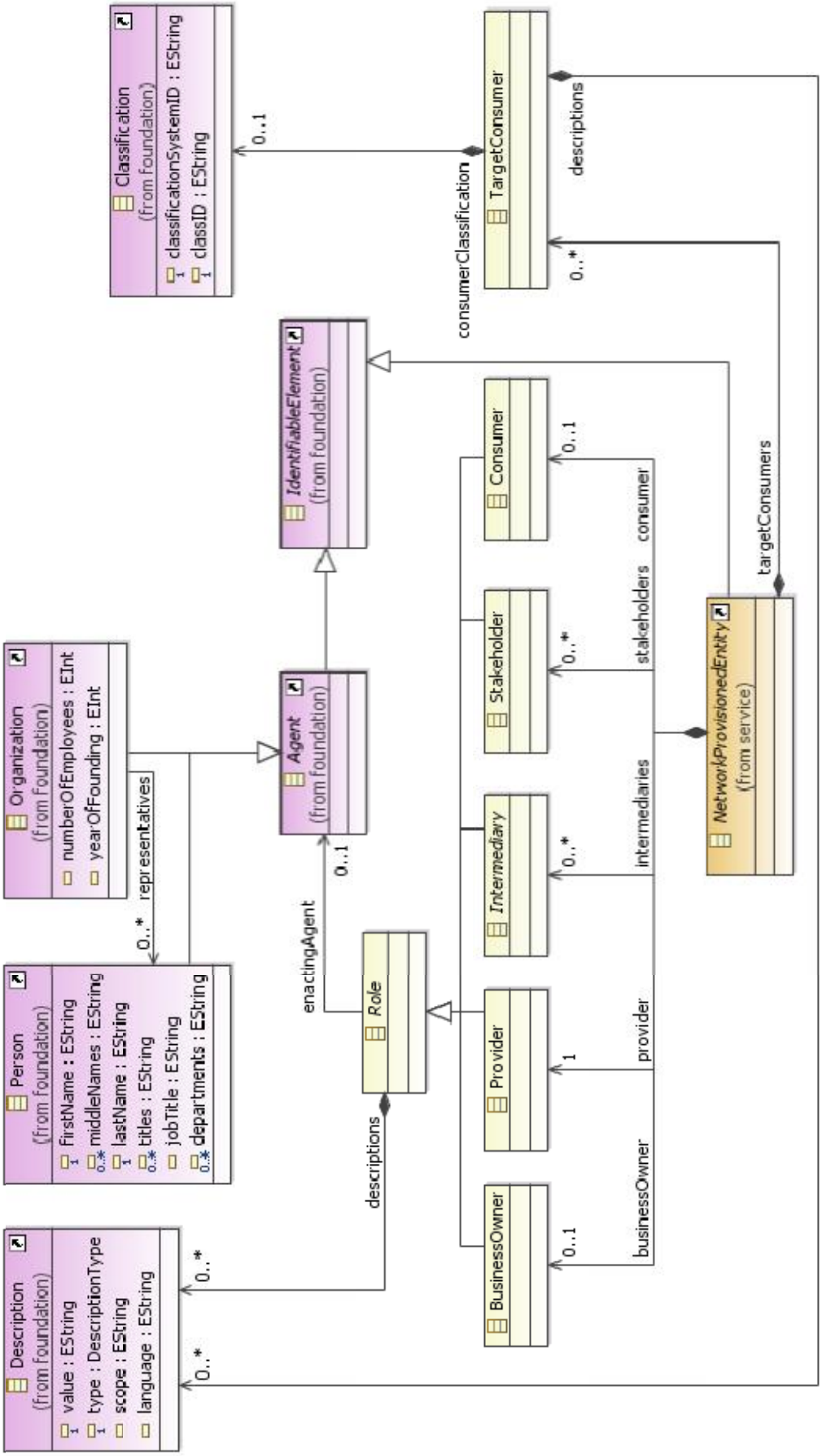

Figure 3 Class diagram of the package that captures the Participants Module

3 Participants Module: Model

3.1 NetworkProvisionedEntity

(Continued from Service Module)

There are a number of agents/parties that possibly participate in the provision and delivery of network provisioned entities, i.e., services or service bundles exposed in a service network. Only network-level agents are considered here, as USDL is limited to network-level aspects of service description. Agents assume a specific role when participating.

- Ecore Type: Abstract EClass
- Interfaces: Composable, DependencyTarget
- Superclass: IdentifiableElement

NetworkProvisionedEntity			
Relations			
Name	Type	Cardinality	Description
provider	Provider	1	The provider of the service or service bundle
businessOwner	Business Owner	0..1	The optional business owner of the service or service bundle
intermediaries	Intermediary	0..*	The optional set of intermediaries that participate in provisioning and delivery of the service or service bundle
stakeholders	Stakeholder	0..*	The optional set of stakeholders that can influence provisioning and delivery of the service or service bundle
consumer	Consumer	0..1	The optional customer of the service or service bundle OR, alternatively, the abstract representation of the customer
targetConsumers	Target Consumer	0..*	The optional set of user groups at which the service or service bundle is targeted

3.2 Role

Role serves as the super type of all concrete USDL classes that represent roles found in a service network (e.g., service provider). Agents participating in the provisioning and delivery of a network provisioned entity perform distinct functions, which define their role.

Roles may either be bound to a concrete Agent or may be used as placeholders. The latter is necessary, if the service is in a stage where some agents are yet to be determined. For example, a service may specify that there needs to be a B2B gateway in order to deliver the service to a consumer. Which gateway provider will be chosen, however, depends on the message/interface standards supported by a consumer and the consumer's preferences.

- Ecore Type: Abstract EClass
- Interfaces: N/A
- Superclass: N/A

Role			
Relations			
Name	Type	Cardinality	Description
enactingAgent	Agent	0..1	Reference to the agent that assumes the role
descriptions	Element Description	0..*	Set of (additional) descriptive information about the enacting agent in the context of the role, possibly in multiple natural languages

Examples (in pseudo concrete syntax)

```
<service>
...
 <provider xsi:type="participants:Provider" xsi:id="prov321">
  <!-- reference to the description of the organization acting as the provider -->
  <enactingAgent> urn:uuid:660a9221-c29b-41d4-b723-552211771234 </enactingAgent>
  <descriptions>
   <description>
    <value> Moonbank Services </value>
    <type> name </type>
    <language> en </language>
   </description>
  </descriptions>
 </provider>
...
</service>
```

3.3 Provider

Provider represents the entity that holds governance and operational responsibility for a service in terms of organizational structures and business aspects, as well as systems and other implementation artifacts.

- Ecore Type: EClass
- Interfaces: N/A
- Superclass: Role

3.4 BusinessOwner

BusinessOwner represents an entity that shares some of the responsibilities of the provider regarding interaction between provider and consumer. Business owners can be understood as sales channels with custodial ownership of services.

Example: A Software-as-a-Service provider that operates globally sells its services through national subsidiaries, which are different legal entities. Consumers interact with the subsidiaries (business owner) but services are delivered by the parent company (provider). A subsidiary is the main partner in sales contracts, provides support and is addressed in case of liabilities.

- Ecore Type: EClass
- Interfaces: N/A
- Superclass: Role

3.5 Intermediary

Intermediary represents entities that do not have ownership of a service, but which have a delivery or third-party provisioning role for the whole service. Examples of intermediaries have been introduced in the overview section of this module.

- Ecore Type: Abstract EClass
- Interfaces: N/A
- Superclass: Role

3.6 Stakeholder

Stakeholder represents entities that do not have ownership of a service. They either have a vested interest in influencing or regulating the service's delivery, or are involved in the provision and delivery of parts of the service. Examples of service stakeholders include the following:

- Providers of services that are aggregated into a composite service
- Governmental authorities that regulate how a service has to be delivered
- Providers of third-party services that are concerned with dedicated outsourced delivery functions, e.g. billing, invoicing, authentication

- Ecore Type: EClass
- Interfaces: N/A
- Superclass: Role

3.7 Consumer

Consumer most often serves as an abstract placeholder for concrete consumers in order to express requirements of consumption to parties interested in using the service. On prominent example of this are service level guarantees obligated to consumers, e.g. employing a particular encryption scheme during communication with the service. Once the service is offered to an actual consumer, this role can be resolved to a concrete Agent (association *enactingAgent*). This makes sense if USDL is used during contract establishment where a copy of the USDL description of the offered service provides reference data to the service contract.

3.8 TargetConsumer

TargetConsumer is used to capture information about user groups that are targeted, e.g. by the provider, to consume the service. Besides informal description, a target consumer can be associated with a classification of consumers. The idea behind this concept is to reference taxonomies of consumers that are created by a governing body of the service network where the service is provisioned to. This would then enable machine processing of this information, e.g., to apply price models only to certain user groups. Note that the actual service consumer is only available in a later phase of the service lifecycle (during the service value exchange), and, therefore, out of scope for USDL.

- Ecore Type: EClass
- Interfaces: N/A
- Superclass: N/A

TargetConsumer			
Relations			
Name	Type	Cardinality	Description
consumerClassification	Classification	0..1	The reference to an entry in a user group taxonomy
descriptions	Description	0..*	Set of (additional) descriptive information about the target consumer group, possibly in multiple natural languages