# UNIFIED SERVICE DESCRIPTION LANGUAGE

## Information Sheet

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# About USDL

In the context of the Internet of Services, a service is seen as tradable entity that constitutes a well defined, encapsulated, reusable and business-aligned set of capabilities. The term business service is used here, in order to distinguish such services from other types, e.g. those that are provided in the service-oriented IT infrastructure inside an organization. This does not mean that automated services are excluded. In fact, many Web services externalize business functions. The difference lies in where services are provisioned to and which aspects of service delivery have to be considered.

Service delivery in cross-organizational business networks has a number of challenges – among them service description, caused to a large extent by the evolution of service-based systems. SOA and Web services have mainly served as technological solutions that enable enterprise functionality to be made available to users as shared and re-usable services on a network. Traditional metadata that describes services intended for these application integration purposes is based on specification languages that were developed in combination with the early service-based system architectures (SOA and Web services). These languages, e.g. WSDL and BPEL, only target the description of technical characteristics of services. This is not sufficient to support solutions for the Internet of Services, which is built on the notion of business services. Business services have a much coarser grain than typical Web services, mainly because they are concerned with the end-to-end delivery of an added value and outcome. They are delivered by a provider to a consumer possibly over a specified period of time, a payment structure, a service level agreement, and related legal obligations of the consumer and the provider. Ultimately, they may be realized by a technical service, but there is definitely the need for more than the technical description of a Web service interface.

Research on additional service metadata has been conducted in various directions since the early days of SOA. However, results so far remain insufficient, insofar as they still do not address the whole continuum of business and technical services. For example, specifications of non-functional properties or quality of service are too limited in scope. They only provide a snapshot into the continuum and often enough are located at the technical end. More comprehensive service ontologies suffer from the same problem. There are initiatives like OWL-S and WSMO, which are closely related to technical Web Service standards. At the other end, we find business-focused ontologies, e.g. E3Service ontology or PAS 1018. One type of specifications that bridges the gap to a certain extent, are domain-specific industry standards, e.g. ebXML or RosettaNet. Even so, while they do cover technical and business aspects, they lack generality.

In summary, the downside of current service specifications is that the gap between the business and the technical perspectives is still open. Nonetheless, for enterprises, the true value of services can only be achieved when their business nature and characteristics can be suitably described, made available to consumers, and aligned with the IT perspective. In other words, there is no unifying approach for the description of generic (business) services that captures and aligns business, operational and technical characteristics. In order to overcome this shortfall and provide what is an important building block of the Internet of Services, we propose a new conceptual model to describe services. The language is called Unified Service Description Language (USDL).

USDL originated in the German lighthouse project Theseus/TEXO, which produced two iterations of the language. Meanwhile other research projects in Europe and Australia have heavily contributed to what is now the 3rd iteration, called USDL v3.0.

USDL builds on models for describing business and technical services, and creates a unified description of related research efforts. The purely business description of services has been driven by research on the E3Service ontology, PAS 1018, and the taxonomy of non-functional properties of services identified by O'Sullivan. From the technical side, the most significant proposals to describe services that have influenced USDL include WSDL, WSMO, and OWL-S. Additionally, USDL introduces a new dimension called the operational perspective. This perspective acquires a special importance when several participants are involved in the provision of a service.

It should be pointed out that USDL is not meant to replace other specifications in the technical service stacks, but aims to complement them by adding necessary business information. On the other side, it was not designed for targeting automated services only. USDL is generic enough to be used for the description of manual services that have no technical implementation. The general design principle was to create a unifying entry point into the overall

set of service metadata, which in the end, comprises several artifacts in different formats. The role of USDL is to enable a number of Internet of Services use cases, among them discovery/matchmaking, aggregation and bundling. In other use cases, where it was clear that a more specialized format will be used by components of the SDF, USDL only provides an abstraction and a link to the specialized artifact (e.g. WSDL, BPEL or WS-Policy).

# USDL Structure

The Unified Service Description Language defines a model to describe services in the universe of discourse Internet of Services, and services computing in general. Capturing relevant concepts in a structured way is the main challenge of any model design. While working on USDL, three general groups of concepts were identified. Some of these concepts are shown in Figure 1.

1. Foundational concepts: These concepts cannot be associated uniquely with a single aspect of service description. They capture common entities that occur in the context of different aspects. Examples include time and location concepts, as well as organizational concepts. The foundation also comprises of general characteristics common among entities, e.g. name, description or unique identifiers.

2. Generic service description (horizontal) concepts: These concepts apply to a broader range of services without being specific to an application or a domain that exists in the Internet of Services. Examples include concepts like pricing, service availability or legal parameters.

3. Domain-specific service description (vertical) concepts: These concepts capture description aspects that are rather special, i.e. are particular to a certain application or industry vertical.

USDL is conceived as a generic language and therefore covers concepts from the first two groups. Even though USDL is thereby limited to the generic part of service description, the set of concepts to model is still quite extensive. In order to ease readability and simplify maintenance of the model, it was decided to separate it into subsets of concepts that are logically related. Relatedness in this context means: "being primarily concerned with the same aspect of service description". Thus, subsets, henceforth called modules, are aligned with the different aspects identified.

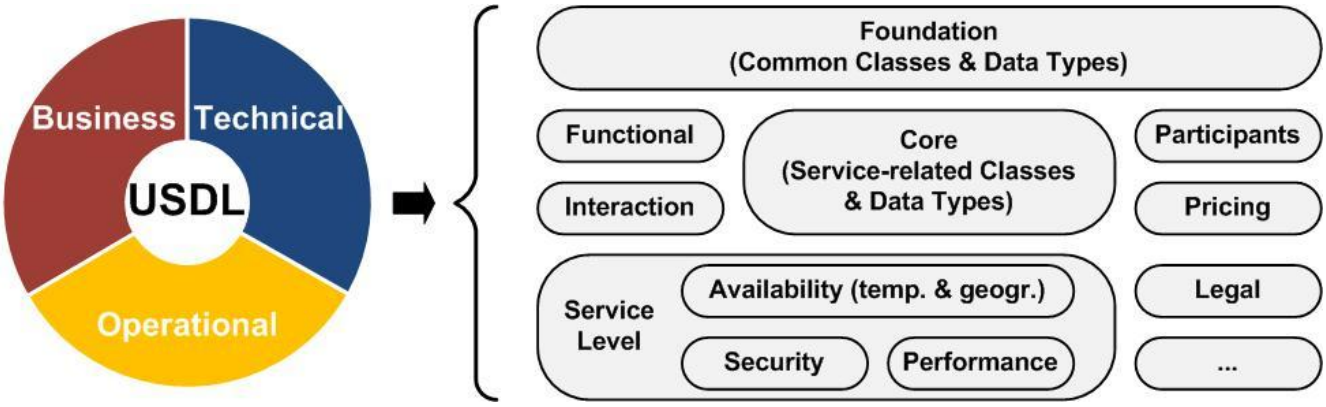


**Figure 1 – Just some of the concepts supported in USDL.**