FAA Web Service Description Ontological Model (WSDOM) – an Introduction

Federal Aviation Administration

Presented to: **Semantic Web for Air Transportation (SWAT) interest group**

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Agenda

- Context
- Problem
- Solution
- Architecture
- Application

Context

- ***SWIM -*** A technological framework for making available a wide range of capabilities in Air Traffic Management information domain through a common infrastructure of reusable and shared services with consistent application of principals of Service-Oriented Architecture (SOA).

- ***Service Description –*** A key ingredient of SOA; a document representing information that is necessary for using a service or considering using the service. The notion of service description is central to the service discovery process. For every service to be usable, a service description for this service must exist and be discoverable.

Problem

- The current service description standards (e.g., WSDL, OWS and XML Schema) operate almost entirely at the syntactic level, focusing only on describing exposed functionality (methods signatures, input/output types) and failing to capture enough semantics (i.e., they define structure, not meaning).

- The standards for free-text, human-consumable documents, (e.g., FAA's WSDD), support a sufficient amount of semantics but are not suitable for automated discovery and provide very limited support for semantic interoperability.
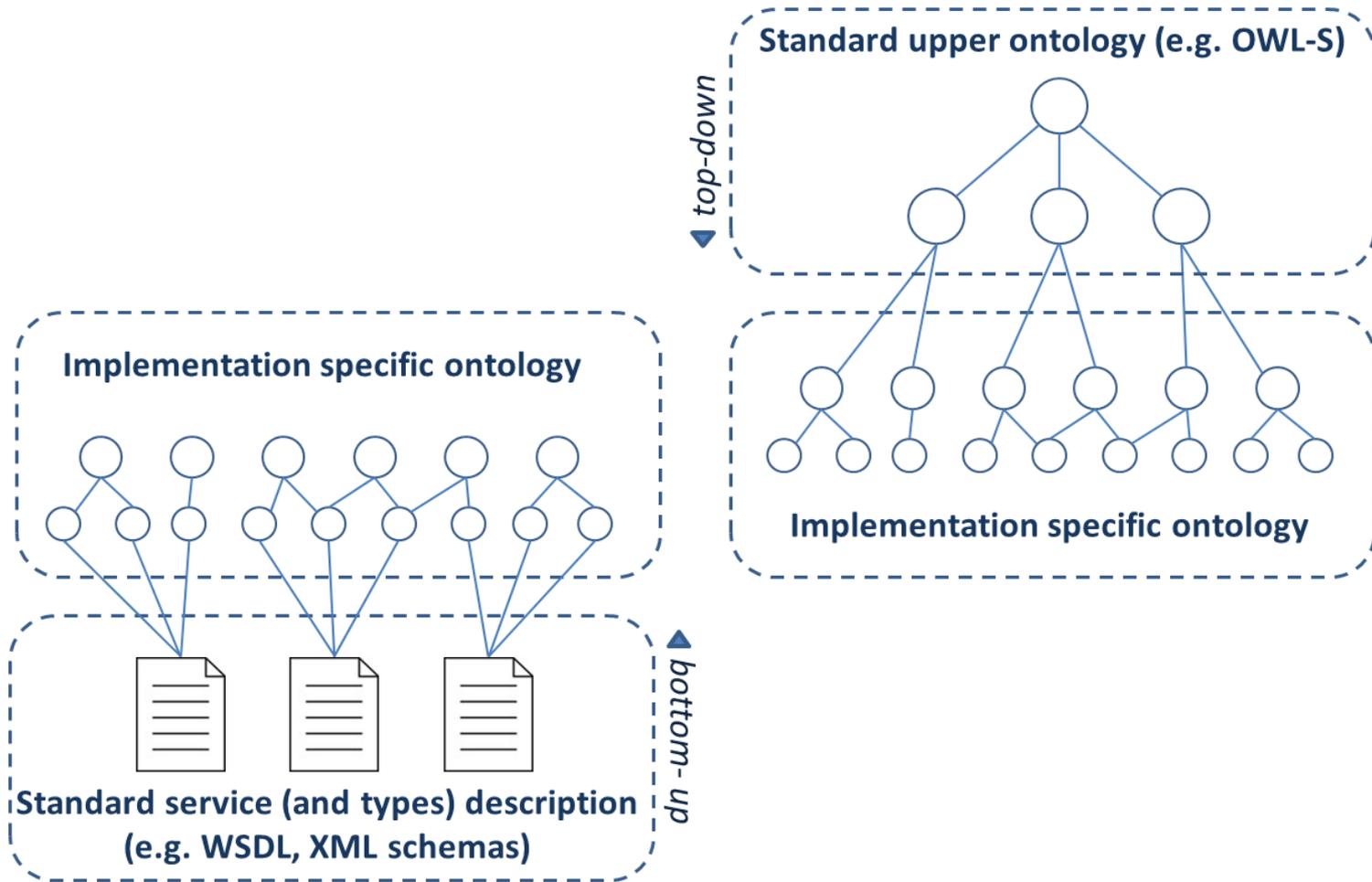
Solution

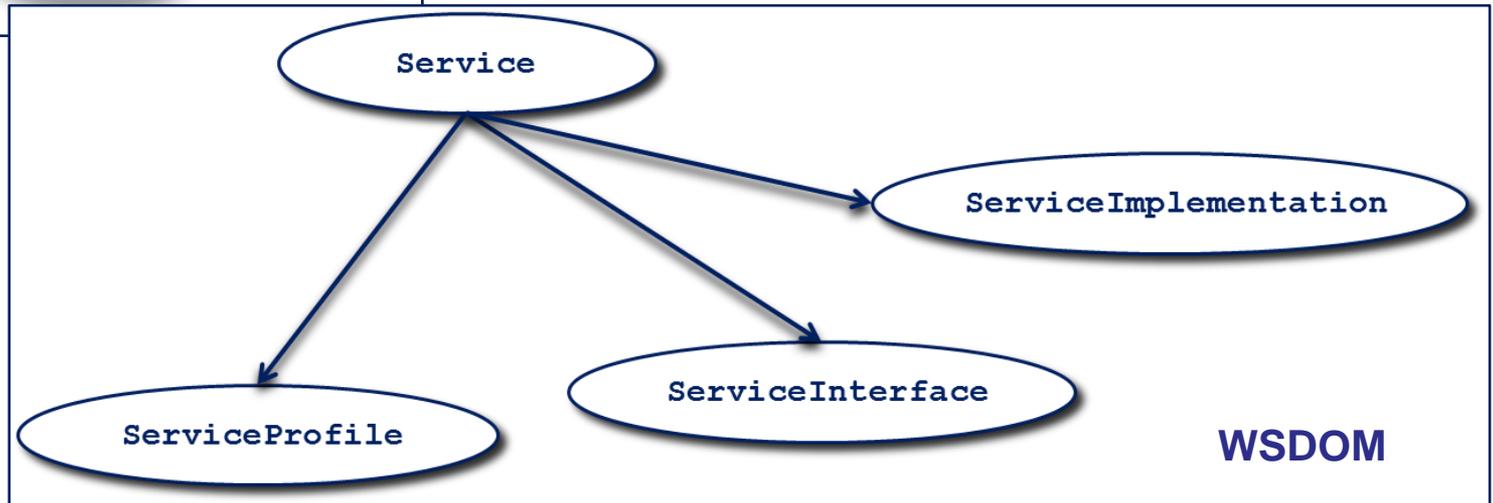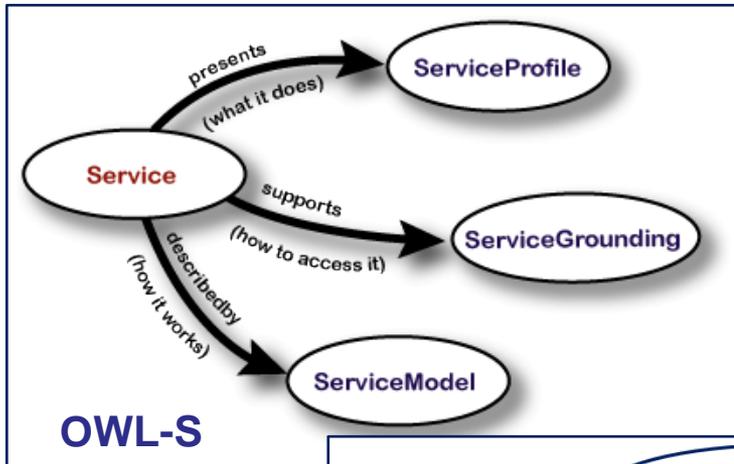Develop an ontology ("a formal, explicit specification of shared conceptualization"*) that:

- Presents all relevant aspects of services in a manner suitable for semantic software agents and humans.

- Adopts industry service description standards and models to take advantage of future adaptations by business partners and vendors.

- Is extensible, to allow linking to other ontology and semantic models developed by FAA and FAA's business partners.

- Correlates with FAA/SWIM standards and practices to ease the adaptation of Semantic Web technologies into the FAA engineering culture.

R. Studer et al, Knowledge engineering: Principles and methods. Data & Knowledge Engineering, 1998

Architectural approaches

Extending industry's open standard


OWL-S

Service
— presents (what it does) → ServiceProfile
— supports (how to access it) → ServiceGrounding
— describedby (how it works) → ServiceModel

WSDOM

Service
→ ServiceProfile
→ ServiceInterface
→ ServiceImplementation

WSDOM top level classes/ontologies

Service	Logical grouping of three major classes: ServiceProfile, ServiceInterface, and ServiceImplementation.
ServiceProfile	Describes "*what the service does*" by presenting information about the service provider, description of what is accomplished by the service and limitations on service applicability.
ServiceInterface	Describes "*how the service works*" by presenting the operations performed by the service, execution flow, messages and data exchanged by the service.
ServiceImplementation	Describes "*how the service is accessed*" by presenting the protocols, messages serialization formats, transport and addressability.

ServiceProfile ontology
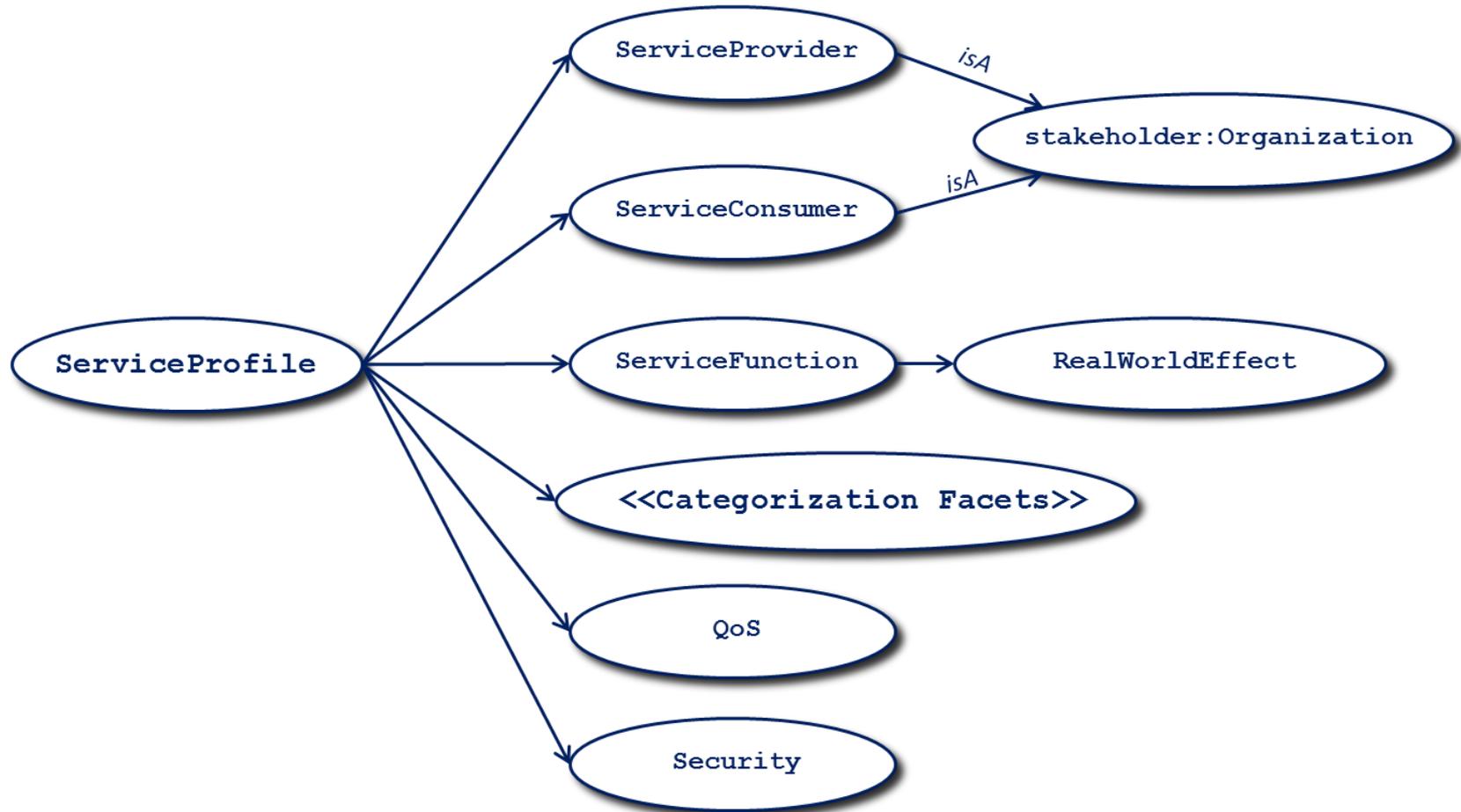
ServiceInterface ontology
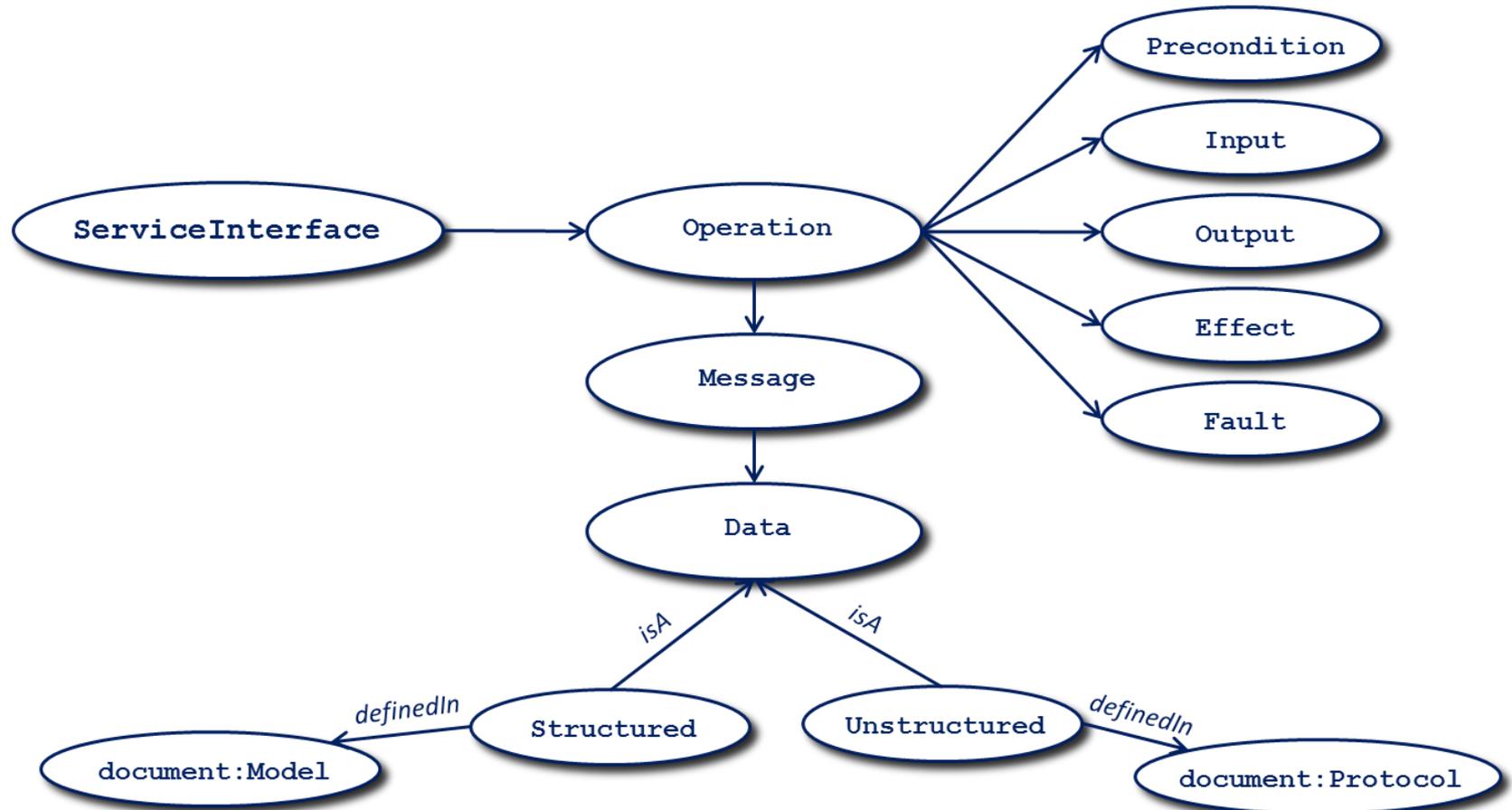
ServiceImplementation ontology

Using WSDOM

- WSDOM was used as a foundation for the development of the Service Description Conceptual Model (SDCM), a joint effort of FAA and EUROCONTROL.

- WSDOM will be used for semantic enablement of the SWIM Common Registry (SCR), also a collaboration between EUROCONTROL and FAA.

- WSDOM will be used to enhance the common, shared understanding of SOA concepts in the international communities.

References

Web Service Description Ontological Model (WSDOM) v.1.1

OWL-S: Semantic Markup for Web Services

Semantic Annotations for WSDL and XML Schema (SAWSDL)

Service Description Conceptual Model (SDCM) (Working Draft)

Utilization of Faceted Classification in the Context of the SWIM Service Registry (White Paper)

Concept of Operations (CONOPS) for the SWIM Common Registry (SCR) (Draft)