

# The Evolving Role Of Semantic MetaData In SOA Systems

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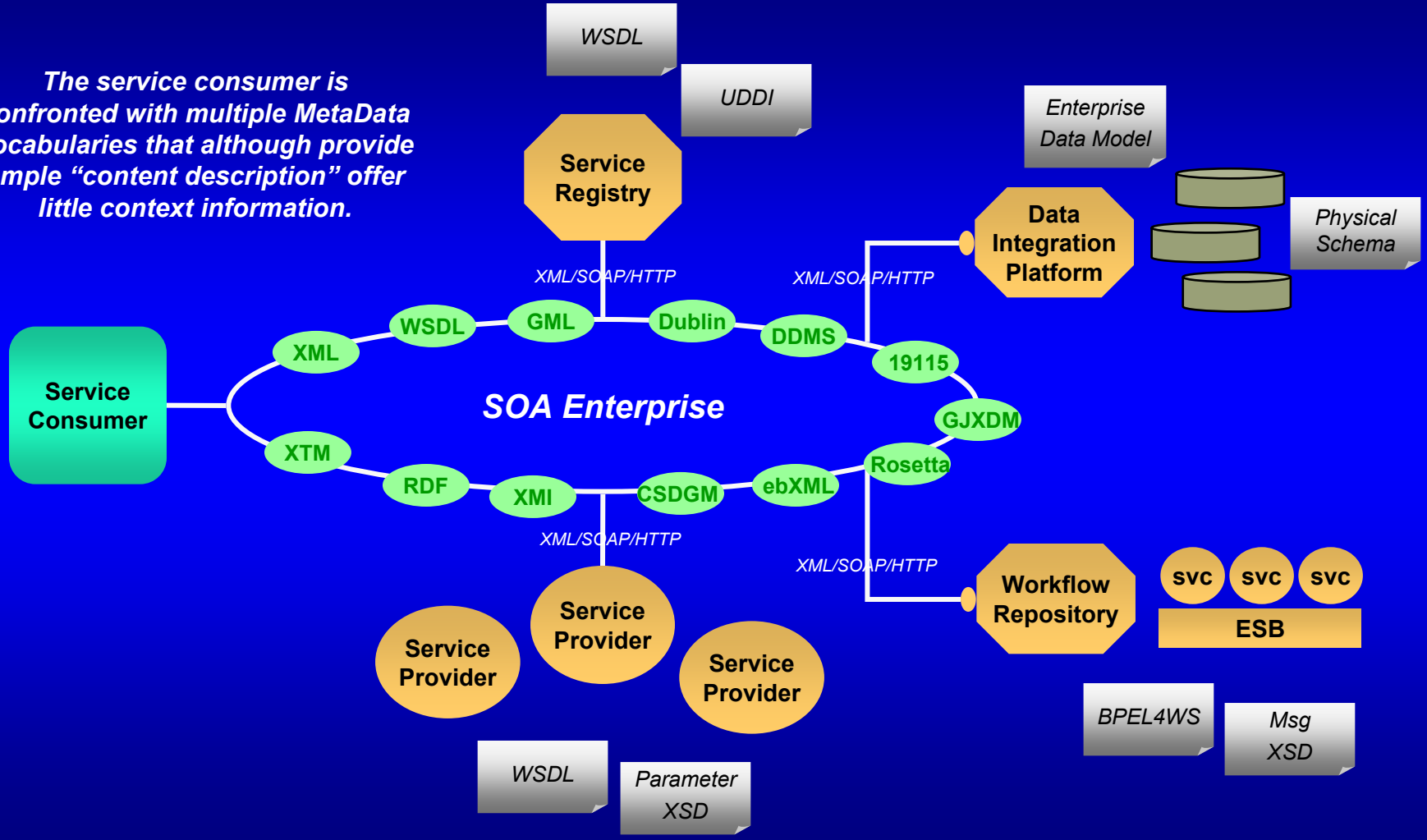
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# MetaData Across The SOA Landscape

*The service consumer is confronted with multiple MetaData vocabularies that although provide ample "content description" offer little context information.*



# Technical MetaData versus Semantic MetaData

- **MetaData plays a key role in enterprise integration**
  - XML based schemas and MetaModels have been fundamental to service interoperability and data discovery.
  - Provides the meta-layer that describes and abstracts what's in the low-level system parameters (e.g. “data describing the” ... service interfaces and data stores ).
  
- **Technical MetaData**
  - Service Type and Parameters
  - Data Format and Type (e.g. size, location, the file is a photo, map or text doc)
  
- **Semantic MetaData**
  - Contextually richer and relevant information about the content.
  - Expresses content in the language of a specific operational domain.
  - Provides information-level content (what subjects are in the photo or map, what's being discussed in the text doc, etc.)

# SOA Issues Driven By Technical Metadata Limitations

## ▪ Service Discovery

- Dynamic service discovery and interaction is highly complex if attempted via service interface description alone
- Dynamic system composition adds several levels of complexity above the service discovery

## ▪ Information Discovery

- MetaModels tend to focus on low level data-centric parameters
- Common MetaData defines data format, content and coverage. It lacks information level context which leaves the enterprise in a “raw state” (e.g. “services and data for what and why” ).

## ▪ Cross Community Information Sharing

- Multiple domain meta-models and vocabularies inhibit collaboration and enterprise re-use
- Service descriptions are highly parametric and lack semantic context making it difficult (if not impossible) for “cross-domain introspection and conceptualization”
- Very complex. In addition to requiring technology to establish a semantic model this also requires technology to introspect and merge disparate community models.

# Some Evolving Technologies Supporting Semantic MetaData

## Service Interface Definition

### ▪ WSDL-S

- IBM/University Georgia LSDIS proposal. Leverages work from the METEOR-S Project.
- Adds semantic annotations to the WSDL standard by extending the metamodel.
- Augments service expressivity similar to service profile and process concepts in OWL-S
- Agnostic to semantic representation language by externalizing the ontology model

### ▪ OWL-S (formerly DAML-S)

- Being developed by the Semantic web services arm of the DAML program (Built on of W3C OWL)
- Provides a core set of markup language constructs for describing the properties and capabilities of the Web services in computer-interpretable form.
- Extends WSDL (types, messages, operation and binding) to allow services to use OWL classes
- Defines profile and process models for a service (what the service does and how it works).

## Semantic Modeling

### ▪ WSMO Working Group

- WSML/WSMF: Web Services Modeling Ontology/Language/Framework
- Provides a core ontological model to derive upon.
- [wsmo.org](http://wsmo.org)

### ▪ ODM

- OMG's Ontology Definition MetaModel
- Facilitates Semantic Modeling Of SOA systems
- Generate OWL files for populating semantic repository's
- [omg.org](http://omg.org)

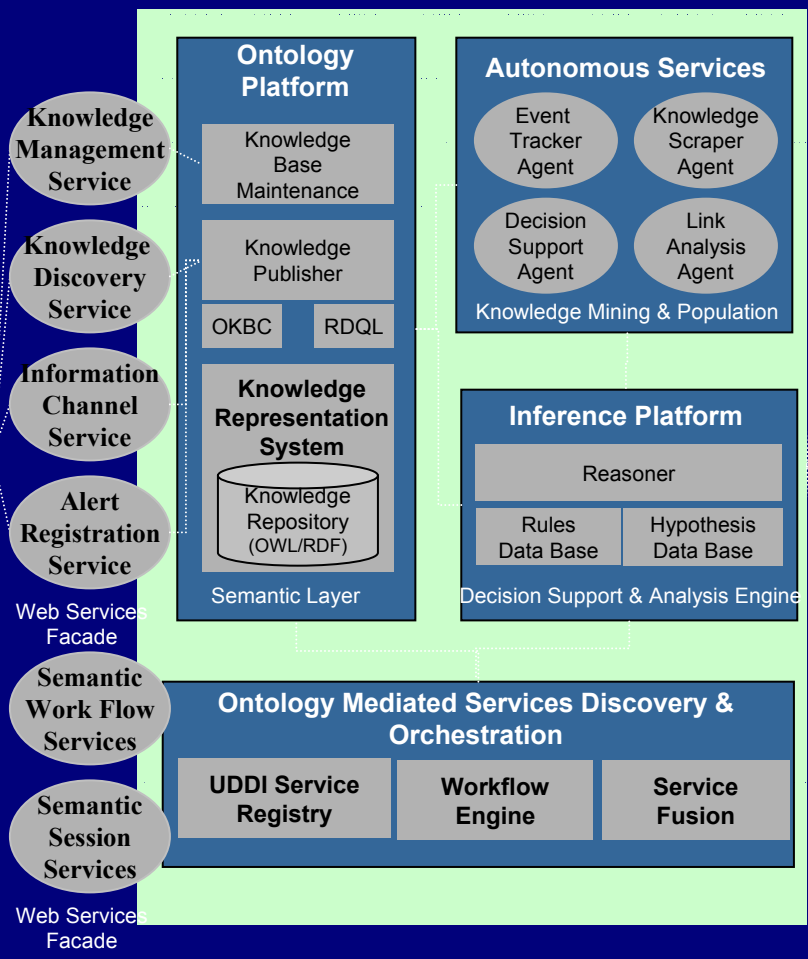
# Integrating Enterprise Platforms Using Semantic MetaData

## BAE's Knowledge Broker Prototype

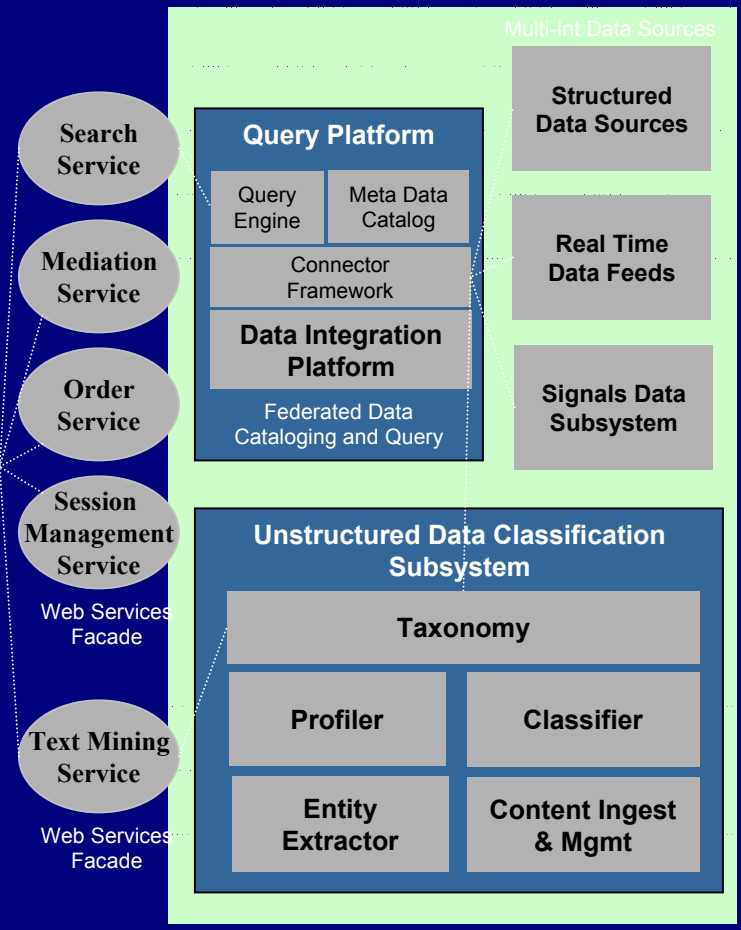
### Knowledge Portal



### Knowledge Representation & Inference



### Data Integration & Classification



# Summary

- **Several methodologies are evolving for semantically annotating Web Services**
  - WSDL-S from the web services community
  - OWL-S from the knowledge representation community
  - Various vendor extensions to UDDI
  
- **Semantic query languages are needed to introspect semantic models and fully enable dynamic service discovery and composition**
  - XQuery and SQL are in play for current structured systems
  - OWL-QL, RDF Query Languages (SiRPAC, RDQL, RQL, etc) and others are in transition for semantic query
  
- **Platform integration issues remain as system integrators must glue together data integration platforms, workflow orchestration platforms, semantic metadata engines and unstructured data classification engines.**
  - Several vendors are working to merge solutions that encompass the Data Integration backbone, Workflow/ESB engine and the Semantic Data engine.
  
- **Adding Web Service Semantics to provide operational context is key in enabling dynamic service discovery and enterprise business integration**
  - More than just a technical need, it adds domain specific context .