Taxonomies and value sets

Discussion paper

November 2003

Wellington

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Abstract:

This paper presents a discussion on a new approach to ontologies, taxonomies and value sets in UDDI in relation with the Semantic Web.

1 Introduction

UDDI uses taxonomies and value sets, but there is no clear distinction between the two from UDDI perspective. The functionality and features of UDDI value sets and taxonomies are limited and do not always meet customer requirements. As a result, UDDI TC produced a new requirements document http://www.oasis-open.org/committees/uddi-spec/doc/req/uddi-spec-tc-rq011-14-20031030.doc.

At the same time, Semantic Web activities are gaining momentum and moving from academia to the practical implementation field. It may be important for UDDI to align our approach to taxonomies and value sets with this new stream.

This document discusses some possible options.

1.1 Terminology

Taxonomy

A classification system

Ontology

A description of concepts and their relationships

Value set

A set of values that do not form any particular structure

For the purpose of this document Taxonomy and Ontology represent the same concept and can be used interchangeably.

1.2 Knowledge representations

Formal knowledge representation is outside of scope for UDDI, but somehow, UDDI should provide an option to use external knowledge representation to provide semantics for its entities.

At present, knowledge can be formalised as ontology or taxonomy (RDF, OWL, XTM). Resources may have metadata (RDF) to link to that knowledge.
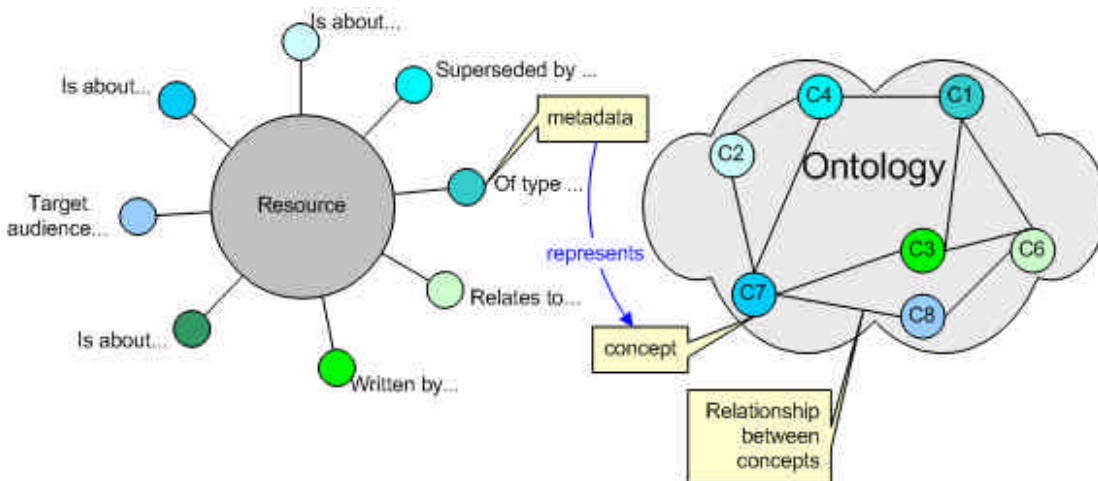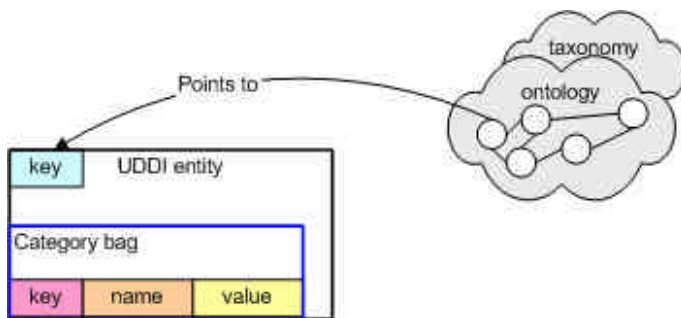

Consider that any UDDI entity can be thought of as a resource with metadata.

2 Use of ontology and metadata with UDDI entities

There are two options how UDDI entities can be linked to ontologies:

1. Ontology elements reference UDDI entities
2. UDDI entities reference ontology concepts, relationships or other elements

2.1 Option 1: Ontology ⯈ UDDI

An external ontology describes some concepts as well as UDDI entities and points to the entities using their keys. The ontology may also need to specify the registry containing those entities.

2.1.1 Issues:

Ontology becomes tightly coupled with a particular instance of a UDDI registry.

Validation – UDDI must understand ontology or use an external provider for validation.

Changes in the registry must be reflected in the ontology, e.g. a UDDI entity seized to exist, but still being referenced from the ontology.

2.1.1.1 Benefits:

Reasoning engines have more information about the entities to work with without querying UDDI.

2.2 Option 2a: UDDI ⯈ Ontology
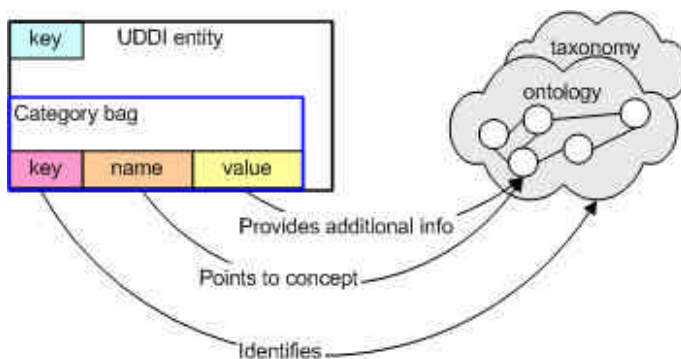
Ontology describes concepts and may be unaware about UDDI or UDDI entities. UDDI key-name-value triple provides a reference to the ontology thru its values. E.g. ontology concepts are

48   likely to have IDs, then KEY may identify the ontology (thru a tModel key), NAME may provide the
49   ID of the concept and VALUE may provide a key of another UDDI entity if the concepts
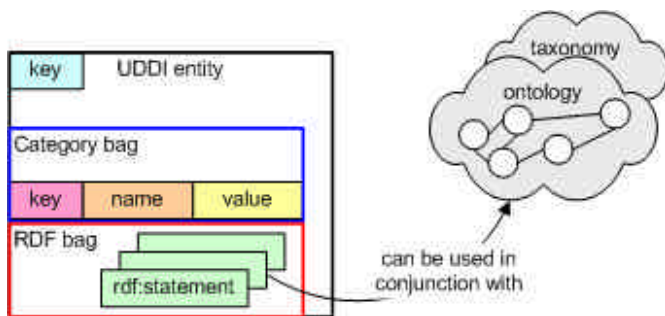50   designates a relationship.

51   2.2.1 Issues:

52   Validation – UDDI must understand the ontology or use an external provider for validation.

53   2.3 Option 2b: RDF bag ₽ Ontology

54   UDDI may have an additional RDF container next to the category and identifier bags.

55   RDF statements may be conformant to a particular RDF schema or be a free set.

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58   2.3.1 Issues:

59   Registry must understand RDF

60   RDF query language may be required.

61   Validation – UDDI must understand RDF schema or use an external provider for validation.

62   2.3.2 Benefits:

63   Rich metadata with every entity

64   Any standard can be used for ontology

65   UDDI does not need to understand ontology

66   Consistency with the Semantic Web

## 67   2.4 Option 2c: UDDI – Value Set ₽ Ontology

68   This option is similar to Option 2a: UDDI $\Rightarrow$ Ontology, but the UDDI Registry is unaware about
69   ontology and does not need to understand it.

70   Ontology provider supplies a value set that corresponds to the ontology.

71   Registry uses the value set for validation

72   Key-name-value triples used to link the entity to the ontology,

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74
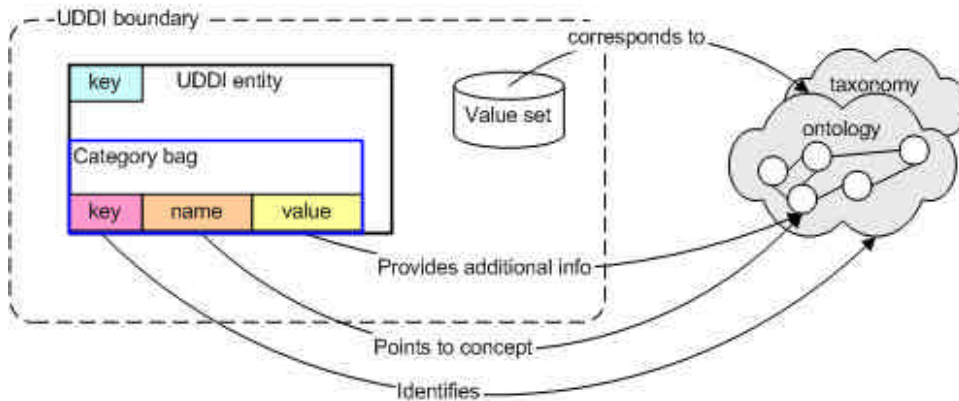
2.4.1 Issues:

76 Ontology has complex structure and the value set is flat – it may lead to some loss of information
77 or some combinations of key-name-value triples may be invalid for the ontology.

2.4.2 Benefits:

79 Any format can be used for ontology

80 UDDI does not need to understand ontology

81 Validating against a value set should not present any difficulties

2.5 UDDI Client

83 UDDI client has to understand ontologies and display them on the screen if the users are
84 humans.

85 Reasoning engines acting as UDDI clients do not need to display ontologies – they need to
86 understand only.

87 UDDI clients do not depend on the implementation of UDDI servers, but to work with the entities
88 efficiently clients have to understand the ontologies and taxonomies used with those servers.

89 UDDI client may provide currently available discovery functionality without understanding
90 ontologies.

2.6 Standards

92 Vendors for UDDI client software may need to enable these technologies in their products:

93 **RDF**

94   resource description framework.
95   Can be used for metadata with a resource. Can be used for taxonomies and ontologies,
96   but with some serious limitations

97 **OWL**

98   Web Ontology Language.
99   Can be used for taxonomies and ontologies

100 **XTM**

101   Topic Maps.
102   Can be used for taxonomies and ontologies

3 References

RDF

Resource Description Framework
http://www.w3.org/RDF/

OWL

Web Ontology Language by W3C Web-Ontology (WebOnt) Working Group
http://www.w3.org/2001/sw/WebOnt/

XTM

eXtensible Topic Maps
http://www.topicmaps.org/xtm/1.0/

Topic Maps

ISO/IEC 13250:2000 standard
http://www.y12.doe.gov/sgml/sc34/document/0322_files/iso13250-2nd-ed-v2.pdf

Semantic Web

W3C Activity
http://www.w3.org/2001/sw/

The Semantic Web lifts off

by Tim Berners-Lee and Eric Miller
http://www.ercim.org/publication/Ercim_News/enw51/berners-lee.html

Semantic Service and UDDI

A Preliminary Report of a Public Experiment of a Semantic Service Matchmaker
combined with a UDDI Business Registry
http://www-2.cs.cmu.edu/~softagents/papers/ICSOC03.pdf