Federal Aviation Administration

The SWIM Controlled Vocabulary

A Semantic Approach to Clarifying SWIM Terminology

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

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Date: **August 24, 2015**
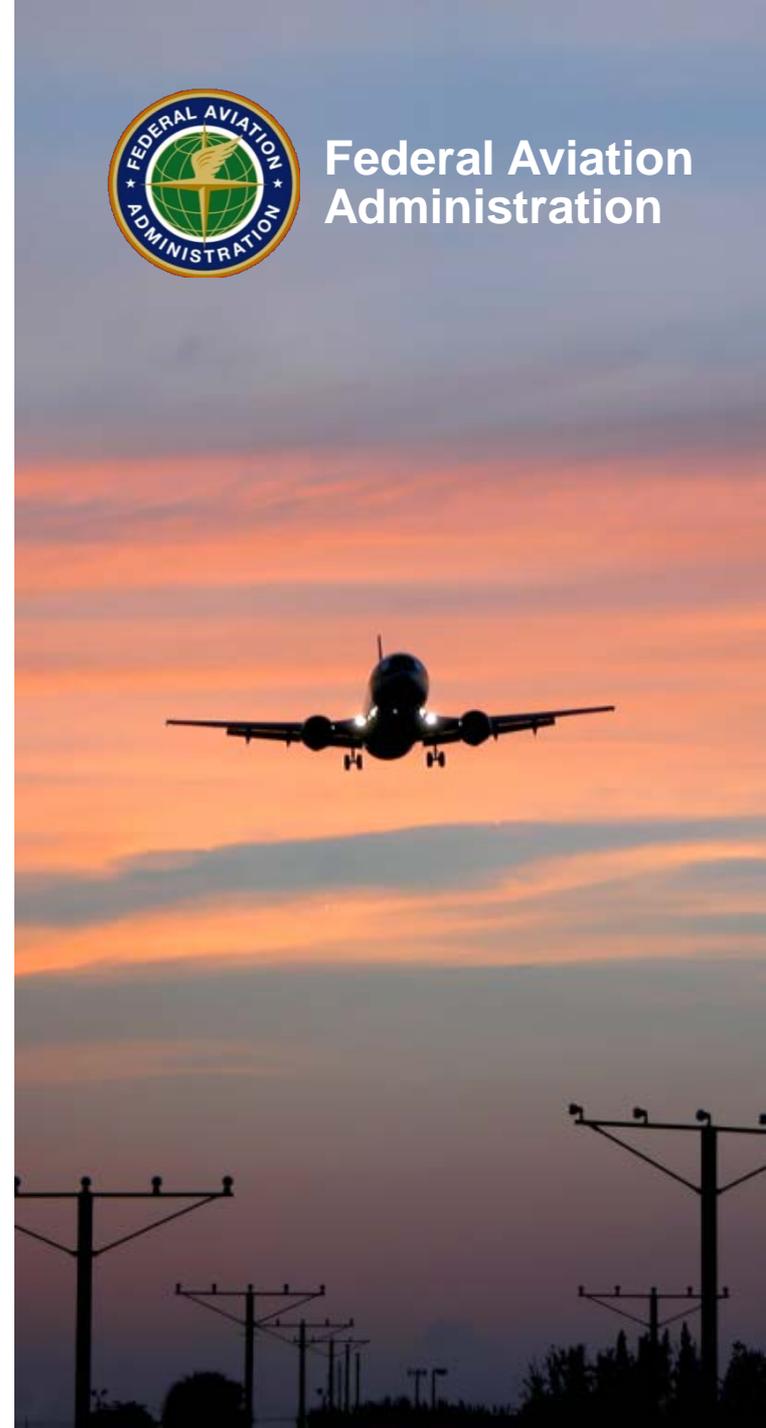
Objectives

This presentation will:

- Introduce the FAA's System Wide Information Management (SWIM) Controlled Vocabulary (CV)

- Describe its RDF/SKOS implementation

- Describe the rules used to name and define CV terms in the context of FAA SWIM

- Describe how SWIM stakeholders can use the CV in their own products.

Problem

- Each FAA community uses its own vocabulary.
  - E.g., the concept of "service" means different things to people in different groups, or even within a single group (air traffic service, Web service, JMS service…)

- Vocabularies are maintained and stored separately, mostly as glossaries in human-readable documents, and are hard to find, let alone integrate.

- All attempts to create a single standard FAA vocabulary have been unsuccessful.

Solution

- Develop a controlled vocabulary to provide a single source for terms and definitions for FAA SWIM-related documentation.

- Make the SWIM vocabulary visible and accessible by putting it within the context of the World Wide Web.

- Make it shareable and semantically interoperable by implementing it using Semantic Web technologies.

What is a Controlled Vocabulary?

- **A controlled vocabulary** is a list of terms that have been enumerated explicitly.
- A controlled vocabulary is managed by and is available from a controlled vocabulary registration authority.
- Every term in a controlled vocabulary must have an unambiguous, non-redundant definition.
- Controlled vocabulary entries are connected through (preferably dereferenceable) URIs on the Web.

The SWIM Controlled Vocabulary

The SWIM CV is a controlled vocabulary developed to provide a single source for terms and definitions commonly used in FAA's SWIM-related documentation suitable for use by both humans and machines.
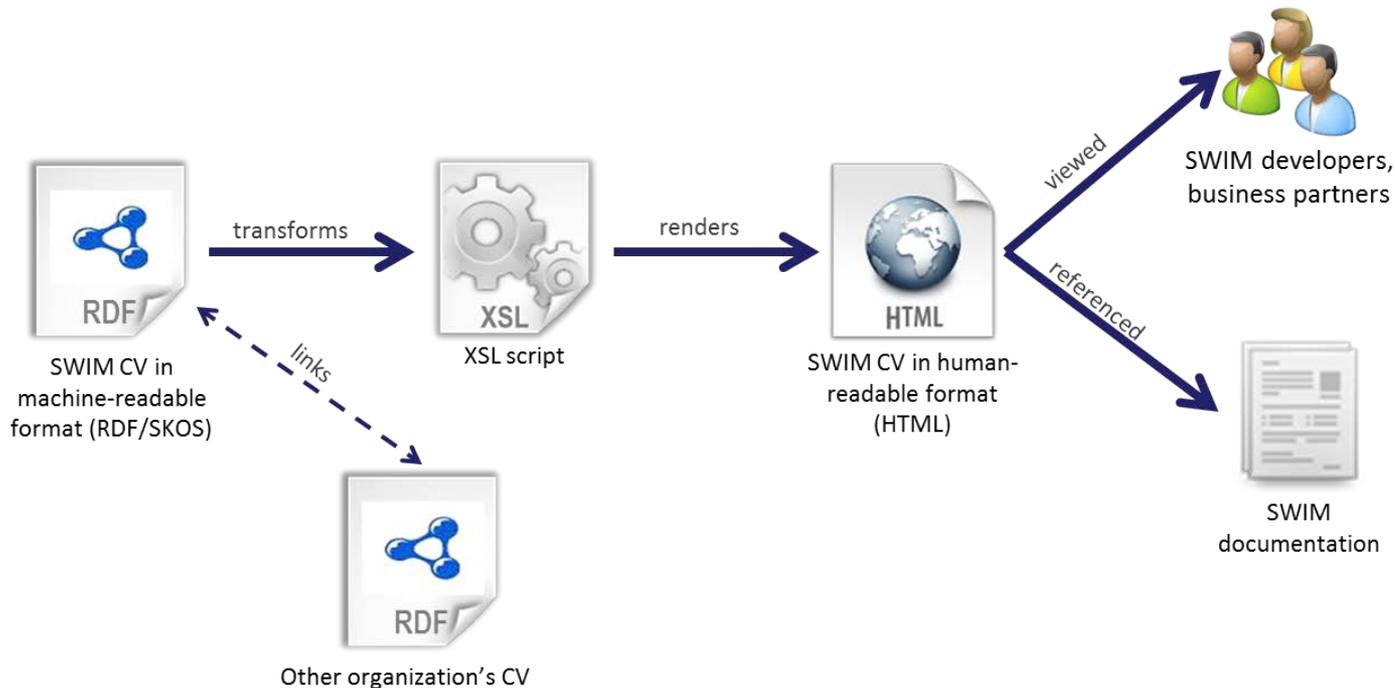
SWIM CV Term Rendered in HTML

service provider

URI	http://faa.gov/swim/vocabulary#service-provider
Preferred Label	service provider
Alternative Label	provider entity
Definition	An organization that offers the use of capabilities by means of a service.
Source of Definition	http://docs.oasis-open.org/soa-rm/v1.0/soa-rm.pdf
Editorial Note	Name of source: OASIS Reference Model for SOA 1.0, 12 October 2006
Exact Match	http://www.w3.org/TR/2002/WD-ws-gloss-20021114/#serviceprovider
Broader	organization
Related	service
Related	service-consumer

Note that SWIM's "service provider" means exactly the same thing as the W3C's "service provider."

SWIM CV Term Rendered in RDF/SKOS

```
<!-- service provider -->
<skos:Concept rdf:about="http://faa.gov/swim/vocabulary#service-provider">
  <skos:inScheme rdf:resource="http://faa.gov/swim/vocabulary"/>
  <skos:prefLabel xml:lang="en">service provider</skos:prefLabel>
        <skos:altLabel xml:lang="en">provider entity</skos:altLabel>
        <skos:definition xml:lang="en">An organization that offers the use of capabilities by means of a
service.</skos:definition>
        <dc:source rdf:resource="http://docs.oasis-open.org/soa-rm/v1.0/soa-rm.pdf"></dc:source>
        <skos:editorialNote>Name of source: OASIS Reference Model for SOA 1.0, 12 October
2006</skos:editorialNote>
        <skos:exactMatch  rdf:resource="http://www.w3.org/TR/2002/WD-ws-gloss-
20021114/#serviceprovider"/>
        <skos:related rdf:resource="http://faa.gov/swim/vocabulary#service"/>
        <skos:related rdf:resource="http://faa.gov/swim/vocabulary#service-consumer"/>
        <skos:broader rdf:resource="http://faa.gov/swim/vocabulary#organization"/>
</skos:Concept>
```

Note that SKOS is maintained by the UN in several languages.

What is SKOS?

- **SKOS (Simple Knowledge Organization System)** is a W3C Recommendation for representing knowledge organizations systems, including controlled vocabularies, thesauri, and taxonomies, in a distributed and linkable way.

- Because SKOS is based on the Resource Description Framework (RDF), these representations are machine-readable and can be reused and referenced across the Web.

- "In basic SKOS, concepts can be *identified* with URIs, *labeled* with lexical strings in one or more natural languages, *documented* with various types of notes, *semantically related* to each other in informal hierarchies and association networks, and aggregated into concept schemes." *

from http://www.w3.org/TR/skos-primer/

Defining SWIM CV Terms using SKOS

Property/Attribute*	SKOS Expression	Meaning
URI	skos:Concept	The term's uniform resource identifier.
Preferred Label	skos:prefLabel	The expression normally used to refer to the term in natural language.
Alternative Label	skos:altLabel	A synonym, near-synonym, acronym or abbreviation that is also used to refer to the term. (Note: could be in some other language.)
Definition	skos:definition	A statement of the meaning of the term.
Source of Definition**	dc:source	The network location of the document or other resource from which the term's definition is obtained.
Editorial Note	skos:editorialNote	Generally, the name of the document or other resource from which the term's definition is obtained.
Exact Match	skos:exactMatch	A term having the same or equivalent meaning.
Broader	skos:broader	A related term which is broader or more general in meaning.
Narrower	skos:narrower	A related term which is narrower or more specific in meaning.
Related	skos:related	A related term which is associated in some non-hierarchical way.
Change Note	skos:changeNote	Used for administrative purposes.
History Note	skos:historyNote	Describes changes to a term's meaning.
Scope Note	skos:scopeNote	Describes limitations on a term's use.
Note	skos:note	Used for general documentation.

*attributes in red are required by the CV; others are optional
**note Dublin Core attribute

Relating SWIM CV Terms

- The properties **skos:exactMatch**, **skos:broader**, **skos:narrower**, and **skos:related** are used in the CV to hold the URIs of any terms which are related to the CV term in question. (If there are no related terms, these properties are omitted.)

- **skos:exactMatch** – A term that is an "exact match" to a CV term will always come from a **different vocabulary**. (Otherwise it will just be an alternative label for the CV term.)

- **skos:broader/skos:narrower** – If a term X has a related term Y which is broader or more general, then X is implicitly narrower than Y; that is, it is not necessary also to define term Y as having a narrower term X.

Linking the SWIM CV to other Vocabularies

- Mapping is accomplished through the use of **skos:exactMatch**, **skos:broader**, **skos:narrower**, and **skos:related**.

- For example, the SWIM CV term "service provider" has the same meaning as the W3C's Web Services Glossary term "service provider"
  (URI http://www.w3.org/TR/2002/WD-ws-gloss-20021114/#serviceprovider).

- This fact is shown by adding a **skos:exactMatch** property to the SWIM CV term:

      <skos:exactMatch
      rdf:resource="http://www.w3.org/TR/2002/WD-ws-gloss-
      20021114/#serviceprovider"/>

Using the SWIM CV in Products

- To hyperlink to the CV within a document, use the URL "http://www.faa.gov/go/swimvocabulary".

- To hyperlink to a specific CV term, use the URL "http://www.faa.gov/go/swimvocabulary***#term***" (e.g., http://www.faa.gov/go/swimvocabulary**#service-provider**).   .

- To use the CV for Web-based products or applications, download the RDF file at http://www.faa.gov/nextgen/programs/swim/vocabulary/model/swim-vocabulary_11252014.rdf.

References

- The **SWIM Governance Service Semantics** Web page is located at http://www.faa.gov/nextgen/programs/swim/governance/servicesemantics/.

- The **SWIM CV "Frequently Asked Questions"** is located at http://www.faa.gov/nextgen/programs/swim/governance/servicesemantics/FAQ/. Here you can find more information about our rules for creating and documenting SWIM CV terms.

- The **W3C SKOS Recommendation** is located at http://www.w3.org/TR/skos-reference/.