



ONE Record & the power of ontologies

Looking beyond the hype for real solutions to real problems

ONE Record is a standard for data sharing that defines a common model for data that is shared via a standardized and secured API. The Data model specification provides the air cargo industry with a common language and a standard data structure for data exchange based on three concepts: Semantic Web, ontologies and Linked Data.

This document focuses on a high-level overview of what is Semantic Web and why the usage of concepts such as Linked Data and ontologies can be beneficial in a distributed end-to-end digital logistics and transport chain, such as the one that the ONE Record standard aims to support.

What is Semantic Web?

[Semantic Web](#) is an extension of the Web that adds semantics to the current format of data representation enabling considerable gains in the information treatment.

On the Web, you can post documents and photos about yourself, listen to podcasts, go shopping, and have video chats with friends. With Semantic Web, you can create data about a topic, remix it with data created by others and link together the most relevant of your information, establishing a world-wide standard of communication.

Why is an ontology important?

An ontology defines a common vocabulary for different stakeholders who need to share information in a domain. It includes machine-interpretable definitions of basic concepts within a domain and relations among them.

Some of the reasons for which someone would want to develop an ontology are:

- To share common understanding of the structure of data among stakeholders;

- To use accurate description of knowledge, unlike natural language in which words can have totally different semantic meaning depending on their context;
- To enable the re-use of domain knowledge. An example would be an ontology created to describe the domain of a bookstore, which once shared would allow other bookstores to build new catalogs without having to redo an analysis of their domain;
- To avoid misinterpretations and to contribute to greater reliability of knowledge representation;
- To enable automated reasoning about the data, as the relationships between the concepts are well defined.

Let's take a simple example: An airline may want to integrate passenger data coming from other airlines. The data can be imported into a common RDF model by using, for example, converters to the airlines databases. However, one database may use the term "traveller", whereas the other may use the term "passenger". To make the integration complete, an extra definition should be added to the RDF data, describing the fact that the relationship described as "traveller" is the same as



“passenger”. This extra piece of information is, in fact, a simple ontology.

How does RDF help?

The [Resource Description Framework](#) (RDF) is the base language for writing ontologies in Semantic Web and is used for describing data, metadata and other data languages. Any data model or data language that uses RDF is a part of Semantic Web.

RDF is based on the concept that every data item should have a unique Web identifier (URI = Uniform Resource Identifier), and that every data item can be linked to every other item, enabling an interconnected set of data that may be distributed at global scale across the Internet.

RDF provides a simple model for defining data, but it does not specify semantics for relationships or advanced data models. There are more advanced languages like [OWL](#) (Web Ontology Language) that is an extension of RDF to supply a rich set of semantics for building complex data models and vocabularies.

Where does Linked Data play a role?

The RDF data standard is built on the principles of Linked Data.

The term Linked Data refers to a set of best practices for publishing structured data on the Web. These principles have been introduced by [Tim Berners-Lee](#) in the design issue note [Linked Data](#). The principles are:

1. Use URIs as names for things
2. Use HTTP URIs so that people can look up those names
3. When someone looks up a URI, provide useful information through RDF links

4. Include links to other URIs, so that they can discover more things

ONE Record and ontologies

Air transport is a complex industry and its data exchange is mostly based on peer-to-peer information flow, meaning that each party sends the information to the next one in the supply chain. This still requires a lot of paper and manual handling, both of which limit transparency and visibility of a shipment and causes error-prone processes.

IATA's ONE Record standard uses a Web architecture based on a secure lightweight API and distributed data, that allow all the partners from the supply chain to actively share and access data.

The concepts of ontologies and Linked Data match perfectly the needs of the next era of logistics, as the supply chain participants are seeking to digitalize their processes, improve the use and re-use of their information and maximize transparency and visibility.

ONE Record data model specification based on Linked Data principles provides the air cargo industry with a standard data structure for data exchange using common ontologies that facilitates data integration with existing and new data services.

Conclusion

Ontologies are frameworks for representing knowledge about concepts across a domain and the relationships between them. ONE Record standard takes full advantage of their ability to describe relationships and their interdependence in order to model high quality, linked and coherent data.

More info at <https://www.iata.org/one-record/>.