The PartLink Platform

The industrial supply chain contains millions of component and commodity parts available from thousands of suppliers. While much of the information about these items is available on-line, there is no organized way to compare similar parts from different sources. The various personnel who interact with this supply chain have different informational needs: procurement personnel are interested in parts selection, sourcing, availability, obsolescence, prices, and regulatory compliance; designers need physical and dimensional properties of parts; maintenance personnel require information on repair and replacement procedures, lubrication and testing; and so on. In aggregate, end users impose a wide variety of informational requirements for parts management data.

From a usability perspective:

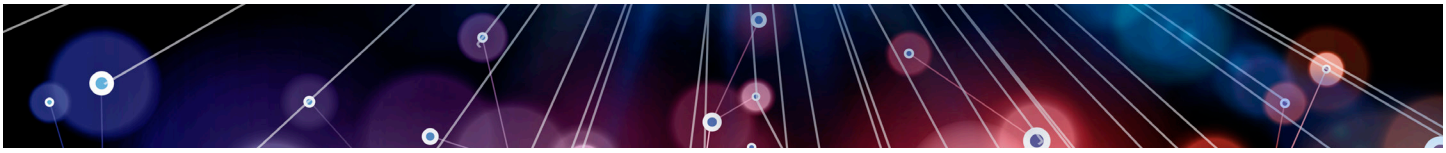
- Parts management data must be broad and deep in order to cater to the informational needs of a variety of end users;
- Query interfaces to this data must be simple and flexible.

When these requirements are met, parts management data is able to support all the needs of supply chain logistics and management.

XSB, Inc. has developed PartLink, a linked data platform for component and commodity parts. It will provide effective management of and access to information about component parts, including manufacturers and suppliers, materials, technical characteristics, and other details. This effort was initially undertaken in support of the US Defense Logistics Agency (DLA), arguably the largest buyer of industrial component parts in the world. Much of the organizational structure of PartLink is derived from DLA's Federal Cataloging System (FCS). The FCS defines a multitude of part categories and their important properties and uses this to catalog items of supply. It also creates standard structures for representing suppliers and critical logistics properties used in managing the sourcing, purchasing, and distribution of these items of supply.

XSB has incorporated the FCS organizational structure with additional part information from commercial web catalogs to create PartLink. The objective is to make PartLink an effective ecosystem for managing information about component parts by:

- Leveraging the architecture of the World Wide Web to provide Web-scale distribution of structured data as well as applications for parts management,
- Utilizing the Semantic Web Resource Description Framework (RDF) to transform data and concepts within the data from multiple legacy systems into a consistent format for data exchange across the WWW,
- Publishing this parts management data as a linked data model utilizing a set of linked Web Resources with Uniform Resource Identifiers (URI),
- Developing an Application Programming Interface (API) to enable developers of ordinary skill to build tools based on the parts management data sources.



One of the common issues in parts data management has been the inconsistent representation of even the most basic information such as part number and manufacturer name. By using RDF to represent the data, we immediately gain the benefits of having Uniform Resource Identifiers (URIs) for these entities. In addition, we are using the OWL ontology framework to express information about part classes, materials, and processes. As part of the data transformation process, we are creating an RDF vocabulary based in part on standard attributes. The parts ontology is deep and detailed, with over 10,000 parts categories and over 1000 standardized attributes defined.

The PartLink ontology consists of a number of parallel class hierarchies. These are:

- A hierarchy of part classes based on the part categories in the FCS – this hierarchy includes 1500 part classes organized in a hierarchical structure based on specialization where each subclass of parts is a subset of the parts in its parent class. These classes make up the majority of items of supply in the DoD supply chain. For the classes in this hierarchy, we have defined and standardized the important attributes that describe parts in each of the classes. In addition, we have over 20,000 part classes that are defined in the FCS but are incorporated in our model as direct subclasses the root of the part hierarchy. These classes are individually not as important in the Defense and Aerospace supply chain but, in aggregate, make up a significant minority of the items DLA purchases and manages.
- A hierarchy of materials from which parts are made – XSB has developed this hierarchy over many years of working with parts in the DOD supply chain. In addition to this hierarchy the material ontology contains a set of classes that are subclasses of ALLOYING CONSTITUENTS. These represent constituent elements that are used to make up metal alloys. The material hierarchy initially breaks down into metals and non-metals and all UNS metal alloy numbers are included under the metals portion of the hierarchy.
- A hierarchy of manufacturing processes used to make parts – as of now, the process hierarchy is a strict taxonomy of manufacturing process classes. There are no properties assigned to manufacturing processes. The processes in this hierarchy represent common processes found in Defense and Aerospace manufacturing.
- A logistics hierarchy with subclasses that model suppliers, purchasing and pricing, DOD acquisition methods, and commercial part to National Stock Number (NSN) relations
- Relations between classes in these hierarchies represented as OWL restrictions.

To make the PartLink data platform easily accessible and useful to industry and Government users, XSB is developing an application programming interface (API) to allow the development of custom parts management tools.

This will allow organizations to integrate PartLink data into their internal part management systems. We at XSB stand ready to support you organization in adding the wealth of data in Partlink to your design, manufacturing, supply chain sourcing, purchasing, and inventory management processes.

For more information contact XSB at info@xsb.com or 631-371-8100

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