

Interoperability in the PLM Ecosystem

Industry Approaches

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Background

Product Lifecycle Management (PLM) deals with the creation, modification and exchange of product information across the entire lifecycle. The scope and definition of PLM has evolved to include globally spread business partners, their suppliers, manufacturers, distributors, retailers, etc. to achieve the unified product realization goal. Thus resulting in the need for leveraging and integrating their diverse business decision support systems involved in the product lifecycle. Engineering and business processes across these partners involve multitudes of product data exchanges. Hence, interoperability across PLM that facilitates a highly responsive environment while enabling extremely flexible means of implementing business processes, needs to be achieved.

Factors driving PLM interoperability

- Heterogeneous PLM landscape: Mergers, acquisitions, 'best of breed' approach involving strategic use of applications from different vendors by different user groups within the enterprise, pose limitations on effective sharing of product information. Also, proprietary formats and data models hamper effective product data exchange.
- Increased scope of data exchange beyond product engineering: The scope of collaboration has been rapidly expanding to cover other enterprise systems such as Enterprise Resource Planning (ERP), Customer Relationship Management (CRM) and Enterprise Asset Management (EAM), etc.
- Global supply chains: Business process coordination across the global supply chains demands tight collaboration and seamless exchange of product data
- Lifecycle span of information: For complex products, duration spent on design phase is much smaller as compared to the length of complete lifecycle. Also, lifecycle of large and complex products such as aircrafts, ships, and buildings is far longer than the lifecycle of software tools used to author the product information. Different business functions that continue to use this product information require product data to be archived in a usable form for longer duration.

PLM Interoperability in the Real world

While importance of interoperability across different phases and functions of PLM has been recognized, it has not been fully addressed due to the divergence of approaches on achieving interoperability.

PLM Interoperability Approaches

- Deploying a common PLM solution across the extended enterprise - Mergers & acquisitions, inability to leverage existing investments, dependency on legacy systems, and processes and need for re-training staff make this approach impractical.
- Supporting product data exchange through manual recreation of data, often leads to data inaccuracies, and process-time delays in the target system. In some cases, it might even involve rework to make significant changes to the product data to make it useful. Thus, expected efficiencies through these systems cannot be achieved.
- Developing point-to-point solutions require dedicated connections for each combination of sending and receiving system. Connecting more and more end points results into a network of hardwired systems that are difficult to maintain.
- Open standards based approach – Open standards serve as the agreed specifications describing how the information should be represented. Matured use of open standards for exchanging geometric data has proven that they enable consistent representation of product data, independent of the commercial systems that authored or consumed the data. However, creation of standards for PLM has been a huge challenge as information to be modeled is complex and flows in all directions across different phases of the product life, with no single entity being responsible for this information.

Open standards are results of collective efforts involving government bodies, industries, vendors, end-user communities and are developed by consensus in the context of an industry group. ISO STEP community has developed the ISO 10303 (STandard for the Exchange of Product data model) STEP series. STEP is a very rich family of open standards for product data. There are several other open standards development organizations such as Object Management Group (OMG), Organization for the Advancement of Structured Information Standards (OASIS).

ISO 10303 or STEP, deals with product structure, geometry and part related information. STEP is designed to cover a product's entire life cycle. It uses the EXPRESS information modeling language. Some commercial solutions based on these standards facilitating PLM interoperability to some level are now emerging. These interoperability solutions strive to provide flexible yet extensible mechanisms for exchanging product lifecycle data.

Product Lifecycle Support (PLCS) based approach

A joint industry and government initiative to develop a standard for product lifecycle support information resulted into ISO 10303-AP 239 (popularly known as PLCS). PLCSs efforts were

targeted to align support information with the evolving product definition over its entire life cycle.

- PLCS has a large and generic information model that covers requirements of most business processes and data managed by most IT applications which allows better flexibility.
- Enables addition of industry specific semantics or context to the information model through the use of Reference Data Libraries (RDL). Availability of semantics along with the product data facilitates modeling of business processes, making them generic and flexible.
- Dedicated to product support, it provides mechanisms to define the necessary support for a given set of products in a given environment. This includes definition of support opportunity, facilities and organizations which make it better suitable for exchanging information needed to support complex assets such as ships, aircraft, building and engines.
- Supports all lifecycle phases of a product from cradle to grave including the disposal lifecycle phase of a product.
- The data model accommodates values that change over time enabling traceability and audit trails.

Summary

Complexity and vastness of the domain involving product lifecycle make it extremely challenging to arrive at an interoperability approach that leverages existing investment and yet, supports future technological innovations. Enterprises have been tackling interoperability using various approaches involving custom applications, adopting vendor specific frameworks, and simultaneously driving initiatives for developing open standards in the domain. PLCS contributes a powerful data exchange mechanism along with reduced commercial risk being an open, neutral data standard. These efforts will mature and converge into strategic, innovative solutions enabling seamless interoperability.

Author

Snehal Baokar is a Senior Solution Architect with the Interoperability Practice at Geometric Limited.

About Geometric

Geometric is a specialist in the domain of engineering solutions, services and technologies. Its portfolio of Global Engineering services and Digital Technology solutions for Product Lifecycle Management (PLM) enables companies to formulate, implement, and execute global engineering and manufacturing strategies aimed at achieving greater efficiencies in the product realization lifecycle.

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