PLM for All: Unleashing Product Data to the Enterprise

CIMdata Commentary

Key takeaways:

- *Product-related information and other enterprise information is created and generally used effectively inside engineering, but its use is often limited to engineering, even though others could make better decisions faster with access to up-to-date product related information*
- *The restricted use of data from PLM and other enterprise systems greatly reduces the potential benefits from broad usage, but most PLM solutions have been implemented in an engineering-centric manner, making it difficult for occasional users outside of engineering to fully benefit*
- *Role-based offerings, like ThingWorx Navigate, which are targeted to different organizational roles and use cases, are essential to optimizing access to up-to-date product data across the extended enterprise*

For more than 30 years CIMdata has supported what has become known as the product lifecycle management (PLM) industry. Over the years, CIMdata consultants have consistently promoted PLM and provided strategic guidance to many leading industrial companies implementing PLM-enabling solutions. As a result, we have gained an in-depth understanding and appreciation of the benefits actually realized through PLM. Unfortunately, when we study the effectiveness of an existing organizational PLM strategy, our findings are often disappointing. Based on an Aerospace & Defense (A&D) industry research initiative, CIMdata published a study of the PLM value gap in the A&D industry (see *www.CIMdata.com)*. Our analysis indicated that a small fraction of A&D companies had in fact minimized the value gap (i.e., the gap between what was implemented and what actually could have been implemented) as compared to most in the industry. This CIMdata research described how many in the A&D industry were still primarily using only product data management (PDM) capabilities in their PLM suites. While our initial study was on A&D, our experience within other industries suggests the same can be said about the state of their PLM implementations.

Another proof point can be seen in a recent CIMdata Opinion Poll (see Figure 1). This poll clearly illustrates the sad perceived state of PLM across multiple industry segments.

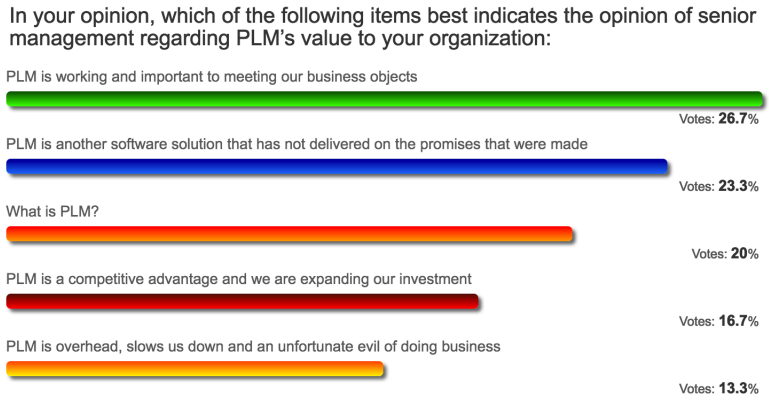

Figure 1—CIMdata PLM Opinion Poll

According to the poll's respondents, most of their senior management feel that PLM isn't delivering the promised value. The natural follow up question is, "Why not?" Why isn't PLM seen by more senior management as adding strategic value to their organization? The answer is primarily associated with two critical issues: 1) for many organizations, PLM hasn't been implemented to address the full product lifecycle; and 2) the organization's culture and process owners have not made the adjustments needed to take full advantage of the PLM capabilities enabled.

In many ways, the second issue is related to the first. This is because people are more likely to use their PLM solution if they believe that they will receive value from doing so. However, with the often-limited implemented scope, the value is often greatly minimized. This then begs the question, why are so many implementations not delivering true end-to-end lifecycle capabilities? There are many possible answers, but often companies don't understand that PLM requires a broad vision—one that defines PLM as a strategic business approach, not just the selection and implementation of one software tool for the engineering department. This strategic approach must apply a consistent set of business solutions that support the collaborative creation, management, dissemination, and use of product definition information (i.e., all product definition information, including specifications, requirements, part records, BOM structures, CAD files, manufacturing instructions, etc.). This strategy and the associated enabling solutions must support the extended enterprise (i.e., customers, design and supply partners, etc.), spanning from concept through the life of a product or plant, and integrating people, processes, business systems, and information. This is where many PLM implementations fail to reach their objectives. Sometimes they fail because of lack of vision, sometimes for lack of solution functionality, sometimes for lack of budget, and sometimes because of sheer complexity. These issues often contribute and result in a heavy engineering focus and minimum value to the organization. But this is only one part of the equation—the solutions available also often contribute.

Many solution providers, for example, haven't provided focused capabilities that specifically address the user needs outside of engineering, and/or have not provided the level of integration with other enterprise solutions required (e.g., enterprise resource planning, service lifecycle management, and data warehouses). Engineering doesn't and shouldn't work in a vacuum, and the data they generate that is used by many others throughout the enterprise shouldn't be bound and locked away in multiple data silos. All this limits an organization's ability to execute its product data related processes efficiently and effectively. This is because there is a direct relationship between the validity and completeness of the data set being used to make decisions, and the efficiency and effectiveness of the organization using that very same data. Two things happen when information users are confronted with incomplete and/or questionable data: they are either more prone to making bad decisions, or to asking more questions and waiting for what they perceive to be better data.

So, what does all this mean? What can a company do to break the cycle and break out of the limited benefits a less than optimal PLM solution provides? First and foremost, an organization needs to define a holistic PLM strategy that includes implementing a PLM solution that enables the extended enterprise and all of its product data stakeholders—one that provides an end-to-end solution that closes the data loops throughout the organization.

PLM for All: Closing the Loops

Fundamentally, an organization's PLM solution needs to address the extended enterprise's product data and related process enablement requirements. PLM can't be an engineering

system, just supporting a limited set of product data and a narrow set of processes. It needs to function as an enterprise product data platform, bringing together information from multiple product data sources and delivering value to all product data stakeholders (i.e., all lifecycle participants who create and/or use product data and other relevant information). Many companies gather incredible amounts of product data about every stage of a product's lifecycle. Unfortunately, most of it is inaccessible. Some of this data comes directly from the product itself via the Internet of Things (IoT). Other data related to new products comes from social media and multiple loosely structured formats generated by internal and external systems. When considering IoT and social media, there are a variety of data types and formats that are neither reliable nor well structured. These shortcomings result in seemingly valuable information being tossed out unseen and explain why so many open informational loops still fragment the information flow in so many enterprises.

Over the years, CIMdata has seen steady progress in data interoperability, in the transparency of workflows and processes, and in collaboration among ever more diverse lifecycle responsible groups (e.g., marketing, development, purchasing, manufacturing, and service). But remaining open loops (not to mention the new ones being created) still can hamstring the efficient and effective management of an organizations' lifecycle and prevent the introduction and support of game-changing, globally competitive products.

Fortunately, there has been a steady flow of improvements due to the expanded use of enterprise-connected PLM solutions to close the many loops throughout the product lifecycle. The emergence of the platformization of PLM, wherein PLM solutions evolve into end-to-end business platforms connecting product data and related processes throughout an extended enterprise, provides a foundation upon which functional capabilities, data, and processes are enabled. These are solutions that enable an information-rich and connected work environment, which fully integrates product development and other enterprise product-related data stakeholders across dozens, if not hundreds, of applications and systems.

Closing loops in information flows with PLM offers capabilities to pinpoint unanswered questions, especially the "Why?" and "What if?" All unanswered questions should be addressed employing information governance (e.g., lifecycle information management and ownership policies and procedures). The hard part of closing loops is comparing user expectations and experiences with the existing product's performance, its initial requirements, and the next product's requirements. This is why tracking information flows with PLM is integral to coherent, enterprise-wide data and process management, and why solution providers are enhancing their offerings to be more user-friendly and accessible.

The leading PLM solution providers are doing much to help close these loops and bring the full potential value of PLM to all enterprise product-data stakeholders. Many of these efforts involve opening up once-proprietary systems as well as building out PLM strategies to give product developers and other enterprise product data stakeholders access to data and information generated anywhere across the entire lifecycle.

PLM for All: What's Required

To support the entire product lifecycle a PLM-enabling solution or platform must possess a number of key characteristics and associated capabilities. Fundamentally, a PLM-enabling solution must be able to meet the requirements of modern markets and business operating models, including the need to drive product and process innovation. To do so, a PLM solution and the work environment it enables must be fully aligned to customer requirements rather than be simply an engineering-centric process driven by research and development. PLM must

be an enterprise business platform used to integrate a host of organizational disciplines outside of engineering. These disciplines include compliance (e.g., sustainability and safety), manufacturing, service, and marketing, among others.

At a minimum, an organization's PLM platform should natively support data analytics and visualization, systems modeling and simulation, closed-loop decision-making, and intellectual property management and protection. Additionally, the platform has to be sustainable (i.e., over the long-term, the PLM solution has to be upgradable without ripping and replacing, and spending a large sum of money). This means it has to be adaptable, maintainable, scalable, usable, and upgradable, several of the PLM Investment Sustainability Characteristics defined by CIMdata's PLM sustainability model (see Figure 2). Each of these characteristics play a critical role in the solution's ability to support the end-to-end requirements we have described.

Figure 2—CIMdata's PLM Investment Sustainability Characteristics

Openness, in support of enterprise wide interoperability, is also critical. This capability helps make PLM-managed data and other enterprise data sources available in a holistic manner for all product data stakeholders. Other key sustainability characteristics in this context include:

- Adaptability—how well and easily the organization can configure the solution's data model, user interface, and workflows to fit specific and changing needs.
- Usability—how well the solution can be operated by the end users to produce their deliverables. The solution's capabilities should be provided in the context of the user's role within the lifecycle and the processes in which they work.
- Compatibility—how well the solution can be connected to appropriate enterprise and desktop solutions within the organization without the use of special software (i.e., custom, and often costly, integrations).
- Maintainability—how well the organization can keep the solution operating in an appropriate condition.
- Upgradability—the organization's ability and ease related to implementing a new version of the solution.

Finally, it should be emphasized that all these need to be provided to the enterprise at a price point that is affordable. The good news is that solution providers are taking note of the issues explained in CIMdata's sustainability model outlined above. One such example is PTC's

recently released ThingWorx Navigate suite of applications (apps), which has been specifically designed to deliver product data to all enterprise product data stakeholders.

ThingWorx Navigate: PLM for All

ThingWorx Navigate, a new role-based suite of apps from PTC, was designed to deliver enterprise product data connectivity and access. The apps were designed to be easy to use and expand access to product data scattered across an enterprise's systems landscape to more stakeholders throughout the extended enterprise. These apps have role-based user interfaces that provide a modern, easy to navigate user experience. ThingWorx Navigate's underlying architecture directly connects these stakeholders to the data they need to make informed decisions based on validated and up-to-date information. These role-based apps enable casual PLM users to access and work with information managed by Windchill 11 and other enterprise systems in a cost-effective and easy-to-configure manner.

PTC designed the apps to deliver product data in a highly consumable manner, thereby providing the ability to extract more value and make better decisions. The ThingWorx Navigate View Requirements app, for example, provides a real-time view into evolving product and software requirements maintained in PTC Integrity Lifecycle Manager. The View Requirements app is one of seven currently available apps. The other six are View Drawing, View Part Properties, View Part List, View Part Structure, View/Download Design Files, and View & Measure in 3D. PTC reports that these apps adhere to the following design principles:

- Tailorable—simple controls limit or expand what can be viewed and searched based on selected properties and attributes of the data in a way that can be different for each role.
- Context-driven—apps extend PLM data to include information from ERP, CRM, MES, and other enterprise systems.
- System-agnostic—back-end systems can be updated independently of the apps so the user is uninterrupted by upgrades, replacements, data migrations, and other updates.
- Secure—data is only served based on the security permissions of the user in the system of record.
- Mobile-ready—apps can be accessed via users' device of choice (smartphone, tablet, PC) with adaptive layouts based on device resolution, screen size, and aspect ratio; and preferred platform (Microsoft, iOS, OSX, and Android).
- Accessible—3D visualization is supported across devices and browsers with WebGL HTML5 so users experience a display automatically optimized to their device without requiring the creation, installation, or management of native mobile apps.
- Modular—fully customized apps can be created from the ground-up using the developer toolkit that leverages existing ThingWorx Navigate capabilities.
- IoT-enabled—when combined with products or equipment connected to the IoT via ThingWorx, tailored or fully customized ThingWorx Navigate apps can include IoT generated or captured data.

With ThingWorx Navigate, PTC is providing the PLM market with user role-centric solutions that address many of the limitations and issues that have often resulted in minimized benefits

of PLM. The apps provide contextual and up-to-date product data from multiple enterprise systems, without complex user experiences, lengthy training, costly integrations, or long-term customizations. By leveraging PTC's ThingWorx technology, ThingWorx Navigate apps can be easily tailored and deployed to roles throughout an enterprise and extended to include data from multiple enterprise systems and even from smart, connected products via the organization's IoT architecture.

Concluding Remarks

It's unfortunate, but according to CIMdata's research and experience many companies miss out on the true benefits an end-to-end PLM strategy and solution can provide. Why? Because too many PLM solutions are implemented with limited enterprise and end-to-end lifecycle capabilities, often becoming legacy, engineering-only systems that are complex, expensive, and never truly beneficial outside of the engineering domain. With the introduction of ThingWorx Navigate, PTC continues its efforts to make product data accessible to all enterprise product data stakeholders, no matter the system of record. The design principles employed by PTC for ThingWorx Navigate promise to unlock the value of product data currently scattered throughout most enterprises' information technology systems. The currently available apps can be deployed by users or groups to enable specific roles and tasks as needed. In addition, these apps can be quickly and easily tailored by adding data types and attributes suited to the specific roles and tasks as needed. ThingWorx Navigate takes a fresh look at how product data should be accessed and consumed by all product data stakeholders, and promises to unleash product data to the enterprise in an intuitive, practical manner.

About CIMdata

CIMdata, an independent worldwide firm, provides strategic management consulting to maximize an enterprise's ability to design and deliver innovative products and services through the application of Product Lifecycle Management (PLM). CIMdata provides world-class knowledge, expertise, and best-practice methods on PLM. CIMdata also offers research, subscription services, publications, and education through international conferences. To learn more about CIMdata's services, visit our website at http://www.CIMdata.com or contact CIMdata at: 3909 Research Park Drive, Ann Arbor, MI 48108, USA. Tel: +1 734.668.9922. Fax: +1 734.668.1957; or at Oogststraat 20, 6004 CV Weert, The Netherlands. Tel: +31 (0) 495.533.666.