How and Why PLM Is Being Transformed Into a Product-Oriented Innovation Platform

CIMdata Position Paper, Part 1 of 3

Key takeaways:

- *The combination of scarce resources and globalization are driving an upheaval in innovation and lifecycle management*
- *Scarcity and globalization upheavals are coalescing into business strategies that demand the "platformization" of PLM*
- *The Iron Triangle of better / faster / cheaper is no longer good enough*

In its ongoing evolution as a business strategy, PLM is approaching and in some cases already achieving the status of a business platform. PLM has always been a core enabler for innovation as part of a business strategy. Now PLM-as-a-platform, or the "platformization" of PLM, is morphing into new ways of going about the business of innovation.

There are two major drivers for higher levels of innovation, and they are unstoppable. One is the Circular Economy, where, according to the UK-based Ellen MacArthur Foundation, "today's products are tomorrow's resources." Closely related to the Circular Economy is "servitization," manufacturers delivering their products as services under service-level agreements (SLAs). Under an SLA, one buys the ability to wash clothes over a specified time period with a given availability of washing capabilities, instead of buying a specific washing machine. Aircraft engine manufacturer Rolls-Royce "sells" some of its engines this way, providing hours of use rather than a specific engine.

The second major driver of higher innovation is globalization, and the unsettling way it can quickly turn today's innovations into tomorrow's commodities. Globalization has been with us for some time. The constraints of the Linear Economy indicate we may soon have too little of critical raw materials to continue consuming them at our present rate, hence the growing body of regulations known to many as RoHS, WEEE, REACH, and ELV.

The Circular Economy and globalization aside, there are many needs to meet: misallocation of capital, scarcity of human talent, regulation, litigation, and fickle consumers, to name a few.

One good way to look at the ramifications is through the lens of Triple Constraint, or the Iron Triangle. Ever since the Industrial Revolution project managers, their counterparts elsewhere in the enterprise, and consultants have told customers and bosses to pick any two options from *good, fast,* and *cheap*. Today's customers want all three, not two out of three.

This is not a new outburst of instant gratification. It is a rational response to globalization and the unsettling way it turns innovations into commodities, as we noted above. Good, fast, and cheap have to become *even better*, *faster still*, and *cheaper yet*. This is why innovation goes beyond clichés such as "thinking outside the box." Clever engineering fixes are no longer enough.

For developing new products and managing their lifecycles, the implications of all this are endless. The need for innovation may have never been greater, such that only ceaseless innovation can overcome these difficulties. Innovators need all the help they can get.

Disruptions and Challenges to the Status Quo

We are surrounded at work, at home, and everywhere in between by disruptions and their challenges to the status quo. We need to embrace these challenges wholeheartedly, and wring maximum advantage from them.

To meet these challenges, PLM solution providers are developing platforms—a construct of software solutions, enabled business processes, and business strategies—that embody new approaches to work tasks and how best to accomplish them. This is where platformization comes into play.

Triple Constraint or Iron Triangle of Projects and Sales: Traditionally, customers were told they could pick any two. Today, customers increasingly find they can demand all three.
(Courtesy of EDIT Innovation and BigStockPhoto)

It's worthwhile at this point to be clear about our terms. A *product* is a physical item, a system, and/or a service that is defined, delivered, and supported. *Innovation* is the definition and realization of a new process, product, service, and/or business approach to a problem—one that performs better or delivers more value than any previous solution.

As platformization grows, internal upheavals can be expected in the accustomed ways of working. These upheavals will result in dynamic new ways to identify, evaluate, deploy, and integrate enabling technologies; and they'll be able to help seize opportunities hidden among the everyday disruptions of markets and technologies.

Platform-centric solutions are reliable, robust, and boundaryless. *Reliable* solutions withstand multiple system upgrades and platform migrations. *Robust* solutions are adaptable, maintainable, extensible, scalable, reconfigurable, compatible, and stable. *Boundaryless* solutions are free of artificial limitations on functionality that are imposed by the marketplace segmentation of design and engineering systems with conventional architectures.

Sustainability and Platformization

And yet there is skepticism about the innovation and end-to-end lifecycle management approaches taken so far, which brings us to an additional characteristic of robustness: sustainability.

At CIMdata we see that industrial companies and software providers have concerns about sustainability. To these doubters, no single monolithic enterprise information technology (IT) application can meet all of an enterprise's business-management needs and strategies. Existing applications are seen as unprepared to handle the growing complexity as the responsibility for innovation migrates from engineering to C-level executives who run the extended enterprise.

Skeptics argue that no single solution provider, no matter how large, can address all enterprise-level business complexities, organizational requirements, and information

constructs (including Big Data), let alone stay ahead of the rapid changes in all of them. The answer lies in the sustainability inherent within platformization.

PLM platformization is well under way, even if doubters overlook some benefits. One need only consider the dozens of recent acquisitions by Accenture, Autodesk, Dassault Systèmes, Hewlett-Packard, IBM, Oracle, PTC, SAP, SAS, and Siemens PLM Software, among other solution providers.

Each of them demonstrates that platformization is real and not just an opportunistic mash-up of tools and capabilities. In their own special ways, each is defining their platformization approach to meet the needs their big users see for product innovation and end-to-end lifecycle management—planned, budgeted, implemented, and measured against requirements current and future.

Well aware of the challenges, a sizable set of solution providers is building core offerings into platforms, and wherever necessary extending capabilities licensing and/or partnering with companies in numerous disciplines. Many solution providers also have aggressive (and costly) acquisition roadmaps supporting their platformization strategy. At midyear, two of the leading solution providers announced they have invested a combined total of nearly half a billion dollars in just two planned acquisitions:

- Quintiq by Dassault Systèmes, for operations planning and optimization capabilities, for the equivalent of US$325 million.
- Axeda by PTC, for secure connectivity for machine and sensor data in the Internet of Things (IoT), for $175 million.

This is platformization up close and financial.

The Digital Manufacturing and Design Innovation Institute

These developers are not working in isolation, notwithstanding the PLM market's fierce competitiveness. Early in 2014 a big product-development initiative, the Digital Manufacturing and Design Innovation Institute (DMDI), was launched with Obama Administration sponsorship. Already at work within DMDI are Autodesk, Dassault Systèmes, Microsoft, PTC, and Siemens PLM Software.

Among the three dozen other industrial OEMs and suppliers in DMDI are Boeing, Caterpillar, Deere, Dow Chemical, General Dynamics, General Electric, Haas Automation, Honeywell, Illinois Tool Works, Lockheed Martin, National Instruments, Okuma, Procter & Gamble, Rockwell Collins, and Rolls-Royce. DMDI also includes twenty-three universities and research labs.

Based in Chicago, DMDI seeks real-world solutions to the biggest engineering challenges facing these huge enterprises. As these challenges are met and overcome, DMDI will help dispel any lingering doubts about PLM platformization.

In coming years, the many successful initiatives at these industrial powerhouses will extend the existing functions of interoperability, broaden their use, and speed up adoption and implementation. Platformization will enable PLM solutions—and their users—to work with one another seamlessly via direct geometry translators, automated data exchange mechanisms, workflows enabled across applications, data models shared among systems, file-naming consistency, and of course industry-standard interfaces. "Integrated" is a very broad term.

Users will perceive platformization somewhat differently. They will see reliable, robust, and boundaryless as simply "open," in the same way that their GSM phone, regardless of brand, seamlessly and automatically connects to mobile networks throughout the world. PLM will work in ways that are transparent to them, even if the solution offerings remain "proprietary." Among many proven benefits, searching for and finding information becomes easier and quicker, perhaps by an order of magnitude, if one counts opportunities uncovered and acted upon.

Tune-Ups, Overhauls, and Rethinking

The innovations of the Circular Economy and the challenges of globalization also require some rethinking by management. The longstanding basics of design and manufacturing need a tune-up (at the minimum), but overhauls are more likely.

Regardless of industry and product or service, rethinking is needed early in every design phase to:

- Minimize the use of energy-intensive raw materials and be aware of regulations covering conflict minerals mined in war zones.
- Maximize the use of eco-friendly materials, especially through resource recovery and repurposing, and not just by recycling from waste dumps.
- Identify and optimize promising new design alternatives.
- Shorten and speed up the learning curves of manufacturing.
- Identify and resolve bottlenecks before they appear in production.
- Use electronic document distribution.
- Optimize shipping and packaging. Virtually all OEMs now specify requirements for both and regulators are watching.
- Provide sufficient after-sales service, warranty claims management, and field support. Like the famous Butterfly Effect, small front-end engineering choices have enormous impacts throughout the lifecycle, including reducing the risk of litigation.
- Ensure servitization, which is not feasible without lifecycle management platforms. To fulfill the terms of SLAs, the use (and abuse) of products in the field must be monitored nonstop via the Internet of Things.
- Support the end of the product's lifecycle and related regulations.

Platformization can deal effectively with all of these challenges. Traditional engineering-oriented solutions such as document management and spreadsheets often fail to track what happens to products after manufacturing and sales. Some existing management structures occasionally conceal the shortcomings of these traditional solutions.

Three Caveats

First, those selecting PLM for the first time should carefully consider the concept of an innovation platform and its inherent values. Significant competitive advantage is conferred by speedier response times for users, better interoperability between systems and users, fewer and shorter information searches, lower information-support costs, and less downtime. The

same gains are available for those upgrading older, more constrained PLM strategies and associated toolsets.

Second, software companies developing PLM add-ons and tie-ins should make sure their efforts are integrated with the emerging platforms, and not just connected and interfaced; as we noted above, "integrated" is an all-encompassing term. In the platformization future, poorly integrated products and services may be dead on arrival.

And third, platformization success is not guaranteed unless effective information governance is established and maintained.

PLM has always been the core enabler for product and process innovation as part of a business strategy. For all the reasons outlined above, the platformization of PLM is inevitable. Success will not be achieved in any large measure by anyone standing in the way of these processes.

To Be Continued In Position Paper 2 of 3: *Platform support for "ideation": the intellectual process of creating new products that are (a) globally competitive and (b) sustaining of the enterprise through end-to-end lifecycle management, including information governance.*

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.