

T E C H N O L O G Y S P O T L I G H T

Cloud PLM: Market Evolution or Revolution?

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Adapted from *Perspective: PLM in the Cloud — Hybrid Approach Prominent, Quality an Emerging Focus* by Jeff Hojlo, IDC Manufacturing Insights #MI258494

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This Technology Spotlight examines the opportunity for manufacturers considering the deployment of product life-cycle management (PLM) in a cloud architecture. It also looks at the role of Arena Solutions in this strategically important market.

Introduction

Momentum has been building for years around cloud PLM, initially as a platform that could manage product data centrally, enable the ideation process, and facilitate better supplier collaboration. The market has evolved slowly over the past 15 years, and now small and medium-sized business (SMB) manufacturers, and increasingly even the largest enterprise manufacturers, are considering designing, developing, sourcing, manufacturing, and servicing products completely in the cloud.

Thanks to reliable, high-performing cloud infrastructure, performance problems are not as much of an issue today as they were only three or four years ago. Security remains a strong consideration for companies that consider rolling out their product data and processes in the cloud and will be a risk as long as there are black hats in cyberspace — just as some security risk exists for on-premises solutions managed in a datacenter by IT. But the risks of not extending the PLM process via the cloud or otherwise, or at least parts of that process, are beginning to outweigh security concerns. That said, many manufacturers still choose to keep their crown jewels — that is, their product data — behind the firewall, connected to a cloud-based PLM system in a hybrid approach. The fact is, cloud security has improved in recent years, in large part because software-as-a-service (SaaS) vendors have invested not only in leading strong authentication and threat detection technology but also in their own security teams to manage the dynamic nature of security threats.

Rolling out an entire PLM process in the cloud is a revolutionary idea for many large manufacturers across industries, particularly automotive, aerospace and defense, and machinery, which were early adopters of product data management (PDM) and then PLM to support their engineering workgroup design and development activity.

Now, with the advent of product innovation platforms, these companies are considering whether a cloud approach will be advantageous. A product innovation platform, briefly, is PLM integrated with other enterprise systems and extended to external partners, smart manufacturing, and connected products. A big reason why a product innovation platform is possible is the growth of what IDC calls 3rd Platform technologies — mobile, social, analytics and, yes, cloud — and innovation accelerators such as the Internet of Things (IoT) and cognitive computing.

Other reasons for manufacturers to move to the next generation of PLM are:

- Product complexity, driven by the IoT and connected products
- Global expansion and competition
- Ease of collaboration among all stakeholders (from ideation and prototype to manufacturing through end of life)
- Mass customization and personalization of products
- Value chain expansion — to all suppliers and suppliers' suppliers
- Enormous increase in the amount of data that can fuel innovation
- Holistic integration between product data and quality

Within this context, manufacturers are increasingly looking to the cloud model for support of specific product development processes and entire PLM systems. These manufacturers need to get products to market fast, so they want a system that is up and running quickly at a low cost of deployment and that is easy to use. They are also looking for an offering that can be externally managed on someone else's cloud servers, in an opex model where initial capital expense is avoided, cash flow can be managed, and the PLM system use is flexible depending on business and market needs.

Although it may seem revolutionary to some, the cloud PLM market has evolved to the point, given performance, security, and foundational technology advances, where the largest manufacturers in the world are considering a cloud PLM system approach.

What Is Cloud PLM?

Today, cloud-based PLM options are diverse. Many large manufacturers are deploying Web versions of their applications in a private cloud, either managed on their own or by a hosted private cloud service. Perhaps not as common, community cloud provides a private, Web-based environment for multiple enterprises to collaborate. Many SMBs and even some of the largest global enterprises that are greenfield opportunities with no existing PLM system per se (beyond office tools and a CAD tool) have decided to fully roll out PLM on the public cloud.

Currently, manufacturers of all sizes are taking a hybrid approach in which some processes and data remain in a private cloud, such as product and product portfolio data, and some data exists in the public domain, such as customer, design review, supplier, and quality information. In IDC Manufacturing Insights' 2015 *Product and Service Innovation Survey*, the majority of respondents said that their organizations have deployed some, but not all, of their PLM licenses in the cloud. So even where PLM is deployed in the cloud at a large manufacturer, such as in complex discrete environments like automotive, aerospace, and machinery, it is most often jointly deployed with on-premises software (see Figure 1). IDC Manufacturing Insights thinks that increasingly, manufacturers will look to the cloud for their PLM initiatives because of the need to collaborate globally for complex products across complex supply chains and respond more quickly to customer demand.

FIGURE 1

Deployment of PLM and SLM Elements in the Cloud: Current and Future

Q. What elements of product life-cycle management (PLM) and service life-cycle management (SLM) do you currently deploy, or plan to deploy, in the cloud?



Base = respondents who said their organizations are currently using/or planning to use PLM/SLM
n = 296

Source: IDC Manufacturing Insights' *Product and Service Innovation Survey*, 2015

It should be noted that not all multitenant cloud PLM applications are the same in terms of their flexibility in workflow, functionality, and usability. Some cloud PLM products offer a platform in the cloud on which to manage PLM process but lack flexibility at the application and workflow level. At the platform-as-a-service (PaaS) level, all tenants use the same application capabilities and there is limited flexibility to update capabilities or processes. SaaS offerings generally provide more flexibility in workflow, functionality, and usability to their shared software instance.

Briefly, the differences between the "as a service" offerings are as follows:

- **Infrastructure as a service (IaaS):** Hardware resources (e.g., basic storage, networks, and servers) shared among multiple user groups
- **PaaS:** Shared software instances with standard functionality, primarily used for application development and deployment, as well as data access, analysis, and delivery software; middleware; quality and life-cycle tools; and structured data management software
- **SaaS:** Shared software applications with standard and flexible functionality, in areas such as collaboration, customer relationship management (CRM), PLM, supply chain management (SCM), and operations; a single instance of software that enables rapid bug fixes, updates, and scaling of the system

Why Cloud? Collaboration and Quality Are Two Key Drivers

Collaboration

Up until the past two to three years, cloud PLM had not gained much traction outside of SMBs in fast-moving industries such as high tech, consumer electronics, and consumer products. But now, with the presence of electronics complexity on many levels, including product, manufacturing process, and supply chain, and the need to get products to market as quickly as possible to achieve competitive advantage, manufacturers of all sizes in almost all verticals are rethinking their PLM deployment approach.

The PLM processes that manufacturers are looking to deploy in the cloud include design review, supplier collaboration, compliance, and validation of both mechatronic assemblies and software. Manufacturers also realize that a cloud deployment can enable easier and faster collaboration and project execution across an internal and external value chain in a more frictionless manner because relevant product data and processes are visible and thus enable better decision making.

Quality

According to IDC Manufacturing Insights' research, quality is another process ripe for deployment to the cloud. IDC Manufacturing Insights thinks that quality is moving to the cloud primarily because achieving exceptional product quality requires organizations to have openness and speed in their quality processes. If a product has a quality issue, organizations want it surfaced and acted upon as quickly as possible, whether via a customer, a partner, an engineering manager, or a service technician. And the IoT and connected products make this rapid flow of product performance and usage information back to the manufacturer possible.

Deploying a quality management system in the cloud increases the ability of an organization to identify and quickly address a product issue and thereby maintain high quality and customer satisfaction. Further, with the available processing power through a Hadoop framework in a cloud deployment, manufacturers are able to scale the management and analytics of massive amounts of data created by connected products, whether that information is related to quality, performance, usage, or service. Simply put, quality is so critically important that manufacturers are choosing the deployment environment that expedites action. IDC Manufacturing Insights thinks the optimal state for quality is to embed this information within a PLM system in order to expedite product improvement and innovation.

From an industry perspective, the high-tech, medical device, and consumer electronics industries will continue to benefit from PLM deployed in the cloud as a result of rapid product development cycles, demand for innovative, connected devices, and changing regulatory compliance. Other fast-moving industries such as consumer packaged goods (CPG), consumer products, and retail can also benefit from the speed of collaboration at the front end of innovation (ideation, design, and collaboration). In particular, high-tech and consumer electronics suppliers that now need to work very closely with automotive companies on vehicle software development and electronics for infotainment, autonomous features, and safety technology stand to benefit from a flexible, cloud-based product data management and collaboration platform. And with the growth of connected products across industry, cloud PLM can be valuable in any scenario where complex, high-mix electronics need to be embedded in products quickly to meet the OEM's time-to-market goals.

Complexity on Multiple Levels Is Upon Us: Cloud Can Help

Constant change is impacting manufacturers in the form of product and value chain complexity and increasing demand from customers and is perhaps most evident in the high-tech and consumer electronics industries. Connected products are now in many industries, including automotive, apparel, medical device, and health and fitness — one could call it the "high-techization" of industries. To put the "smart" in "smart products," manufacturers need to manage the development of software and printed circuit boards (PCBs) efficiently and cooperatively with the rest of the development process. In other words, management of mechatronics design and engineering, including software development, needs to be concurrent in a systems engineering approach. If this process is not managed in one system, as is often the case, then the multiple disparate systems need to integrate easily — a cloud PLM deployment can expedite this integration of information and systems as well as enable collaboration among these disparate engineering domains. This also enables better information flow and collaboration with suppliers — whether a large manufacturer or a small manufacturer not vertically integrated.

Because of this change and complexity, these manufacturers are planning to move to the next generation of PLM — what IDC Manufacturing Insights calls the product innovation platform. This approach requires tying together multiple data sources, processes, and applications, inside and outside the company, from public and private cloud or on-premises services. It could be other PDM tools or CAD packages that need integration, or other complementary PLM systems of an increasingly diverse set of partners and suppliers involved with the PLM process, or possibly dynamic cloud mashups with other data sets.

The ability to rapidly tie together multiple data sets, analyze the information, and make decisions quickly (and accurately) becomes increasingly important in this evolving era of connectedness between products, value chains, customers, and markets. This data could include electronic parts component databases such as Octopart and SiliconExpert for availability, pricing, end-of-life information, and compliance and could include product quality, performance, usage, supplier performance, or customer feedback. Analytics should also be in place to manage the influx of data from connected products and improve service, product quality, and innovation.

Complexity exists on many levels — product, supply chain, value chain, demand — and must be predictively and proactively managed. SaaS cloud PLM can help expedite the implementation and management of this extended PLM approach through faster deployment and by mitigating initial and ongoing operating and personnel costs. A SaaS cloud PLM deployment can also enable faster time to market, improved product quality, and better collaboration with suppliers. Supplier collaboration is key, especially for the electronics supply chain that plays an increasingly important role in the design and development of connected products in all industries: OEMs need to be able to share relevant information with the right supplier and enable feedback and iterative communication to accelerate time to market and time to value.

Considering Arena Solutions: 100% SaaS Cloud PLM

The opportunity for SaaS cloud PLM vendors such as Arena Solutions, which bills itself as the original cloud PLM company, is to provide an easily deployable and manageable cloud solution to manage the aforementioned massive complexity. This is particularly relevant for industries such as complex electronics with a high mix (of components) and high rate of change where it is also necessary to maintain high quality and rapid time to market. The growth of the IoT and connected products also presents opportunity as products of all kinds become more high tech and customers expect rapidly customized products that have a high mix of components. PLM companies such as Arena that offer a SaaS, multitenant cloud PLM product and have an industry focus and expertise in high tech and the electronics supply chain are well positioned to take advantage of the need for these services.

The key capabilities in a PLM system that are necessary given these dynamics include embedded quality that can enable faster response to product issues and predictive analytics, social collaboration for improved communication among the development team and external partners and suppliers, product costing for improved profitability and product success, demand planning (particularly with the electronics supply chain), and analytics for smarter decisions throughout the new product development and introduction process.

Arena Solutions, with its cloud PLM offering, is one such company that can support these key capabilities. Although Arena's focus and expertise are not in "traditional PLM" industries such as automotive, aerospace and defense, industrial machinery, or heavy equipment, where CAD/CAM/CAE and systems engineering for complex mechatronic assemblies are challenges, Arena has expertise in the high-tech, consumer electronics, and medical device industries. As products are increasingly connected with software and PCBs and manufacturers need to meet compressed time-to-market demands, there is a requirement for high-tech expertise as well as a platform that provides the ability to address the inherent complexity, tie to other systems, and bring products to market quickly.

Arena Solutions key product offerings include:

- **Arena BOMControl:** Complex product data, multilevel BOM, and compliance management
- **Arena Exchange:** PDX-enabled collaboration and communication with suppliers on build package and quality information
- **Arena Demand:** Aggregation of product information down to the component level for negotiation and purchasing
- **Arena Quality:** For product quality management, embedded in the PLM system
- **Arena Projects:** Customized project templates for all programs, projects, and related resources
- **Arena Analytics:** In-context analysis on product data and PLM process
- **Arena Scribe:** Internal social collaboration tool across the product development team

Meeting the Challenges Ahead

One challenge for cloud-based PLM offerings such as Arena's is that the majority of PLM deployments at midsize to large companies are still on-premises today, and there hasn't been a perceived need to switch to cloud. Additionally, among large manufacturers with a firmly entrenched PLM system, the perceived short-term switching cost of moving from on-premises to cloud is high; SMBs that don't yet have a full PLM system see the benefit of low initial cost and total cost of ownership (TCO) of cloud PLM.

This trend is changing, according to IDC Manufacturing Insights research, as manufacturers of all sizes across industries are looking to at least deploy certain PLM processes in the cloud such as design review, supplier collaboration, and quality management and connect these related processes into a product innovation platform (i.e., PLM extended to other enterprise systems). As such, cloud PLM deployments need to be open and flexible so they can integrate with other systems across the enterprise such as PDM, application life-cycle management (ALM), enterprise resource planning (ERP), SCM, CRM, and manufacturing execution.

Scalability and security have been the primary concerns for many large and small manufacturers, as well as product companies (e.g., suppliers that design pieces of products for OEMs). However, today's modern cloud systems have the ability to scale in support of complex products, assemblies, and supply chains. Security will always be a concern (whether companies have an on-premises system or a cloud system), but continuous improvement in strong security by cloud PLM companies will lower the risk, and given the market dynamics, complexity, and other factors previously noted, overall speed and cost benefits will outweigh the risks.

Cloud PLM will continue to have the most traction with SMBs because there are limited legacy applications and data to rip out and cleanse — that is, their overall system complexity is low. Additionally, SMBs, particularly high-tech and medical device manufacturers, have accelerated new product introduction (NPI) cycles, need to minimize capital expenditures, and still need a low-cost, effective PLM system where they can pay as they go. But why not for large manufacturers as well? Don't they also have accelerated NPI cycles, need to minimize capital expenditures, and want a low-cost, pay-as-you-go PLM system?

Conclusion

Cloud is not the antidote to all the challenges in NPI today, and PLM will likely remain hybrid at many manufacturers — some data and processes on-premises, some in the cloud. Some manufacturers are more comfortable keeping complex simulation, requirements management, and design in a private, secure infrastructure. But cloud can provide enormous benefits, supporting the process and industry scenarios and dynamics noted previously: collaboration, program and project management, design review, and quality. According to IDC Manufacturing Insights' research, manufacturers are considering cloud rollouts in all these areas. Arena Solutions can support these processes and offers an open platform that can integrate with other systems, and thus it is a vendor worthy of consideration for cloud PLM initiatives — particularly among manufacturers in the high-tech, consumer electronics, and medical device spaces, as well as high-tech suppliers involved with the design and development of connected products across multiple industries.

For organizations with an existing investment in an on-premises PLM system, moving to the cloud will result in the short-term loss of some of the investment made, but the longer-term ROI outlook is much brighter. It is possible, however, to work with a software vendor to mitigate the short-term effect by establishing a flexible, cost-effective cloud migration program that doesn't completely diminish the current investment. These organizations should consider the long-term payback to managing their infrastructure and processes outside of their network.

The benefits of cloud PLM are many, including lower initial cost and lower total cost, faster and more frequent upgrades, easier collaboration, and good scalability. These benefits need to be weighed against the existing investments that have been made in PLM systems and the need to secure the organization's intellectual property (IP). Increasingly, small and large manufacturers alike are evaluating the trade-offs and moving at least some of their PLM data and processes to a cloud environment.

Is cloud PLM a revolution or an evolution? Although it will feel revolutionary to some manufacturers, IDC Manufacturing Insights thinks this is a natural evolution of the PLM market.

A B O U T T H I S P U B L I C A T I O N

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