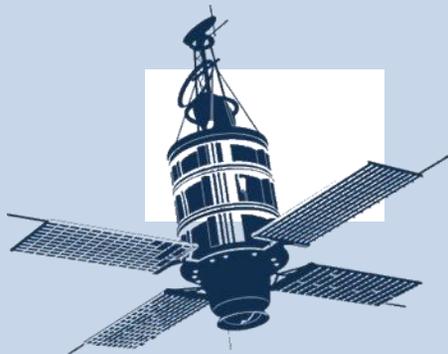# DECENTRALIZED PRODUCT DEVELOPMENT ENVIRONMENTS

LEVERAGING CLOUD-BASED PLM FOR CO-DEVELOPMENT, LONG-TERM PROGRAMS, JOINT VENTURES, MERGERS, ACQUISITIONS, AND DIVESTITURES

LIFECYCLE INSIGHTS

UNCONVENTIONAL DEVELOPMENT, UNCONVENTIONAL NEEDS

Product development does not always happen under conventional circumstances; nevertheless, it must be executed on schedule and according to plan. Sometimes, a great opportunity emerges and a co-development project needs to ramp up instantly. Other times, a program must adhere to a rigid schedule, as typically happens in the aerospace and defense industry. And in yet other cases, ongoing development must be partitioned off while the company undergoes a merger or acquisition. These unconventional situations are a great opportunity for a business. However, they burden product development efforts with new and unusual requirements and constraints.

One noteworthy constraint is how, when, and why to deploy the Product Lifecycle Management (PLM) system—the enterprise system that supports product development—in these environments. In co-development scenarios, partners are usually not willing to expose all of their digital intellectual property, so creation of a new, independent PLM environment is necessary. During a spin-off, merger, or acquisition, the development organization's efforts must remain isolated while the pending transaction executes. All of these scenarios must be supported, despite their difficulty. Ultimately, these out-of-the-norm projects may need the support of a PLM system even more than traditional, in-house development projects do. Integrating the product development efforts of multiple organizations or coordinating development during business transition is turbulent and wreaks havoc on certain products or product lines. Chaos is detrimental to the business and reduces shareholder value.

In these situations, a traditional, on-premise PLM solution is not the right answer. Its setup takes too long, requires too much effort, and demands too much up-front cost. Time, effort and cost are often critical pressures in these situations, so most organizations find themselves in a catch-22. They need a PLM system, but traditional solutions are non-starters.

So what is the answer? Technology advancements combined with new business models provide a promising alternative. A flexible, agile PLM solution deployed on the cloud meets the fast start-up time requirements of these scenarios. Moreover, stakeholders from various locations and companies—many of whom are outside the firewall—can use such a solution securely. These new cloud-based solutions represent an excellent fit for decentralized development projects and programs.

The purpose of this eBook is to detail these types of development efforts and their solutions. It delves into the circumstances and technological needs of each of these three special product development scenarios. It then describes the critical capabilities of cloud-based PLM solutions.

Supporting these unusual product development environments has traditionally been no easy task. However, with cloud-based PLM solutions, it is easier than ever.

LIFECYCLE > INSIGHTS

RAPID AND DISTRIBUTED CO-DEVELOPMENT PROJECTS

When a great business opportunity emerges, companies need to take advantage. The chance to hit a fast moving market window or invest in a breakout product calls for co-development with customers, strategic suppliers, and outsourced or contract manufactures. In this scenario, these partners aren't merely providing commodities. Rather, each organization brings value to the co-development program by providing and enhancing key intellectual property based on their core competencies.

While sharing that critical intellectual property is crucial, there are important limitations. No party is willing to share or expose the data and information that resides in the PLM solutions for their company, effectively eliminating any single one of their systems from use in such a co-development effort. As a result, a new PLM environment, specially deployed for the development program, is required. In this context, a number of key technology capabilities are necessary.
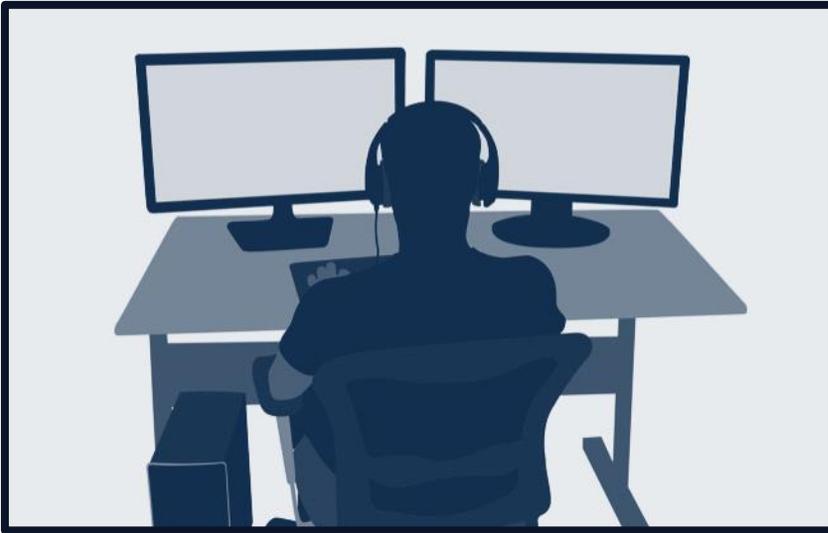
- **System Time to Deployment:** Time-to-market constraints dictate that minimal time be spent deploying the PLM system. Timeframes must be measured in hours and days, not weeks or months, because key stakeholders need to work immediately from a single source for data, processes, collaboration, and more.

- **System Accessibility and Location:** All key parties must be able to access such a PLM system, even though they come from different companies and reside in locations around the world. Given the nature of the co-development program, accessibility through a browser and hosting in the cloud are important traits of the PLM system for this scenario. It must also have robust access controls, which can partition different groups and roles with need-to-know level permissions to protect IP while enabling collaboration.

- **System Flexibility:** Each participating organization brings its own practices, processes, and procedures, each of which provides value in the context of a particular competency. The PLM system must be flexible enough to support process variations, business rules, data schemas, and security structures on a project-by-project basis. It must even be able to handle changes during the middle of an initiative.

- **System Archiving and Retrieval:** At the end of the program, the participating parties often need to archive all or part of the data and information in the system. This lets parties capture intellectual property related to the development effort, and it satisfies legal and traceability requirements. This system archive may need to be re-deployed quickly so the data and information are again accessible. This is true both of the data and the system as a whole.

LIFECYCLE INSIGHTS

# SEPARATE AND FINITE DURATION DEVELOPMENT PROGRAMS

Sometimes a set duration program has a short timeline, and deadlines are fixed. In this scenario, time is of the utmost concern—not because the company needs to jump on an opportunity, but because it needs to follow a hard timeline through project completion. These situations often arise in Aerospace and Defense industries, where each program has its own development environment. During the course of the product development effort, organizations devise highly specialized practices and methodologies, sometimes only applicable to this one project or program. Because of these characteristics, this type of development program needs its own enterprise PLM solution, which can support highly specialized needs and compliance requirements while operating to scheduled milestones and deadlines. Such a context requires a different set of technology capabilities.

- **System Time to Deployment:** Although fast reaction times are unnecessary for these kinds of programs, there is still a desire to set up such systems quickly once the contract commences. This is crucial, because such lengthy programs often have important concept design and bidding stages, within which key design decisions and product definitions are created. These decisions and definitions must carry forward into the other stages of the program should the bid be won or the initiative continue. This requires proper configuration management control provided by PLM to reduce risk and assure schedule performance.

- **System Integration, Flexibility and Upgrades:** Although such programs need stand-alone PLM environments, they must also integrate with Accounting, Enterprise Resource and Planning (ERP), and other important systems. Furthermore, because of the specialized nature of these programs, the PLM system must support customized data models, processes, and business rules. Finally, control over upgrades to the PLM system without downtime and without the reimplementation of customizations is critical.

- **System Security:** Security within the PLM environment in these scenarios is critical, and over the life of the program the organization's access control requirements often change. Having granular, need-to-know level permission capabilities in the PLM solution is essential. In some cases, data encryption and private routing into data centers—which keeps the network traffic off the Internet—is the key. Furthermore, it may be important to the program to verify the hosting provider's certification against standards and regulations required by contractual mandates.

LIFECYCLE INSIGHTS

SEPARATE OR TRANSITIONAL DEVELOPMENT SCENARIOS

Change is a constant in the world of business. Mergers, acquisitions, and spin-offs all may disrupt product development. Joint ventures (JV) present different challenges, but similarly require separation from the primary corporate entity. In these scenarios, operations, including product development, must be separated out as part of a new organization. Furthermore, this separation can last for some time, as the organization will remain separate for months or years. A dedicated PLM system for the business, division or JV during these cases keeps development running smoothly. The PLM systems that best support these cases provide the following key traits.
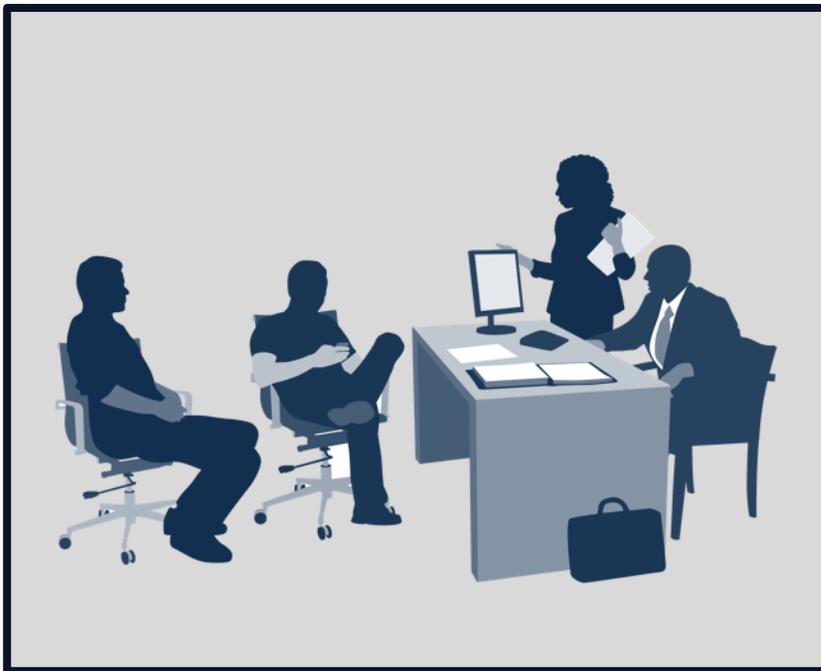
- **System Time to Deployment:** Again in these situations, the PLM system needs to get up and running rapidly, as information and processes must be separated out quickly—days or weeks, not months or years. Stakeholders involved in the new unit need to be working from one collaborative tracking system of record, which houses all development program data, processes, and other vital information.

- **System Migration:** The PLM system must be able to import and export data easily, so it can become operational as fast as possible. If the situation is temporary, such as during an acquisition or merger, then data from the existing application may be migrated to an existing corporate PLM system once the transition is complete. Alternately, in the case of a JV, the corporate partners must be able to set up quickly and provide data to load the new PLM environment. JV partners must also be able to withdraw intellectual property from the environment should the relationship terminate.

- **System Archiving and Retrieval:** The intellectual property managed under these circumstances must be maintained and accessible at a moment's notice. At any time, a liability scenario may occur, lawyers or executives may need a paper trail to figure out the conditions of a contract, or engineers might need access to data for a product in the field long after the business entity exists. Because these needs could arise at any time, users must be able to bring the PLM system and its data back online quickly after archiving and shutoff.

LIFECYCLE INSIGHTS

FLEXIBLE PLM IN THE CLOUD

As we've seen from these three decentralized scenarios, product development needs PLM solutions with unique characteristics and capabilities. Flexible PLM solutions deployed on the cloud represent an excellent fit for decentralized development projects and programs. This section explores these solutions from a PLM fundamentals perspective and discusses the innovative new capabilities that set them apart.
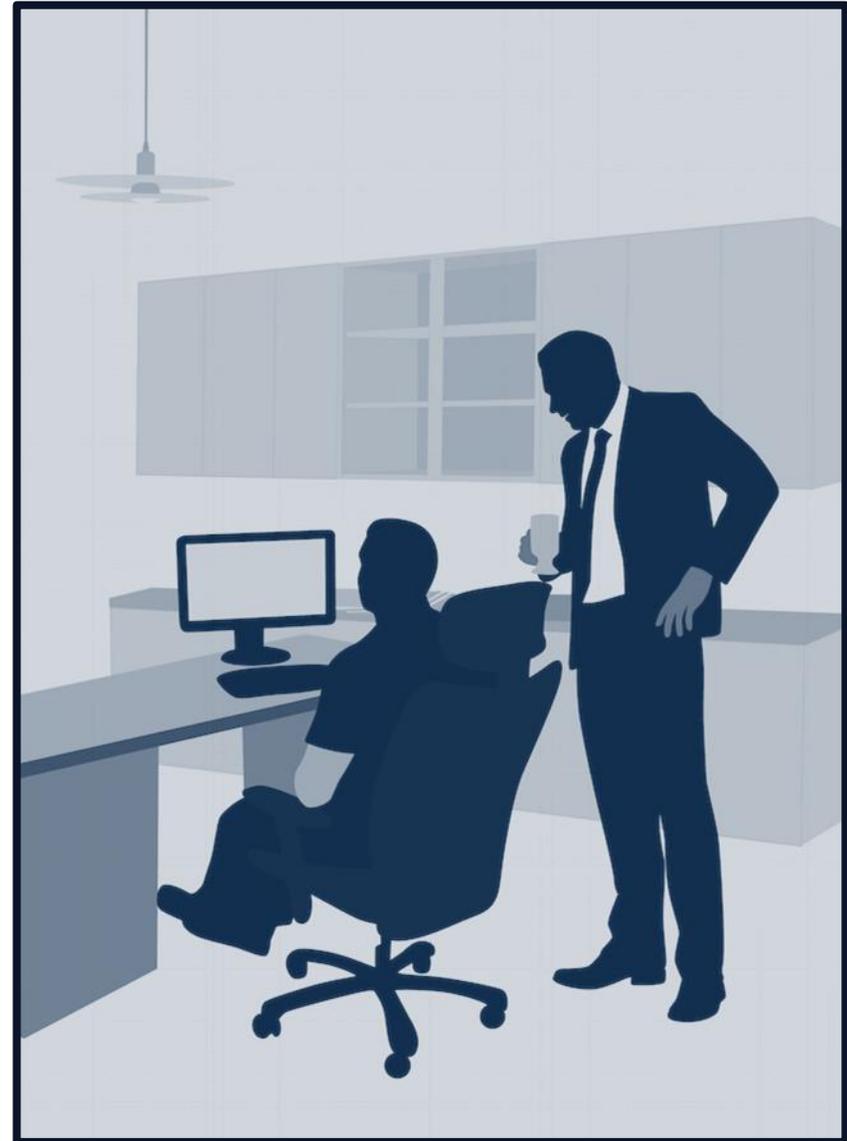
FUNDAMENTAL CAPABILITIES

Although the decentralized scenarios discussed in this eBook require unique characteristics, organizations cannot afford to overlook the fundamental capabilities a PLM system must provide. The following capabilities are essential for any solution.

- **Manage Product Data and Information:** PLM is the system of record and the single source of truth for the products and processes in development. This definition of the product includes the product's configuration, including hardware, software, and electronics. It also tracks development information, such as design-review decisions and regulatory submittal processes.

- **Execute Processes and Projects:** The system enables product development processes through two capabilities—workflow and project and program management. Workflow includes routing and approving tasks along with reminders of tasks and notifications about the development process. Tasks and items are routed through different branches of the process. Project and program management lets users define task-based plans and track them to completion. These capabilities provide visibility and oversight into the progress to deadlines.
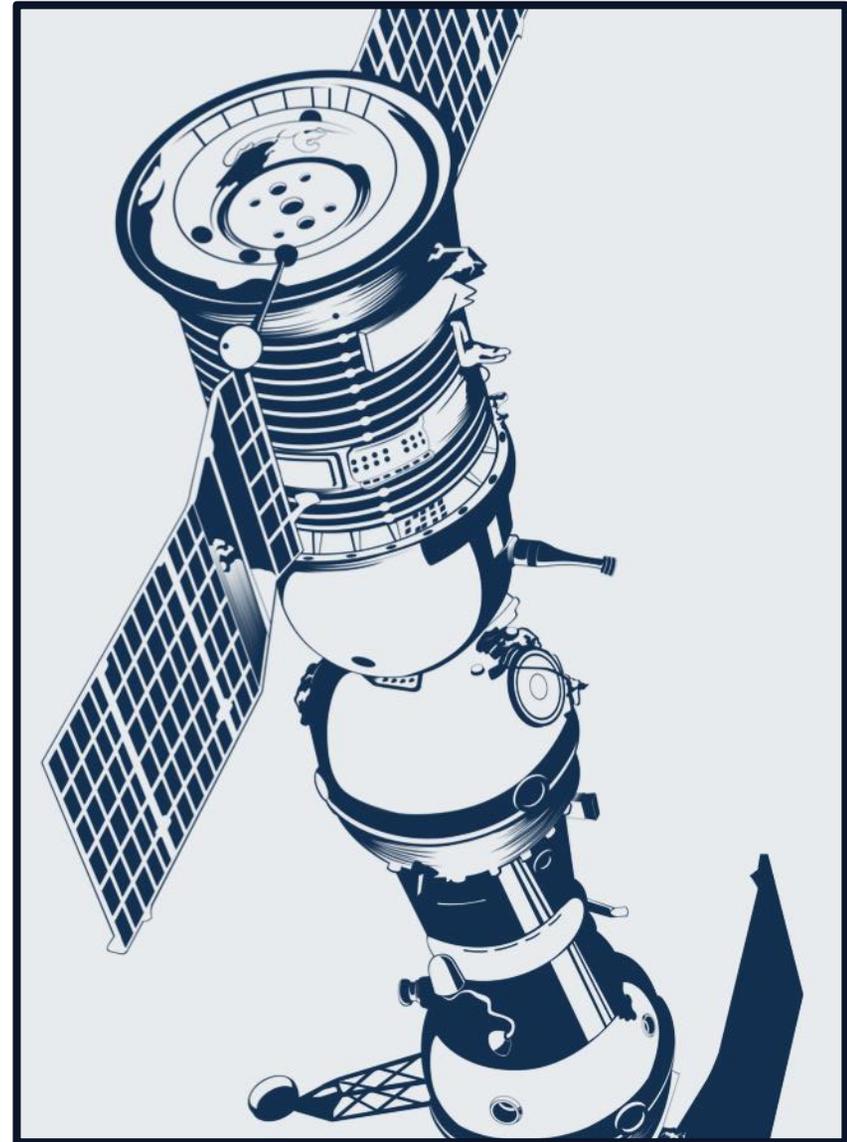
FLEXIBLE PLM IN THE CLOUD

- **Share and Collaborate in Development:** These capabilities allow users to exchange information over the system. Correspondence is conducted in the context of a file, representation of a project, a process or any other artifact. This acts as a common single reference point for those collaborating. Users can also follow a threaded discussion or stream of activity taking place around a certain feature within the development process, such as a 3D model, a requirement, a bill of materials, or other project item.

- **Generate Development Reports and Analytics:** The PLM system's ability to generate reports about products and processes in development is also important. Product-based reports speak to the state of the product—the amount of constrained materials needed for regulatory compliance, systems and components details, requirements fulfilled, etc. Process-based reports, on the other hand, show the progress of development processes. Examples include the volume of change requests over time, the condition of a verification process, or the costs accrued over the life of a project.

- **Integrate with Enterprise Systems:** The system must share information with other enterprise applications by exchanging information in real-time, bi-directional, or batch exchanges. Other enterprise systems might include Application Lifecycle Management (ALM), which manages embedded software or firmware aspects of products, or Enterprise Resource Planning (ERP), which coordinates all of organization's accounting and financials. For example, PLM releases the bill of material to the ERP, which executes production after design release. Many such exchanges are required during the course of product development.

LIFECYCLE > INSIGHTS

FLEXIBLE PLM IN THE CLOUD

INNOVATIVE CAPABILITIES

Traditional PLM solutions frequently provide fundamental capabilities, but they often lack some or all of the following innovative new capabilities. These capabilities, in particular, are necessary to support product development in decentralized environments.

- **External Access:** In the scenarios depicted in this eBook, users must collaborate outside the firewall with customers, partners, suppliers, and more. Here, a cloud-based PLM system is not only acceptable but it also provides significant advantages. Users from participating organizations can access the shared, external PLM system from a browser or mobile app while assuring protection for intellectual property Hosting a dedicated PLM system in the cloud is a good way to establish the common, external system.

- **Quick Startup and Shutdown:** Many of these complicated scenarios require speedy setup and shut down, along with easy archiving of data and the PLM environment. Furthermore, those archives must be easily and speedily accessible when needed by multiple parties. A cloud hosted PLM system running on virtual machines (VMs) is particularly well suited to meet these demands.

- **Ongoing Customization and Upgrades:** Product development and engineering processes, especially in these scenarios, is a rapid and dynamic thing. Templates for corporate processes, procedures, and business rules may be defined at the beginning of the project. However, in many cases they evolve over time as the initiative matures, compliance requirements

change, or the procedures and business rules of participating business partners' switch over time. The PLM solution supporting these efforts must provide the flexibility and agility to accommodate data and process changes.

- **Internationalization:** With potential participants located around the world, an effective PLM solution must be capable of presenting the user interface in a multitude of languages. That, however, is not the complete set of needs. The data and information housed within the PLM system must also offer the same flexibility. For example, measurements must appear in metric and English units, depending on the settings. Furthermore, time zones must synchronize to a single, system clock so that workflows and editing make sense in relative time. For instance, to satisfy compliance requirements, an initial workflow approval completed in the United States must occur—and be time-stamped—before subsequent workflow approvals in Japan, even though Japan is hours ahead.

- **Data Federation:** This capability allows the PLM system to reference data managed in other systems without moving it. This lets users view and edit the information easily and securely. It also enables security permissions, versioning, workflow, and more, without the challenges of conventional integration techniques.

LIFECYCLE > INSIGHTS

RECAP AND CONCLUSION

Sometimes, unusual opportunities warrant unusual circumstances. Such scenarios include organizations entering into rapid co-development projects, conducting separate programs, and undergoing mergers, acquisitions, or divestitures. Each of these is a strategic move to realize opportunities in the marketplace, outmaneuvering competitors, and ultimately building tomorrow's intelligent, connected product systems. However, the execution of product development and its attendant processes in such scenarios often takes place in a non-traditional, unconventional, and decentralized manner. Product development in these circumstances calls for more modern approaches to PLM that can meet the needs of these particular cases.

KEY COMMONALITIES

Regardless of the situation, the PLM systems used to support these decentralized development scenarios share some commonalities. Each requires complete PLM functionality with strict security. Each should be accessible by browser from remote locations, ideally with mobile options. Each must also be capable of being set up and loaded with data quickly. Each should be able to be shut down with minimal effort, and capable of archiving the data and system for future access. They should provide Internationalization capabilities for both the user interface and the data. They must not restrict customization of the data model, processes or business rules, and must offer integration and data federation capabilities. Finally, they must be easy to upgrade at the request of the business, even when customized.

CLOUD-BASED PLM

By leveraging cloud-based PLM solutions, organizations can access these capabilities. Cloud-based PLM systems provide the fundamental capabilities expected of every solution, yet they provide the innovative capabilities these unconventional environments require. They offer quick system setup, shutdown, and archiving. They allow all users in every location easy access, even on mobile devices. They provide a neutral and secure environment, so participants can contribute key intellectual property without exposing everything. They are the technology that fits the need.

FINAL TAKEAWAYS

Not every product development effort fits the mold, but that does not mean you cannot execute without key enterprise systems like PLM. New, different, and more modern approaches, such as cloud-based PLM, best satisfy the needs of these decentralized product development scenarios. Such options have greater agility, are more cost effective, and are optimized for these specific scenarios. Because of this, they provide the right capabilities at the right price, and at the right time.

© 2015 LC-Insights LLC

Chad Jackson is a research analyst, thought leader, and blogger with Lifecycle Insights, providing insights on technologies that enable engineering, including CAD, CAE, PDM & PLM. chad.jackson@lifecycleinsights.com