PLM Today and Tomorrow:

How High Tech Companies Can Gain Profitable Innovation Through Product Lifecycle Management

A Product Lifecycle Management Whitepaper

Abstract

The next generation's successful tech companies will excel at sustaining innovation, delivering the right products to market, reinforcing brand identity, and minimizing costs, all while decreasing time to market. The alternative is to be swept away by increased pressure on profits from shorter product lifecycles, extended supply chains, mounting regulatory requirements, globalization and increasing outsourcing.

Product lifecycle management (PLM) technology offers high tech companies the tools to address these issues and develop demonstrable competitive advantages. Designed to bring together marketing, research and development, design, manufacturing, quality, procurement and other key stakeholders at the earliest stages of a product's existence, PLM solutions consolidate product and management data in a collaborative, dynamic, secure environment. Future gains for high tech enterprises using PLM include the ability to adapt their organizations to handle the onslaught of rapid change.

More recently PLM solution providers have helped companies cut costs and increase revenues by shortening product development cycles, enhancing quality control, integrating supply chains, and lowering compliance costs. All of the key enablers and business transformations driven by enterprise PLM can allow organizations to achieve profitable innovation by driving decisions affecting down-stream processes earlier in the product lifecycle. Achieving these goals can make the difference between increasing profits and growth on a global scale versus risking product irrelevance.

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Prepared by ENOVIA

Introduction: PLM in High Tech

Managing product lifecycles has been a long-standing challenge for the high tech industry. Software developers created product data management (PDM) solutions in response to that challenge in the 1990s. Initially focused on helping engineering manage design data, PDM soon grew to include collaboration tools for stakeholders outside of engineering – the foundations for today's PLM solutions. As their capabilities have increased, stakeholders inside and outside engineering have used PLM solutions to improve processes throughout the design cycle, including quality control manufacturing, program management, sourcing and maintenance, mid-level and executive management.

The user community has also expanded to include strategic partners in outsourced design, manufacturing and intellectual property licensing. This continued evolution offers greater insight into how PLM can drive innovation, growth, and profitability in almost every sector of the enterprise and external value chain.

One of PLM's primary benefits is its ability to shorten new product introduction (NPI) cycles and lower total cost of ownership (TCO). In parallel, PLM is frequently deployed to optimize process standardization, intellectual property re-use and supply-chain management. It also gives enterprises the tools to deal with the geometric expansion of product complexity and supporting technologies. Currently, PLM allows high tech enterprises to eliminate non-value-adding processes, such as manual data transfers from system to system, cuts queue times through automated workflows and reduces re-work at all stages of the product lifecycle through virtual product development and collaboration. The ability to utilize virtual product development to drive manufacturing and supply chain optimization can take high tech organizations to the next level of global efficiency and competitive advantage. For companies embracing this vision of PLM, there is a clear opportunity to drive profitable innovation for operational excellence, time-to-market advantages, and overall strategic benefit.

Market Dynamics Affecting High Tech Companies

The high tech sector is made up of many sub-sectors with unique drivers that affect their ability to compete and drive bottom-line results. For example:

- The consumer electronics industry faces top-level business drivers such as ever shorter product lifecycles combined with pressure to satisfy frequently changing consumer tastes.
- Infrastructure equipment companies are driven by engineering needs for long-term service life and maintenance.
- The medical device industry needs government and FDA approvals.
- Semiconductor companies need complex design management and EDA workflow control in a collaborative multi-site, multi-enterprise environment.
- The electronic manufacturing services (EMS) industry needs to optimize the exchange of data, streamline sourcing processes, and collaborate with customers.
- Regardless of their drivers, these sub-sectors have a common need to support interaction, collaboration, and communication early in the design process. This allows them to use the best available ideas to drive down costs, increase product quality, and improve customer satisfaction.

Business Drivers and Transformations in High Tech

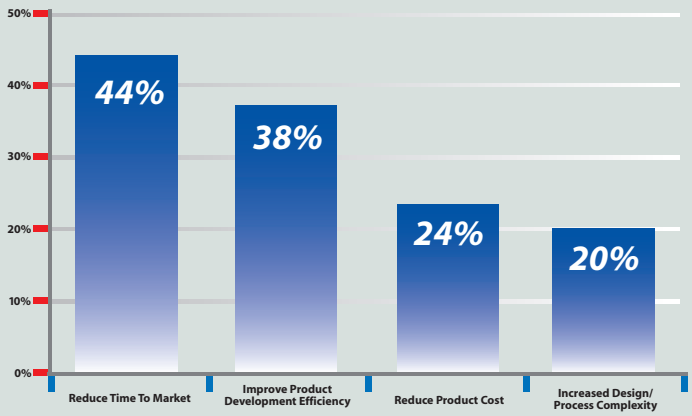
All high tech industry segments must focus on enabling business transformation, a process that touches stakeholders across the entire enterprise and requires a great deal of strategic and operational adaptability. For example, at the strategic level high tech companies must be able to quickly make go/no-go decisions on product lines, technologies and market opportunities. In such markets, a delay or mistake can cost revenue and market share. Gathering the best ideas from customers, the marketplace and key partners also has strategic benefits. Finally, the ability to track and audit product development – from idea, to manufacturing, to service and obsolescence – is of great strategic importance in maintaining customer satisfaction, growing profitability and encouraging innovation.

On the operational side, capturing best practices and driving continuous process improvement becomes integral to driving business excellence. Supporting Design-for-X (compliance, cost, quality, manufacturing, assembly and test, obsolescence etc.) is a key part of the process. The complex matrix of stakeholders, processes, and data required in a complete DFX solution demands a single-platform Service Oriented Architecture (SOA) strategy that can generate a single version of the truth to guide decision making and impact analysis across the business.

Part and IP re-use are also critical to operational excellence. Market demands for product variety and enhanced features at commodity pricing requires that part and IP re-use programs cover the design productivity gap. Product flexibility also requires content re-use. The need for a global re-use strategy is becoming more and more critical as design and manufacturing outsourcing increases. Operational excellence hinges on re-use at all levels, from requirements, to features, designs and intellectual property.

In addition, ease of collaboration, access control, and exchange of product data across the supply chain and extended enterprise affect operational excellence. As adoption of Original Design Manufacturer (ODM) models and the percentage of value driven through the supply chain increases, this seamless interaction between OEMs, suppliers, design partners and manufacturers becomes even more critical.

Enterprises need broad, deep PLM systems to optimize their chances of transforming their businesses. Flexibility is key to executing a successful PLM strategy that avoids obsolescence, painting the organization into a corner, or worse yet, losing investment and causing the pain of future re-implementation and re-work. Given the continued pressures on high tech companies to rapidly evolve, a PLM system must also enable executives to choose the business transformations and PLM capabilities that make the most sense for them. Companies need the ability to start in any area of PLM; scale quickly at the enterprise level; and add additional capabilities based on the market and business needs critical to the organization's success.



Overall, the message is clear. Electronics manufacturers must bring increasingly complex products to market on shorter time tables. In fact 44% of electronics companies also realize the they need to improve their product development efficiency (38%) to decrease time to market as well as reduce product costs.

"Our implementation of ENOVIA MatrixOne is a necessity in order for Sony Ericsson to stay ahead in an increasingly competitive market," said Colin Boyd, CIO for IS/IT, Sony Ericsson Mobile Communications. "Sony Ericsson is customer focused, but the quality and efficiency of our engineering environment—which makes up more than half of the company—is key to the success of the company, and so we need powerful tools in order to increase productivity and reduce the lead time in bringing new products to market. By standardizing on ENOVIA MatrixOne, Sony Ericsson can potentially replace numerous freestanding R&D systems with a single development operations platform. At its essence, ENOVIA will help us to develop better products cheaper."

Defining PLM for High Tech

PLM platforms must be able to grow in application capabilities as well as core technology offerings without becoming stale. Companies should not have to throw aside previous implementations and undertake expensive re-implementations to realize benefits in the future. "Future-proofing" PLM investments is critical to achieve lowest total cost of ownership (TCO). Other important factors in minimizing TCO include the breadth of capabilities offered out-of-the-box, a strong vision and an understanding of the product roadmap and migration path.

Enterprise PLM solutions must support five core capabilities:

- Product Data Management and Mechatronics (the combination of mechanical, electronic and software engineering);
- Collaborative Product Design;
- End-to-End Traceability;
- Component and Supplier Management; and
- Product Portfolio Management.

Organizations don't have to implement all of them, but they do have to create a foundation for future growth and value.

• Product Data Management and Mechatronics

Key PDM and mechatronics capabilities include multi-discipline bill-of-material management; change control; configuration management and documentation. This PDM functionality should provide a solid foundation for virtual product development processes that minimize physical prototyping and testing. An environment that can support optimization, simulation and impact analysis is the foundation for a mechatronics strategy of synthesizing electronics and software to create simpler, more economical, reliable and versatile systems. In addition, the ability to provide strong configuration management capabilities will allow organizations to manage the growing complexity of products and related IP.

"Our product development team expects to function as a much more cohesive unit than they could before we implemented ENOVIA MatrixOne," said Shai Cohen, Dialogic's vice president of engineering. "We believe that the common knowledge repository and automated processes will enable us to speed collaboration and be on the same page both internally and externally throughout our value chain."

• Collaborative Product Design

PLM solutions should support collaborative product design (CPD) through Internet-based SOA (service-oriented architecture) collaboration capabilities and the ability to control role-based access visualization. Ideally, CPD should enable those stakeholders without CAD tools to participate in product design discussions as easily as those who do have CAD. The ability to collaborate based on multiple dimensions, such as the user's role, the state of the PLM data or IP, and in context of a program or project in real time, eliminates on-value-add processes and queue time.

- ***End-to-end Traceability***

Full end-to-end traceability requires the ability to navigate from requirements, to features, to logical/systems view, to physical (as designed) product views. This requirement-to-feature-to-logical-to-physical traceability craves the closed-loop feedback mechanism that is often lost through the product lifecycle. Without this feedback, it is harder to capture lessons learned and avoid repeating costly mistakes in future product iterations. More seriously, it helps design teams meet customer expectations and needs.

PLM solutions must support end-to-end traceability throughout the product lifecycle, from requirements, to functional, logical and physical (RFLP) views of the product definition. This begins with customer and market requirements for engineer-to-order (ETO), build-to-order (BTO), design-to-order (DTO) and original design manufacturing (ODM) models. Once customer requirements are defined, they can be mapped to features. The features are integrated to provide the overall solution. At that point, the requirements and the features are categorized in the PLM system for re-use. For example, a product developer who determines that a product needs a touch screen interface to meet customer requirements can search the PLM system to learn what co-workers did with hardware, software drivers, etc. on previous projects that called for a touch screen interface.

Finally, capturing and validating configurations based on select features (and the fulfilled requirements) before design work occurs helps eliminate unnecessary design and manufacturing re-work.

- ***Component and Supplier Management***

Component and supplier management should include a global strategy for IP and part re-use as well as new part introduction (new part request, or NPR, and new part development, or NPD.) The needs of direct materials sourcing should be able to allow for early requests for quotations (RFQ) processes to be tied directly to the product record and related data. From a security perspective, supplier access to product IP should be managed based on the supplier's role across the extended enterprise and level of strategic importance. This is essential as it enhances the ability to capture recommendations prior to volume manufacturing. This also optimizes cost savings, quality and performance opportunities in the product design.

- ***Product Portfolio Management***

Product portfolio management draws on all of the areas previously mentioned to allow companies to make the correct strategic decisions and maximize market opportunities. It is critical to be able to connect project plans to the product configuration management solution. Being able to tie key milestones in the project work breakdown structure (WBS) to the product timeline gives a more complete picture of progress and risks involved. Also, the ability to tie dependencies between any type of project allows companies to quickly identify, analyze and mitigate technology, process, R&D, and operational dependencies and risks before costly errors or miss-steps occur.

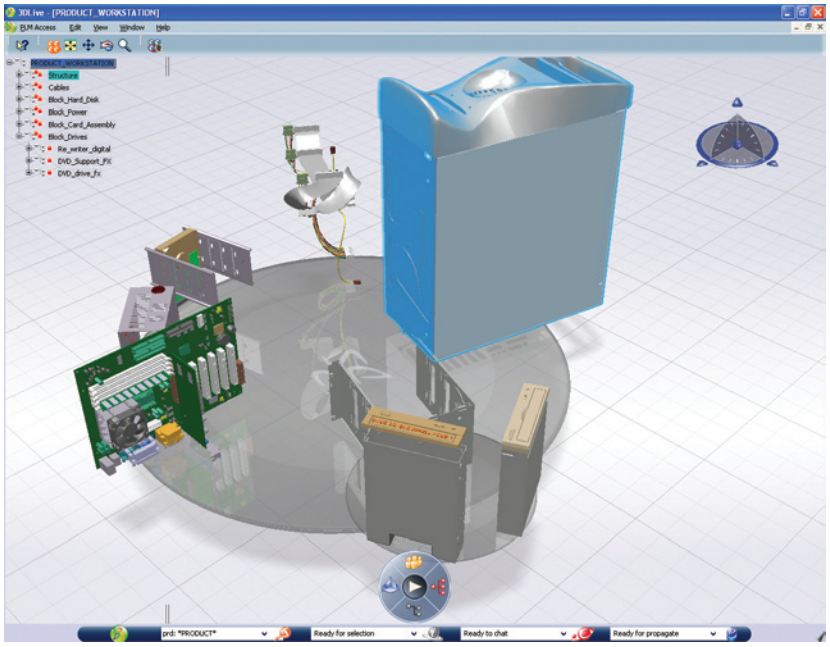
Many companies also require the ability to report on key performance indicators for product data or IP stored in the PLM system. This allows for continuous process improvement, as well as identifying areas of improvement in the interaction between methods, tools, processes and different stakeholders across the enterprise. With such a dynamic market, it is important for high tech companies to have the flexibility to create new KPIs and user-configurable dashboard views that promote easy maintenance and reaction to changing business models.

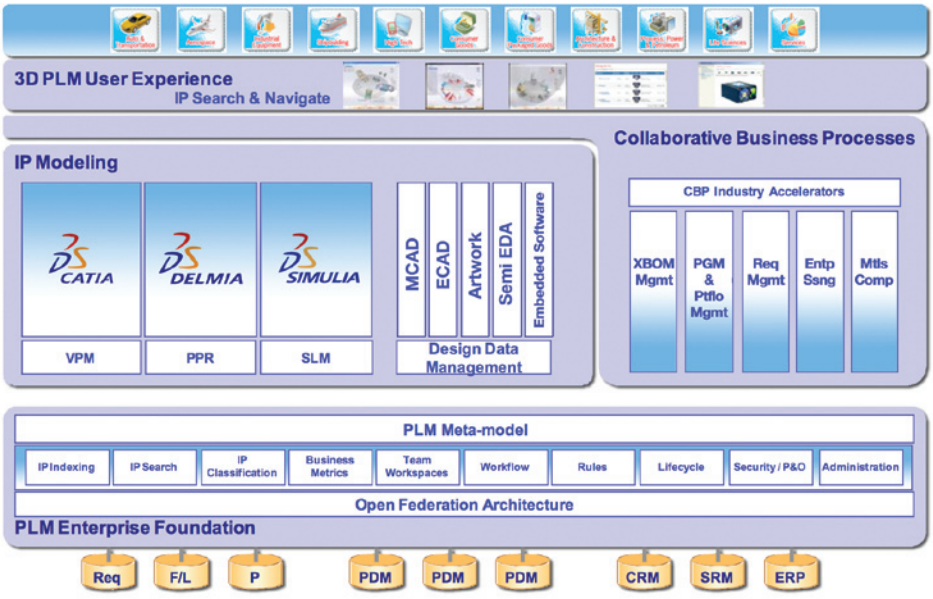
The New Paradigm for PLM

The new paradigm for high tech PLM must enable virtual product development, testing and manufacturing. In the future, all high tech products will be digitally designed, produced and managed. Avoiding physical prototypes and validating the ability to manufacture products (as well as knowing that they meet customer and market requirements up front) will enable high tech global enterprises to grow and profit while eliminating waste. These gains will be driven by the ability to work in 3D, and not just the visual 3D associated with CAD applications. In a PLM environment, the entire process becomes multi-dimensional. A design does not move in a linear pattern through a process. At each phase every stakeholder – engineers, production engineers, compliance, financial and marketing staffs, etc. – are adding value. Production engineers advise about a potential manufacturing problem, and design engineers eliminate it long before it can become a problem. Marketing sees how the product is evolving so it can plan packaging and displays. Financial analysts monitor material and production costs as they develop so they can decide how to maintain profitable price points. Everyone navigates the data quickly and intuitively through a common interface. Under the PLM aegis, design, engineering, and manufacturing become a concurrent whole.

Content providers and creators must be able to interact with enterprise PLM systems that contain more and more complex data and business processes. This demand will be driven by the need for greater functionality, including easy search, navigation, real-time collaboration, and information access in a context that makes sense for their role.

In addition, the PLM interface should allow direct connection between content owners and contributors for real-time collaboration rather than endless notifications and e-mail threads.





A forward-looking PLM strategy must be built from the ground up on a true enterprise SOA platform foundation. Such a foundation allows enterprise PLM to support "on-demand business transformation," which is critical to ensuring long-term value. This SOA strategy must be dynamic, so that new requirements for schema, architecture, and the evolution of other systems and behaviors can be quickly taken into account without costly customizations or re-implementations.

Finally, companies embarking on PLM projects must consider their breadth and depth. A long-term PLM solution must include focused, easily configurable solutions for the high tech industry while still retaining the technological flexibility to adapt to new market conditions. It must also come from a solutions provider with the vision and depth of industry knowledge to plan for market developments over the next three to five years. These areas should include not only the traditional areas of PLM (as referred to previously), but the vision to support profitable innovation by enabling virtual product development, testing, and manufacturing.

ENOVIA: The PLM Leader for the High Tech Industry

Dassault Systèmes ENOVIA solutions for PLM continue to lead the market.

With the broadest market coverage, ENOVIA solutions have evolved to promote profitable innovation; maintain the ability to start in almost any focus area; implement in clearly defined controlled phases; and scale quickly across the enterprise.

ENOVIA solutions enable customers to initially deploy a small scale PLM project, and based on results, rapidly scale to offer an enterprise-wide solution. Another key differentiator is the company's ability to offer a single and flexible SOA platform with broad capabilities in product portfolio management, collaborative product design, supplier relationship management, digital validation, test and manufacturing.

ENOVIA solutions also help customers across the entire high tech ecosystem innovate profitably by bringing stakeholders together via Internet-based access to PLM content and business processes. By offering different stakeholders role-specific access, views and process interaction, ENOVIA integrates silos of communication into the process with the single focus of driving out non-value added processes, and optimizing quality and cost. This may start in one area utilizing ENOVIA's out-of-the-box processes. From that foundation, companies can expand into an end-to-end PLM implementation that unifies design, process management, simulation and manufacturing into a single collaborative environment.

As PLM within the enterprise becomes more mature and sophisticated, companies can add capabilities to interact more directly with customer requirements or with suppliers for design re-use and optimization. Regardless of the order of the phased PLM implementation, ENOVIA solutions will allow companies to reach for profitable innovation through DFX, virtual product design, and optimizing product manufacturing before the first prototype is built.

As the data stored in PLM becomes more advanced, companies looking for the next wave of value must optimize product quality, reduce costs, increase process efficiency and throughput. The power of Dassault Systèmes' ENOVIA solutions in process, product data, navigation and analysis gives high tech companies the tools to digitally innovate, design and manufacture the products they need to win market leadership and exceed customer and market expectations.

About ENOVIA

ENOVIA is a recognized leader in delivering collaborative PLM solutions. We enable companies from a broad range of industries to dramatically accelerate innovation, time-to-market and revenue generation by collaboratively developing, building and managing products. Our solutions facilitate the sharing of concepts, content and context across product lifecycles and throughout value chains of employees, customers, suppliers and partners.

ENOVIA collaborative PLM solutions help global enterprises bring together people, processes, content and systems to achieve a compelling competitive advantage. Our interoperable solutions unify and streamline processes across the product lifecycle, enabling companies to easily and cost-effectively work on projects within and outside of their enterprises. Our adaptable, scalable technology is built to accommodate the ever-changing marketplace.

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