

PLM Rapid Deployment Framework for a Global Application

Product Value Management

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PRODUCT LIFECYCLE MANAGEMENT
ROAD MAP™



CPDA: Collaborative Product Development Associates, LLC

CPDA's Product Lifecycle Management (PLM) research programs target the critical decisions in Product Lifecycle Management challenging Design, Engineering, Manufacturing, and Information Technology managers and executives. CPDA's PLM collaborative research programs provide in-depth analysis of strategies, products, issues, processes, technologies, trends, case studies, and surveys for assessing technology, business goals and objectives, and implementation road maps.

The cohesive suite of collaborative programs clarifies and evaluates new capabilities, standards for frameworks, and development issues; it highlights the most advanced uses of leading technologies, and it links the technical effort to the realization of business value. The four collaborative research programs include:

Design Creation and Validation: A bottom-up view of engineering requirements from the desktop across the enterprise. Advanced computer-aided design (CAD), engineering analysis, manufacturing technologies, collaboration, and visualization software serve as springboards for gaining a competitive advantage. The Design Creation and Validation service applies CPDA's structured methodology to the evaluation of new products and processes as well as to current projects in client organizations. A critical focus, the emerging technology of knowledge engineering with templates and rule-based architectures focuses on delivering the needed tools into the hands of product developers to capture knowledge, and to formalize its use. The use of direct geometry access and manipulation, data translation technology, XML alternatives, and JT options are also assessed for their ability to deliver interoperability across the diverse and disparate business and technical applications.

Design/Simulation Council: The Council promotes a standard framework employing common terminology to integrate and optimize the diverse and divergent specialist activities currently fragmenting design efforts. CAE must fully integrate with design, up front, to close the chasm between design and analysis. Analysts must actively participate continuously in design decisions and enter the mainstream. The impending breakthrough in CAE will rest on knowledge reuse, process capture, and streamlining.

PLM Integration / Product Definition: A top-down view provides a conceptual framework for collaboration across different product development perspectives, bridging customer needs, systems engineering and tradeoffs, design solutions, and fulfillment and manufacturing. Integration and interoperability in complex PLM environments pose substantial hurdles. The rapid transition to cross-enterprise collaboration, at all levels of design and supply, intensifies the pressure on existing, inwardly focused IT architectures to support and enable new modes of doing business.

Product Value Management: Common processes for design, development, and product introduction across the supply chain may be validated with reference models such as SCOR (Supply Chain Operational Reference model), or VCOR (Value Chain Operational Reference model). The first step, business process modeling (BPM), facilitates the building of consensus around a common understanding and terminology, across organizations and functional silos. Mapping BPM to a service-oriented architecture based on open standards represents a critical second step. An IT integration infrastructure in a Federated Enterprise Reference Architecture™ (FERA) supports a loose coupling between enterprises extending across the supply chain.

Collaborative Product Development Associates was formed by the PLM research team of D.H. Brown Associates, Inc. (DHBA).



PLM Rapid Deployment Framework for a Global Application

Carlos Moreno, PLM Systems Manager, Pentair Water

Carlos Moreno led a successful transformation at Pentair Water to support cross-functional collaboration and product innovation. He joined the company in 2005 as a PLM systems manager. He is responsible for the creation, deployment, and launch of a new product management platform used to control product innovation initiatives across business units worldwide. Carlos benefits from fifteen years of extensive experience across multiple information technology disciplines driving initiatives for business digitization, creating and aligning IT program portfolios.

This report is derived from Carlos' presentation at CPDA's annual conference, PLM Road Map™ 2007. Our thanks go to ENOVIA SmarTeam for introducing us to Carlos Moreno, and for sponsoring and supporting this publication.

EXECUTIVE SUMMARY

Carlos Moreno drove a highly successful PLM effort globally across Pentair by clearly recognizing realistic priorities for the program from the start. Self-driven to systematically reduce risks, he set up early planning to concentrate on the target of collaboration, to set a realistic scope, and to establish careful phasing. Implementation benefited from a framework addressing four priorities for decisions making – operational excellence, functional alignment, cost containment, and technology advancement. Operational excellence to Carlos means that any new system introduced to automate a business unit has to work flawlessly. A careful targeting of windows of opportunity did not extend beyond one hundred days, with resource use projected across thirty, sixty, and ninety-day periods to keep progress moving. In considering the architecture, the system has to be robust so that every business unit is satisfied. It must be globally open, and provide a single solution with the adaptability to meet the needs of each of the business units.

Eighty percent of the benefits flow from the common shared definition, simplification, and collaborative communication of development processes. The exercise of documenting the process, and digitizing it, initiates a value stream mapping that streamlines the process. Now, Pentair has in place forty multiple workflows created in templates. Each provides the flexibility to be customized with minimal work to individual environments.

Of particular note, Pentair, Inc. took a phased approach to implementing ENOVIA SmarTeam across the various disciplines in the organizations with twelve different business units worldwide. That approach may well have been encouraged by ENOVIA SmarTeam, which has noted independently that its customers typically take a phased approach, gradually and cost-effectively deploying a PLM program over time, targeting real business benefits at every phase. Design cycles have been cut by as much as fifty percent. The success of the program established PLM as a strategic tool enabling innovation, extended the payoff well beyond cost savings, process, and knowledge reuse.

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PLM Rapid Deployment Framework for a Global Application

BACKGROUND

Pentair focuses on two industries – water services and clinical products. With roughly fifteen thousand employees in twenty-seven countries and projected 2007 revenues of \$3.4 billion, approximately two-thirds of the company’s revenues derive from providing services in the water industry. Pentair serves worldwide markets, and the design effort is concentrated in sixteen centers around the globe. With continued growth driven organically as well as through a series of acquisitions, changes continuously present new challenges in managing both the growth and the diversity. Because the industry is highly fragmented, Pentair perceives an opportunity to gain major synergy by leveraging the strengths of diverse players in bringing them together under a single large portfolio that focuses on water. The effort spans all the way from a tiny pump in a fish bowl to municipal applications providing water to thousands of homes daily.

RAPID DEPLOYMENT FRAMEWORK: WHY IS IT NEEDED?

To drive the synergy of a collaborative effort, PLM concentrates on the management and transformation of the intellectual property assets that support the ability to create new products, in order to generate new revenue. Later on, the PLM system feeds ERP with orders, and provides the opportunities for CRM to handle marketing.

Collaborative Innovation

Harnessing the power of a global talent pool, leverage the particular core competency of each team or team member towards the active resolution of a customer problem, seamlessly, anywhere, anytime....



Image Source: Google.com

Conceptually, PLM solutions as a first step help compress the development cycles to make the organization more nimble and efficient. While the ability to become lean and to accelerate development processes appears quite useful, Carlos clearly stresses the bigger payoff from the implementation in deepening and accelerating the clear understanding of common processes for each one of the business units. Collaboration presents a far greater payoff. With the system in place,

information now flows laterally and not just vertically. Peers in other business units establish a synergistic opportunity once information has been exchanged. The individual territories were not designed to help each other. Exchanging information from one unit to another was painful. Even our central Indian location involved really long times for exchanges, involving FTP sites, CD burning, and uncontrolled duplication with all of the unintended consequences.

Now, a virtual engineering workbench supports multi-site connections across China, India, and multiple locations in the U.S. Regardless of where you happen to be, the exact same information is available almost at the same time. We even have several projects with follow-the-sun capabilities. Before one designer goes to bed, on the other side of the planet another picks up the effort. That gives us ten days of effort in a week. There's no way we could have ever accomplished that objective without this platform.

Currently, eight locations replicate with each other using meta data. Very large files are downloaded on demand. That has worked relatively well. With smaller satellite sites, with only one or two designers, the investment cannot be justified for that performance. We also publish a library of current information in PDF read-only format. People on the shop floor in China or any other assembly shop can access the web and use the same information.

That flexibility in supporting a range of global information requirements is needed to meet the data consumption profiles of a diverse set of users.

ADDRESSING THE FIFTY PERCENT RISK OF FAILURE FOR IT PROJECTS

As the PLM manager for an SME business, Carlos remains acutely sensitive to the perceived risk of a fifty percent failure rate for IT programs. Indeed, he cites one survey reporting a sixteen percent level of success for IT projects, and even more dismal results for very large companies with roughly nine percent success rates.

To address the risks, Carlos aggressively creates momentum behind investments in the IT infrastructure by collecting successes and improving the chances to get that return of investment to kick in. He systematically cuts risks by reducing complexity and simplifying, which simultaneously renders the IT effort more manageable. He builds on a series of simple successes that as a whole meet the challenge of complexity that the business generates, and avoids automating or digitizing areas that are inherently complex.

"Any intelligent fool can make things bigger, more complex, and more violent. It takes a touch of genius – and a lot of courage – to move in the opposite direction"

E. F. Schumacher

EARLY PLANNING PRIORITIES: TARGETING COLLABORATION, SCOPE, AND PHASING

From the beginning of the PLM program, Carlos emphasized three approaches that included focusing clearly on the target of collaboration, scoping the effort clearly, and phasing the project with specific goals and relatively short timetables.

In reviewing the complexity of integrating the remarkable range of diverse efforts across the full development cycle, Carlos recognized that Pentair proactively encouraged and initiated collaboration. Admittedly, redundant and overlapping silos of information were growing everywhere, and crippling the ability to exchange information. Sharing the data and integrating the information flowing through the different stages supported the exchange of ideas and synergized efforts across the company.

Carlos simply and clearly states, “We’re talking about enabling collaboration.” Eighty percent of the benefits flow from the common shared definition, simplification, and collaborative communication of development processes. The exercise of documenting the process and digitizing it initiates a value-stream mapping that streamlines the process. Now, Pentair has in place forty multiple workflows created in templates. Each provides the flexibility to be customized with minimal work to individual, specific environments.

Functionally, the business units now realize that they are not that different [from each other], even though they originally thought they were. The introduction of multiple parallel processes relaxed the resistance. Particularly in engineering for wiring, designers working with their established techniques identify familiar approaches. ENOVIA SmarTeam enabled us to do that, which provided a major source of savings.

With the target of collaboration established, the scope must be clearly and realistically defined. It may target the simplification of data sources to support open access and unlock the product library for everyone to exchange ideas for improvement. Standard processes can be applied to transform the approach and support continuous improvements. The target may be listening to the customer to create something new. Or, it may relate to simply reacting quickly and clearly to the current challenges facing the business at the moment. Later on, they can collaborate by integrating the knowledge from one particular skill set that happens to be in one country with another group in another country.

To accelerate progress, the early planning established different phases with specific and manageable goals. In the process, Carlos again clearly targeted the reduction of risk.

FOUR PRIORITIES IN A DECISION FRAMEWORK

With the planning complete, four priorities contribute to a framework for making day-to-day decisions. **Operational excellence** rises right to the top as the first priority. Any new system introduced to automate a business unit has to work flawlessly. ENOVIA SmarTeam proved critical in resolving any outstanding issues along the way rather than attempting to patch any needed changes later. Any challenges “go right to the top really, really fast.”

[PLM] has to work every single time. It doesn't matter how sophisticated the software is, how wonderful the functional capability is, if your users are not able to rely on the software every day without flaws, it's a mistake. It doesn't matter if it's the lowest bid proposal or the most expensive; the system has to work every single time. If I have an outage for one day, I'm losing on ROI, not to mention the credibility hit. I define operational demands as zero down time, or zero unplanned outages. That's pretty much what the ENOVIA SmarTeam and SolidWorks combination delivers.”

Carlos also credits the abilities of his own team as well in maintaining the continuous balance and discipline required to apply the particular functions needed within the Pentair environment. **Functional alignment**, priority number two, involves balance with the careful evaluation of the fine tradeoffs, to avoid

introducing too many features and over shooting our requirements, or giving the user base more than they need. We do not introduce a feature or change unless it is widely required or fully necessary. The contribution from ENOVIA SmarTeam and SolidWorks proved critical here as well. Because both systems have been out for a while, we pretty much tap into their experience to come up with a very comprehensive design for the data model. More than ten months of planning went into the effort before the system was introduced to anyone. For this project, we fully capitalized on the efforts of others to come up with a pretty robust solution. That approach has worked marvels, giving us ninety-five percent of what we need. The other five percent we can live without or overcome with a workaround. The tools that we introduce and the demands from people for support must serve a purpose. We will introduce sophisticated new tools so long as they are required, backed by a very strong business case. We are not going to invest in resources that will go unused.

Priority number three is **cost containment**. It is great to have savings, but also make sure that the total investment actually works in terms of both the software and the organizational support needed. It is not solely about taking costs out. It is also about managing the total cost of ownership. Throughout the five or ten year planning window, the organizational structure must be aligned correctly to manage the effort successfully.

Priority number four is the ability to **apply technology that survives** throughout the years. Avoid painting yourself into a corner and maintain the flexibility to move forward regardless of what the future throws on the table.

This framework for decision making is available to adapt and apply to the circumstances and the particulars of each area. The priorities are easily shuffled up and down to apply to the needs of a particular group at a particular moment.

IMPLEMENTATION

Given a keen sensitivity to the risk that one out of every two IT projects will fail, Carlos targets windows of opportunity that do not extend beyond one hundred days. Resources are projected across thirty, sixty, and ninety-day periods to keep progress moving. The end of the project life, or the exit from the funnel, must remain within reach. This approach helps to manage expectations for the project, and to mature it.

The team must also be developed. The experts who are available for everyone to use are particularly important, along with those in operations in the front lines. Blurring the lines between the two extends the project well beyond IT. It becomes an engineering project that has a higher rate of success. With the experts in place, the collaboration and teamwork can be established to bring everyone together. Then an army becomes available, from every group nationwide.

Clear goals convey the benefits that PLM provides to a business unit and how it will work. Even so, the benefits resonate differently depending on the priorities of the particular moment in each group. Nonetheless, the framework for decisions discussed earlier, and expectations for benefits, help everyone to understand what was promised, what was expected, and what will be accomplished.

SYSTEM REQUIREMENTS

In considering the architecture, the system has to be robust so that every single business unit is satisfied. The solutions must be strong enough to meet the needs of a global environment, and flexible enough to evolve with the shifting requirements and different opportunities that the market presents. It must maintain centralized management, but support the business units with sufficient independence to control their own destiny. The success of the product is still in their hands.

Dassault also understood the issues involved with a medium-sized company just realizing the full implications of its global footprint. Their flexible licensing agreements

allow us to basically share or float licenses globally or internationally. Traditionally, the distribution channel would not allow us to do that. The top leadership took the position that the challenges in distribution were not the customer's problem. That's been a major factor that helped us, and avoided a heavy initial investment that could otherwise have been a show stopper.

The system must also have the ability to provide a single face, to represent a single solution. A single system helps with the training, helps to simplify the use of the systems, and helps with support on a cost-effective basis.

THE PAYOFF: PLM AS A STRATEGIC TOOL FOR INNOVATION

Business processes become complicated because of the wide range of systems involved. A flexible set of tools are required that are basic in concept. But when the tools work together on an integrated basis, they support the powerful possibility of driving many different scenarios and processes. The modularity supports the flexibility of assembling a wide range of capability.

The success of the PLM program at Pentair moves automation out of the cost containment category, and turns it into a strategic tool. It creates the innovation that every company requires to generate new revenue sources. If the cycles are automated and digitalized, enormous possibilities emerge. Assume one designer starts the digital development process. Then the engineer in the next office may do something similar, even using the same tools. And so on as the efforts multiply. Suddenly the simultaneous efforts in parallel can be tapped vertically or horizontally as a standardized process, available for everyone. Europe and Asia in a global environment can leverage the technology regardless of whether it is in manufacturing or product development.

Collaboration Forums & Global Innovation Workbench

Brings together a global talent pool to innovate and solve problems as a combined force. This initiative provides a collaboration space while it develops and promotes an inclusive culture where ideas hatch and challenges transform into opportunities.

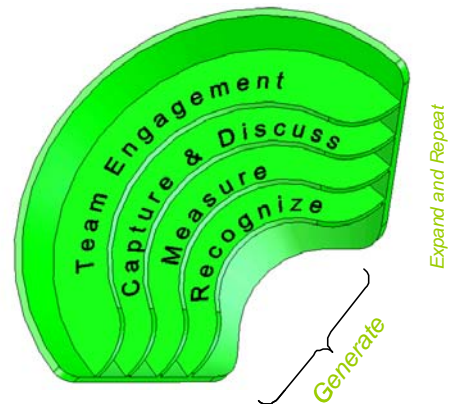


Image courtesy of Pentair CDR

In closing, Carlos returned to one of his opening themes of aggressively creating momentum for IT efforts by collecting and promoting successes. Measure and collect the benefits. Make sure that the users and engineers feel it. They need to speak out in their own words, saying “I’m glad you did this. I really look forward to the next IT project that we can work on together with you.”