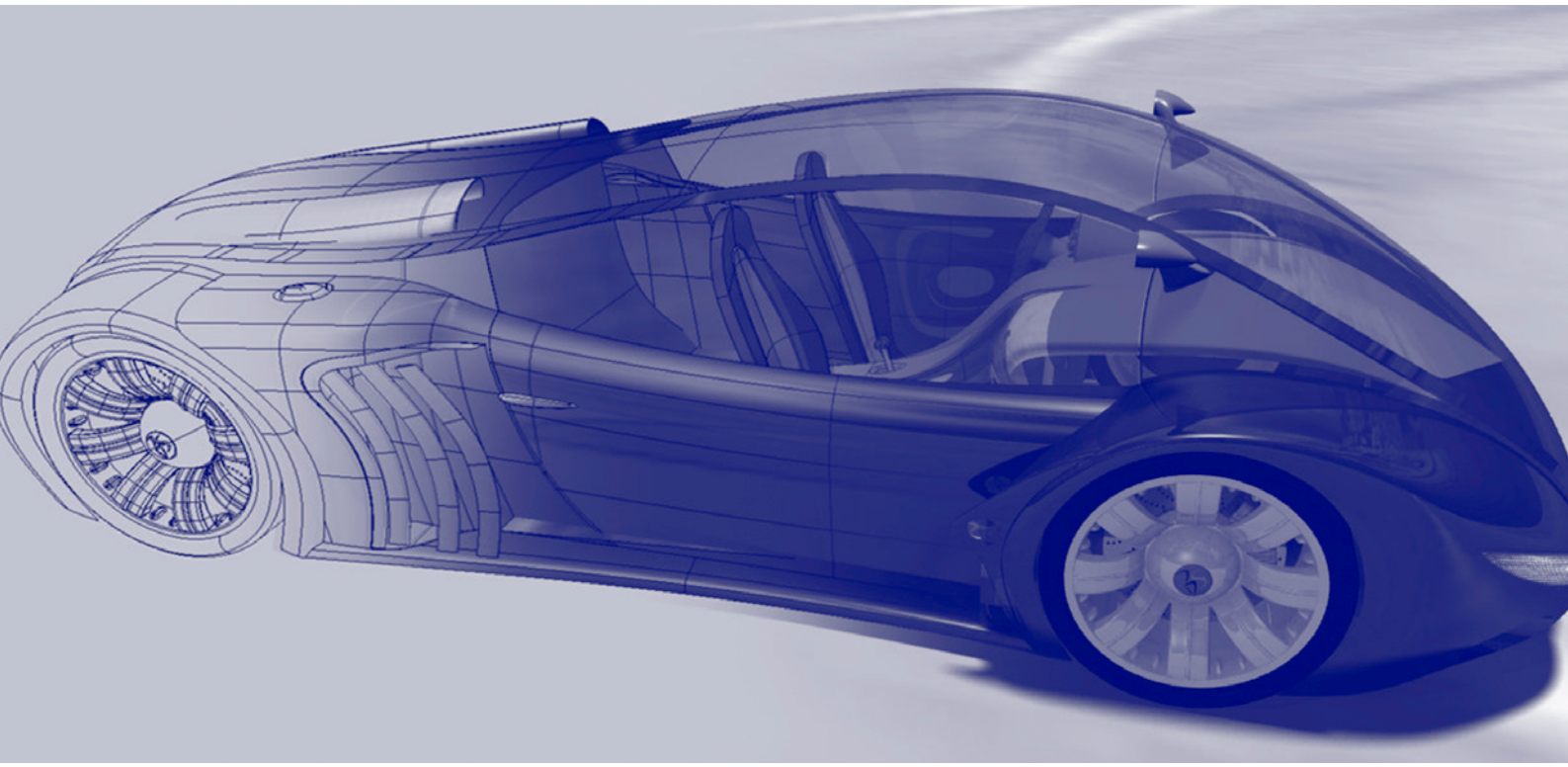
The Process of Innovation: A CIO's Guide to Product Lifecycle Management



A Dassault Systèmes publication with research from Gartner

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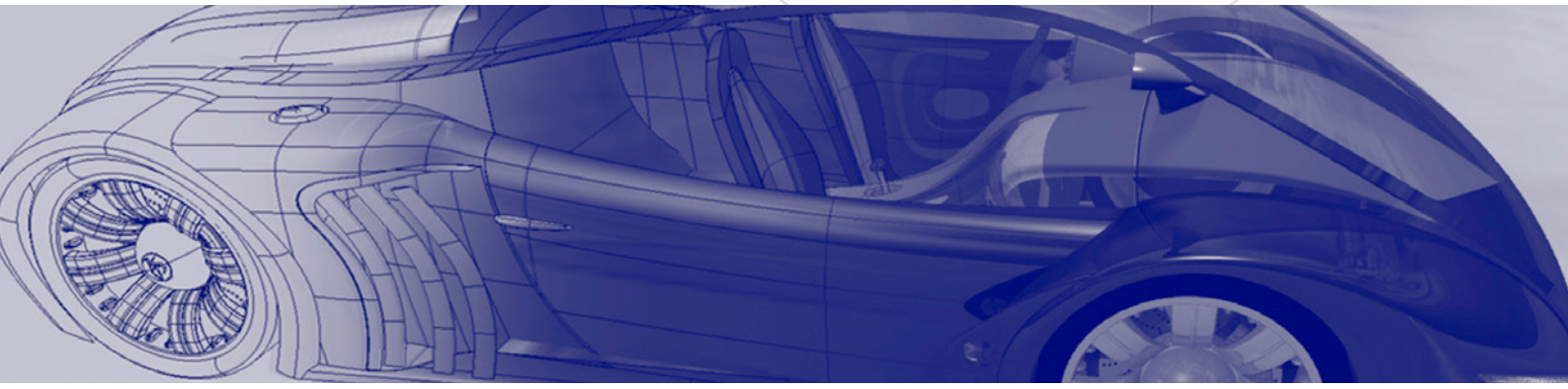


Management Summary

Companies of all shapes and sizes are increasingly looking to top-line growth for their businesses, growth that will come from exciting the market with innovative products and services. One need only look at some of the latest examples, whether it be Apple's iPod product line or Motorola's RAZR to see what an innovative product can do for a company's top-line as well as overall perception in the broader market. Such perception can lead to a significant "market glow" increasing the inherent value of the enterprise that is reflected in higher market capitalization and share price.

While companies seek such growth opportunities, competition has never been tougher and all economic trends point to only an increase in market competitiveness as more nations modernize and join the global manufacturing community. To thrive in this highly competitive and increasingly global market, companies must become agile and responsive to changing market conditions and needs. This requires the effective and efficient utilization of not only internal resources, but those of strategic partners, partners who are not across the street anymore, but often on the other side of the country, if not the planet.

It is here where your IT strategy and infrastructure will play a crucial role. Only through the effective deployment and use of IT can a company successfully participate in a rapidly evolving market that knows no physical boundaries, responding with agility to opportunities wherever they may present themselves.

Fostering innovation not only across your enterprise, but across your ecosystem of strategic partners and effectively tracking, capturing and extracting the value of those innovations requires a Product Lifecycle Management (PLM) strategy and supporting technology platform.

In this report, Dassault Systèmes will introduce some of the key technology trends that are taking place today in PLM that will assist companies in improving "The Process of Innovation".

Source: Dassault Systèmes

Interview: Marc Halpern, Gartner

Marc Halpern, P.E., Ph.D., is a research director in Gartner Research, where he is the lead analyst covering product life-cycle management strategies and software applications. He focuses on design, product data management, manufacturing process planning and product portfolio management. Dr. Halpern has more than 20 years of experience as a PLM software industry specialist and a practicing engineer.

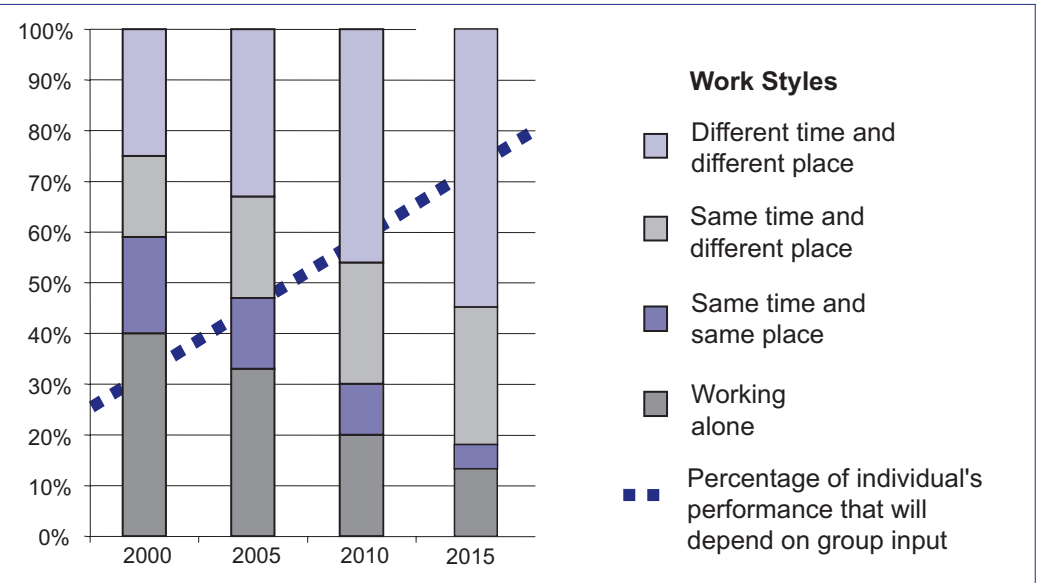
In the following interview Marc talks about best in class design processes, the challenges facing design today and the risks and benefits of collaboration.

Q. Given, today's global business pressures, what type of data and information does an organisation demand from R&D for product development?

A. You mention today's global business pressures. These include rapidly increasing, technology content, global competition, and regulatory requirements. Also, many manufacturers in advanced economies need to source goods and skills from around the world to optimise costs and subject experts if they do business with overseas suppliers. Gartner predicts that more than 50% of project work will be geographically distributed and asynchronous by 2015.

In addition, many of those suppliers' involvement in projects extends beyond just delivering parts to needing to share risk. OEMs are demanding that if suppliers are being paid more, their involvement should be in design, liability, and warranty claims. These are among the key issues driving new needs for product development information.

In this situation, it's increasingly important that collaborative design tools should not contain just the description of a design – things like geometric shape, and notes about dimensions or manufacturing. They must also provide a contextual understanding of why a design is what it is, and why key design choices were made. As we collaborate across different cultures and languages, we need this richer level of communication and journaling to maintain a common understanding.



Source: Dianne Morello/Betsy Burton, Future Worker 2015: Extreme Individualization, Gartner symposium presentation, October, 2005.

Figure 1. Trends in Collaborative Work Styles from 2000 through 2010

We also need to be able to track design rationale. To address regulatory requirements – in the case of product failures, for example – we need to trace the genealogy of a design, to identify accountability.

Also, the stakeholders including design, manufacturing, service, and purchasing experts ideally share a common understanding of the business objectives for the product. Also, they have their own ideas, views, requirements, and objectives related to the common goal based on their roles and responsibilities. Therefore, they need an IT environment that shares common product data and information, yet the environment shares that information in views that reflect their individual purposes. The traditional view of each department keeping its own version to support its own purposes is no longer sustainable. The need to ensure contributions and sign off by the stakeholders creates unique needs for product development leaders. These concepts are not unique to highly engineered products such as ships, aircraft, and automobiles. We see it in every industry, from toys, to apparel, to space craft.

Finally, in a world where we need to reduce the costs and time taken by new product development, we want to be able to re-use the content from previous designs as much as possible. Having richer information in the design content itself should enable us to do that, by helping us to know what we can re-use and what we may have to modify.

Q. What do you consider to be the "best in class" design process today?

A. Firstly, we look for a very clear relationship between market research within an industry, and an organisation's engineering and design departments. The marketing team should capture market requirements in a disciplined process. This process could include gathering user feedback, trying to understand better the wish lists of customers and potential customers, looking at market trends, and examining new technologies that might provide better functionality or cut costs. Then the organisation needs to map those requirements and technical specifications, and assess the risk. Can the desirable results be achieved? Business leaders should also look at the chances of increasing revenue share and profitability. Weighed against these are the risks of not succeeding, the risk that one might have misjudged the market opportunities. Look at various alternatives, and then decide which product ideas you want to pursue.

Here it's vital to make use of the lessons you've already learned. Today we should be talking less about designing specific products and talking more about product platforms. We want to define a product architecture such that we can use common parts to create a number of products, performing a common function but addressing many different markets. For example, a company might be involved in two different product lines, say a personal digital assistant and a cell phone. The firm might combine all the PDA and phone functions in a single product, or create a range of different products, each with a selected range of functions, all at different prices, but they would share common parts.

This gives companies much greater agility when they create new products. They can respond faster to new market conditions, and save money. At each step of the process, decisions should be made and validated according to manufacturability, performance, service considerations, safety and disposal, and all the stakeholders in that project need to be involved. At the beginning of the lifecycle you should collate all requirements, and as you make

Interview: Marc Halpern, Gartner (cont'd)

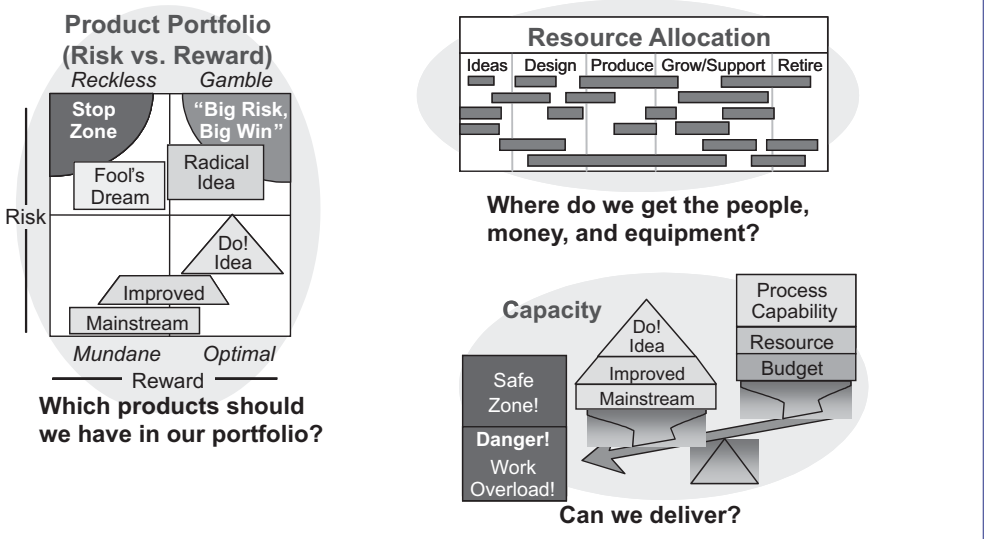


Figure 2. Design processes should be aligned with product strategy and resource management.

design decisions all those requirements should be visible to you.

"Best in class" design processes also reflect a structured stage-gate approach to product development. At the beginning of each stage, there will be certain criteria that the entire team understands need to be met, and at the end of each stage the team must check to ensure that those requirements are met.

Q. How does today's "best in class" design process compare to the "best in class" three years ago?

A. Today's "best in class" design process is not just about designing a part or product to meet certain functions. You must consider the entire lifecycle and the overall product experience - from purchasing the product to learning how to use it, using it, servicing and maintaining it and finally disposing of it - so that when you are designing you will deliver the highest quality you can at the lowest cost. Many basic design decisions will influence all stages of the product lifecycle, which is one reason why product lifecycle management focuses so much on front-end design. There is also a feedback loop reporting the experiences from the various stages of a product lifecycle back to product development. This fosters continuous improvement.

There was an understanding of these requirements three years ago, but not the progress that we see today. Three years ago we were still emphasising the three-dimensional (3D) 'as-designed' state. We were trying to streamline the mechanics of the design change processes themselves. We were also attempting to share data and reconcile the ideas of various stakeholders - including marketing, sales, manufacturing, and senior level executives, as well as customers and suppliers. Sharing information was a real challenge and remains so. Three years ago, there was a great deal of waste and rework, not only in transfer but also in the reconfiguring of information for the different disciplines, i.e. de-featured models for analysis, deformed shape for tooling, textured for marketing. But even now, many manufacturers have not reached the "best in class" standard of three years ago that eliminates such waste.

Q. Is geometry still the challenge?

A. Geometry is one of the challenges, but the nature of the challenge has changed. Five years ago designers struggled to describe and edit their own geometry. They chose to leave many geometric features as notes on a drawing. We were still learning how to benefit from feature-based design, and how to manage modifications in designs without having to destroy and re-create a great deal of geometry. Also the majority of the time was taken creating the key design features and the dress-up features such as drafts, fillets, threading etc. were added badly or only on the drawing. Now the challenge has moved on to guaranteeing that all features are on the model and are able to respond to change without rework. Also there is demand to incorporate non-linear features, like warping and nonlinear expansion of materials.

Exchanging geometry was also a major challenge. There were no robust ways of sharing geometry, so exchanging CAD models and designs so that they could be re-used took a lot of time and money, and was of then used as a chargeable task. Today we are much better able to create and change geometry and even share it across what I would call adjacent projects, like the PDAs and cell phones I mentioned earlier. And we are rapidly commercialising new technology that makes cataloguing modelling content, collaboration and validation more efficient.

But people still struggle with the communication of design concepts, where geometry is concerned. We need to make geometry more digestible for the entire organisation, and the supply chain, and to combine geometry with other types of information. Today the question is: How can we communicate geometry to a greater number of stakeholders, as they embrace more collaborative practices?

Q. What are the risks of collaboration?

A. There are both business and technical risks and frustrations. But at the same time, we cannot operate in today's world without collaborative product development. Cost factors and time-to-market factors mean that collaboration is here to stay. As we cannot escape the risks this entails, we must face them directly.

Let's talk about those risks. At the business and cultural level, collaboration requires working today with companies that might be your competitors tomorrow. Sometimes, the same manufacturer will spawn competing products from a common product platform. So, you may have to work with competitors today although you competed with them yesterday and will compete with them again tomorrow. It is not unusual for a major automotive OEM to contract multiple suppliers who are competitors to deliver multiple aspects of an interior design on a single car model – one supplier designs the dashboard and the console, for example – while another designs the seats. So we need ways to share content that our partners need to have, while protecting our strategic intellectual property.

Of course risks are multiplied by the number of languages and cultures involved in collaboration. We must have a common understanding of what is being communicated. Collaboration also needs to be independent of time zones and working hours. Ideally, design tools will be tightly integrated with the product data management tools that capture the revisions in design and communicate the nature of these changes – whether collaborators are working together in real-time, or responding to one another's input at different times.

Interview: Marc Halpern, Gartner (cont'd)

Q. Does collaboration change the demands on modelling or CAD?

A. Yes, collaboration demands that design software is flexible enough to contain much more than geometry. It needs to capture design drivers, manufacturing and service requirements and other types of needs. As I mentioned before, we need to be able to combine geometry with other types of information more fluidly, and represent shared information in different ways, so that team members with different kinds of expertise can understand it better. Finally, CAD requires ways of filtering models so that only relevant information is sent to our partners, not just for protection of intellectual property but also to improve the performance of design applications and collaboration tools across networks. And, of course there are the nagging challenges of mechanisms of geometry exchange plus exchange of other classes of data and information; although we will continue to make progress on those fronts, the challenges will persist.

Q. How can customers assess what they need?

A. They need to understand the business drivers in their marketplace, and the kinds of product architectures and platforms that will address those drivers. They need to collect and categorise market demands, and analyse how those demands might be changing. They must also understand the key indicators that their own managements and outside parties, including investors and industry observers, will use to measure their performance.

Q. Can you give some examples of the application of these philosophies?

A. Let's take a high-volume, low-margin manufacturer, such as a consumer electronics company. They might need to eliminate manufacturing defects related to tooling costs. This may be measured by the key performance indicator of costs related to scrap and re-working faulty items. Analysing which factors are undermining the ability to meet key "scrap and re-work" performance targets would identify particular design for manufacturability needs.

An alternative example would be a high-tech or automotive environment, where there is a high degree of modularity, and where it is vital to continue defining new product variants even when the technology inside is evolving and new technologies emerge. Introduction of new technology might make the product more competitive but it may require complex upgrades to product architecture. There, key performance indicators would include product development costs, for example, percent of design re-use and the cost of engineering change during the design phases of the product lifecycle.

Q. Where next?

A. The bottom line is that manufacturers need collaboration and innovation tools that match the requirements of all team players – not just in engineering and manufacturing, but for everyone in the organisation and beyond it, including suppliers and customers, sales and service agents, so that everyone knows what it is happening and can provide feedback. In

order to protect intellectual property, we also need to improve access control to information and better ability to create abstract views of information. The abstract views should be able to communicate what stakeholders need to know yet protect critical intellectual property. At the moment, we need to share information in bigger clumps, so to speak, than we would like. In future, we must abstract information more efficiently, addressing the specific needs of our partners and guarding our own intellectual property.

We need better support of concurrent engineering and decision making processes, to reduce time to market, and make sure that when different parties with different responsibilities are recommending or making changes to a design, one change is not ignored or eliminated because of another change.

Our infrastructure should also allow us a better simultaneous representation of different views, so when a change is made, all stakeholders are updated. Finally, we need better systems to be able to communicate with common understanding, even if we speak different languages and come from different cultures.

This is where I believe we will be going next.

Source: Gartner

Interview: Katherine Wood, Goodrich Aerostructures

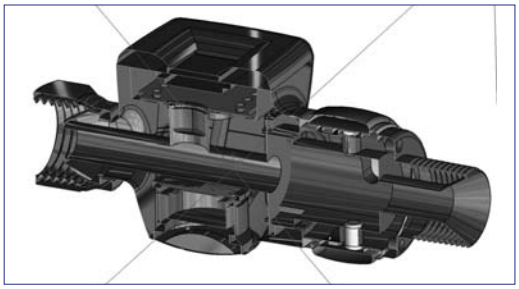
Katherine Wood leads the Enabling Technologies Group at Goodrich Aerostructures. This group is responsible for defining and delivering Engineering tools and processes in support of the Lean Product Development Process vision employed across Goodrich. Defining, implementing, and supporting the PLM environment are key aspects of this initiative.

In this interview, Katherine articulates how Goodrich Aerostructures PLM strategy is the next step in the evolution of their product innovation process. She also provides details as to what necessitated this adoption and the positive business transformation that is anticipated.

Q. Is this the first Goodrich PLM system, are you pioneering? If so, why your unit?

A. Yes this is the first system at Goodrich, but only in the sense of PDM and PLM together. Goodrich Aerostructures (ASG) is taking a lead role for PLM in new-product development as it has had one of the greatest combinations of need and opportunity to boost productivity in new-product development and further strengthen our ties to our primary business partners, Boeing and Airbus.

Q. What was the overarching business strategy?



Getting closer to customers was probably foremost, especially because of the need to tie ASG product development to customer requirements, especially during the joint definition phase.

But more generally, Goodrich's overarching PLM strategy can be broken down into five key components:

- A need to work more closely with customers as they develop their own internal requirements, which in some cases must be replicated within ASG. This was instrumental for landing the huge Boeing 787 and Airbus A350 orders and getting them up to speed in a hurry. Also, our PLM strategy provides the potential for ASG's design data to "live" in the customers' PLM systems rather than its own system to address intellectual property (IP) concerns.
- Standardizing the individual business units' IT infrastructures. This began with IT infrastructure, procurement, and SCM and is now being extended to PLM. This will also allow for more effective use and deployment of engineers across business units as workloads rise and fall. Adopting Dassault SystèmesV5 PLM platform insures engineers will always be working with the same system regardless of location or project.
- The need to reuse knowledge and geometry in Intelligent Master Model (IMM) templates as part of the corporate initiative to automate, eliminate or put behind the scenes as many routine and mundane engineering tasks as possible. This will allow engineers to focus more on creativity and innovation, a critical factor for maximizing ASG returns from new-product development.
- A need to deal with extensive supply chains amid fast-paced product development. This includes a requirement for higher quality geometric data and consistency of data from new-product development. Strict downstream requirements for model data quality make adherence to standards essential. Design standards are more easily enforced with PLM methods, tools, and embedded best practices.
- Support Goodrich corporate and ASG Lean Product Development and Lean Manufacturing initiatives.

Q. Why now?

A. We have been waiting for the intersection of software and business readiness, it was

just a question of timing. This was required to close the gap left within the Work-In-Process engineering environment and the rising role of Model-Based Definitions (MBD). This means the end of 2D paper, which had been the primary means of sending design information "downstream." Being driven by PLM, MBD is a huge change for us

Q. How are your key suppliers involved in this initiative?

A. The Airbus A380 was our first program to be entirely V5. We are now working with our suppliers to provide them with MBDs to replace drawings and shorten the product development cycle. The Boeing 787 is the first MBD program. In the future, ASG wants to use 3DXML for all non-CATIA data visualization and phase out the current non-Dassault tools. 3DXML is especially good for working with our smaller suppliers who may have no CATIA and whose systems may be incompatible with CATIA data formats.

Q. What were the limitations of your legacy system that led you to adopt a more holistic PLM platform/strategy?

A. We used the interface between CATIA V4 and an enterprise PDM system for four years as our PLM system. This put a tremendous burden on engineers in life-cycle management and duplicative data entry. Using Dassault Systèmes' VPM Navigator we are lessening this burden by providing the engineering community with a single interface with which they interact as well as keeping the lifecycle aspects outside of the engineering domain

Q. What domains and processes are you targeting first and why?

A. Purely new-product development with extensions to tooling, R&D, Business Acquisition, etc. Still being handled by PDM are legacy engineering data, engineering release, bills of materials (BOMs), engineering changes, etc.

Q. What were the expected benefits when implementation began?

A. Like all other users, reducing cycle time and improving quality. At ASG, quality comes down to "achieving first-pass yield." Sub par performance can disrupt delivery schedules that could have a big (negative) impact on customers.

Related to this is the opportunity in PLM to increase the quality of CAD data by embedding design rules and standards. Less-than-ideal surface quality causes repercussions downstream. Also there are big gains to be made with high quality model data and consistent model formatting. Improvements here will help ASG shorten delivery times and avoid unnecessary costs with outside suppliers.

Q. What were some of the initial gains from your PLM deployment?

A. We are already seeing design cycle-time reductions that are as good as, or better than, what we wanted. Also seeing better integration and collaboration between designers and analysts and between designers and people in manufacturing. There are also cultural issues that the implementation process has brought to light so that they could be addressed.

"From our viewpoint, PLM is a process that encompasses everything we do in engineering relative to the development, manufacture, and support of our products. PDM is simply how we manage and control the data."

Katherine Wood
Goodrich Aerostructures

Interview: Katherine Wood, Goodrich Aerostructures (cont'd)

Q. Where has your company seen the biggest benefits from adoption of DS's PLM solution?

A. "Hands down, product development and collaboration with internal units, especially in analysis (no more tossing designs back and forth across departmental walls) and 'downstream' with detailed engineering. We have seen some very nice reductions in product development cycles times, one of which was from a month to an hour, though that was unusual. The norm for most tasks is 25% or 35% less time.

Q. What was the biggest pleasant surprise?

A. Overall it's been easier than anticipated – and this has been critical to the PLM success so far – because we worked very hard upfront on our contacts with the key players both internally and externally. The responsiveness of Dassault Systèmes, IBM, and our value added resellers (VARs) INCAT and Axiom have been right where we needed them to be. As required, they got us to the right people with the right levels of expertise.

We are also pleased by the openness of V5 and the tools, which is a big help in implementing and ensuring that we are true to our Lean heritage.

Q. What have been some of the biggest challenges to executing your PLM strategy?

A. We did not have the luxury of picking a project and starting small. Nothing other than a program-wide rollout was ever seriously considered as Boeing and Airbus both have very aggressive schedules. Also there is the challenge of integrating dissimilar functionality between our new PLM platform and legacy PDM which requires requirements definitions, process testing, evaluations and gaining buy-ins.

Q. How did ASG overcome internal resistance to PLM strategy and implementation?

A. The best way to reduce resistance is to build ownership among the users and our team strives to do that, engaging them early on their wants and needs and concerns, assuring them of no surprises at "go-live." Also, we pointed out to people that while PLM presented them some challenges, the bigger unknowns for them lay in keeping with the status-quo.

Q. What are some of the lessons learned from this deployment?

A. Working with customers gets more and more challenging all the time. There is more data to be handled in more formats and types, and more of the work has to be done on a real-time collaborative basis.

Q. Looking ahead 5 years, how do you see Goodrich extracting further value from its PLM strategy and enabling solutions.

A. Supporting Goodrich's Lean Product Development initiative by providing a mechanism for controlling "master geometry models", standard product structure templates, etc. Ultimately, we are driving to a single source of data and one point of entry and no more paper unless it is generated for shop floor support through our PDM/ERP system.

Q. What advice would you offer those contemplating PLM?

A. Don't expect everything that is out-of the box to fit your business processes. There has to be change to the business and to current processes if you want to maximize the benefit you get from the implementation. New tools aren't likely to work within the traditional process environment."

Source: Dassault Systèmes

Enabling the Process of Innovation

Manufacturers continue to seek new ways to differentiate themselves in an increasingly competitive, global market. For many, new innovative products will be key to such differentiation. In an IBM-sponsored survey in 2004 of over 450 CEOs and Board Directors, 80 percent of respondents stated that they were refocusing on top-line revenue growth with nearly two thirds stating that new products were key to that growth.

Challenges Remain

But a manufacturer can not simply pour resources into R&D with an expected outcome of new products that will excite the market, be priced appropriately and can be manufactured efficiently.

To be effective and meet these goals, manufacturers must create an environment for innovation excellence an environment that enables the Process of Innovation. But in so doing, this environment must also concurrently optimize costs, insure product integrity and provide for organizational agility. It is here where a company's IT department will play a central role.

Unfortunately, most IT departments today struggle with a multitude of legacy systems and applications that hinder one's ability to transform and accelerate the innovation process to meet pressing demands for faster time to market, time to volume, as well as cost containment. Yesterday's PLM technology is ill-suited to meet these demands and subsequently will compromise effective and efficient global innovation processes that are now necessary to compete

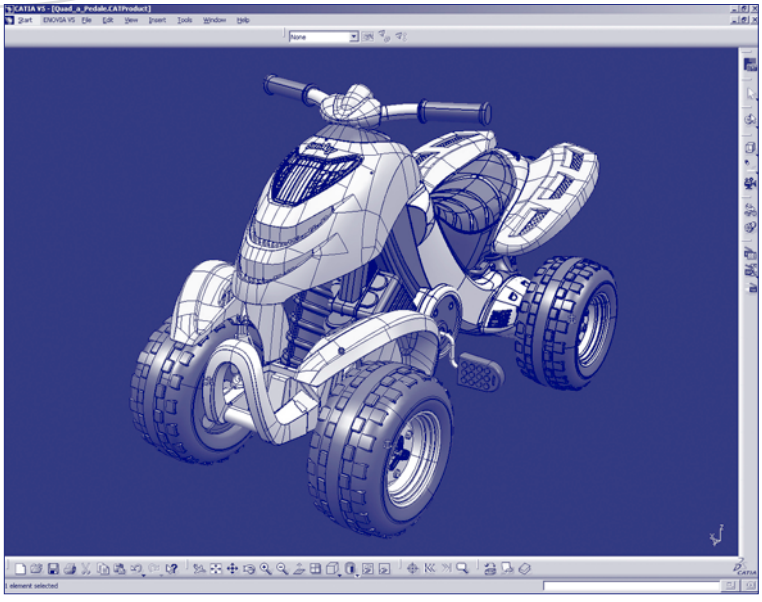
Dassault Systèmes Approach

Leading innovators worldwide depend on Dassault Systèmes (DS) to provide them with the PLM solution they require to enable their innovation process thereby insuring their competitive differentiation in the market. Key to the strength of the DS solution suite is a philosophy on PLM that is based upon five fundamental principles. These principles are:

- Process Centric: *Industry-wide business process optimization.*
- Collaborative Workplace: *Pervasive 3D-based communication and collaboration.*
- PPR (Product Process Resource): *Unique product, process and resource description, integration and federation model.*
- Knowledge: *Capture, share and reuse of corporate knowledge.*
- CAA V5: *Provide an open development environment and support ecosystem extension through component-based architecture.*

Process centric:

Deep domain expertise derived from years of close interaction with customers is mandatory to understand and create the framework that will support their unique processes. And nowhere are these processes more unique within an organization then in New Product Development and Introduction (NPDI) processes.



Enabling the Process of Innovation (cont'd)

Achieving a deep level of NPDI process knowledge specific to a given industry is achieved by investing time, resources and energy to grasp the basic concepts and components underlying the different business processes that drive manufacturing industries. Benefit for manufacturing industries will not be achieved simply by mapping current practices into PLM, but rather through an understanding of the direction in which their businesses are being driven, and defining together with these industries the processes that need to be implemented for market success.

Collaborative Workspace:

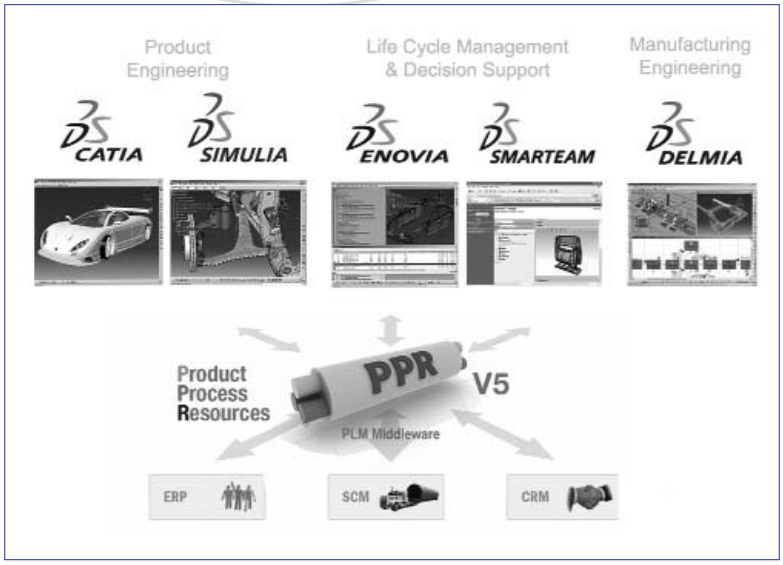
Success hinges on one's ability to effectively communicate across disciplines, across markets, across languages. Interaction within a shared digital 3D workspace enables such communication fostering a deeper and richer level of collaboration. The most significant contribution to collaboration within product development in the past ten years has been Digital Mockup (DMU). Pioneered by DS, DMU provides an immersive 3D digital environment in which all the participants in the product lifecycle interact with each other's in-work designs. This significantly enhances communication through rapid exchange, direct use, simulation and ultimately validation of a product.

Beyond DMU, many DS customers, such as Goodrich Aerostructures, are adopting the leading edge concept of Virtual Product Management (VPM). This is being necessitated by the need to operate and support global, collaborative product development processes while insuring that those processes are not burdened by overly complex methods of sharing detailed product data. Traditional Product Data Management (PDM) solutions that have been widely deployed manage product data at a document level leading to such complexity in sharing product data. With VPM, DS is now providing customers the opportunity to manage and share product data at the object level, which greatly simplifies the sharing and reconciliation of concurrent product development, regardless of where it may be taking place. This is assisting these leading adopters in accelerating *The Process of Innovation*.

PPR:

The NPDI process can not be focused solely on the product but must extend beyond product information to address both supporting processes and resources. This requires a PLM solution and architecture that at the core of its data model supports not just product information, but includes process and resource information as well. True optimization of the product lifecycle can only exist within this larger context.

PPR (Product, Process, Resource) provides a unique associative model that serves to integrate the product with its processes and resources. The PPR is unique in its ability to



manage multiple views (xBOM) of product, process and resource information.

Capturing where (position and orientation), when (configuration) and why (functional and logical) a component is installed in a product is critical to accurately model a 3D-based design. Further capturing of all dependencies of a given installed component by other components that contribute to its function, by the manufacturing processes employed to produce or assemble it, or by the tools or equipment employed during the execution of such processes, is required to give life to the virtual product lifecycle and insure optimization of the NPDI process.

Knowledge:

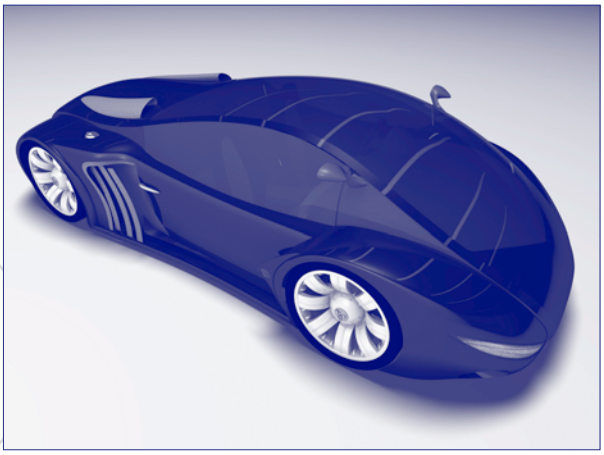
As competitive pressures place a premium on innovation, manufacturers realize that intellectual property and the knowledge contained therein is increasingly becoming their most valuable asset.

Harnessing knowledge to innovate can be broken down into three processes. The first consists of capturing or mining knowledge in an exploitable manner. The second consists of sharing knowledge, thereby making it available. The third process consists of reusing or reapplying knowledge quickly, accurately and efficiently. The successful execution of these three processes allows corporations to replicate the capabilities of its most learned people across a broader population.

The integration of knowledge-based technologies throughout the DS V5 PLM solution suite provides the necessary capability to allow a corporation to harness its knowledge to innovate. V5 applications make a further breakthrough by directly embedding specific industry domain knowledge to support critical industry-specific processes that incorporate best practices and design rules. These applications have knowledge, they understand aero-elastic effects on a wing, they understand the nuances that drive the styling for a car. Leveraging these capabilities accelerates the *Process of Innovation* and reducing time to market.

CAA V5:

The broad and encompassing nature of PLM necessitates that a platform provides significant breadth and depth. Specific needs of a company will further require that this capability be tailored, extended and integrated. Therefore, a company's PLM platform must be open and flexible to support a broad ecosystem of applications and the business processes they will support. The component application architecture provided within V5 has been specifically developed to meet these needs.



CAA V5 is Dassault Systèmes open middleware and development environment for PLM. The CAA V5 development environment delivers all leading-edge technologies (PPR, Knowledge and many others) which are systematically used with success within Dassault Systèmes PLM brands. Beyond DS, CAA V5 is the ecosystem that supports the PLM industry's largest community of application developers. Today, over fifty leading independent PLM-enabling software suppliers build their applications within the V5 environment.

The CAA V5 ecosystem provides the most comprehensive engineering product development environment today, delivered through one common user interface. While this will simplify training and adoption of engineering applications it will also greatly simplify an IT department's deployment and support of the Dassault Systèmes PLM platform.

Source: Dassault Systèmes

About Dassault Systèmes:

Dassault Systèmes is revolutionizing how manufacturers address their most pressing PLM needs through its vision to provide customers with realistic 3D simulation of their entire product lifecycle, from initial design to manufacturing, marketing, service, and recycling/retirement. Managing all aspects of the lifecycle in a virtual 3D environment, enables companies to concurrently lower product development costs by minimizing physical prototypes while accelerating time to product launch through deeper collaboration with strategic partners.

With solutions that scale from SMB manufacturers with modest requirements to addressing the most complex products designed and manufactured today, Dassault Systèmes provides an unmatched 3D PLM offering. This offering includes the brands CATIA, ENOVIA, DELMIA, SMARTEAM, and SIMULIA. More recently, Dassault Systèmes acquired Virtools, an innovative software company whose solutions bring 3D imagery to life. Industry leading vision, a comprehensive offering, and deep industry expertise combine to make Dassault Systèmes the undisputed leader in the PLM market

In addition to a strong application solution suite, Dassault Systèmes' long-standing relationship with IBM offers unmatched sales and services currently serving in excess of 80.000 customers in over 80 countries.

To learn more, visit us at: www.3ds.com

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