

point of view

#2
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Capgemini

From project
to strategic
approach

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Leveraging
your core
business

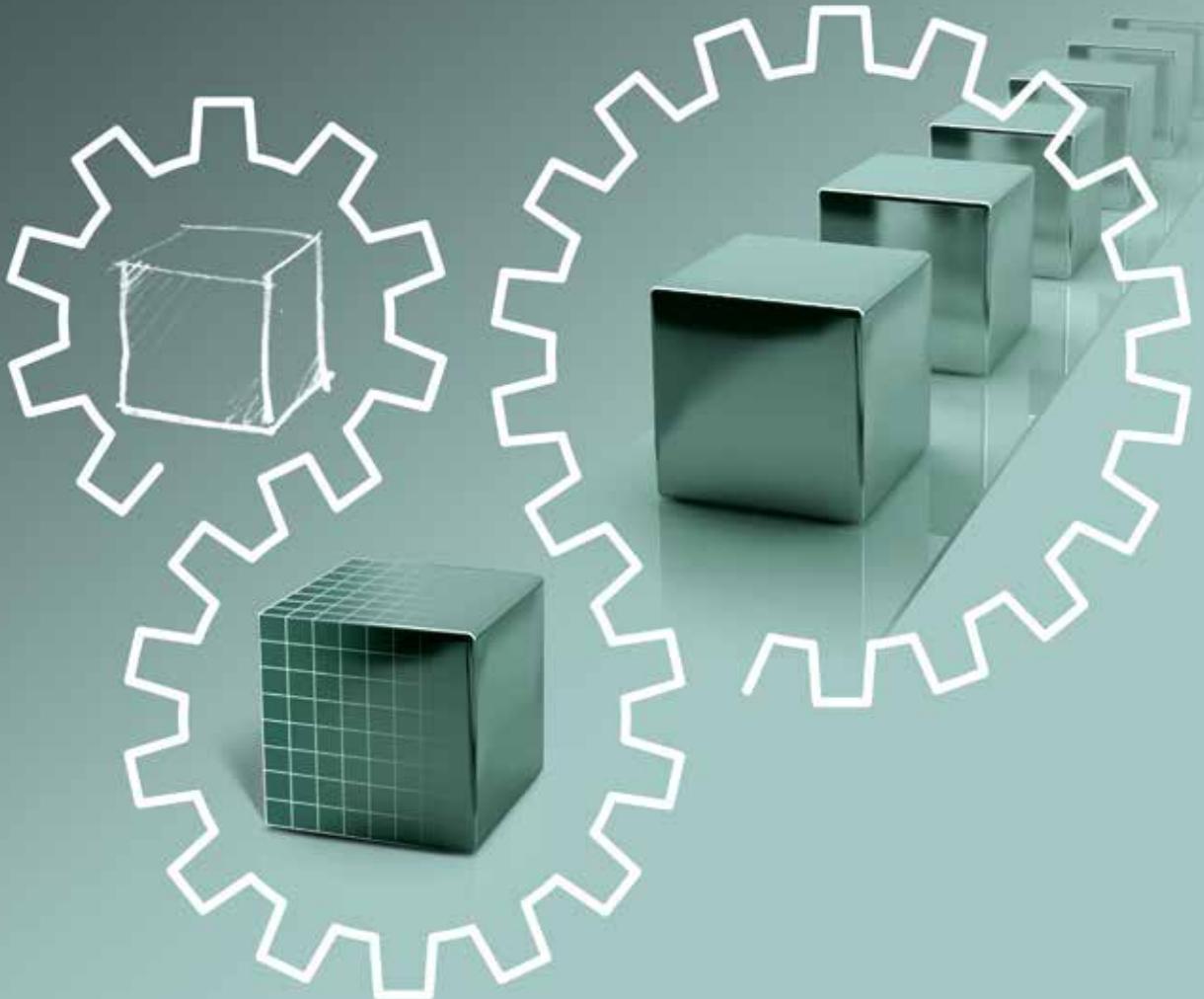
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Expertise -
system
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force for
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Can industry do without PLM?

Knowledge, not action, is the most important currency in today's world!

To achieve a competitive advantage, manufacturers need to control and create maximum value from all their internal business processes, from design and validation through to industrialisation. But getting there alone is easier said than done! Faced with an increasingly complex range of technologies and regulations, an increasingly globalised marketplace, company mergers, and so on, manufacturers need to re-engineer their organisational structure to factor such constraints into their strategy for attracting new customers.

Finally, manufacturers cannot rest on their laurels and continue offering the same products! They need to break new ground in a bid to satisfy the growing demands of today's customers, all of which faster than the competition.

Part of the solution to overcoming these different challenges undoubtedly lies in the PLM approach. PLM is often seen as an IT project, but it is primarily an enterprise-wide project. PLM formalises and gives greater structure to the company's business processes, establishes a standard language, allows for easier integration of partners into the value chain, and encourages concurrent engineering.

Companies that adopt a PLM strategy are often the most innovative.



PLM is becoming a must have for manufacturers facing a demanding and changing ecosystem where

time to market is a key competitive factor.

Faster, safer, more innovative

The number of constraints affecting industry has mushroomed, and no sector is spared. The external environment is the first to be affected. The size and complexity of the playing field and the rules of the game have changed significantly. Almost regardless of the product that you are looking to market, you now need to think of the competition, market and legislative framework on a global scale.

This means crossing paths with a larger number of competitors scattered around the world, not all of whom are ready to play by the rules. It also means designing and manufacturing products to suit different tastes, cultures and standards. The onus is on companies to master and cram more technologies into each product, but sometimes even these efforts fall short. More than ever, industry needs to win over growing legions of versatile and savvy customers. Whatever the sector of industry, whether hi-tech, clothing, cars or food & drink, buyers are looking for something new, something safe and something that they can personalise. Sustainable development and its associated regulations are just one example of the legislative framework governing the actions of every manufacturer. Legislation never stands still, with every new measure stricter than the one before.

The internal environment has also been affected, with companies undergoing massive organisational changes. Mergers, technology purchases and supply chain development have caused data and knowledge to be scattered across many disparate systems. In such cases, how can companies ensure that everyone speaks the same language and uses the same guidelines, which are prerequisites for achieving operational excellence? Companies need to iden-

tify which skills and industrial processes have become the most strategically important. They can then streamline, formalise and retain those skills and processes to ultimately maximise their added value.

The situation facing the manufacturing industry can be summarised as three challenges that companies must overcome if they are to survive in the global marketplace - reduce the time to market, ensure seamless traceability of the industrial business model and their products and, above all else, never stop innovating.

PLM - a value-driven approach

Structuring the extended enterprise, responding to legislative constraints, streamlining business processes, standardising legacy PDM systems, developing a standard repository... PLM can be used to achieve several different objectives. « But there is no point looking for the Holy Grail, » suggests Jean-Pierre Petit, Deputy CEO Application Services France of Capgemini, « you need to choose the area in which PLM will create the most value for the company. That is why a clear insight into the company's business is so important. An outside perspective will often help to prioritise the strategic business objectives more effectively and produce a realistic roadmap. »

Jean-Pierre Petit advises, « Above all, companies have three major goals - design lower-cost multi-technology products, integrate the industrialisation supply chain, and develop product-related services. The easiest goal to achieve is expertise in multiple technologies, and PLM can be an invaluable ally. As part of a more ambitious approach, the amount of energy that the company pours into each of these three goals

depends on the business environment, the market and its customers. Project managers must therefore have a clear insight into these factors when defining the strategy. »

After choosing the objectives that it wishes to reach, the company must constantly check that the PLM approach is contributing towards the achievement of those goals. On a day-to-day basis, this means taking decisions according to their ultimate return on investment. Returns can be assessed by estimating the number of study hours saved, the number of needlessly-repeated tasks or cycles (downtime) that can be avoided, and the number of physical tests that can be replaced with digital simulations.

This obviously has to be proven whenever the system enters production using predefined business indicators to check that the assumptions and model are correct.

Three strong arguments for adopting PLM

- Create a common repository
- Reduce the time to market
- Comply with legislative constraints and environmental regulations

Leveraging your core business



The first companies to go down the PLM road a few years ago often ran into major difficulties. There are several reasons to explain such problems, such as aiming too high from the outset, approaching PLM in the same way as a software vendor, and especially losing sight of the company's core business principles.

Pascal Morenton, CAD / PLM Manager at the Ecole Centrale Paris engineering school:

What is a bill of materials? What is an item? How do you manage several versions of the same document or business object? What are the validation processes? These are just some of the questions that companies should accurately answer before deploying any software. These questions should prompt the company to scrutinise its key processes, which incidentally is a beneficial exercise. Sometimes, key business processes are unfamiliar to or unevenly shared by the company's employees. »

« The path that leads to control over all or part of a so-called PLM strategy is often much steeper and longer than expected. This is the first fact that companies need to take on board if their future project is to be a success. They are also advised to talk with other companies and organisations pursuing similar goals or strategies. Irrespective of the line of business, it transpires that the "core business principles" are the same and constitute the knowledge base that any company really should master, » adds Pascal Morenton.

« Garner **strong sponsorship** from senior management and a real **will to change**. »

From the big bang to the tunnel effect

Deploying a PLM project is often seen as a complete overhaul of the company's working practices. Employees expect to see a « simple change » to the IT infrastructure, but instead get the impression that their everyday work environment has undergone a big bang. As seen earlier, the choice of objectives is crucial to avoid this phenomenon.

The second type of fallout from this type of project is the tunnel effect. Jean-Pierre Petit, Deputy CEO Application Services France of Capgemini, explains: « A PLM project should not take longer than 18 months. It is essential for employees to quickly see how the project will create value. Companies should therefore choose the project offering the highest gains and provide an overview of the roadmap to achieve the project's goals. »

Do not forget the importance of collaborative work

« A defining feature of PLM projects is that they involve many people across the company and are highly conspicuous due to the fact that they affect the company's core business and individual expertise. » suggests Walter Cappilati, Deputy CEO Application Services France and in charge of PLM activities for Capgemini. Furthermore, for economic and operational reasons, it is becoming increasingly important to offer similar functionality to the solutions currently available in the market

The seven keys to success

- Restrict the project's scope
- Pair together business experts and PLM experts
- Ensure communication throughout the project lifecycle to simplify project management
- Define milestones aligned with the company's business and which are flexible enough to absorb any unforeseen incidents
- Engage senior management, especially a leader with a global insight into the project
- Lead the PLM approach like an enterprise-wide project and not like an IT or R&D project
- Do not underestimate the necessary resources

wherever possible and not go overboard on personalisation, which companies have too often been guilty of in the past.

« This apparent contradiction can only be resolved by garnering strong sponsorship from senior management and a real will to change » completes Walter Cappilati. Implementing a collaborative work system will ensure that all stakeholders are working on the processes and solution at the same time. Any approach that treats these two aspects as separate issues will lead to a high level of personalisation and fail to take advantage of the “good ideas” available in market-standard solutions. During the early stages of the project, leaders must keep daily tabs on the project's level of personalisation, ultimate cost and deployment date in order to make informed decisions.

In addition, PLM projects are ideally suited to iterative development methods, which encourage collaborative work and acce-

lerate project initiation by avoiding never-ending rounds of specifications. Furthermore, the PLM approach simplifies project management and the deployment strategy by quickly generating gains for the company and thereby demonstrating the project's value and credibility.

FROM THE EXPERT'S MOUTH

François Oury,

PLM, Sales manager, Capgemini

« Systems integrators play a key role in PLM strategies.

But they must prove their credentials and their ability to carry out such projects. »

Deploying an international PLM system

Two factors are critical to the successful deployment of a PLM system in an international environment. The first factor is a technical one and involves initialising the data in the new system. The idea is to fetch the data that have been scattered across geographically disparate sites with their specific legacy technologies. Then comes the problem of migration, which is exacerbated by the wide range of technical platforms in use. The second factor is naturally a human, cultural or political one. For example, IT hardware is subject to specific regulations in certain countries, which must be taken into account. The same situation applies to all IT projects, but with the added complexity of PLM. The integrator's international experience and location influence its ability to handle these two aspects. Finally, it should not be forgotten that some countries have no such thing as a PLM culture. This obstacle can be overcome by providing intense training, expatriating experts or adopting a different service delivery strategy.

IS THERE A CAPGEMINI PLM STRATEGY?

The Capgemini strategy is built upon several focus areas, the first of which is collaboration and impartiality towards the three main PLM solution vendors. In terms of the different sectors, we can draw strength from our experience in

the aviation and defence industries to lead PLM projects in the transport, hi-tech and energy industries and life sciences. Furthermore, we can leverage our geographic footprint to serve major groups and lead international projects. Finally, our services span the entire project lifecycle, from pre-project scoping through to in-service support for PLM environments, including project guidance and technical support such as during system migration.

IS THERE A CAPGEMINI SIGNATURE?

There is no signature as such, but rather an organisation and specific methods to help our customers carry out their PLM project. For example, we have launched the

PLM Academy for our own teams. The Academy provides training on the fundamental principles and tools of PLM, as well as industry's core business processes. 15 engineers receive training every year. They can follow certification programmes for off-the-shelf PLM solutions and continue training through e-learning courses in addition to on-the-ground training. As far as our customers are concerned, our ASE methodology (Accelerated Solution Environment) is an innovative management tool for getting to grips with the complex phases in a PLM project. In the case of the Airbus

A380, for instance, the ASE methodology was used to define the work plan aimed at reining in the engineering costs of the design stage. Three work sessions were enough to convince the 70 attendees of the need to review their business processes and thereby raise the operational performance bar.

DOES CAPGEMINI HAVE ANY TECHNOLOGICAL CONVICTIONS ABOUT PLM?

types of work dovetail together. We are actually moving towards a systems approach to PLM. For example, the digital mock-up of a product undergoing development will incorporate the behavioural and interactive model of its mechanical, electronic and software components, as well as the methodological rules behind its design. Finally, the PLM approach can be used to good advantage by new sectors, including life sciences.

WHAT ARE THE FOUR KEY MISSIONS OF A PLM SYSTEMS INTEGRATOR?

First of all, define the project's architecture, then identify the milestones to reflect the customer's business and obviously integrate the PLM environment into the customer's global information system, and finally facilitate change management and the transition from a sequential to a collaborative work system.

Capgemini has many convictions about PLM, and they are often interdependent. PLM systems must shed any overly complex workflows to encourage collaborative work, while offering tools to control how different

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Sell the project to internal customers

Above all, it is essential for the project leader - ideally an operations director - to have a global insight into the project and its impacts on the company's organisation. This is the only way that employees will understand their role and purpose, and adopt the approach. Furthermore, the PLM system must be presented to management as a solution for creating even more new products, reducing the time to market and generating an even larger margin. The project must be limited to a given scope, with the most transparent proof of concept possible. Finally, it may be worthwhile meeting similar companies that have successfully carried out a PLM project.

System migration

Migration projects are too often approached from a purely technical angle. To avoid an unreasonable level of personalisation, it is essential to review the functional areas, working practices and even the business processes, and take account of any impacts on users. The project will include all the phases involved in implementing a new system, even if some stages will be accelerated. Involvement of the business stakeholders is fundamental for correctly calibrating how the new system will work and understanding the source data and agreeing on the changes to be made. The way in which data are to be migrated must be taken into consideration from the outset of the project and interfaced with the change management phase to share the impact analyses and functional definition of the new system to avoid designing a system where nobody knows how to migrate the data.

Similarly, the deployment strategies must factor in the migration constraints in a bid to minimise the cost of migration and the number of temporary interfaces required to maintain both systems. Finally, integrators must look at the technical part of transforming the data from the most industrial perspective possible - the use of middleware to reduce the amount of code written and correctly monitor the changes. Migration will be performed many times both before and after the new system has gone live, and any ways of swiftly troubleshooting problems or raising performance levels will be most welcome.

To ensure the success of this major technical phase, the company must not underestimate the legacy system. Gateways are not an all-in-one solution and can cause a number of errors. Units of measurement are a typical example, since they differ from one software program to the next. Even in the case of a simple upgrade, upward compatibility is not always guaranteed. Companies must carry out an in-depth analysis of the impacts of migration and specifically manage the business correspondences from one tool to the next, without forgetting to determine what needs to be retained in the new system, since not all data will be relevant. Considerable engineering work is therefore required to ensure that the data will be compatible with the new system and to develop tools to automatically transfer the data. This is one of the major tasks under the PLM integrator's responsibility.



Amaury Soubeyran,
EADS Corporate Technical Office
PLM Harmonisation Centre, Assistant Director

**WHAT IS
THE PHENIX
PROJECT?**

In the wake of the difficulties that EADS ran into during the A380 programme, EADS took the decision in 2007 to launch the PHENIX project, which was aimed at harmonizing the PLM systems across all the group's divisions. Admittedly, EADS is still a young group featuring over 50 companies, some of which are very old, with a mixed range of organisational cultures, industrial practices and PLM environments. PHENIX was therefore a factor for integrating companies into the group by using a dialogue platform for sharing strategic PLM processes between all Divisions.

**WHAT ARE
THE BENEFITS OF
THE APPROACH?**

The approach offers a number of benefits. It has enabled us to establish a set of best industry practices and common standards to reinforce EADS' international leadership across the aviation and defence industries. These standards have fostered the convergence and harmonisation of programmes at Eurocopter, Astrium, Cassidian and Airbus. Implementing an enterprise-wide reference has also simplified dialogue and promoted development synergies between the divisions. We have also seen substantial economies of scale by sharing strengthened ties with a few chosen software vendors. We are playing our role as true partners and as such can provide our input on the technical focus for the solutions that they are developing. Generally speaking, PLM is also required for integrating the supply chain, which generates up to 80% of the added value from our products and which is scattered around the world. The harmonized PLM in PHENIX gives EADS

a handle on the entire product development cycle, from defining requirements through to customer service, including with our subcontractors. Finally, there are longer-term benefits, but which are less obvious. In particular, we can improve our ability to sense the expectations and opportunities of the market, customers and partners through the active PHENIX community of specialists that transcends all the group's Divisions.

**WHAT HAVE YOU
LEARNT FROM
THE PHENIX
PROJECT?**

The project taught us three major lessons. The first is the choice of people to lead the PLM project. You need to select experts from both engineering and IT. A PLM harmonisation programme is never solely an IT project. It initially involves sharing industrial expertise, which may lead to the deployment of solutions. Specialists therefore need to be brought together from the different PLM areas who are capable of representing the company's different organisational cultures and businesses. Involvement from senior management, reaching as far as CEOs Tom Enders and Louis Gallois, was decisive in the success of PHENIX. The second lesson is the project management strategy - both bottom-up and top-down. The organisation must be able to collate the needs and information of each division and thereby simplify the choice and dissemination of the standard practices to be adopted out in the field. Finally, you need to be patient. PHENIX, superseded by the PLM Harmonisation Centre, has been in operation for seven years. The programme is constantly renewed through regular communication with all stakeholders to ensure that it reflects current business requirements and opportunities.

«**A PLM harmonisation programme**
is never solely an IT project.»



OUTLOOK

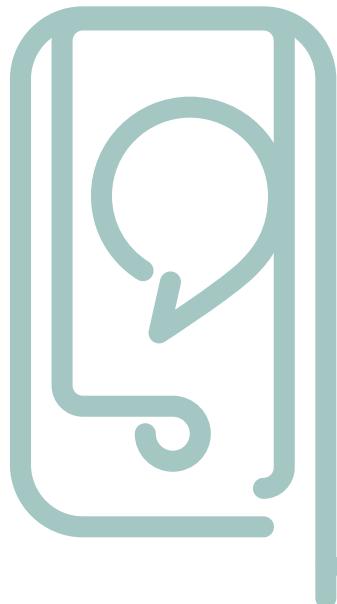
PLM - a driving force for innovation

In the hi-tech and consumer goods industries, manufacturers have used PLM to build a standardisation strategy, set up libraries of parts and subassemblies, and make widespread use of date reuse. This represents a major advantage for manufacturing products that can easily be tailored to different markets and a fast renewal rate. Car manufacturers have used digital mock-ups of their vehicles to design highly sophisticated product configurators. These configurators obviously serve to develop new models, but are also used by garages and dealers to help customers choose between the thousands of options available.

PLM for powering sales, marketing and service delivery

PLM is much more than a software vendor concept. For those companies that have successfully led change, PLM has come to represent a true driving force for superior production and even innovation, such as creating greater innovation in the services delivered to customers. Eurocopter and Schneider today offer much more than a simple technical product. In the naval sector, DCNS supplies a complete PLM environment with its vessels, including the digital mock-up and the associated metadata. This represents a considerable asset for the customer when it comes to servicing the ship and making inevitable upgrades.

Sometimes, entire sectors draw on their PLM expertise to push the envelope and revolutionise their industrial business model. An overwhelming number of aircraft manufacturers have rolled out this technology to incorporate their supply chain. Within the space of 15 years, PLM has gone on to become the backbone of the entire industry. Following in the footsteps of 3D CAD, digital mock-ups and virtual platforms, co-innovation is currently the initiative being developed at the European level with the launch of BoostAeroSpace. This collaborative hub is built upon Enovia V6 from Dassault Systèmes, meaning that it supports web-based access. BoostAeroSpace is a technical and organisational system that could be described as the cloud for the aviation, space and defence industry.



Is Cloud Computing the future of PLM?

Much has been written on the subject of cloud computing

Entire swathes of corporate and home computing have been outsourced. Professional solutions for data backups, CAD, computing, realistic rendering and even PLM are now available. Although most PLM vendors have launched similar services, their approach remains timid, and the US continues to serve as the test bed for such solutions. Anglo-Saxon countries are known to respond to new technologies faster than their Latin cousins. Manufacturers are taking the same cautious approach. But what about security? Confidentiality? Service availability in case of a line failure?

Even so, the promises of cloud computing still fire the imagination. Break free from the shackles of corporate hardware and software resources, tap into computing power and obtain results 10 times faster than a desktop, free up computers for other tasks, build 3D models from a basic laptop, tablet PC or smartphone anytime, anywhere, only pay for what you use... Basically, the very epitome of flexible computing is within everyone's reach.

François Oury, PLM, Sales manager Capgemini, believes that the cloud computing technology is unavoidable. « More and more companies are using a distributed computing architecture with open, collaborative systems. Cloud computing will first be adopted by small and medium-sized businesses, but not all companies will switch over. The trend



is towards mixed and traditional architectures hosted in the cloud. » Yves Pelissier, Director of the Capgemini PLM Centre of Excellence, adds: « The onus is on operators to overcome the security and confidentiality issues,

and come up with solutions giving customers control over the chosen system. Software vendors and industry will also need to agree on a data definition standard. »

interview

OPERATIONAL COMPETENCE

Yves Pélassier,

Director of the PLM Centre of Excellence - Capgemini



interview

The aviation & defence industry has gone the furthest in terms of PLM. An experience empowering Capgemini to **foster synergistic ties with other industries.**

WHY DOES THE AVIATION & DEFENCE SECTOR REPRESENT A PLM BENCHMARK FOR CAPGEMINI?

problems facing the defence industry is that projects often feature an international dimension. PLM systems need to be rolled out across several sites and continents, while meeting stringent change management constraints.

Capgemini has drawn strength from this experience and now serves other sectors of industry. Synergies abound. For example, using PLM to manage an aircraft's configuration can be replicated in the pharmaceutical industry. Similarly, environmental management can be applied in the electronics sector, and supply chain integration can be implemented in practically every sector subject to intellectual property issues.

WHAT IS THE PLM CENTRE OF EXCELLENCE?

The Capgemini centre of excellence features a team of 150 PLM specialists offering a wide range of cross-disciplinary skills. Team members are independent and ready to spring into action at a

The aviation industry obviously had to learn how to handle a minefield of complex technical issues, but also a vast array of organisational and legislative issues. PLM lost no time in becoming an essential tool for managing this highly constrictive environment, and the aviation industry has made considerable headway in product lifecycle management. One of the major

moment's notice, irrespective of the industry and the location. They have acquired high-level experience in the aviation & defence industry. For example, the centre of excellence enabled the PLM project for the Airbus A350 to be wrapped up in only two years, instead of the initially expected three years. The centre is also leading a PLM project for DCNS to allow the company to accompany the sale of its vessels in the international market with its PLM environment in order to provide in-service support.

HOW DOES THAT DISTINGUISH YOU FROM OTHER PLM INTEGRATORS?

Our Group is the only one in the market to offer four core competencies: PLM programme management (especially international or multi-site projects); expertise in all PLM processes (digital mock-ups, configuration management, collaborative work, etc.); expertise in market-standard PLM software and the ability to incorporate those solutions into the customer's environment by leveraging Capgemini's other areas of expertise (ERP, CAM, CRM, and so on); finally, expertise in proprietary Capgemini methodologies for accelerating or securing the critical stages of a PLM project, whether realising the solution or leading change. We have acquired considerable experience in spearheading ambitious PLM programmes. We have gained the technological skills to adapt to new markets. We know what PLM projects are capable of achieving. We are familiar with the critical stages and the corresponding solutions. Why? Because we give customers end-to-end support, from defining their requirements through to development and deployment to the end user.



Patrice Quencez,

Latécoère Group
Process and Organisation Director

A common language as the backbone **for an innovation chain**

WHAT WAS THE SITUATION LIKE BEFORE THE PLM APPROACH WAS LAUNCHED?

We did not have any internal PLM solutions. But as an aviation OEM, we had no choice but to work with the processes and information systems used by our many customers.

WHY DID YOU DECIDE IN 2012 TO USE YOUR OWN SOLUTION AND WHAT WERE THE CRITERIA?

aviation customers and acquire a DOA agreement (Design Organisation Agreement). To achieve that aim, we have to redefine and streamline our business processes, our engineering skills and our project governance methods, as well as build a true innovation chain. The need to set up a PLM-type collaborative work tool had become obvious.

WHERE ABOUTS ARE YOU WITH THE PROJECT?

developments and modifications. At the same time and based on the initial elements defined, we are creating pilot applications to demonstrate and promote the benefits of the PLM approach. We are currently working with an intermediate technical solution. The work carried out in 2013 will guide our choice of technology to be implemented in 2014.

WHAT ARE YOUR EXPECTATIONS OF PLM?

Our main expectation is the adoption of a single repository in terms of information and processes. We are currently working on defining the common language, which will be enhanced on a daily basis. A universal language is essential for working collaboratively with enterprise-wide processes. The PLM system will also enable us to formalise our data and processes, achieve greater independence from our customers and assume our responsibilities in terms of operational performance. Finally, the system will help us increase our role as a systems manufacturer, meaning that we will be involved as far ahead of our customers' requirements as possible, so that we can propose a stream of ideas.

IS PLM SUITED TO YOUR LINE OF BUSINESS?

In our line of business, we are required to manage large volumes of data in many different formats that transit to and fro between our various customers and partners. Furthermore, the aviation industry is governed by strict legislation, meaning that traceable procedures and products are essential. There are many different product configurations, and R&D is prevalent in the development processes. These are just some of the features that PLM addresses directly, not to mention the fact that PLM is conducive to an innovation-oriented organisation.



OPINION

« PLM, what comes **next?** »

In today's world, PLM is becoming just as commonplace in industrial companies as accounting and human resources management.

But what about tomorrow?

If the company's functions still operate in functional silos, we know that the major improvement in its performance will come from implementing a process-focused approach across the company and integrating the organisations to support that approach. Without denying the specific features of each functional area, the dividing lines between each area will move to bring greater fluidity and agility from idea to market.

In this respect, PLM as a process integrator has a major role to play in coordinating, but not hindering, collaboration and keeping companies focused on the product.

In terms of tools, does this mean that everything is PLM? That all corporate information must be centralised in a PLM system? No, integration is the challenge that will face tools over the next few years. We will need to put the right tools in the hands of the right users, without any break in digital continuity, while addressing the new needs for accessing and enhancing data and leveraging the latest technologies.

Let's think along the lines of a unified supply chain served by an integrated IS.



Yves Pélissier

Director of the PLM Centre of Excellence
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About Capgemini

With more than 125,000 people in 44 countries, Capgemini is one of the world's foremost providers of consulting, technology and outsourcing services. The Group reported 2012 global revenues of EUR 10.3 billion. Together with its clients, Capgemini creates and delivers business and technology solutions that fit their needs and drive the results they want. A deeply multicultural organization, Capgemini has developed its own way of working, the Collaborative Business Experience™, and draws on Rightshore®, its worldwide delivery model.

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People matter, results count.