

Can ERP Speak PLM?

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PLM - The Next Enterprise Application Suite

Product Lifecycle Management (PLM) promises significant benefits to manufacturers and the market is full of vendors claiming to provide faster new product introductions, reduced product costs, reduced product development costs, increased revenue, better quality products, enhanced product innovation and other valuable benefits. Because of the high appeal of these benefits and their associated ROI, PLM has become one of the fastest growing categories of enterprise applications.

The PLM market today consists of vendors offering a variety of solutions that in some way offer value to the product lifecycle, but there is no single vendor that is supplying all of the solutions required to support a full PLM Program (see [The PLM Program](#)) October 28, 2002. Many of the PLM solutions have their roots in the engineering department, but make no mistake; PLM is an enterprise application suite and has all of the additional requirements that come with enterprise class applications.

The PLM concept pulls together information and business processes from multiple disciplines within the enterprise and across enterprises. While product design plays a crucial role in the product lifecycle, PLM is not just a series of add-on tools for Computer Aided Engineering (CAD) and Product Data Management (PDM). But it is not just another module for ERP, either. PLM is a suite of applications that can be used by a company to get the highest value from their products to improve their business results. And like any other new suite of enterprise applications, as learned from SCM and CRM, companies may have to choose between the potential tradeoffs between best of breed solutions and solutions from their ERP vendors.



Innovation is King

PLM is not just another module of the ERP system. At the risk of simplifying things too much, PLM enables innovation and relies on flexibility and loosely structured information while ERP enables control and relies on discipline and structure.

Without getting into a philosophical debate, let's examine what that means in practical terms by looking at an example. During the process of developing a new product, companies typically go through multiple iterations of the design. The designers may procure or produce component materials to use in the product and go through many different sets of specifications before delivering the final design. In addition to the product design, information about internal design reviews, market analysis, customer preferences, supplier input, pricing and other documentation is generated. Many finished designs will never see production, however, let alone the components, ingredients, or specifications.

ERP applications supply the discipline to control these materials on a large scale from an inventory, costing and regulatory view. This level of control, which is required to plan and execute a global supply chain, may not be appropriate for the product innovation environment. In addition to avoiding too much "ERP overhead" in the design process, we also don't want to pollute the ERP system with a lot of experimental material definitions and documentation that may never be used again.

Integration Might Be Queen

If innovation is the highest priority, then integration is not far behind. Integrating the business processes and information flow across the enterprise and the supply chain is a key component of enabling PLM. Many of the benefits from a PLM implementation come from better communication between departments and trading partners and the integration of different people and perspectives on the new product introduction processes. An enterprise level view of the design process promises to result in a design that takes into account the strengths and possibilities of all departments and business partners involved, and a design that can be efficiently and effectively introduced into current operations.



While some business processes rely solely on the PLM system, others cross the line between innovation and execution. Let's explore the engineering change process, for example. Assuming that some simple file transfers between ERP and PLM are in place, it is a relatively easy task to populate the PLM system with the current Bill of Material or Recipe, if it is not already there. As the new design is developed, many tools provide a compare utility that will show the net change between the new and old structure. That defines one important aspect of the engineering change, the changes in materials used in production.

The next aspect of change is the timing of when the change should be implemented. In order to plan the execution of the engineering change, information about levels and locations of inventory, costs, planned production, planned purchases and current demands for the product must be taken into account. This information resides in the ERP application, and is critical to making the optimal decision on when to introduce an engineering change. Without that information, the impact of making this change based on a set date, the date when existing inventory is consumed, or for a particular production run could not be understood.

A Failure to Communicate?

Integration is more than just transferring data between two systems. Integration requires that both information and business processes be supported across multiple systems (see [What's Wrong With Applications – Business Processes Cross Application Boundaries](#)). One of the key challenges of integrating PLM with other enterprise applications is semantics. "Semantics" is a term that is sometimes not very well understood, but a semantics problem could be summarized by the phrase "It's not that I didn't hear the words that you spoke, I just don't understand what you meant". Different systems have different ways of representing concepts, and associate different meaning with their data. In order to integrate systems, you have to know more than how the data are stored; you have to know what it means. While standards efforts like RosettaNet for the discrete industries and ISA S95 for the process industries have helped to standardize data structures, they still do not guarantee semantic compatibility.

Are ERP and PLM Speaking the Same Language?

Costs are an excellent example of semantic confusion. Accountants know that “cost” is not a single characteristic of an item but a category of characteristics. Without answering a series of questions about the cost, the meaning of it is vague. Is the cost the procurement cost from the supplier? Does it include shipping? Does it include tax and duty? Does it include internal overhead, or is it just direct costs? If it is an assembled item, does the cost include only material costs of the components or does it include labor or processing costs? Does the cost assume a particular volume of purchase?

The same issue shows up in seemingly simple things like status codes, dates, and numerical values. For example, is the “quantity per” on a Bill of Material in the PLM system compatible with the one in the ERP system? Is the quantity per parent unit or batch/lot? Do the units of measure align? Is the decimal precision compatible? Does it include yield and scrap factors for production? Another example that has caused problems in past ERP integration projects is the definition of effectivity dates. If a component has an effectivity ending date of December 15, is the component active on that day? Is it inclusive, going out of effectivity at 11:59:59 PM (23:59:59) in the evening, or exclusive, going out of effectivity at 12:00:00 AM (00:00:00) in the morning?

These are usually simple questions to ask and to answer, but the right questions have to be asked for semantic alignment. Ideally, the questions will have been asked and answered by the vendor in advance, whether it is through standard integration or an integrated application suite.

Are ERP and PLM Talking About the Same Thing?

Some may argue that the yield and scrap factors mentioned in the previous section are not truly semantic differences, and they are probably correct. This type of issue highlights a conceptual difference between the PLM and ERP systems. A scenario that highlights the need for conceptual alignment between the product design in the PLM system and the production information in the ERP system is the selection of alternates.



A specific revision of a design may allow for alternate parts to be used in production. Some of these alternates can be applied independently, while others can only be used in conjunction with other alternates. For example, an alternate power supply can be substituted for the primary power supply for a piece of equipment, but only if an additional capacitor or resistor is also substituted on the same unit. Couple this requirement with the potential that a specific customer may have an approved supplier list. The customer, for regulatory, commercial, or quality reasons, may only allow components from particular suppliers. This is another constraint on the alternates that can be used for a particular production order. A final complexity to be considered in alternates is the identification of required replacements by geographical or organizational boundaries. For commercial or regulatory reasons, it is common to have alternative part requirements in certain geographies or for certain commercial entities.

Without strong conceptual alignment in how alternates are defined between the product design and the production order, and therefore the PLM and ERP systems, material planning to accommodate multiple substitutions and approved supplier lists would be cumbersome if not impossible. If both systems don't understand alternates in the same way, or if they have different ways to characterize geographic and organizational entities, technical integration will not provide the additional business logic to correct the mismatch. In this case, inefficient and error-prone manual intervention will be required.

PLM solutions have to work with many other systems, not just ERP, so integration is not a new issue for PLM vendors. Most PLM vendors recognize the need for integration and have addressed the need in their toolkits. The additional work comes from integrating the concepts and semantics of one system to the next, if this business level integration has not already been provided between the two systems. This can be a big challenge for best of breed vendors, who may need to rely on systems integrators for much of this conceptual and semantic integration.



Who Speaks PLM?

In the same way that innovation is King in product design, it is also true in software application development. Enterprises that are looking for the highest level of functionality will probably want to turn to PLM specialty providers or PLM suite providers. The PLM specialists typically offer greater depth of functionality in the design, product development, and engineering functions and will probably continue to lead in these areas for the foreseeable future. Given the rate at which new functionality is being developed, the gap between best of breed and ERP will probably include significant functionality.

An example of this is the development and management of manufacturing processes supported by specialty vendors like **Tecnomatix** and **INTePLAN**. These solutions provide rich design tools to help companies develop production processes, a complex and challenging problem. It will be a long time, if ever, before an ERP product develops that level of expertise and functionality in a particular engineering discipline.

On the other hand, solutions from ERP providers will be more likely to have better semantic and conceptual alignment that will make implementing and maintaining the applications less troublesome and expensive. The software selection process is going to come down to a tradeoff between best of breed versus an integrated solution. While the ERP vendors will likely continue to lag in product functionality, pre-integration means lower risk of implementation. You may need to wait longer for your ERP vendor because they have to fit new PLM functionality into the development calendar with all of the other requests. On the other hand, the ERP vendors are taking on a large part of the integration challenge for you.



User Recommendations

All of the major ERP vendors recognize the need to offer PLM to their customers, and have a strategy to deliver these capabilities. Some have developed their own solutions through development and acquisition such as **SAP**, **Baan** and **Oracle**. Others, such as **PeopleSoft** and **JD Edwards**, have developed partnerships. All of the major ERP providers will provide PLM capabilities, but most will continue to lag the best of breed PLM vendors like **IBM/Dassault**, **EDS**, and **PTC** and specialty vendors like Tecnomatix and INTEPLAN.

- Each manufacturer must first evaluate their competitive and business requirements for PLM based on the needs of their business.
- PLM requirements should include enterprise and commercial considerations such as the ability to deliver the new product profitably, in addition to design-related criteria.
- Manufacturers should compare their PLM requirements with the capabilities of their ERP vendors and the best of breed PLM vendors (see [Selecting a PLM Solution](#)).
- Remembering that "Innovation is King", manufacturers should first make sure that the functionality that they require is available from the solutions they are evaluating.
- Keeping in mind that "Integration may be Queen", significant value should be placed on integration, including semantic and conceptual alignment.
- Don't assume that the solution from your ERP vendor is integrated. Integration, particularly business level integration of concepts and semantics, is difficult work for your vendor as well as it is for you. Look for tight alignment and strategic investment from your ERP vendor.
- Don't assume that a solution from a PLM-only vendor is best of breed. Take the time to define your requirements and analyze the vendors against them.

Summary

ERP can “speak PLM”. While ERP may not speak PLM as fluently and as eloquently as the specialty PLM vendors, particularly in their areas of specialization such as design tools, there are advantages in predefined and pre-built integration. In order to make a PLM selection, the manufacturer should weigh the deeper functional depth of best of breed vendors against the value of pre-integrated solutions from their ERP providers.

About the Author

Jim Brown has over 15 years of experience in management consulting and application software focused on the manufacturing industries. **Jim** is a recognized expert in software solutions for manufacturing and has broad knowledge of applying Product Lifecycle Management, ERP, Supply Chain Planning, Supply Chain Execution, and e-business applications to improve business performance. **Jim** served as an executive for software companies specializing in PLM and other enterprise solutions before starting his consulting firm, Tech-Clarity Associates.



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