

Integrating PLM Processes

Business Challenge

Product lifecycle management (PLM) is a collection of business processes and tools that help companies improve their product innovation, product development, and engineering performance. A PLM solution today typically involves a combination of multiple design tools, analysis tools, and data management solutions along with numerous other documents, spreadsheets, and databases. Common business processes – such as implementing engineering changes or tracking the incorporation of requirements – usually cross the boundaries of multiple, heterogeneous applications.

The increased adoption of technologies such as Web services and service-oriented architectures (SOA) are helping companies bridge the process and data gaps between individual applications. In addition to bridging gaps in transactional applications, connecting product-related processes requires managing the context and relationships between CAD models, PDM systems, documents, and other product information. The combination of managed processes and relationship-driven data management techniques promises to meet the need to integrate and manage PLM processes for today's enterprise.

The PLM Process Challenge

Defining Processes

The set of solutions that supports product innovation, product development, and engineering processes – known as “product lifecycle management” or “PLM” – consists of a variety of software suites, specialty solutions, and innovative applications. Despite the goal common to many companies of consolidating onto common systems, a PLM solution still typically requires a number of different solutions to be used in combination. Even if a company could standardize all of its internal systems on one solution suite (assuming there is one that meets all of their needs, which is unlikely), product innovation and engineering processes frequently cross corporate boundaries, inevitably bringing in additional systems that play a role in the product development process.

Multi-application environments lead to challenges in coordinating and communicating both processes and data. Frequently, for example, a single function may require the use of computer-aided design (CAD), product data management (PDM), and computer-aided engineering (CAE) applications. In this scenario, data is frequently replicated in each of the systems, often in multiple proprietary formats. In addition, the business process or workflow is not captured in a single system, forcing reliance on manual coordination of processes by the users.

This problem is not going to resolve itself quickly. More applications are being introduced at the same time that suite providers are expanding their functionality. But it will be some time before the different technical and functional disciplines will be able to work effectively on one integrated PLM offering. Although this is a positive direction for companies and solution

Announcement

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providers to strive to achieve, reality dictates that the business of innovation today requires integration.

Giving Life to Processes

Aberdeen's [Product Innovation Agenda Benchmark Report](#) discloses that over two thirds of companies today (68%) are attempting to standardize their new product development processes. Recent findings from Aberdeen's [Product Portfolio Management Benchmark Report](#) indicate the value of standardization, noting that best in class companies have higher levels of adoption of their product development processes, with more than 80% of survey respondents reporting adoption of product innovation processes by more than half of their intended users. Particularly with the expansion of global design and global manufacturing processes, keeping everybody working on the same processes is critical.

Process management can help. Defining processes has value, but processes that are designed and put in a binder on a shelf do not lead to top-level performance. Automating a process, on the other hand, gives it life. With role-based processes, people know what they are supposed to do and how it fits into the bigger picture. Done properly, these business processes span application boundaries, not only tying together different individuals in the processes but also the supporting applications.

Cross-application processes are not unique to PLM. In fact, they are common in many areas of business today and have led to an increased use of workflow and "composite applications" that provide structure to a business process and pull together the appropriate solutions in the context of that process. Composite applications are assembled by linking disparate applications together to create a larger, hybrid process that selectively uses functionality from the appropriate system. Linking the process to the supporting data and applications promotes the use of the process because it makes life easier for the participants. They know what they should work on and when. Recent integration technologies and architectures such as service-oriented architectures (SOA) are making the development of composite applications possible.

Managing Processes in Context

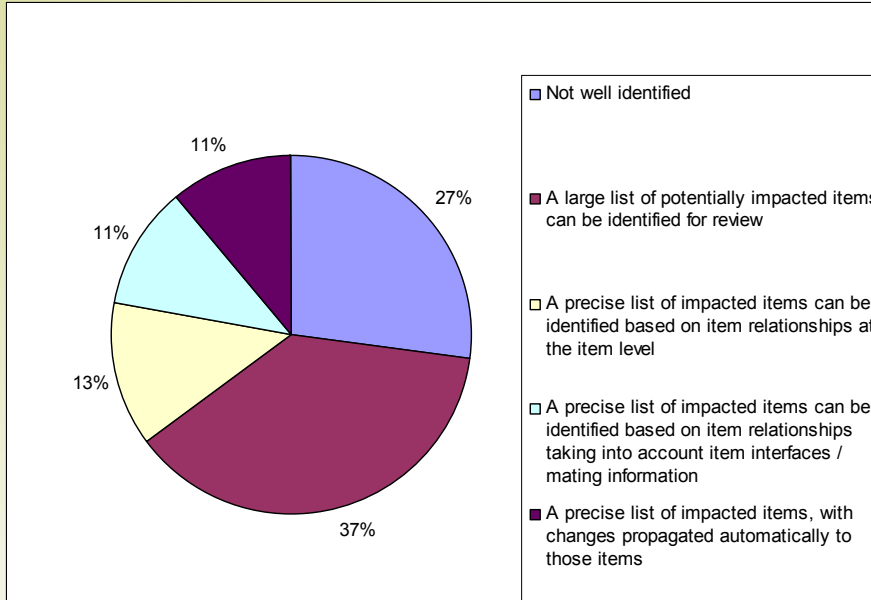
Process without context – in this case, product data – is only a partial solution. A real-world process is typically oriented around data. The data could be a customer order, a non-compliance event on the plant floor, or some other information. Linking this information to the process – across multiple applications and their associated databases – makes the process actionable. But linking data across multiple applications can prove to be difficult, particularly for product-related information.

Product-related data has a unique characteristic: it changes over time. Product designs and definitions are continuously evolving. This has led to the adoption of techniques to manage the relationship of different data elements to each other in order to ensure that all of the product information is kept in sync at all times.

Relationship-based, associative techniques have been developed in PDM solutions in order to manage these relationships, such as the mating information for two parts or the association of a downstream deliverable like a drawing to its original CAD model. These relationships become critical when managing products because one design change typically affects upstream and downstream decisions and also, potentially, many other designs. Many companies struggle to manage the impact of changes even in a homogenous systems environment (one CAD and one PDM system). Many companies struggle to identify the impact of changes from one item to another (Figure 1), and more struggle with identifying the impact of changes from an item to

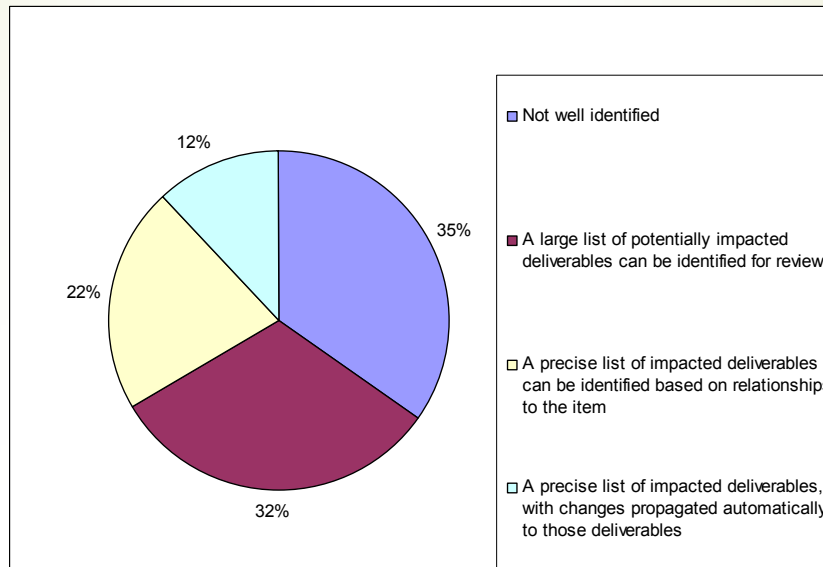
downstream deliverables (Figure 2). As business processes cross multiple systems, keeping upstream and downstream alignment between requirements, designs, and deliverables proves to be even more challenging.

Figure 1: Managing the Impact of Product Changes on Related Items



Source: AberdeenGroup, November 2005

Figure 2: Managing the Impact of Product Changes on Related Deliverables



Source: AberdeenGroup, November 2005

Technologies to Watch for Enabling Relational, Composite Applications

PLM systems, particularly for PDM, serve as repository for CAD files and related product data. One of the key benefits of PDM systems is that they manage relationships. PLM suite providers that very tightly link PDM and CAD – for example Dassault Systemès, PTC, and UGS – manage the complex CAD files that make up a modern 3D CAD model. Beyond managing the files, these systems also manage the complex relationships between parts and components. This capability, sometimes known as “associativity” or “relational design,” offers the ability to predict and manage how a change to one part impacts other parts and assemblies. For more information, see [*Managing Product Relationships: Enabling Iteration and Innovation in Design*](#).

Some PLM vendors have begun to look beyond the physical design, to address associativity between different types of product data. As an example, PTC acquired enterprise publishing vendor Arbortext to better develop downstream deliverables such as technical documentation, training manuals, and marketing materials based on existing product data. PTC is extending the promise of associativity to downstream documentation, ensuring that the documents stay synchronized with the most current designs. In this way, it is extending both process and data across its application portfolio.

One vendor aims to extend processes and associative capabilities across all elements of product information and associated applications. KollabNet uses “design maps” to create, manage, and visualize dynamic product development processes and related information stored in requirements, analysis data, CAD files, PDM systems, and even documents and spreadsheets. The company’s goal is to manage common processes and extend associativity between product data stored in different systems to help users understand the impact of planned design changes. For example, users could validate a change in a CAD file against associated requirements in a spreadsheet or parametric information stored in PDM and know how these changes can affect cost, calculations, and other parameters in the development process.

Other vendors, including some big names, are also looking to enable cross-application processes. IBM had announced an SOA strategy aimed at leveraging IBM middleware products to link and execute disparate applications into composites. Dassault Systemès, a long-time IBM partner, is also focusing on SOA, leveraging technologies from IBM as well as Microsoft to pull together different applications into common processes.

These approaches are examples of extending product innovation, product development, and engineering processes across multiple systems and, moreover, doing so in the context of product data. Given the heterogeneous nature of PLM environments today, these approaches are ready to deal with the reality facing companies today – even as they may be trying to move to common suites as they become available over time.

Recommendations for Action

- √ Define and manage best-practice business processes, seeking to extend these processes to a large percentage of new product development and design participants.
- √ Automate best practices by linking disparate applications together into “composite applications” that leverage functionality from the appropriate systems to support higher level processes.
- √ Connect product data – the context of the processes – together to support processes.
- √ Look for opportunities to extend associative techniques beyond components and assemblies to encompass the relationships between all forms of product data.

Related Research

[*The Product Innovation Agenda Benchmark Report*](#), September 2005

[*The Product Portfolio Management Benchmark Report*](#), August 2006

[*Enabling Product Innovation: The Roles of ERP and PLM in the Product Lifecycle*](#), December 2005

[*PTC Acquisition Brings Dynamic Publishing into PLM Suite*](#), July 2005

[*Managing Product Relationships: Enabling Iteration and Innovation in Design*](#), August 2006

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