Software Integration With Hardware Crucial for Product Development

Kevin Prendeville, Accenture

Manufacturers share a vexing and important problem.

In the aerospace and defense, automotive and consumer products industries, manufacturers have difficulty integrating software with hardware in product development. The truth is that too few companies do this well. Engineering and product introduction costs are often high and product deliveries excessively slow. Companies struggle with such integration because they use separate processes to coordinate product development. For instance, a company's hardware engineering group typically uses Product Lifecycle Management (PLM) tools to manage the physical design, whereas engineering groups employ Application Lifecycle Management (ALM) tools to manage software inside the product.

Why does this integration matter? In a word, money. Research and development investments for high-tech companies, which include product development, can represent 20 percent of revenues annually, according to Accenture research. Late product launches can cost a high-tech firm 10 percent of its profits over multiple years. Overcoming this integration challenge, especially to accelerate product development and reduce product defects, is critical.

The big challenge is that PLM and ALM tools are fundamentally different. PLM uses hardware tools for product development processes such as engineering, supply

chain management, manufacturing, services, and marketing. ALM harnesses software tools within PLM processes to manage product features, test cases and results, configuration management, and software defects.

Manual processes cause errors

Because of these differences, a manual and difficult-to-track process is used to reconcile data for a complete product across disciplines such as requirements, test cases, defects and change orders. It is difficult to synchronize design information and configurations, which leads to errors in product development.

New Accenture survey results underscore these integration problems. Nearly two-thirds (65 percent) of aerospace and defense executives admitted they face challenges integrating hardware and software. More than four-fifths (81 percent) said ALM capabilities are important and three-fourths (75 percent) said integrating these capabilities with PLM is important. More than half (55 percent) seek to enhance software and application lifecycle management within their PLM systems.

With integration so crucial, it's important for manufacturers to blend processes and tools for managing software and hardware development into a process known as unified ALM-PLM. By doing so, they will accelerate product deliveries, enhance communications across product teams, and boost research and development efficiency. These ideas are conveyed in an Accenture report titled Maximizing the Return on Your Billion Dollar Research and Development Investments: Unified ALM/PLM Investments. [1]

This unified approach blends strengths of ALM and PLM tools. ALM strengths include managing product requirements and features, test results and software defects. PLM strengths consist of managing product changes, configurations and compliance.

How does Unified ALM-PLM work?

This unified approach makes it possible for steps unique to hardware or software development to proceed independently. However, at certain stages in the process such as during the requirements phase, integration becomes important. As hardware and software coalesce in a product, manufacturers should coordinate the process using an integrated bill of materials that captures hardware and software information.

One of the most noteworthy benefits of PLM is the rise in research and development investments aimed at improving management of defects and enhancements. Defects have generally been tracked better in the software industry than in the hardware industry. So enhancing those capabilities using ALM processes can ensure compatibility of releases between software and hardware, and provide consistent status tracking. This would generate better product planning.

Unified ALM/PLM offers four key capabilities:

1. A common data model. Unified ALM-PLM defines a common data model and change management processes for managing an entire system, both hardware and software data, without duplicating data management or business processes across those systems. The two primary integration points are, first, tying back the requirements to the software and hardware bill of materials and, second, linking defects back to change requests and change orders so PLM can reflect them.
2. Management of hardware and software requirements. Unified ALM-PLM tracks and manages the complete integrated hardware and software product requirements from the original product concept through design, testing and validation.
3. Consistent defect and change management. A single process for product defect management and change management across hardware and software enables better product tracking and management.
4. A framework independent of a tool or platform. The framework of Unified ALM-PLM can be implemented on many kinds of systems from different vendors. This is because the standard data model and processes can be adapted to fit multiple technology environments.

Kevin Prendeville is a managing director with Accenture's Product Lifecycle Services group. He can be reached at kevin.p.prendeville@accenture.com [2]. [3]

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