



# Defining the PLM Open Landscape

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## EXECUTIVE SUMMARY

“Open Systems” has been an IT buzzword across most industries for well over a decade. In design and engineering, however, the absence of common definitions and the lack of any shared framework assessing priorities continue to impede efforts in integration and interoperability. Without a shared understanding, consensus too often vaporizes in the face of bickering over wordsmithing and confusion over conflicting priorities. Without a rational framework for presenting requirements, it is rare for major users to present a consistent set of demands to their key vendors.

The critical need for PLM integration for applications across the enterprise becomes ever more urgent. Moreover, integration of such complex environments as ERP, CRM, or SRM requires openness on each side. Yet the open PLM landscape remains murky.

This study provides a common framework of critical criteria for evaluating integration and openness requirements for design and engineering. The five leading PLM solutions providers and SAP all contributed to the effort. The scorecard in this analysis identifies customers’ requirements linked to a review of the capabilities of the PLM vendors. The approach aims first at presenting a common definition of needs that can form the basis for achieving internal consensus, to help avoid confusion over terms and to help focus on the difficult task of prioritization. That focus in turn may serve to clarify communications to the software development community dramatically, laying out the basis to accelerate the evolution of an open PLM landscape. Overall, the scorecard provides a framework for evaluating each of the suppliers, for understanding end-user requirements, and for refining and phasing an implementation scenario efficiently and reliably.

Progress on the scorecard with the PLM vendors and selected, leading-edge users now provides the basis to validate the prioritization of needs with a broader community of users, and to verify the capabilities of the major PLM platforms in use in the market.

## MAPPING AN OPEN PLM FRAMEWORK

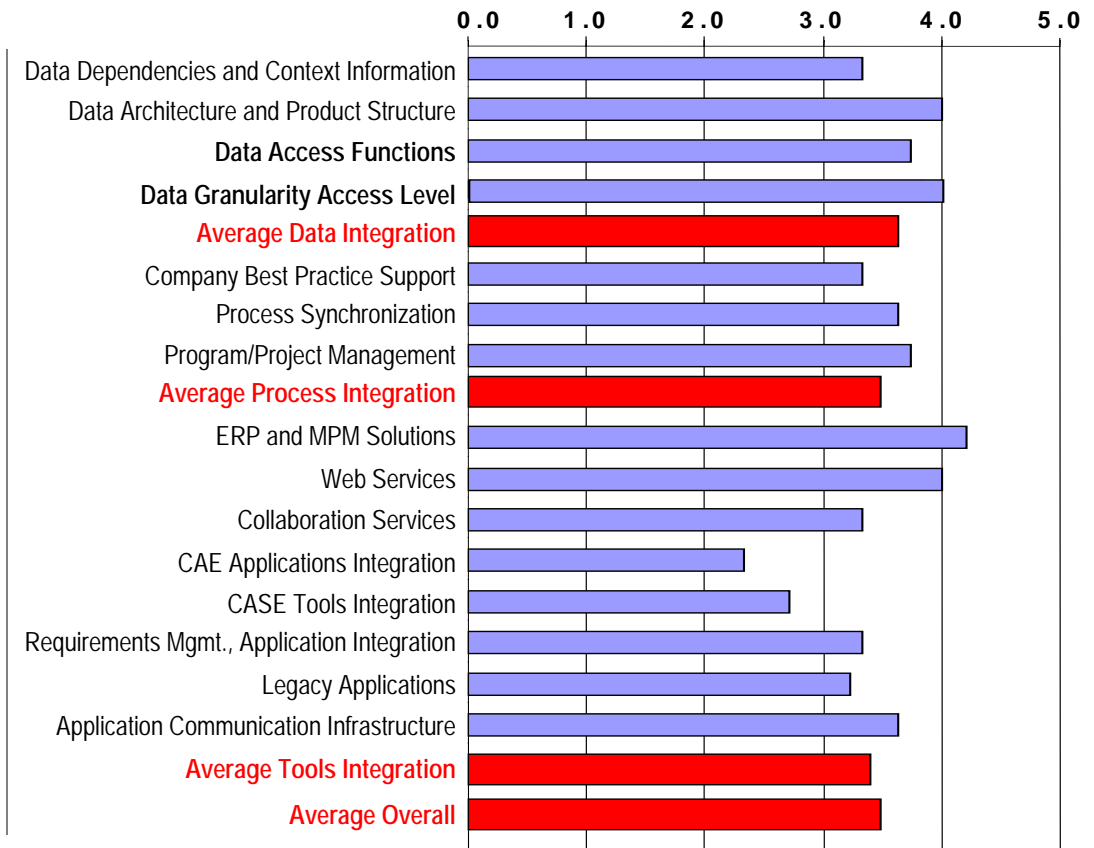
The priority through the 1990s turned on the race for the best modeling features, the fastest and most accurate math algorithms, the most complete manufacturing simulation set, or the most sophisticated structural analysis capabilities. Vendors aggressively hawked their unique data model as the one and only alternative to offer the most powerful feature set imaginable. The sharing of information did not register as a priority. End users cheered their preferred partner on, often with a rigid and heated intensity. CAD lock-in ruled.

Reflecting a stunning reversal, UGS and PTC signed an interoperability agreement in March of 2002. While both had signaled a shift in course earlier with their modeling kernels, the agreement formally signaled a major change in the industry. Since then, the PLM and ERP leaders, including **Agile**, **Dassault/IBM**, **MatrixOne**, **PTC**, **SAP**, and **UGS** have clearly recognized the opportunity to leverage Web services to solve ongoing integration pain in value chains.

Today, an evaluation of the critical capabilities for meeting integration and open requirements in design and engineering now demonstrates reasonable levels of support, which in turn represents a significant improvement over the capabilities available as recently as a year ago. The five leading PLM solutions providers and SAP registered an overall average rating of 3.5 on a scale of one to five, as summarized in the chart on the following page. All improved their standings over the latest year. Given the competitive attention the vendors now accord open PLM, continued and significant improvements can be expected in the coming year.

Of the twenty-seven criteria across three major areas that are evaluated, fifteen represent particularly critical functions that are defined and discussed in chapter 2 of the body of the report, with highlights on the offerings of the vendors. Twelve additional criteria that are less critical are discussed briefly in the appendix. Overall, the scorecard provides a framework for evaluating suppliers, for understanding end-user requirements, and for refining an implementation scenario.

Open Framework Summary Results – Average for PLM Vendors



**PLM OPEN CRITERIA**

APIs (Application Programming Interfaces) and Web services represent two areas of particularly dramatic progress over the latest year.

**APIs**

The disclosure of public methods to first access any type of information, and then to execute any required actions on that information, represents a fundamental capability that must be available for efficient integration. Efficiency here means both low cost in terms of development time and maintenance, and high performance supporting sophisticated access to functions and features. On those two points, a tremendous added value is derived from object-oriented programming. The payoff extends well beyond object-oriented programming per se. It flows more from the use of an API for encapsulating applications, and from the concept of defining objects and classes as applied to applications. The concept as well as the actual implementation supports a multi-layered applications architecture with a data communication infrastructure, core components, process communication, and user interface. Two other key points have also been addressed – stability and completeness.

The commitment from vendors to migrate and then maintain their code over time has involved thousands of public methods. That effort has entailed significant cost, and a major shift in architecture. Most have been able to maintain the necessary investment largely because of the benefits of object-oriented technology and layered applications. Reality dictates, however, that as vendors enhance functions release by release, a limited number of APIs may need to change. How well each vendor minimizes the impact of those changes, and manages the ease of transition for users of changed APIs, will become an important competitive differentiator.

#### **WEB SERVICES**

Web services deliver three classes of benefits in design and engineering environments: Web access to an application, standard Java services, and dedicated, high-level services available for integration. This third class of benefits contributes the most important added value. It delivers the ability to launch services within a foreign application without having to actually modify the original application. Such high level services reduce the cost of developing and deploying custom applications and custom services dramatically. A service-oriented architecture (SOA) structures an application to separate a service so it can be called by another application. Accessing the product structure of a CAD model and visualizing it in the most appropriate way from within an ERP application from different vendors is a key enabling capability for enterprise-wide integration of PLM.

#### **VENDOR STANDINGS**

The **Agile** solution is built on recent technology, fully leveraging Java-enabled capabilities in terms of flexibility, Web services, and multi-layered architecture. Its experience and proven industrial success reflects significant adoption for production use of its technology. Of note, Agile has established a presence in the electronics sector, where long ago authoring tools bridged the chasm separating silos of experts served by specialized solutions, tailored process support, and divergent data management. On the other hand, not being a supplier of authoring tools for CAD/CAM and CAE reduces their level of understanding of product definition with its embedded knowledge and complex structures. Agile has made a significant move to address that issue with the acquisition of Eigner, a company highly regarded for its product structure and configuration management solution applied to discrete manufacturing.

**Dassault Systemes** started working on a complete new architecture and technology base back in 1995, with the V5 announcement. Ten years later, they now ride the openness race with a competitive advantage: object-oriented concepts applied from the basement to the top floor, a standard communication infrastructure, software components, a multi-layered application architecture, a common data model for the family of CATIA V5 applications with specific extensions to match application-specific requirements, a complete API with 22,000 public methods to access every piece of information, support of process steps or program items, and multiple execution environments for servers and

end-user access. The vision is great, the potential enormous, although the full value at the level of industrial implementation has still to materialize. A handful of customers are ready to talk about the first benefits and visible breakthroughs, and Dassault Systemes plans on many more in the near future.

**MatrixOne**, very much like Agile, has built its solution on Java and is leveraging this architecture to offer a flexible and expandable solution. The object-oriented approach that was at the heart of MatrixOne from the early days gives them a competitive advantage. While they do not provide CAD/CAM/CAE authoring tools, they do have a good understanding of the engineering environment through their customer-installed base. MatrixOne has also learned the hard way to extend well beyond the toolbox concept that backed its early successes. They now support a complete “out-of-the-box” PLM solution, while maintaining their traditional strength in openness and customization.

**PTC** has built its PLM offering from two main sources: authoring CAD tools with CAD Data Management such as Pro/E and Pro/Intralink, and PLM for a broader enterprise view of product definition and process support with Windchill. Now, PTC brings the two together with Wildfire. As an open solution by construction, originally developed to federate heterogeneous sources of data, Windchill has traditionally served multiple authoring tools and addressed cross-functional, enterprise-wide processes. In fact, all the standards for openness known and recognized today are part of Windchill – including object-oriented technology, a multi-layered architecture, Web services, and Java clients and application servers. While that foundation taken alone might seem to imply immediate success, PLM requires more than a good conceptual foundation. The completeness of ready-to-use services, the built-in industrial experience and practices, and the effectiveness of the solution took more time than expected to meet and beat competitive norms. Today, the combination of Windchill and Pro/E restores the PTC competitive positioning vis-à-vis Dassault Systemes and UGS, intensifying the now-fierce competition.

**SAP** is a one-of-a-kind company with a dominant position at the enterprise level through their ownership of master data, or enterprise data supporting BOMs, financial metrics, specifications and requirements, and processes covering all industry segments from discrete manufacturing through chemical, pharmaceutical, and electronics firms. SAP is involved in all steps of product definition and product delivery. The downside is that exposure spreads their expertise thinly. Such a high level view of the business process does not fully address the level of detail and complexity that makes PLM solutions attractive and potentially powerful today within design and manufacturing engineering. Nonetheless, a number of manufacturing companies do rely on mySAP PLM for their product development process with success, managing product structure at the part level and transitioning it easily from engineering to manufacturing.

**UGS** takes a lead in terms of both breadth of background and experience. The history and positioning gives UGS the advantage of being the most practiced company with open systems, heterogeneous data, and process integration across

multiple industrial sectors. More recently, with the merge of the UGS and SDRC product lines, not only did the application breadth increase again, but the support of heterogeneous data, process, and tools integration became a critical objective for the overall strategy of an open platform. UGS did the right thing with an impressive proof point delivered in the market, building upon standards, with the PLM XML initiative for data exchange and process synchronization. The data model is published in a standard and open format. The re-architecting of CAD and PDM products to take advantage of new technology concepts with multi-layered Web services represented the core of a new line of solutions with NX and Teamcenter. The extended APIs also represent the new set of methods available. UGS has established an impressive master plan that carefully balances the tactical needs of existing legacy deployments within the industry with the longer-term, strategic potential targeted by the new architecture and advancing technology.

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