Aberdeen*Group*

Data Visualization: Foundation for PLM Success

An Executive White Paper

August 2003

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Executive Summary

After years of aggressive cost-cutting measures, enterprises are refocusing their efforts on developing strategies to drive top-line revenue growth and market performance. With many companies operating with a focus on remaining lean, growth initiatives must focus on improving the development, management, and performance of products. Simply put, the next area of competition will be determined by an enterprise's ability to align processes and information that support the efficient development, delivery, and management of a product over its useful life.

As a result, manufacturers (and other companies) are adopting product life cycle management (PLM) as *the* key strategy for driving competitive differentiation, performance, and profit optimization in the market. PLM is a business strategy intended to link all information, people, and processes associated with a product from initial concept through end-of-life disposal. Companies that can coordinate access to product data and foster collaboration across multiple stakeholders have been able to develop and deliver products to market faster and maintain them better and cheaper than the competition. This edge is critical in today's uncertain business environment.

PLM is made possible through the coordination and use of an integrated series of business applications, data sources, and technologies that allow efficient data exchange, collaboration, and process execution. Unfortunately, schematics, drawings, and other critical product data are spread across a heterogeneous mix of business systems and data stores within and outside the enterprise. Likewise, stakeholders that require access and provide input to such product intelligence are dispersed geographically, based on their function and role in the product life cycle. These stakeholders — ranging from design to procurement and manufacturing to sales and marketing — also require product information to be accessible in different formats, at different stages of the product life cycle.

PLM success requires a central repository for all product data and tools that enables stakeholders to access product intelligence in their native formats. Visualization tools enable such access, linking together disparate sources of product data and presenting this information in a form that is relevant and accessible to every stakeholder in the product life cycle.

Such timely access to accurate and complete product data fosters inter- and intra-enterprise collaboration, driving improvements in process cycle times and product quality and costs. In short, building a PLM strategy without visualization tools is akin to building a house atop of sand; either is likely to topple because it lacks a solid foundation. Manufacturers would be wise to make visualization a first step to PLM — not an afterthought.

This *Aberdeen Executive White Paper* explores the need for a data visualization and collaboration technology in a PLM environment and reviews Cimmetry Systems, a leading provider of visualization solutions.

PLM: The Next Wave of Competition

Industry is undergoing tectonic change. Globalization, regulatory requirements, industry consolidation, outsourcing, technological advances, and mass customization are reshaping the business landscape before our eyes. To compete, enterprises must adopt new strategies and technologies to improve collaboration and control across an increasingly complex and globally dispersed network of internal stakeholders and external trading partners.

For manufacturers, this network coordination and control must occur around the product, which is the nexus of a manufacturer's activities and the key determinant of its survival. Put simply, a manufacturer's success will be determined by its ability to align processes and information that support the efficient development, delivery, and management of a product over its useful life. Manufacturers that excel at this activity will be market leaders. Manufacturers incapable of managing and integrating such product life cycle processes will be relegated to "also-rans" and likely forced out of business.

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PLM will be a key enabler of success and survival in the manufacturing sector. Intended to link all of the information, people, and processes associated with a product from initial concept through end-of-life disposal, PLM offers a framework that enables manufacturers to consistently develop and deliver products faster, better, and cheaper than the competition.

PLM is fostered through an integrated series of business applications, data sources, and technologies for efficient data exchange, collaboration, and process execution. However, the numerous disparate data sources and business systems inherent within a single enterprise make establishing a complete and integrated PLM environment difficult. Such challenges are magnified further when enterprises incorporate external design and trading partners into a PLM strategy. Attempts to establish a common data model and associated tool across multiple enterprises quickly becomes impossible. This lack of commonality has built seemingly impenetrable barriers between unfamiliar, unstructured, and cross-enterprise data systems.

In fact, many early PLM initiatives toppled under the sheer weight of strategy alignment, change management, and systems integration issues. Other PLM efforts stalled in the starting gate because of indecisiveness over where or how to begin.

Early successes and failures clearly signal that a prerequisite for PLM success is the ability to establish a single point of truth for all product data and to provide tools for enabling access to this product intelligence *across all stakeholder*s that have

an input into designing, producing, delivering, or servicing the product. Therefore, a PLM environment must allow controlled access to all product data — beyond just design data — enabling each participant to view and contribute relevant product information in his or her native format.

For example, engineers might use authoring tools, such as CAD (computer-aided design), to create and share product data during the engineering and design stages. The product intelligence locked up in this CAD environment is critical for collaboration among all participants in the product life cycle.

Unfortunately, stakeholders often lack the technical infrastructure or skills necessary to access and manipulate a CAD drawing. Suppliers require design data to develop their own parts and suggest alternatives, but often use different authoring tools than their customers. Procurement specialists rely on product data to test various sourcing and supply scenarios, and marketers can use such data to prepare pricing strategies, promotional campaigns, and sales collateral. However, these groups typically lack authoring tools and skills.

> Plan early for increasing the useful access to all types of product data.

On the other hand, information on product performance (e.g., defect rates, return rates) or changes (e.g., part obsolescence, supply shifts) is vital for designing future product iterations. However, this data typically exists in enterprise systems, such as enterprise resource planning (ERP), supply chain management (SCM), and customer relationship management (CRM), or in disparate formats, such as e-mail word processor documents or spreadsheets.

Visualization: Laying a Sound Foundation for PLM

In response to such product data disconnects, manufacturing executives are quickly realizing the significant business potential of data visualization and real-time collaboration throughout a product's entire life cycle. Visualization tools can link together disparate sources of product data and present this information in a form that is relevant and accessible to every stakeholder in the product life cycle — regardless of data store, format, or authoring tools.

The importance of visualization is best rendered in the old axiom, "a picture is worth a thousand words. " Visualization functions as the lingua franca of collaboration, providing controlled access to product data, drawing associations among seemingly disparate product data elements, and fostering collaboration across internal and external parties that have input or impact on a product during its useful life.

Such visibility provides an opportunity for every entity along the product chain, no matter how nontechnical, to have a more complete understanding of the product, to foster inter- and intra-enterprise collaboration, as well as to drive improvements in process cycle times and product quality and costs.

Visualization and Collaboration Beyond Engineering

PLM vendors provide engineers with the benefit of visualization and collaboration for the authoring tools they supply. Third-party visualization solutions can also extend to these same engineers, enabling them to collaborate across disparate authoring environments. However, as noted above, there is both more to view and more on which to collaborate in a single product than engineering data alone. For example, visibility to the "as built" and "as maintained" product information, in real-time, is of increasingly significant value for after market parts and field service operations.

Moreover, not all stakeholders work with identical engineering authoring tools; i.e., CAD and PDM systems. These reasons and the need to proliferate product data beyond engineering make adopting an independent, cross-platform, and broader format access capability an important consideration in any PLM strategy.

An efficient visualization and collaboration solution must punch through the communication and information formatting barriers within and across enterprises to establish a Web-based repository with a role-based, native access that allows all participants to view all of the data, regardless of data format or local authoring tools. Furthermore, document collaboration must be part of the viewing solution to permit all parties in the discussion to view the same information concurrently. In any data-sharing strategy, enterprises must consider the vast number of data formats that are created in a corporate environment.

Providing native access to the active data means there is no compromise (or least a common denominator) to contend with that will limit the usefulness of the data. Reading from the native format also means that the data is current and accurate.

A visual collaboration context means that the accuracy of product-specific communication can be enhanced. Product terminology idiosyncrasies and even language barriers no longer pose an impediment to communications between individuals when all parties are using the same image as a point of reference for discussions.

The access and collaboration afforded by visualization can help drive improved design and product management decisions; shrink design, review, and time-to-market cycles; improve product and design quality; and lower printing and courier costs. In addition, visualization can also help enterprises reduce software license investments and training costs by enabling each user to access required product intelligence and collaborate in existing native environments.

It is important that the selection of a visualization solution be considered early in the PLM evaluation phase and not be treated as an afterthought. This implies that a visualization solution can be selected and implemented independently of PLM to derive value from legacy systems while being poised to deliver incremental value to later initiatives.

Cimmetry's AutoVue: Building Blocks for PLM

Cimmetry Systems (www.cimmetry.com) has firmly established itself as the leading independent provider of visualization and collaboration technologies for the AEC (architectural, engineering, construction), aerospace, automotive, electronics, engineering, manufacturing, oil and gas, and utilities markets. Since its inception in 1988, Cimmetry has taken a *vendor-neutral* approach to visualization, developing a family of viewing and markup solutions for individual, companywide, and business-to-business viewing and collaboration.

The company's flagship AutoVue solution enables product life cycle participants to view and collaborate on vital product information in real time — regardless of the format or authoring tools employed. Available in both Windows desktop and Web-browser-based thin-client versions, AutoVue provides native viewers for more than 200 engineering, multi-CAD, and business-document formats. A partial list of the formats supported by AutoVue include 3-D CAD; 2-D CAD; EDA layouts and schematics; scanned and raster documents; vector files; Microsoft Office documents and graphics; and solid modeling formats.

AutoVue also provides full markup and annotation capabilities, empowering users to provide feedback on viewed data and drawings. The solution's real-time collaboration capabilities allow users to schedule meetings, as well as co-view and co-markup 3-D solid modeling formats, 2-D engineering formats, electronic design formats, and Office desktop document formats in real time on a private intranet or the Internet (Figure 1).

AutoVue fosters data access and collaboration across the product life cycle by enabling three primary functions:
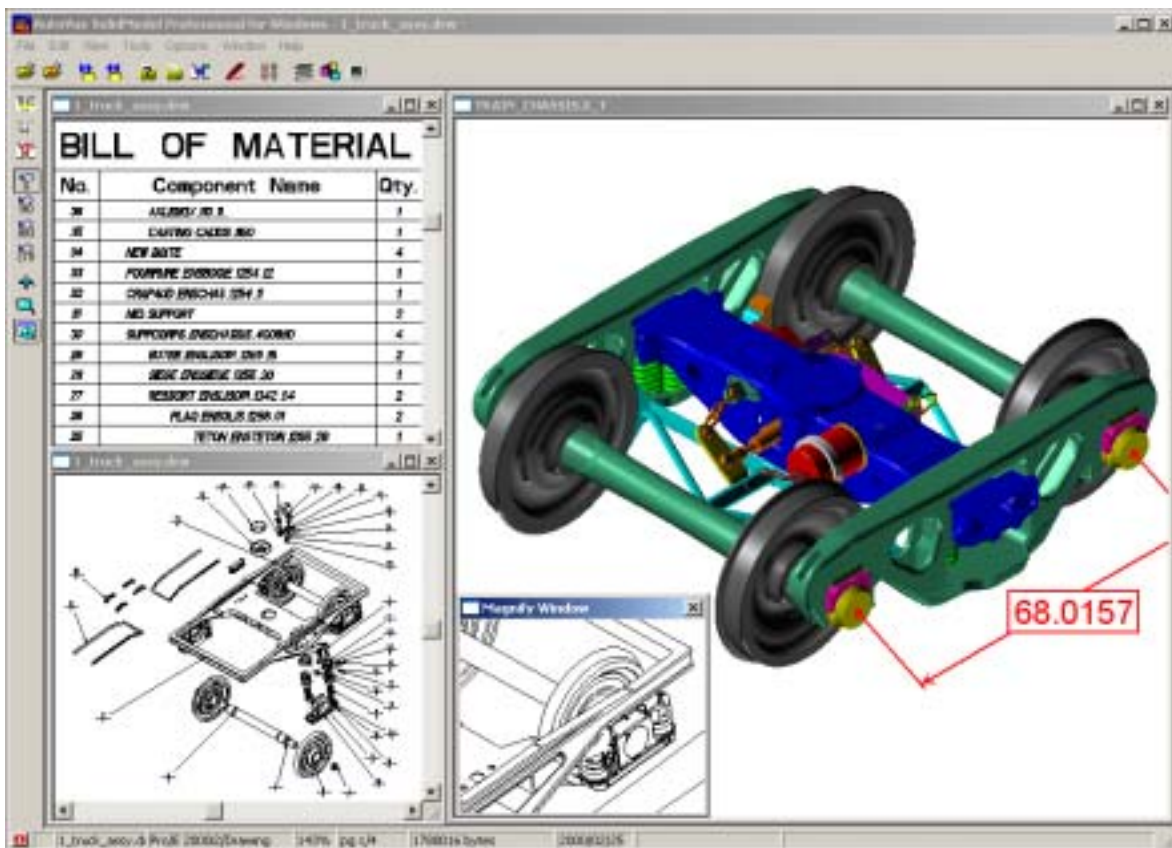
1. Access — AutoVue's open architecture gives all stakeholders in the product life cycle controlled access to relevant product data *in its native format*. The solution includes intuitive tools for rotating, expanding, and drilling down into designs, drawings, and schematics, allowing users to access only the product information and detail level they require.

2. Markup — AutoVue enables multiple parties to view and mark up 2-D design drawings and schematics, and 3-D models and assemblies, either independently or in real time.

3. Collaborate — AutoVue supports collaboration across multiple, heterogeneous, and geographically dispersed computing environments.

All AutoVue products have out-of-the-box application programming interfaces (APIs) to enable flexible integration with leading document management, PLM, and ERP solutions. Such capabilities have made Cimmetry an attractive partner. PLM companies such as Agile, Baan PLM, MatrixOne, and SmarTeam integrate AutoVue functionality within their own offerings. Leading document management companies — such as Documentum, Synergis, FileNet and OpenText, among others — also leverage AutoVue components within their own solutions.

Thousands of organizations worldwide have chosen software solutions from Cimmetry Systems. Its products are available in multiple languages and are sold worldwide through a network of VARs (value-added resellers).

Figure 1: AutoVue: Visualization and Collaboration Environment

Source: Cimmetry Systems, August 2003

Aberdeen Conclusions

Aberdeen research strongly suggests that companies will succeed (or fail) based on their ability to develop, manage, and service products faster and at a lower cost than the competition. The race to PLM competence clearly suggests that success will go to firms that put data visualization at the forefront of their PLM initiatives.

When managed appropriately, data visualization can coordinate product data and foster collaboration across all stakeholders in the product life cycle, regardless of a participant's role or technological infrastructure. Put simply, visualization tools function as a stable foundation for building a successful PLM initiative.

A generalized or universal visualization and collaboration framework must allow for the use of product data that is created on any system, regardless of data store, format, or authoring tools. Such use provides an opportunity for every entity along the product chain, no matter how nontechnical, to have a more complete understanding of all the product life cycle activities and related knowledge access.

Cimmetry has established a significant presence as a leading global provider of visualization and collaboration solutions and is the engine inside many leading PLM and document-management applications. The company's visual-based AutoVue solution suite supports viewing and collaboration on any product designs and documents in real time across heterogeneous systems and networks. By leveraging AutoVue's extensive data format visualization technology, manufacturers can extend product data to and foster collaboration between relevant stakeholders across the complete product life cycle, from design conception through product retirement.

In summary, Cimmetry's AutoVue visualization and collaboration solutions can provide the sound foundation required for companies to build and maintain an effective PLM strategy.

Aberdeen Group, Inc.
260 Franklin Street
Boston, Massachusetts
02110-3112
USA

Telephone: 617 723 7890
Fax: 617 723 7897
www.aberdeen.com

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August 2003

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