Windchill Executive White Paper

Leveraging the Internet for collaborative product commerce

PTC™
Shaping Innovation

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A CHANGING BUSINESS ENVIRONMENT

The increase in competition brought on by the accelerating use of the Web has created a buyer's market, where customers will no longer accept mass-produced products that only partially address their needs. Knowing that numerous alternatives exist, customers expect services and products tailored to their specific requirements. As manufacturers struggle to meet this increasing demand for customer-tailored products, they face exponential increases in product complexity, unprecedented competitive pressures to bring products to market faster, and ever increasing dependence on their supply chains. To compete in the future, manufacturers must create an environment where both customers and partners can participate in the innovation process, and where new products can be delivered dynamically as customer demand requires.

Customizing products and getting them to market faster are extremely challenging because creating and delivering products now requires collaboration among so many supply chain participants. Suppliers and partners contribute as much as 40-70 percent of the finished product. Since few products are the output of a single company, few companies have a complete view of their product asset. Product and process information is distributed across organizational boundaries, with each supplier employing unique business processes and systems. To create a complete source of product knowledge that can dynamically link manufacturing processes and business systems across organizational boundaries, companies will need to embrace and exploit the diversity of suppliers, partners, and customers.

To complicate matters, the supply chain is more fluid and dynamic than ever before, with companies choosing partners and suppliers opportunistically for each new project or product. The supply chain has become a living organism that evolves to address changing business dynamics. To survive, companies must be able to acclimate themselves quickly to the processes and systems of new partners, and to collaborate flexibly. Manufacturers who can rapidly and effectively manage diversity within an evolving supply chain will succeed.

ENABLING COLLABORATIVE PRODUCT COMMERCE

Industry analysts like GartnerGroup, the Aberdeen Group, and CIMdata have been independently observing and analyzing this change in business dynamics and agree that it represents an emerging new market, which is being called collaborative product commerce (CPC). CPC enterprise solutions are Web-based; they use the Internet to let employees, customers, and suppliers collaborate in creating, developing, and managing products throughout the entire product lifecycle. Industry analysts have concluded that those manufacturers who make CPC one of their primary business initiatives will emerge as leaders in their markets.

- **Elevating the product to an enterprise asset**
  Products are the lifeblood of manufacturing organizations. Product innovation and market success drive top-line revenue growth, making product knowledge the key enterprise asset for all manufacturers. Yet few companies have invested in enterprise solutions that focus on leveraging the product asset to create new business opportunities. Instead, many companies deploy transaction-oriented fulfillment systems—such as enterprise resource planning (ERP), supply chain management (SCM), or logistics—with an eye to reducing costs. CPC leverages product knowledge to drive innovation and expand revenue potential. It offers a complete

network of product and process information that can be managed as a strategic enterprise asset.

- **Creating interenterprise collaboration**
  Products are created and delivered with the collaboration of multiple supply chain participants. Because outsourcing has become a way of life for many companies, and product and process information is widely distributed across organizational boundaries, few companies have a complete view of their product asset. The traditional approach of imposing a common system on all trading partners is no longer viable, and arguably never was. Instead, companies who embrace the diversity of their suppliers, partners, and customers must link processes and systems together more dynamically, to create a complete source of product knowledge that crosses organizational boundaries.

- **Developing agile business models**
  As companies rely more on their suppliers, they need to be able to respond quickly to changes in the supply chain, that is, to adjust their mix of suppliers opportunistically so as to take advantage of new technology, product innovations, domain expertise, and superior strategic business relationships. With product information dispersed all over the world and managed differently by each supplier, exchanging information is difficult. Companies need a means to connect instantly to the heterogeneous processes and information systems of each new supplier.

- **Managing a product throughout its lifecycle**
  Leading manufacturers must reconsider how products are created, developed, and managed during all phases of the product and process lifecycle—from concept and definition to sourcing, production, service, maintenance, and retirement. Until now, there has been no single solution for managing the entire product lifecycle. Point solutions focus on part of the problem, but without a strategy to knit these stand-alone systems together, the information they house remains inaccessible and isolated.

  The most successful CPC solutions will provide a broad range of functionality to address the entire product lifecycle. They will let manufacturers seamlessly link distributed data sources to create a common representation of the product asset as it evolves over time. As a market, CPC subsumes many smaller, previously isolated markets that address various phases of the product lifecycle, such as product data management (PDM), component and supplier management (CSM), visualization and digital mockup, computer-aided design, manufacturing, and engineering (CAD/CAM/CAE), program and project management, manufacturing planning, and maintenance, repair, and overhaul (MRO).

THE WINDCHILL *FACTOR!* e-SERIES FOR CPC

The Windchill Factor! e-Series™ is a comprehensive set of e-business solutions for CPC. Based on the Windchill federated, webcentric architecture, the Windchill Factor! e-Series provides a complete solution to product and process lifecycle management, from conception through development, manufacturing, and retirement. Windchill lets customers, partners, and suppliers

collaborate in a Web environment to create innovative new products, deliver those products to market faster, and manage the complexities of an evolving supply chain.

- **Webcentric approach**
  Client-server technology, which has traditionally limited access to critical process information, often results in delayed and even poor decisions. By contrast, the Windchill webcentric approach facilitates decision making by allowing access to timely and accurate information and creating an environment in which the same information is available to everyone. Windchill was designed from the ground up using standard Web technology such as Java®, search engines, HTML, XML[*], HTTP, email, hyperlinks, and RMI. Viewing and modifying valuable product information is accomplished through a standard Web browser, which is intuitive, user friendly, and widely familiar. With the Internet rapidly gaining acceptance as a vehicle to do business, companies who deploy Web-based strategies are in a better position to collaborate business to business and take advantage of emerging Internet technology.

- **Federated architecture**
  Windchill allows manufacturers to seamlessly connect multiple, heterogeneous data sources and IT systems in a Web-based environment. Companies gain the ability to leverage existing IT investments while avoiding the costly and time-consuming task of having to decide upon a uniform process or data model.

  The federated architecture lets companies link product information that may reside across departments and divisions, or within supplier and partner organizations. For example, Windchill can combine cost information from ERP or legacy systems and join it with an as-planned bill of materials (BOM) in Windchill to create a valuable composite representation of a product, which can be accessed through a Web browser. Traditionally, to obtain this kind of complete information, a user had to contact several owners of different systems, wait for a response, consolidate reports on spreadsheets, and pray that no errors were made in the process. By contrast, the Web-based information that Windchill provides is accurate, up to date, and readily available to all enterprise participants via a Web browser.

The Windchill Factor! e-Series is comprised of the following solutions:

Windchill Collaboration *FACTOR!*
The Windchill Collaboration Factor! consists of Windchill Foundation, Windchill Info*Engine, and Windchill ProductView. It creates an environment where businesses can share valuable product and process information, regardless of where that information resides or what format it is in. By making such information available to everyone in the extended enterprise, the Collaboration Factor! transforms product knowledge into a significant business asset.

- **Windchill Foundation**
  Windchill Foundation supports the entire Windchill Factor! e-Series by supplying common capabilities, including interenterprise document management, structure management, workflow management, lifecycle management, and system administration. The capabilities are provided using an Oracle8™ database, which allows access to the most current

information. Flexible access-control policies ensure that only appropriate users and groups have access to information in a particular lifecycle stage of a project.

- **Windchill Info*Engine**
  Windchill Info*Engine offers companies an integration framework that allows them to create business applications comprised of information from multiple, disparate data sources. It allows access to information stored in legacy, ERP, PDM, client-server, mainframe, or homegrown systems. The information is then presented through a Web-based composite application.

- **Windchill ProductView**
  This application provides CAD- and document-independent viewing capabilities. It allows users to access nearly any type of product-related information—including online forms and applications, documents, 2D drawings, and 3D solid models—regardless of the application used to create it. Users can view, interrogate, and mark up various types of 2D and 3D standard and native formats to create supporting materials for engineering change orders and to hold online conceptual reviews.

Windchill Product Planning *FACTOR!*

The Windchill Product Planning Factor! gives manufacturers the agility they need to deliver customer-tailored products on demand while minimizing the number of product variations required. It includes the Windchill Product Configurator, which lets companies create flexible products by incorporating configuration and customization logic into the product definition. Having this capability reduces the cost and effort of customizing products by eliminating the traditional guesswork of defining the millions of potential product variations that customers might order. The Product Planning Factor! also offers personalized design portals that let customers evaluate parametric configurations of the products they are defining. Once a product has been defined, the customer's configuration is automatically compared with existing product variations.

Windchill Engineering *FACTOR!*

The Windchill Engineering Factor! manages work-in-process information as well as the information from different mechanical, electrical, and software authoring applications so that engineers can collaborate on product design. Engineering teams work independently and use tools that are optimized for their workgroups, while aggregating the information from various sources across the supply chain into an enterprise view. As a result, product teams can innovate and share digital product information regardless of the source system. The Engineering Factor! also offers direct management of Pro/ENGINEER data within Windchill, as well as gateways to Pro/INTRALINK and Optegra$^®$. It lets users design better products faster by capturing and reusing design information, improving communication, and involving both customers and suppliers in the design process.

Windchill Sourcing *FACTOR!*

The Windchill Sourcing Factor! offers a full range of component and supplier management (CSM) capabilities, reducing global procurement and product development costs by standardizing and consolidating part and supplier information. Designed to address part proliferation, one of the largest obstacles to a company's profitability, the Sourcing Factor! standardizes part selection procedures and optimizes the inbound supply chain, making it easy to identify reusable parts, commercially available parts, and preferred suppliers. With its Web-based architecture, the Sourcing Factor! is ideally suited for use across product lines, business units, and the supply chain.

Windchill Product Management *FACTOR!*

The Windchill Product Management Factor! offers a complete set of PDM functionalities, including configuration and change management throughout the product and process lifecycle. Capabilities include multiple related BOM representations (as-designed, as-planned, as-built), effectivity, baselining, document references, change references, dynamic hierarchical navigation, net change, and change management. The Product Management Factor! makes a single source of product information available to all of the functional organizations, ensuring they receive the information they need when they need it.

Windchill Manufacturing Planning *FACTOR!*

The Windchill Manufacturing Planning Factor! creates and maintains detailed process plans and executes production analysis and process simulation. By closely aligning manufacturing process definition with product design, the Manufacturing Planning Factor! greatly increases information capture and reuse, optimizing manufacturing processes and sharing of knowledge across the enterprise.

Windchill Production *FACTOR!*

The Windchill Production Factor! integrates Windchill with market-leading ERP systems. Distribution of valuable production-related information among Windchill systems and ERP applications ensures a complete, consistent product representation within both systems, regardless of where discrete information resides, and significantly improves efficiency. The Production Factor! allows the exchange of part master, BOM, and engineering change information between Windchill and ERP. This exchange of production-related information is automatically triggered by events throughout the product lifecycle and ensures that all the systems involved are synchronized.

Windchill Service *FACTOR!*

Scheduled for release in 2000, the Windchill Service Factor! will enable companies to provide personalized service for the lifetime of their products. Capabilities such as online monitoring, configuration specific diagnostic, service and repair instructions, and maintenance history tracking and analysis are being investigated for this solution.

Windchill Customization *FACTOR!*

Most manufacturers agree that their competitive advantage stems primarily from their internal processes and practices. The Windchill Customization Factor! lets companies rapidly blend their proprietary knowledge with the Windchill Factor! e-Series to produce solutions that safeguard their leadership status. It combines the latest industry-leading tools, such as Rational Rose® and Symantec VisualCafé™, with a robust set of predefined Windchill business objects and powerful automated system generation capabilities. This approach reduces the administrative overhead and maintenance typically associated with application development. With the Windchill Customization Factor! companies can achieve as much as a fourfold reduction in development of custom applications and a significant reduction in application management.

SUMMARY

The Windchill Factor! e-Series provides a comprehensive suite of e-business solutions for the emerging CPC market. These solutions elevate products to an enterprise asset so that manufacturing companies can meet product goals and exceed revenue goals. The Windchill Factor! e-Series has many benefits:

- **Creating a strategic source of product and process information**
  By using a Web-based infrastructure with a federated architecture, Windchill creates a strategic source of product and process information and presents it in a collaborative environment where all members of the value chain can communicate. As on the Web, this is done independently of where the information is located or what application was used to

create it. Processes are executed seamlessly across functional disciplines, companies, and systems. The Windchill Factor! e-Series enhances the value of existing IT investments by connecting information which, in some cases, has been locked away in legacy, client-server, or mainframe-based repositories.

- **Facilitating interenterprise collaboration**
  Manufacturing companies are beginning to realize that their products are their most valuable assets. They are listening to customers who demand products that address particular requirements. Their suppliers and partners provide domain expertise not available within the company. All of these constituents have some type of Internet strategy, whether it is as simple as email and Web access or as sophisticated as CPC. The Windchill Factor! e-Series facilitates customer, supplier, and partner collaboration to deliver innovative products at Internet speed.

- **Driving top-line revenue growth**
  With corporate relationships changing opportunistically, mergers and acquisitions increasing, and design anywhere/build anywhere initiatives proliferating, companies must be able to respond quickly to a dynamic business environment. The Windchill Factor! e-Series supports this environment by providing companies with access to the product and process information they need to make the best business decisions, thus identifying new market opportunities and driving new levels of competitiveness.