

ENOVIA V6 Whitepaper

The Voice of the Customer Process Integration and Traceability through Requirements Management

a Product Lifecycle Management Whitepaper
Prepared by ENOVIA, a Dassault Systèmes Brand



Executive Summary

Market-leading companies delivering complex products in competitive markets must overcome many challenges to manage product requirements throughout their enterprise. Among the most difficult challenges are integrating complex systems engineering processes, promoting collaboration among multiple engineering disciplines, and enabling the sharing of intellectual property among globally dispersed teams.

Companies seeking a way to efficiently manage product requirements can leverage a comprehensive product lifecycle management (PLM) solution to:

- Effectively reuse intellectual property to reduce time to market
- Increase innovation
- Improve overall traceability of the requirements throughout the product lifecycle

Companies must avoid the inefficiencies in managing product requirements that result in costly product development headaches ranging from rework to customer dissatisfaction and rising development costs. Research shows that early requirements management improves time-to-market and helps manage costs. Requirements management allows organizations to capture the “voice of the customer” and translate that information into new products – improving their overall global requirements process.

Two essential areas of focus that enable companies to best leverage requirements management are **process integration** and **traceability**. Process integration eliminates communication barriers by creating a collaborative environment for sharing ideas, requirements and data throughout the product lifecycle. Increased innovation, in turn, fosters ideas that improve products and new product introductions. In addition, continuous traceability — from capturing the customer needs to product definition — makes a significant difference in project cycle times and cost reductions.

This paper will highlight the criteria needed for a comprehensive requirements management solution that incorporates PLM to offer customers a scaleable enterprise grade solution. This collaborative approach is designed to bring together people, processes, data and systems to deliver products to market faster and more efficiently.

The Voice of the Customer

Process Integration and Traceability through Requirements Management

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Requirements Management is Key to the Right Product-to-Market

Requirements management is the consistent, prioritized, and monitored approach for administering and controlling the information that helps an enterprise develop the 'right product for the right market at the right time.' The challenge for most enterprises is not capturing customer requirements (needs). The true challenge is the need for continuous communication, change management and traceability (enforcement) of customer requirements throughout the development cycle.

Effective Requirements Management Lowers Product Development Costs

Poor requirements definition in the early stages of a product is a major factor in rising development costs. Requirements errors specifically can account for 70% to 85% of rework costs¹. For example, product rework can:

- Represent about 40% of a development organization's total spend — with a significant effort focused on correcting requirements defects²
- Consume 30% to 50% of total product development costs³ while requirements errors specifically account for 70% to 85% of rework costs⁴

As Figure 1 illustrates, correcting requirements errors after a product is released can cost over 100 times more than anticipated. Best-in-class companies have learned to make the requirements definition visible early in the product development lifecycle.

In a typical product development lifecycle, eliciting, authoring, analyzing, and managing requirements represents about 10% of a project's resources. A recent study demonstrated that the most successful projects spend roughly 28% of their resources on requirements⁵. This research also shows that early requirements management improves time-to-market and helps keep costs on target.

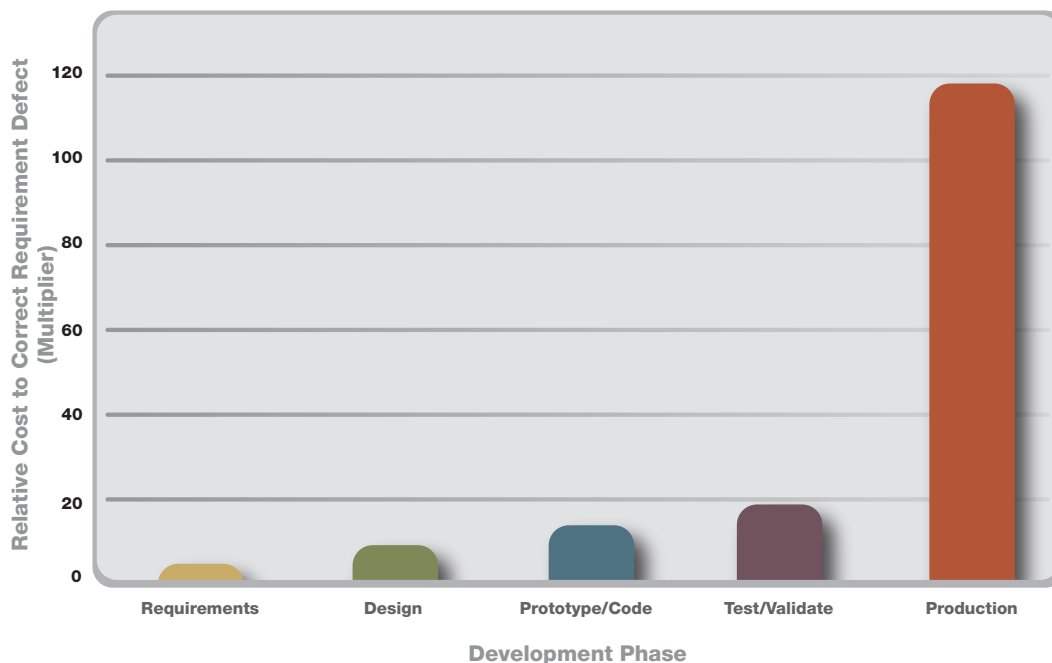


Figure 1. Correcting errors after a product is released can cost over 100 times more than if the problems are found early in the product development process. Best-in-class companies have learned to make the requirements definition visible early in the product development lifecycle.

Challenges of Effective Requirements Management

Today, most standalone requirements management solutions fall short after the initial requirements capture and analysis. Many companies use groupware applications and manual processes to manage product requirements. These manual processes are slow and prone to error. Groupware solutions create “information silos” which are not integrated with downstream processes directly. Project teams must spend costly manual person-hours to ensure traceability, driving up product overhead costs.

Requirements management, as part of a PLM solution, vastly improves decision support by linking business functions and key areas of product development, providing:

- **Global collaboration** via a common platform that fosters innovation by bridging the gap across all disciplines to share requirements, design and product launch data;
- **Effective traceability** allowing direct links to product line planning, systems design (features/options), designed product definitions (Engineering Bill of Material [EBOM] releases), and use-case testing (prototype and test); and
- **Automated governance** (rules) to enforce validation at each development state (e.g., system engineering, design, prototype, and test), ensuring that all requirements are met.

Downstream Process Integration and Traceability

Integration of requirements with downstream processes removes “information silos.” This collaborative environment leverages shared ideas and data throughout the product development cycle. A common, shared view of customer needs drives innovation, whether an evolutionary change in existing products or a revolutionary new product. Collaboration also supports continuous improvement of products and business processes. Typically today 61% of a company’s profits are generated from new innovative products (i.e. new ideas, radical concepts) and

86% from product extensions of current product lines⁶. Requirements management packs a powerful punch. Companies can create product concepts and requirements, evolve product lines (roadmap), determine engineering feasibility and establish early product quality and manufacturing criteria, ensuring they are aiming at the correct target.

The business impact of having requirements management processes within a PLM platform include shorten cycle times, lower product and quality costs and the ability to take advantage of tight market windows.

Business Case Study

Dassault Systèmes and a tier-1 automotive electronics manufacturer facilitated a case study to improve its product development lifecycle. The study addressed the manufacturer’s lack of process enforcement and traceability to product design and definition. Using the Dassault Systèmes Business Value Assessment (BVASM) methodology, the study (see Figure 2) concluded that a solution was required with dynamic traceability and governance to:

- *Enable the creation of the ‘right product for the right market at the right time’*
- *Reduce downstream rework costs*
- *Improve efficiencies during requirements searches, impact analysis, validation and engineering changes*
- *Enhance resource reallocation opportunities by reducing test cycles*
- *Allow for better product consistency and customer satisfaction*

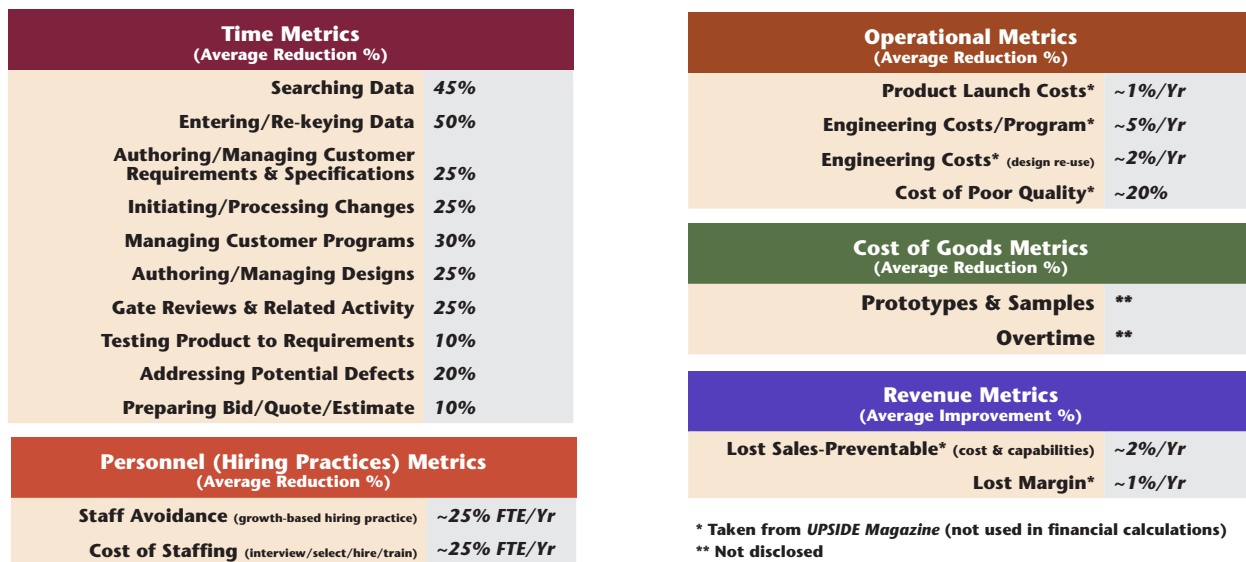


Figure 2. Case study results of a facilitated tier-1 automotive electronics manufacturer that realized product development cycle improvements with requirements traceability.

ENOVIA Requirements Central

Dassault Systèmes ENOVIA Requirements Central™, a key business process of V6, enables PLM 2.0, the next generation DS platform. PLM 2.0 is a 3D environment for experiencing a virtual product and harnessing all user interactions to generate and enrich Intellectual Property (IP).

ENOVIA Requirements Central provides integrated capabilities for global enterprises to capture, define, engineer, manage, trace, and leverage product requirements systematically throughout the product development lifecycle. It decreases development costs and rework effort by successfully bridging the communication between all disciplines and the extended enterprise involved in the product development lifecycle.

With ENOVIA Requirements Central on the V6 platform, companies can leverage a common repository that manages customer needs with traceability to product designs. When used with other ENOVIA products for defining the system aspects of a product, ENOVIA Requirements Central enables traceability throughout the entire development process to ensure products are developed that meet market goals.

The solution provides a cross-functional and organization change process that maintains the integrity of the reported problem to the internal resolution of the problem via an engineering change. The change process maintains full traceability of all the affected items from hardware to software and accountability of all the implemented items in one flexible structured single lifecycle.

ENOVIA Requirements Central supports the requirements analysis process enabling users to

review, assess, prioritize, and balance customer needs. Users can derive and decompose requirements from a high level into detailed low-level requirements by partitioning and allocating to products and system components. The result is an effective means of maintaining design decisions throughout the product lifecycle and ensuring traceability to the underlying foundation of the original designs.

In summary, ENOVIA Requirements Central enables companies to:

- Design and integrate the voice of the customer directly into systems design, product design and production test lifecycles (build the 'right product the first time')
- Link requirements directly to the deliverables (designs, BOMs, use-cases, etc.) and directly drive participation in the entire development process
- Consolidate all requirements: analysis and traceability into a single scalable global solution
- Enforce engineering best practices related to the change process
- Lower total cost of ownership via decreased development costs, minimal rework and ready to use out-of-the box capabilities and best practices

Why Dassault Systèmes

Dassault Systèmes is a world leader in 3D and PLM solutions. One of six DS brands, ENOVIA is a recognized leader in delivering collaborative PLM solutions. The ENOVIA collaborative platform delivers the flexibility and scalability that successfully ties together multi-discipline engineering groups and other key contributors.

ENOVIA V6 Platform

ENOVIA Requirements Management Central supports PLM 2.0, product lifecycle management online for everyone, and the ENOVIA V6 key values. PLM 2.0 adopts the concepts of online communities and creation, constituting a new paradigm for product innovation. ENOVIA V6 harnesses the collaborative intelligence from diverse online communities to maximize intellectual assets, capturing and leveraging the Intellectual Property (IP) from all business and consumer users.

ENOVIA Requirements Management Central uses V6 capabilities to bring these benefits to users:

Global collaborative innovation

Everyone with a stake in the product has the ability to participate in the development lifecycle—from sharing new ideas that reflect customer needs to product validation.

Lifelike experience

Leveraging other tools from Dassault Systèmes, users can collaborate in an immersive online 3D environment

A single PLM platform for intellectual property management

All deliverables related to the requirement process (e.g., product designs, definition, and validation) are stored and managed in a single enterprise platform eliminating translation and communication errors.

Online collaboration and innovation

Internet access for all stakeholders to access and read requirements means increased requirements reuse (and all associated deliverables) enabling to improved time-to-market and lower development costs.

Ready to use PLM business processes

Immediate value is possible with the use of out-of-the-box processes to capture, organize and publish requirements with the ability to trace those requirements to designs and validate throughout the development lifecycle.

Lower cost of ownership

Companies can easily integrate requirements with other development disciplines with simple extensions. Modifications to out-of-box processes are easily implemented and managed using our adaptable business model built on a Services Oriented Architecture (SOA) platform. Scalable and flexible, ENOVIA PLM solutions lead to breakthrough Return on Investment (ROI) and deliver immediate financial value.

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2. Grady, Robert B. 1999. "An Economic Release Decision Model: Insights into Software Project Management"
3. Boehm and Papaccio 1988, "Understanding and Controlling Software Costs, IEEE Transactions on Software Engineering"
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6. Kim, Chan & Mauborgne, Renee 2005, "Blue Ocean Strategy – How to create uncontested market space and make competition irrelevant"

PLM Solutions for Your Business

Contact us today to find out how leading companies worldwide are using ENOVIA PLM solutions to beat the competition and speed time-to-market.

Visit us at www.enovia.com or email us at enovia.info@3ds.com to learn more.

Dassault Systèmes ENOVIA Corp.
900 Chelmsford Street
Lowell, MA 01851
978-442-2500

About ENOVIA

ENOVIA is a recognized leader in delivering collaborative PLM solutions. We enable companies from a broad range of industries to dramatically accelerate innovation, time-to-market and revenue generation by collaboratively developing, building and managing products. Our solutions facilitate the sharing of concepts, content and context across product lifecycles and throughout value chains of employees, customers, suppliers and partners.

ENOVIA collaborative PLM solutions help global enterprises bring together people, processes, content and systems to achieve a compelling competitive advantage. Our interoperable solutions unify and streamline processes across the product lifecycle, enabling companies to easily and cost-effectively work on projects within and outside of their enterprises. Our adaptable, scalable technology is built to accommodate the ever-changing marketplace.

About Dassault Systèmes

As world leader in 3D and Product Lifecycle Management (PLM) solutions, the Dassault Systèmes group brings value to more than 90,000 customers in 80 countries. A pioneer in the 3D software market since 1981, Dassault Systèmes develops and markets PLM application software and services that support industrial processes and provide a 3D vision of the entire life cycle of products from conception to maintenance. Our offering includes integrated PLM solutions for product development (CATIA®, DELMIA®, ENOVIA®, SMARTEAM®), mainstream product 3D design tools (SolidWorks®), 3D components (Spatial/ACIS®) and SIMULIA®, DS' open scientific platform for realistic simulation. Dassault Systèmes is listed on the Nasdaq (DASTY) and Euronext Paris (#13065, DSY.PA) stock exchanges. For more information, visit 3ds.com.

