

Visual solutions for product quality management

SIEMENS

White Paper

Leveraging the Microsoft SharePoint environment to visually resolve product development issues

Siemens PLM Software and Microsoft have teamed up to create solutions that help manufacturers proactively address and solve quality problems in their product development processes. Teamcenter® software's community collaboration solution harnesses the power of Microsoft SharePoint to provide real-time ad hoc collaboration capabilities that distributed value chains can use to synchronize their product development activities across the product lifecycle. These collaboration capabilities combine rich visualization with a configurable social community, where people with focused interests work in product-oriented teams using tools they already understand.

Microsoft

Solution Partner of Siemens Product Lifecycle Management Software Inc.

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Executive summary

Now more than ever, consumers are demanding the highest quality products for the lowest possible price. As a result, the need to ensure quality and to stabilize and reduce costs has become so crucial that many formal methodologies have been developed to resolve these concerns, including failure mode and effects analysis (FMEA) and Six Sigma. These methodologies scrutinize processes in the most efficient way possible using statistical methods to ensure the detection of defects and the deployment of preventive actions.

These and other methods hinge on one common theme: gathering useful information early and managing it efficiently. In addition, they all agree that early detection and early resolution provide the best approach for successful resolution. It is commonly accepted that the cost of a design change rises by a multiple of 10 when the change is made after the design stage in the product development lifecycle.

In many companies, information is stored, tracked and communicated within text-based, nonintegrated systems, resulting in time being wasted explaining, understanding, tracking and resolving product development issues. As a result, teams and suppliers around the globe ineffectively convey information by e-mail and memo, increasing the risk of security breaches. Information is trapped in corporate silos, preventing stakeholders from actively contributing to a problem's identification and resolution.

Siemens PLM Software's Teamcenter system addresses both hurdles head-on, enabling global stakeholders throughout the value chain to explicitly convey issues visually and effectively capture the details about their resolution. Teamcenter's community collaboration solution – based on Microsoft SharePoint technology – provides a familiar Microsoft Office-based interface to enable design and engineering teams – as well as other value chain participants – to route and manage product development data across the entire product lifecycle.

This paper focuses on managing visual issues with the intent of creating better, safer and higher-quality products at a lower cost. It also suggests solutions that enable you to:

- Track and resolve difficult issues by including visual capabilities to ensure the success of high-quality processes.
- Facilitate high-efficiency operations by including visual issues capabilities to spot, communicate and resolve issues before they become highly expensive problems.
- Resolve security and access challenges that result from opening the system to a large number of users.
- Increase organizational efficiency and collaboration by alerting the entire value chain to changes and enabling stakeholders to identify issues and participate in the creation of helpful solutions.
- Glean actionable information from business intelligence (BI) visually represented by key performance indicators (KPIs) and dashboards, thereby enabling decision makers to quickly evaluate the health of individual projects, production capabilities, processes and the company as a whole.
- Establish built-in history capabilities to facilitate product and project traceability, maximize the re-use of team knowledge and promote rapid and efficient problem solving.
- Leverage built-in history capabilities to closely monitor resource and materials usage and minimize scrap, waste, returns and service costs.
- Improve the quality and performance of key suppliers and global teams by using one database and one system and their related business intelligence to monitor value chain activity.

Business challenges

To identify a problem at an early stage and develop a quick, cost-efficient solution, all members of the value chain must collaborate effectively. But when it comes to collaborative problem solving, product development teams encounter two major hurdles with traditional tools – clearly describing the issue at hand and tracking its resolution.

Many companies operate in a distributed environment and maintain structured data channels where suppliers and partners contribute to varying phases of the product lifecycle from design, engineering and manufacturing through sales and service. The organizational structure of today's extended enterprise makes it difficult to:

- Effectively view and manage all of the functional organizations that contribute to the finished product.
- Conduct quick design reviews and approval processes in a cost-effective manner.
- Continually compress process cycles to meet increased market pressures.
- Expeditiously find and re-use the right information for the right development project.
- Effectively distribute information and services throughout an extended enterprise.
- Quickly identify and disseminate issues, project assignments and ideas to every project participant.
- Maintain data security and confidentiality.
- Efficiently capture and leverage input from customers and end-users.
- Make better, more informed decisions based on business and product information.

Describing the problem

It is generally accepted that 80 percent of the design and engineering costs of a product are committed during the first part of the project. As mentioned earlier, it is commonly accepted that for each downstream stage of the project where the problem persists, the cost of resolution escalates by a factor of 10 (illustrated in figure 1). By making the right call

early, companies can avoid the costs that are associated with reworking projects later in the product development process. In essence, early resolution enables companies to get the product out the door on schedule, avoid returns and keep service calls to a minimum. To accomplish this, each and every upstream and downstream member of the project needs access to the right design information in a way that is clear and easy to understand.

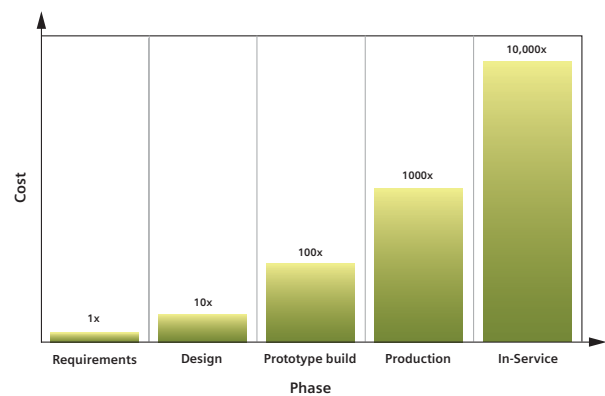


Figure 1: The effect of changes on product development.

When issues do arise, teams need an effective way to communicate and describe them, which shortens the time it takes to achieve resolution. They need a system that's easy to understand and use; a system that facilitates job-specific views, secure access, integrated real-time data and instant communication. By meeting these system specifications, the entire value chain can quickly access the information needed to spot difficulties and appropriately address issues. The system must also enable all team members to clearly and easily propose solutions to existing issues in a way that is common to how they work. Foreseeing possible issues, detecting issues early and resolving issues efficiently and quickly saves money while increasing consumer confidence in your brand and building customer loyalty.

Tracking and resolution

The organizational structure of today's value chains makes it difficult to understand the history of a problem and the steps taken to resolve it. To resolve an issue more quickly and efficiently, companies need a system that makes it easy to re-use knowledge and understand the decisions that are made.

When an issue arises, it's far more efficient for managers and team members to consult with someone who has solved a similar problem rather than trying to figure out the answer from scratch. Team members need a project lifecycle management (PLM) solution that will help them quickly learn how other teams resolved similar problems, as well as to immediately communicate the issue and its possible resolution to coworkers in a visual medium. In addition, managers must know what materials and resources are needed to fix the problem and how long the fix will take. They can then estimate the cost overage and determine how their schedule will be affected.

By reviewing a project history, managers are positioned to quickly recruit original team members who initially solved the problem. If a problem is detected early on, managers can use these recruits right away. If a problem is caught later on, it becomes much more difficult to assemble recruits that are familiar with the work since this personnel may have been reassigned to other projects. However, even in that case, the project manager can consult the project history to check for the availability of experienced resources. If no one is currently available, the manager has a visual resolution history to quickly educate current team members.

Another problem often arises as issue management can be extremely difficult in today's global organization structures. Non-local resources need to be tightly managed to ensure quality. Global suppliers and resource organizations must comply with regulations of the country where they are based, as well as with regulations of the countries where the product will be sold, designed, manufactured and assembled. Companies need an integrated system that enables them to easily manage compliance and value chain collaboration, and to track and resolve problems from any location.

Business intelligence

Although data is necessary to design models, it is also extremely important to visually represent forecasts and schedules, estimated versus actual profits, performance metrics, resource allocation and global activity – all of which can be created in graphic format for stakeholders who require overall status instead of a line-by-line report. For example, managers and business decision makers often need a quick report of the health of the organization, such as a summary view and detailed project view, progress versus schedules and views that explain which and how many product actuals are not aligned with the projected budgets.

Financial officers need to determine which phase the project is in and the daily average for expenditures. If there is a problem, they need to review past information or current estimates for a resolution to determine how the resolution might exceed budget. Also, business decision makers, project managers, global manufacturers and field personnel need mobile access to reports to address problems that can arise. In this case, data could be displayed in a table, graph or chart, which can be done in seconds with Microsoft Excel Services or in interactive portal dashboards through SharePoint Server and built-in Microsoft PerformancePoint Services.

Solution

Teamcenter's community collaboration solution (with Microsoft SharePoint) facilitates instant collaboration by enabling your global teams to securely connect, communicate and share information on-demand in a community setting. Teamcenter's unique "visual issues" capabilities enable engineering and non-engineering team members to collaborate on and capture design issues in the context of 2D and 3D CAD models (regardless of origin). Issues can then be easily routed and managed through resolution.

The entire process is tracked and recorded; it can be audited at any time. All of this is accomplished without requiring any special user training or having to learn how to use a PLM or CAD system. Issues and mark-ups are captured using JT™ data format, the common 3D PLM language for all major industries. The JT format enables all stakeholders to conveniently participate in the resolution process by way of a viewer embedded in SharePoint, or from within Teamcenter's lifecycle visualization solution.

Issue ID	Issue Title	Status	Assignee	Priority	Due Date	Actions
1	Task complete count with model	Open	Bill Engineer	High	4/30/2011	[Icons]
7	Bill of Materials need to be increased in 4	Open	Bill Engineer	High		[Icons]
10	Check loading during testing	Open	Don Designer	High		[Icons]
8	High speed wheel loading from surface	Open	Bill Engineer	Normal		[Icons]
9	Resistor loaded under load	Open	Bill Engineer	High		[Icons]
11	Test with ongoing	Open	Bill Engineer	Low		[Icons]
12	High flow testing needed for capacitor	Open	Don Designer	High		[Icons]
13	Water pump under stress	Open	Mark Manager	High		[Icons]
14	Resistor loading in auto	Open	Don Designer	High		[Icons]

Figure 2: Visual issues.

Traditionally, it was difficult to share detailed product development documents without giving suppliers, marketing teams and other stakeholders direct access to central data repositories. Teamcenter solves this dilemma. Everyone in a workflow can share Visual Issue data, working individually or in connected, real-time groups through the internet. Teamcenter's embedded viewer enables authorized users to search for critical data stored in Teamcenter via any standard

Internet browser. In addition, thanks to the convenient list rollup feature, users can quickly zero in on problem areas by checking the status of visual issues from multiple projects and multiple sites through a single dashboard-like interface.

Including visual capabilities and control into quality processes

Visualization backbone Teamcenter provides a consistent and scalable visualization backbone in SharePoint that teams can use to view products as they evolve across their lifecycle. Siemens PLM Software's JT format is a highly flexible, CAD-neutral format that can be created from most major MCAD applications, enabling full representation of relevant model information. JT data can be very lightweight, holding little more than facet data, or it can be richer, holding precise model geometry, product structures, attributes and product manufacturing information (PMI), including GD&T and annotations. High-end mechanical CAD applications export data in JT format to provide an efficient representation for viewing and exchanging 3D models. The JT format supports textures, lighting models and motion, as well as multiple tessellations for level of detail (LOD) generation.

Teams that leverage Teamcenter's community collaboration capabilities directly embed a JT file into a SharePoint project site. To analyze 2D and 3D models, you can use intuitive tools, including zoom, pan, rotate, measure, section and mark-up. These capabilities:

- Enable more stakeholders to participate in the early stages of the design process without incurring the cost or complexity of a CAD system and without having to standardize on a single CAD system.
- Improve decision making by letting product teams exchange and mark up universally accessible visualizations as part of their PLM workflows.
- Streamline innovation by enabling product teams to visually collaborate on new product ideas, test their validity and evaluate virtual prototypes.

Tracking issues and resolutions Visual issues utilizes the SharePoint framework to securely route Teamcenter-managed PLM data through a closed-loop workflow, giving instant visibility of the process to all participants. Users and managers can:

- *Track and record the issue and person responsible* for changes or problems. Tracking also creates an audit trail for regulatory compliance and costing.
- *Create and track virtual teams by project* to enable groups to quickly establish a virtual team and easily add new contributors.
- *Minimize lifecycle costs* by enabling all lifecycle participants to review the product design as early as possible, thereby minimizing lifecycle rework and accelerating the time-to-market schedule.
- *Reduce development costs* by enabling design teams and other lifecycle participants to iteratively work with virtual prototypes instead of costly physical prototypes.

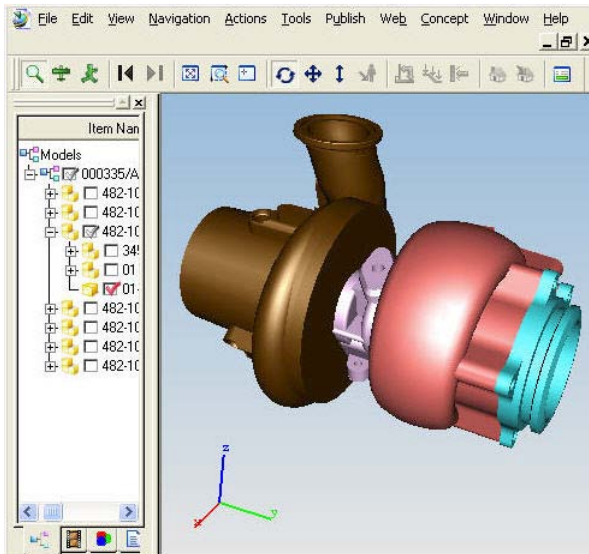


Figure 3: Embedded iSeries Viewer.

Leveraging the visual issues capability for high-efficiency collaboration

Throughout the issue-resolution process, stakeholders can mark up, update, lock and flag each visual issue that requires attention from others in the workflow. Teamcenter automatically alerts each flagged individual via e-mail and includes a direct link to the visual issue for easy access. All the while, Teamcenter maintains a comprehensive user event log, tracking

each visual issue based on menus and viewer actions – a valuable record for backtracking details about decision-making and solution histories.

Teamcenter enables product teams to work with suppliers, partners and customers in a collaborative community that facilitates concept studies, program, design and engineering change reviews. To support these initiatives, Teamcenter provides community collaboration capabilities that enable users to:

- *Locate and communicate with team members* using Microsoft Unified Communications and Microsoft Office Communicator integrated presence, which shows availability of all team members – including status such as: *away from desk, in a meeting, available or busy and do not want to be disturbed*. Then, through Teamcenter's collaboration community solution, users can call or send an instant message (by clicking the presence icon right in SharePoint).
- *Discuss problems quickly with virtual conferencing*, enabling team members to share information easily from their desktops without incurring the costs and hassles of travel.
- *Capture ad hoc knowledge*, which enables teams to collect information from individual participants and integrate this unstructured data with the structured information already managed by Teamcenter.
- *Preserve a project and product history* by keeping a user event log and tracking each visual issue based on menus and viewer actions – a valuable record for backtracking details about decision-making and solution histories, which helps ensure compliance and attribute responsibility.
- *Track product requirements* using Teamcenter's capabilities to define, capture, manage and leverage product requirements. You can employ Teamcenter parsing tools and content management capabilities to extract key requirements from commonly used information assets, including documents, spreadsheets, drawings and diagrams. Then, you can link these requirements and manage their dissemination for wider use.
- *Define systems and architecture* by outlining a product from a logical systems perspective and decomposing these systems into significant product requirements. You can use these connected requirements to understand how key characteristics (such as performance, maintainability, reliability, usability and ergonomics) are affected by given requirements.

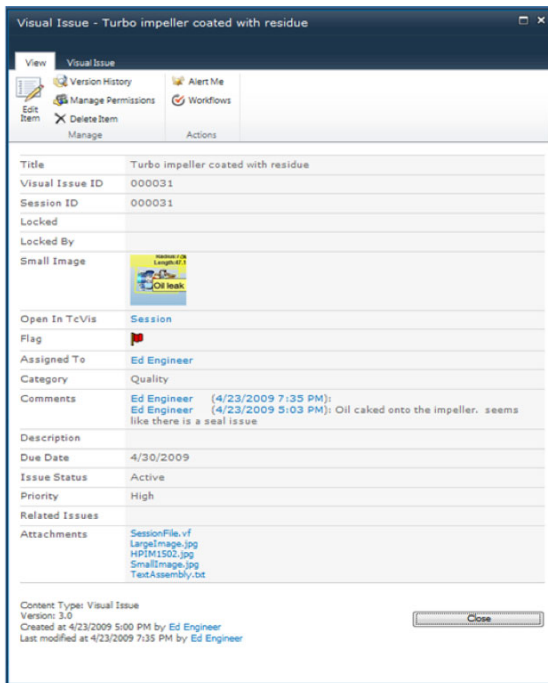


Figure 4: Visual issue record.

Improving communication and collaboration across the organization With Teamcenter's community collaboration capabilities, you can establish an adaptive environment where distributed, multidisciplinary teams work together in real time with rich product data across the entire product lifecycle – without incurring any special training or learning how to use a PLM or CAD system.

Gaining greater access and security throughout the workflow Until now there hasn't been an easy way to share detailed product development documents without giving suppliers, marketing teams and other stakeholders direct access to central data repositories. That's all changed with Teamcenter. Everyone in the workflow can share visual issue data, working individually or in connected, real-time group sessions through the internet. Teamcenter's embedded viewer also enables authorized users to browse and view the product structure of data stored in Teamcenter using any standard web browser. In addition, thanks to the convenient list-rollup feature, users can quickly zero in on problem areas by checking the status of visual issues from multiple projects and multiple sites through a single interface (such as, a dashboard).

Beyond facilitating real-time collaboration, the tight integration between Siemens PLM Software and Microsoft products enables every participant to use familiar Microsoft Office system productivity tools,

maximizing efficiency and maintaining quality throughout the workflow. The SharePoint Picture Library automatically creates and displays thumbnail images of JT files so that designers and engineers can identify components quickly and easily. In addition, users can cut, copy and paste Teamcenter-managed PLM items into a shared document library and control access to those files via the item-level security provided by SharePoint.

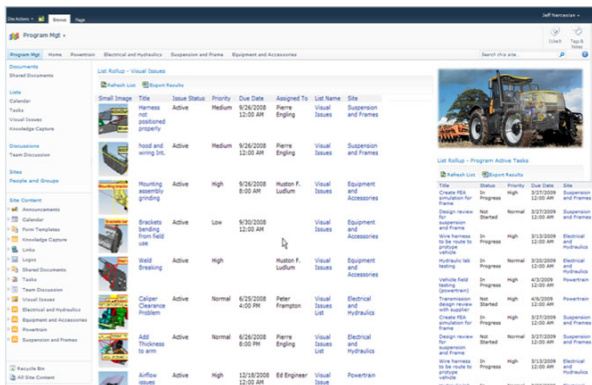
Another significant value of the Siemens PLM Software-Microsoft integration lies in the ability to attach the visual issue history directly to an item in Teamcenter, making that history a permanent, searchable part of the product lifecycle. These rich historical records help guide future decision making by facilitating closed-loop corrective action, driving continuous improvement and enabling users to:

- *Adopt a familiar interface* to increase user adoption and reduce downtime by promoting ease-of-use. The tight integration between Siemens PLM Software and Microsoft products enables every participant to use familiar Microsoft Office system productivity tools. Product familiarity maximizes efficiency and maintains quality throughout the workflow. Minimal install with out-of-the-box functionality reduces downtime and IT management. In addition, Teamcenter's community collaboration solution works with familiar products, such as Microsoft Office Outlook and other Microsoft Office products.
- *Use the Shared Document Library* to cut, copy and paste Teamcenter-managed PLM items. You can control access to these files using the item-level security provided by SharePoint.
- *Protect critical information* with the Teamcenter security model. Integrated web parts honor the Teamcenter security model so that only authorized users can gain access to items in Teamcenter.
- *Create a product history* by tracking progress and changes to a design in Teamcenter. Through the embedded viewer, authorized users can search for critical data stored in Teamcenter using any standard web browser.

Building in product and project traceability

Teamcenter's data, document, record and content management capabilities enable you to integrate all critical mechatronics information (i.e., all mechanical, electrical, electronic and software-related information). Integrated change and process management implement best-practice workflows that enable cross-discipline teams to understand change impact, manage review/approval processes and execute approved product changes. As a result, you can:

- *Trace downstream processes* to product requirements, providing decision makers with visibility to source knowledge about how or why each requirement was determined. You can leverage Teamcenter's workflow and change management capabilities to version, track, manage and route requirement changes to your product teams.
- *Roll up visual issues* across all different sites (such as team sites) for a consolidated view. For example, business decision makers can see if the suspension team is falling behind because it has many open issues and the priority of these issues. They can also determine which departments or teams have more high-priority issues than others and use this knowledge as a basis for deciding whether further action is necessary.
- *Manage workflow* throughout the issue-resolution process. Stakeholders can mark up, update, lock and flag each visual issue that requires attention from other participants in the workflow. Teamcenter automatically alerts each flagged participant by e-mail and includes a direct link to the visual issue for easy access.



Issue Status	Title	Priority	Due Date	Assigned To	List Name	Site
Active	Harness not positioned properly	Medium	9/26/2009 12:00 AM	Pierre Engling	Visual Issues	Suspension and Frames
Active	Head and wing DC	Medium	9/26/2009 12:00 AM	Pierre Engling	Visual Issues	Suspension and Frames
Active	Mounting assembly printing	High	9/26/2009 8:00 AM	Hugon F. Luffum	Visual Issues	Equipment and Accessories
Active	Brackets bending from fall safe	Low	9/20/2009 12:00 AM	Visual Issues	Visual Issues	Equipment and Accessories
Active	Weld Breaking	High	9/26/2009 12:00 AM	Hugon F. Luffum	Visual Issues	Equipment and Accessories
Active	Color Detection Program	Normal	6/22/2009 4:00 PM	Pierre Engling	Visual Issues	Electrical and Hydraulics
Active	AGS Recorders in both	Normal	6/26/2009 8:00 AM	Pierre Engling	Visual Issues	Electrical and Hydraulics
Active	Surface White	High	12/18/2009 12:00 AM	ES Engineer	Visual Issues	Powertrain

Figure 5. List Rollup aggregates cross-site information into one dashboard.

Understanding your product and process through business intelligence

Raw data becomes useful only when generated into meaningful information, such as summaries and reports. When working with a visual medium, such as a product design, the information is more effective when displayed as a visual representation, such as a picture of the product. To create a truly lean company, you need to do more than analyze the information. You need to be able to act on it during all stages of the product lifecycle.

Gleaning business intelligence through visual issues Creating live, interactive business intelligence (BI) that assembles and displays business information to suit the needs of various teams within an organization requires solution flexibility. Teamcenter's community collaboration solution, based on SharePoint, offers an integrated set of BI capabilities including PerformancePoint Services dashboard web parts, Office Excel publishing through Excel Services, KPIs and business data connectivity technologies.

A company's visual issue repository typically holds valuable information about the health of projects, products and/or the organization itself. Over time, companies accumulate not only information about how to resolve issues in the PLM process, but also about the resources (time, cost and people) required to fix them. With the right tools, this information can be mined to reveal actionable data that can drive business performance, increase worker productivity and reduce the risk of missed schedules or budgets.

Traditionally, the tools for accessing unstructured data for the purpose of analysis were available only to people with years of experience in data warehousing or data mining. By using the information gathered through visual issues coupled with the features available in SharePoint, Teamcenter users can easily assemble and publish data in the form of KPIs, reports and dashboards that are common to a group, whether it is as small as one team or as large as an entire organization. This information is then readily and securely available to the individuals, managers and executives who require timely and accurate information to conduct analysis and make informed decisions.

Key performance indicators Key performance indicators provide a visual cue that indicates how much progress is being made in achieving a goal. KPIs enable teams, managers and business organizations to quickly evaluate this progress against measurable

goals. By using KPIs in Teamcenter's community collaboration solution, you can easily visually determine:

- Where am I on a given project?
- How far ahead or behind am I?
- What required project tasks have I completed?
- Where are my resources being used?

Each area of a business can track different types of KPIs, depending on the goals it is trying to achieve. For example, to improve performance, a business decision maker can track the average time it takes to close visual issues across project sub-sites and/or the number of people involved in resolving them.

A typical visual issue provides the business decision maker with crucial information, such as the nature of the issue, which employees are involved, which cases are open, and how many days a case has been open. For more strategic decision making, the business decision maker can use Microsoft Excel Services to extract and plot data that shows the number of visual issues open versus those closed, which can help to determine how likely you are to deliver the product on time. You can also graph and monitor a KPI that indicates the average time it takes to close a visual issue. Using PivotTable views, you can build a vision across multiple projects and analyze why some projects take longer to close than others. This is very helpful in uncovering bottlenecks in the product development process.

Connecting PerformancePoint Server to other data in your Microsoft SQL Server database enables you to utilize cost data for risk analysis (for example, plotting the number of hours it took to solve a visual issue in addition to the average human resource cost to determine a total cost of the visual issue in dollars).

Other capabilities

You can leverage the following capabilities through Teamcenter's collaboration community solutions on SharePoint.

Dashboards are used to communicate status and drive action. A community dashboard is a web page within SharePoint that allows you to assemble and display information from disparate sources such as reports, charts, metrics and KPIs. You can create your

own dashboard page by using various web parts, or you can add web parts to pages that already exist on your team site.

Microsoft Excel Services helps you deliver data in a meaningful and graphical manner. Microsoft Excel Services empowers users to publish and run spreadsheets from the server, enabling users to access spreadsheets through a web browser without the need for any custom browser components. The server performs all data access and analytic functions, enabling efficient processing and ensuring that all views of shared documents are generated from a centralized source. Fully interactive, data-bound spreadsheets – including charts, tables and PivotTable views – can be created as part of a portal, dashboard or business scorecard, without requiring any custom server development.

Filter web parts empower you to display only the subset of data that you are interested in viewing. For example, a data set can contain a five-year history of multiple products for the entire country or region. By using filters, you can display something more meaningful, such as only one sales region, only one product or only the current year. Standard web parts filters are available to enable you to enter or choose one or more values to change the contents of one or more web parts on a page, thereby allowing you to display exactly the information you need.

PerformancePoint Services is an integrated feature of SharePoint that can be employed to analyze and report business intelligence from visual issues. PerformancePoint Services provides performance management and analysis capabilities that users can employ to plan, manage and report their data, as well as to monitor and analyze performance based on the analytical data provided by SQL Server from your visual issue history.

Monitoring capabilities are available through PerformancePoint Monitoring Server and applications such as PerformancePoint Dashboard Designer and PerformancePoint Dashboard Viewer for SharePoint. Analysts and IT administrators use Dashboard Designer and Monitoring Server to create and deploy PerformancePoint dashboards. Users view the dashboards on a SharePoint Services site through Dashboard Viewer for SharePoint. These interactive dashboards typically include a variety of scorecards, reports and filters that provide relevant, up-to-date information.

Advantages

By implementing visual issues capabilities with Teamcenter's community collaboration capabilities, companies like yours can achieve the following benefits.

Mitigate risk visually

New products contain a certain degree of risk. You can mitigate the risk of new product development by understanding product requirements, program constraints, engineering issues and manufacturing and production issues. This enables you to:

- Make better trade-off decisions by combining systems-level understanding with requirements understanding.
- Maximize revenue potential by ensuring that you deliver the right product content at the right time to the right market.
- Facilitate closed loop feedback by recognizing when strategic intent is at risk and informing lifecycle stakeholders of this impending impact.
- Increase collaboration, innovation and problem solving by enabling participants from multiple disciplines to work collaboratively using visual tools to dispel ambiguity.
- Quickly find other resources to resolve issues by searching your enterprise (including blogs, wikis, MySites) for teammates who have worked on similar cases or who share common interests.

Monitor the systems engineering process and requirements

Monitoring the systems engineering process and your product-related requirements enables you to:

- Drive better business performance by creating a basis for establishing, measuring and analyzing key performance metrics.

- Easily extend capabilities to systems other than those used during the product lifecycle. You can leverage Teamcenter's open framework, flexible data input formats, application-specific application programming interfaces (APIs) and Java database connectivity (JDBC) support for any relational database.
- Support your design-anywhere, build-anywhere initiatives by leveraging a single source of product and process knowledge.
- Develop common standards and processes by capturing and re-using workflow and best practices.
- Reduce cost, error and cycle time by increasing the use of your product and process knowledge.

Collaborate to increase innovation, resolve issues and reduce costs

Your company can leverage value chain collaboration to:

- Increase innovation by securely linking stakeholders and product lifecycle participants with each other and with diverse sources of product knowledge; this facilitates better and faster product-related decisions.
- Reduce travel and meeting costs for design reviews and their related iterations.
- Maximize team efficiency and productivity by using dynamic processes and connected teams to facilitate enterprise collaboration and leverage data ranging in complexity from simple documents to rich 3D product data.

Reduce waste

Reducing waste enables your enterprise to:

- Efficiently execute lean manufacturing and design-for-manufacturing initiatives by providing downstream teams with a single source of manufacturing and production knowledge.
- Facilitate earlier and better decision making by enabling teams to understand the entire electro-mechanical product structure and how customer and product requirements relate to its component designs.

Create and act on business intelligence

By creating business intelligence and acting on its implications, you can:

- Reduce the total cost of ownership associated with implementing your BI capability.
- Rapidly and accurately aggregate data from multiple application sources into an enterprise information integration (EII) solution.
- Estimate the cost of issue resolution by attaching an average cost per day to each project.
- Transform the decision making processes that you use to determine what products you should offer and how these products should be brought to market.
- Maximize innovation throughout the product lifecycle, which translates into higher revenues, greater market share, faster time-to-market and improved portfolio success rates.

Conclusion

Teamcenter's community collaboration solution harnesses the power of Microsoft SharePoint to provide real-time ad hoc collaboration capabilities that distributed value chains can use to synchronize their product development activities across the product lifecycle. These collaboration capabilities combine rich visualization and conferencing capabilities with a configurable social community that enables participants with focused interests to work in product-oriented teams using common tools that exist on every enterprise desktop. All team members can easily leverage product knowledge to establish a common frame of reference without having to learn how to use a CAD system or any specialized PLM authoring tool.

Teamcenter's unique "visual issues" functionality enables engineering and non-engineering team members to collaborate on and capture design issues using JT, the common CAD-neutral PLM language for all major industries. By working in this familiar environment with a standard internet browser, you can easily view, mark-up and route product development-related issues through managed workflows, thereby significantly reducing the time it takes to resolve these concerns. The system enables you to preserve a history of your activities – a valuable resource for re-using knowledge about your decision-making and leveraging solution histories to ensure product quality, facilitate compliance and reduce the time it takes to resolve future issues.

In short, Siemens PLM Software and Microsoft have partnered to deliver an integrated solution that enables your organization to streamline its product lifecycle processes, improve decision support, accelerate time-to-market cycles and reduce development cost.

Contact information

For more information on Microsoft and Siemens PLM Software integrated products and services, visit:
www.siemens.com/plm or
www.microsoft.com/siemensplm.

About Microsoft

Microsoft (Nasdaq "MSFT") is a worldwide leader in software, services and solutions that help people and businesses realize their full potential. The company's innovative, familiar software takes advantage of employees' knowledge and capabilities to accelerate business results. It also provides flexibility, allowing companies to adapt readily to changes in partners, products and the business climate.

About Siemens PLM Software

Siemens PLM Software, a business unit of the Siemens Industry Automation Division, is a leading global provider of product lifecycle management (PLM) software and services with 6.7 million licensed seats and more than 69,500 customers worldwide. Headquartered in Plano, Texas, Siemens PLM Software works collaboratively with companies to deliver open solutions that help them turn more ideas into successful products. For more information on Siemens PLM Software products and services, visit www.siemens.com/plm.

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