SIEMENS

Ingenuity for life

Accelerating innovation with unified application lifecycle management

Real-world business best practices

Accelerating innovation has become essential for organizations around the globe to meet evergrowing market pressures. This innovation is increasingly achieved via software for applications and embedded systems, which must evolve as fast as organizations can develop them. But shortening release intervals combined with the complexities of global ecosystems have introduced many new challenges and risks. Looking into the Siemens PLM Polarion user base of more than 2,500,000 worldwide, we have been able to discern a common set of success factors that enable leading companies to surmount these complexities with real-time collaboration, roles-based transparency and comprehensive traceability.

A white paper issued by: Siemens PLM Software

www.siemens.com/plm

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Executive summary

To deal with modern-day challenges, application lifecycle management (ALM) has emerged with the intent to fasttrack innovation, while safeguarding quality, functional safety and compliance. Leaders are already applying the methodology across a wide range of industries to deal with the relentless drive for innovation. In fact, according to Forrester Research, "speed in developing and delivering innovative applications is becoming essential to the success of businesses in any industry." A recent Forrester report points to the untapped potential of ALM:

- The speed at which applications are delivered is a new strategic weapon.
- Technology differentiates, but information technology (IT) leaders aren't perceived as accelerating business success.
- When bad news can go viral in an instant, quality trumps speed – but just barely.

Software development organizations find themselves on the defensive. While being called on to do more with less to drive innovation, most teams are stuck in disconnected silos that hinder collaboration and integration of processes. Since the advent of ALM, tool environments have been pieced together to tap into the opportunity and help solve this dilemma. But they pose a wide range of disadvantages. For instance, when solutions are not built on top of a single repository, it is difficult to link, trace and re-use artifacts to assess the impact of changes and attain accurate release predictability. Another drawback is the lack of a cohesive feedback loop that brings important context to all stakeholders.

"ALM is a paradox in the software engineering world, where engineers recognize the need for requirements management, change and configuration management, QA and test management, and so on, but are not familiar with the term ALM. This is a serious problem because ALM is necessary to manage software complexity, and the rise of embedded software in engineered products needs mature management processes and tools."

Michael Azoff
Principal Analyst
OVUM

A unified solution for ALM

Siemens PLM Software set out to address those issues and empower development teams with a single solution built from the ground up to span the entire application lifecycle with a consistent data structure and business logic.

In this business white paper, we discuss industry best practices and the benefits customers gain from using Polarion® ALM™, the unified application lifecycle management solution for unlocking synergies across disparate teams.

Among the first to embrace ALM methodologies were companies in regulated environments, where development processes must adhere to strict rules. Development teams that apply software frameworks to support product portfolios and have to manage the unfolding complexity of fast-evolving hardware quickly followed. So did teams that manage large-scale projects where the orchestration of parallel development processes is critical.

We set out to analyze the refined processes and best practices of those teams for the benefit of development organizations at large. The following is a summary of our findings, organized around the top advantages attributed to ALM processes:

- **Agility** through improved collaboration
- **Productivity** through process integration
- **Predictability** through better estimation and reporting
- **Quality** through transparency and automation
- **Auditability** through traceability and accountability
- **Innovation** through unlocked team synergy

Gaining agility through improved collaboration

The days when organizations could release software only once a year are long gone. Most of our customers confirm that they have restructured their teams and processes to match accelerating market dynamics with faster release cycles. If faster time-to-market is a key success factor in today's competitive environment, real-time collaboration and contextual performance of tasks are the means to stay ahead. In many cases, lightweight Agile software development methods have replaced or augmented incremental waterfall methods to release products more frequently. Adaptive discovery, design, development and testing in a time-boxed iterative approach supports rapid response to change. In turn, chains of command that had previously been slowing down processes have given way to empowered, accountable collaborators.

Polarion ALM maps well to those new market dynamics as it seamlessly adjusts to any preferred processes and workflows. In fact, it provides flexible support for Agile or Lean, as well as traditional and hybrid environments, including any customized Scrum, feature-driven development (FDD), Kanban, extreme programming (XP), or rational unified process (RUP) methodologies. Templates available for most common methodologies can be used "out of the box," or rapidly configured to map to particular business scenarios, while process automation safeguards that no steps are missed or bypassed.

"Polarion ALM provides the opportunity to allocate our complex and formal development rules through just one state-of-the-art tool. The modularity and flexibility make the adjustment to our needs simple and effective. The traceability and workflow features are convincing and really assist the everyday activities."

Christian Kettl
MTU Aero Engines

Customers using Agile methodologies in combination with Polarion ALM report that innovation has started to originate from all different levels and roles within their organizations, and that suggestions can be quickly assessed and assimilated into the development lifecycle. The Polarion ALM 100 percent browser-based architecture makes information universally accessible from anywhere for any collaborator. Developers can access the requirements related to assigned tasks for context and reach out to the respective author when they have questions. The same applies to the testers that verify whether the requirements have been met.

Contextual collaboration is a critical factor for the successful implementation of any methodology. The always-up-to-date online environment makes communication between development, operations, and quality assurance continuous. In addition, Wikis, subscriptions, live dashboards, change alerts and access-controlled threaded commenting further enhance the Agile knowledge transfer.

"Traceability for all the important artifacts in the software engineering process right down to the source code, dashboards and metrics, Wiki-centric project collaboration and efficient change and release management are the key success factors to manage and keep software projects under control. Polarion ALM offers exactly that."

Uwe Grüner
T-Systems

Advancing productivity through process integration

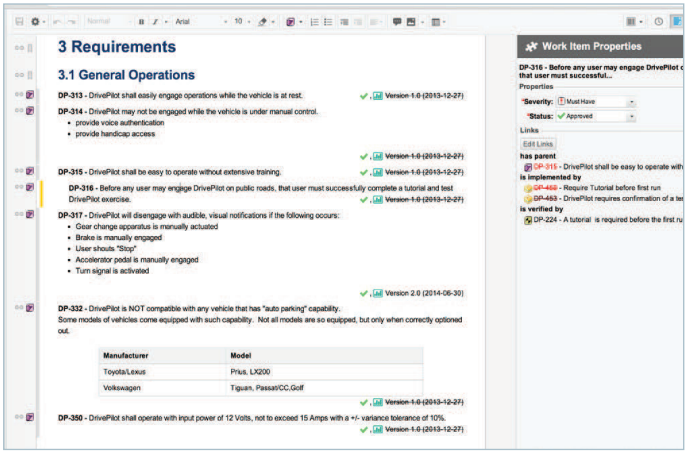
Adoption of Agile methodologies has proven to be a great first step to support accelerating cycles, with a focus on optimized workflows and constant iteration. But resulting improvements are confined to development teams. To further productivity, adjustments across the entire value chain are necessary, including process automation right at the intersection between Development and Operations (DevOps). DevOps emerged as the answer, allowing companies to advance to the next level of productivity.

A large part of Polarion ALM customers apply a combination of Agile and DevOps methodologies to streamline the interdependence between development and operations and to automate repetitive processes in their pursuit to advance productivity. The Polarion ALM solution is the perfect conduit to DevOps, allowing easy synchronization of development and delivery processes spanning requirements definition, feature development, quality testing, and maintenance. Issues anywhere in the process can be quickly traced back to the source in either direction, and the impact of changes can be directly assessed, while at the same time schedules can be adjusted in real time.

"Siemens PLM's designed-in traceability support saves significant time. Before, the company invested 20 to 25 percent of project time just managing the process with Excel and Word. With Polarion ALM, the traceability is achieved by pressing a button and the time invested is reduced to 5 to 10 percent."

Uli Markert
Supervisor, Software Services
Spansion

It is worth noting that the unified Polarion ALM environment makes product delivery much more efficient regardless of the methodologies applied. Our customers report vast productivity gains based on the detachment of previously cumbersome sequential workflows. First to introduce the concept of Work Items in 2005, Siemens PLM Software pioneered a new structure where discrete artifacts can be established and managed independently from the document that contains them. This enables teams to uncouple workflows and drive them forward autonomously and to automate where possible, delivering unprecedented efficiencies.



Equally important for organizations to achieve higher levels of productivity is the flexibility for domain experts to use the tools of their trade while integration delivers comprehensive traceability. With Polarion ALM, this is easy to achieve. For instance, requirements or test cases created in Microsoft® Word or Excel® are easily converted into conceptual documents within Polarion ALM that we call LiveDocs™. This patented technology gives those that author and manage requirements the editing functionality they are fond of while enabling them to be more productive in the collaborative online environment. An added bonus is the patented RoundTrip™ functionality, which allows for changes by stakeholders made outside of the system to be imported back into the system while maintaining all relational links, thus creating a complete path of traceability.

Polarion ALM also supports specialists who need to use the tools of their trade via native integrations. For instance, Siemens PLM customers are excited about the ability to add MathWorks Simulink® Model-Based Design workflows as an integral part of their application lifecycle. Another popular native integration is available for the Requirements Interchange Format (ReqIF) to support lossless exchange of requirements and associated metadata between software tools across complex supply chains common in the automotive sector. To complete the picture, connectors for popular third-party tools such as HP® Quality Center® and Atlassian® Jira® are available, and so is an open and fully documented Java API. As a result, a strong community of more than 100,000 members has formed and created extensions, integrations, and customizations made available for users via the Siemens PLM Polarion Extension Portal. All this process integration has been instrumental in helping advance productivity among our customer base.

"Siemens PLM's Polarion ALM recent integrations with MATLAB® Simulink®, Klocwork and others show a real deep understanding for their target markets."

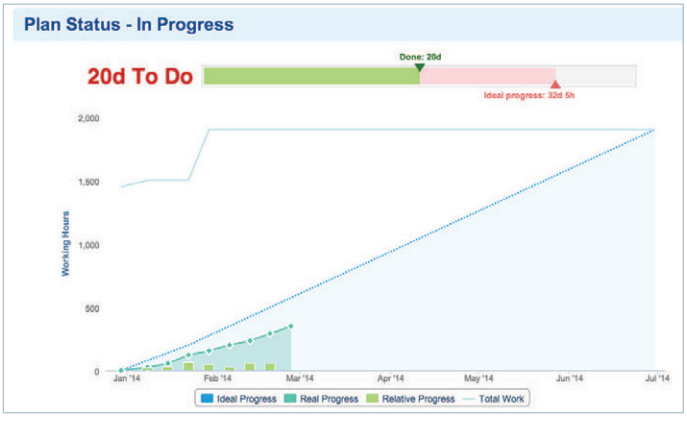
Michael Azoff
Principal Analyst
OVUM

Achieving comprehensive traceability and accountability

While many development teams are switching to Agile processes to achieve a higher level of agility and productivity, there are concerns about the impact those processes have on transparency and release predictability. In this new paradigm, customers express needs, product management defines related requirements, the development team commits to fulfill them and the operations team stands by to manage the delivery. But at release time, results tend to be quite different from the requirements the organization started out with, due to changes and adjustments made along the way.

Typically, unknown risks can increase with the number of changes introduced throughout the development process, and new delivery dates can be even less realistic than the original ones. But ALM processes spanning development and delivery facilitate end-to-end planning and reporting. Complete views across all process steps, accessible in real time, can be used to improve scheduling accuracy and accurately predict release readiness as well as to assess the wide-ranging impact of changes.

ALM processes combined with Polarion Work Items make full traceability throughout the lifecycle easy. Work Items can be stateless, representing a simple definition of work to be done, or packed with metadata about their status attached to the definition, providing real-time access to status updates. This becomes invaluable in the planning process as Work Items can be time-estimated when scheduled for any milestone, while actual time spent is tracked automatically at task completion.



Live Reports in Polarion ALM display the actual release progress and the estimated capacity at any time, driving accurate release predictability as well as the wise use of resources.

"We chose Polarion ALM at Phoenix Contact in the Business Unit Automation to consolidate our very heterogeneous tool landscape – PVCS, Bugzilla, OneTree. With Polarion ALM we achieved transparency on all levels of development and we got fast acceptance in the teams. We now see exactly and in detail the status and the progress in our projects in the different project phases."

Andreas Deuter
Phoenix Contact Electronics

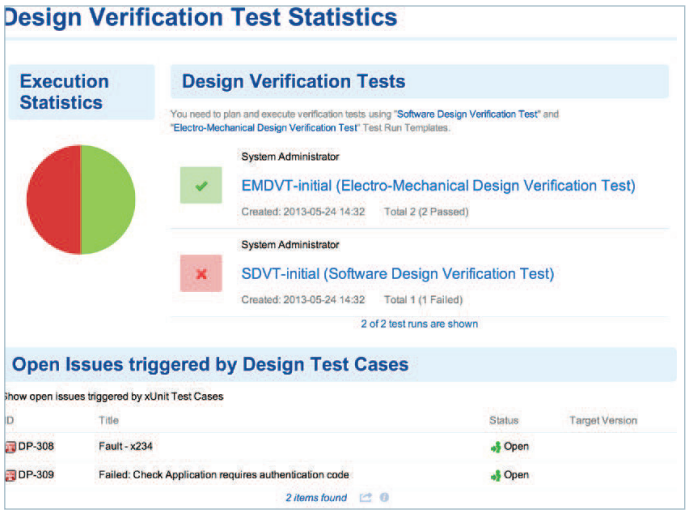
Safeguarding quality through transparency and automation

The functional structure of organizations causes silos that are often amplified by the use of different tools to help teams get their work done. A big problem with this approach is that team members usually get the information about what they need to accomplish from static documents that tend to go out-of-date as quickly as they were created. To make matters worse, vital changes are communicated late, if at all, to the people who need to know about them, and decisions are made without including necessary stakeholders and subject matter experts. But perhaps worst of all, changes and ad hoc decisions often fail to take into account the downstream impact.

These challenges are amplified by the flexibility inherent in software, which is easy to adjust, copy and re-use, creating a proliferation of software-driven product variants that are hard to manage and control. The frequent changes to embedded software increase product and system complexity and in turn jeopardize quality. Undetected or unresolved issues can pose huge functional safety risks on top of the compliance challenges faced by regulated industries. Unclear requirements are surprisingly often cited as the number one cause for quality issues and sometimes even defects. When development teams lack the necessary context or sufficient understanding of specific customer needs that underlie requirements, they are negatively affected in their ability to successfully plan and perform testing activities.

Transparency is one key factor in the testing process, starting with early feedback from stakeholders within the development cycle to improve clarity across development teams and drive up application development quality before misinterpretations occur. Among the Polarion ALM customer base, collaborative interaction with other stakeholders has proven to lead to better solutions, thanks in large part to the rapid feedback loops possible in the online environment. Automation is another leading factor our customers cite for effective quality assurance.

One example is an automated workflow by which a tester can focus on clearly defined steps to perform an assigned test, mark the new status, and move on to the next task while everyone who needs to know is automatically notified and an audit trail is recorded for compliance. The unified nature of Polarion ALM and the business logic at the core of this functionality is critical for cost-effective quality protection.



"I've been working for over 20 years in automotive electronic development. With Polarion ALM, it is the first time that the entire spectrum of development activities is covered by one tool. This allows closer collaboration between software, hardware, mechanical, project management, test and requirements management which improves the product quality and saves time and money."

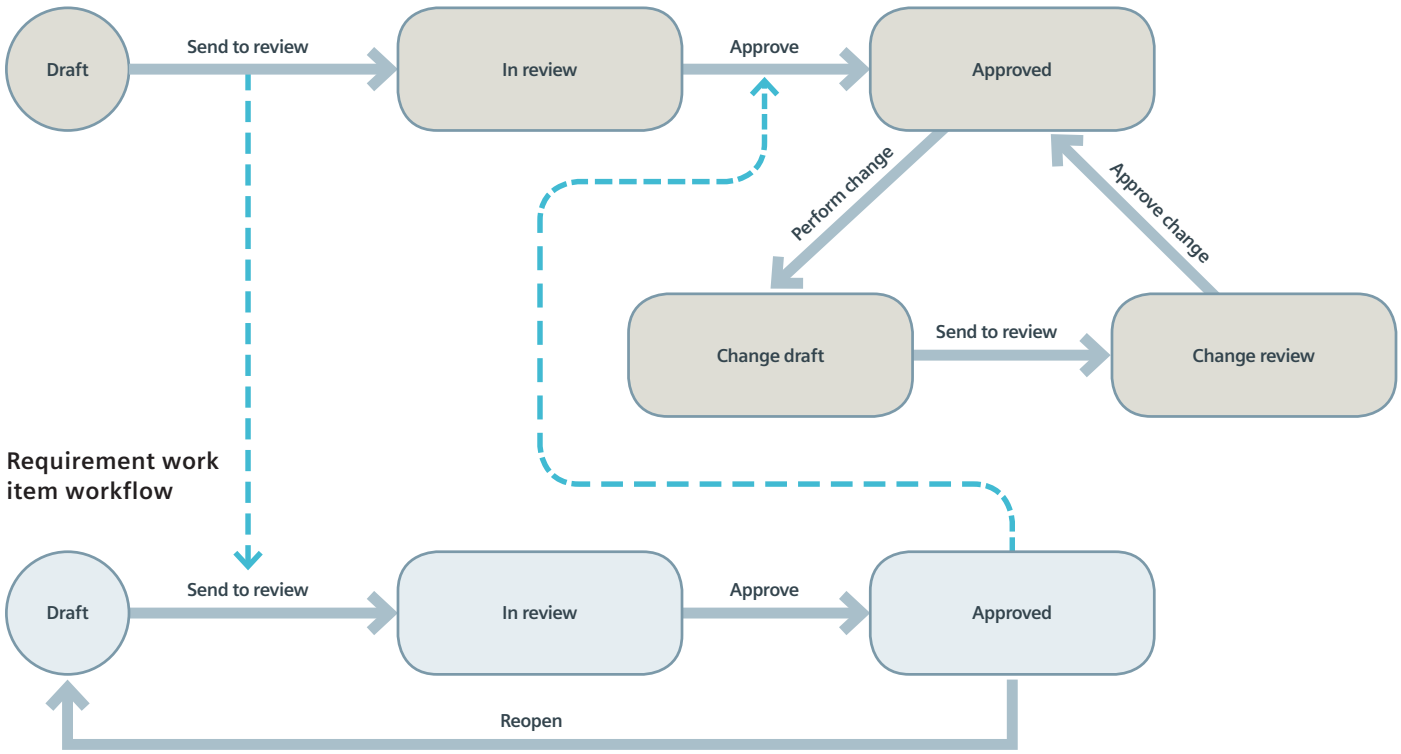
Rainer Kirchner
ASK Industries

Automating proof of compliance

With the integrated workflows of Polarion ALM, compliance can be assured by demonstrating that steps cannot be missed or bypassed even at crunch time. Indeed, customers report that they can pass audits and regulatory inspections smoothly due to the comprehensive traceability that is easy to implement and is guaranteed via programmed change control. Automated workflow control, complete lifecycle traceability linking, and comprehensive artifact history remove headaches usually associated with compliance documentation.

One thing we have learned from Polarion ALM customers is that they generally do not rely on a single vendor or testing solution, including open source tools. For example, most perform automated load tests, user interface (UI) testing and static source code analysis. Polarion ALM is architected to manage all of these activities with ease, functioning as the central hub for all test cases, plans and results. With this setup, whenever a test fails, a Work Item about the issue can be automatically created and passed to developers to expedite resolution. To get customers going quickly, Polarion ALM provides a wide range of baseline reports, including one that helps assess the impact of changes across the entire set of Work Items that are linked to them. Using the built-in baselining and versioning comparisons has proven to be of great help in regulated industries to quickly satisfy the regulators.

Requirements specification document workflow



Customers and auditors alike value the automated tracking functionality that records every Work Item change via the configuration management system. This delivers a complete audit trail of who did what, when and why, making it impossible to change anything without leaving a trace. Beyond the wide range of real-time reports available to provide insight into the current state of projects and increase release predictability, teams can also browse and report on any historical baseline state via the Polarion TimeMachine™.

Rolled-up metrics and reports across diverse, distributed teams and even business partners have proven to be critical to make well-informed decisions at any and all levels throughout an organization. Customized reports are easily created across multiple projects to help coordinate crossfunctional activities. It comes as no surprise that when information is shared freely and transparently, decisions can be made with much more accuracy and speed. Of course, once decisions are made, they need to be communicated quickly and consistently across the extended product team so that everyone's efforts are aligned with the new path forward. Customers have found that they can build trust with transparency, and thereby remove hidden agendas and confusing directions that often tend to derail product delivery. This, in turn, helps protect auditability and accountability.

"Polarion ALM's ISO 26262 qualification will save us a great deal of effort and cost in our own qualification process. We leverage the Polarion ALM solution across our complete development lifecycle for requirements tracking, release packaging, test results and full traceability coverage for vehicle hazards ISO 26262."

Maria Eugenia Zuniga
Quantum Technologies

Unlocking team synergies to accelerate innovation

Organizations must accelerate innovation to stay competitive in most industries. Unlocking team synergies across disparate software development teams is paramount. Many organizations are still struggling with the old way of doing things. They focus on isolated process optimization instead of driving business value through comprehensive synchronization. With Polarion ALM, customers have been able to get their teams out of their silos and orchestrate development efforts across the entire application lifecycle. This approach has empowered stakeholders to better perform tasks in context and quickly make sound decisions based on real-time access to information.

"The revolution is just beginning, but it's real – and the time to act is now. In fact, it is yours for the taking to harness a broad platform, services and ecosystem to transform your business. A unified approach to application lifecycle management is not a futuristic technology trend. It's here today, and the good news is that you don't have to completely stop and reset, but can smoothly transition from squeezing the most out of your existing business processes to making your organization thrive."

Kurt Bittner
Analyst
Forrester Research

Siemens PLM Software

Headquarters
Granite Park One
5800 Granite Parkway
Suite 600
Plano, TX 75024
USA
+1 972 987 3000

Americas
Granite Park One
5800 Granite Parkway
Suite 600
Plano, TX 75024
USA
+1 314 264 8499

Europe
Stephenson House
Sir William Siemens Square
Frimley, Camberley
Surrey, GU16 8QD
+44 (0) 1276 413200

Asia-Pacific
Suites 4301-4302, 43/F
AIA Kowloon Tower,
Landmark East
100 How Ming Street
Kwun Tong, Kowloon
Hong Kong
+852 2230 3308

About Siemens PLM Software

Siemens PLM Software, a business unit of the Siemens Digital Factory Division, is a leading global provider of product lifecycle management (PLM) and manufacturing operations management (MOM) software, systems and services with over 15 million licensed seats and more than 140,000 customers worldwide. Headquartered in Plano, Texas, Siemens PLM Software works collaboratively with its customers to provide industry software solutions that help companies everywhere achieve a sustainable competitive advantage by making real the innovations that matter. For more information on Siemens PLM Software products and services, visit www.siemens.com/plm.

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