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Polarion ALM and CMMI

How an integrated ALM tools approach can speed CMMI compliance

This white paper discusses the capabilities of Polarion® application lifecycle management (ALM) software from Siemens PLM Software, and how this comprehensive solution can help you bring your organization to Capability Maturity Model Integration (CMMI) Maturity Level 2 or Level 3.

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Executive summary

Like many software development organizations, yours may be seeking to improve software quality, reduce costs, increase transparency and manage the development process better throughout the software lifecycle. You may face the need to operate within changed or changing paradigms such as increasing reliance on outsourced/offshore resources. And like increasing numbers of your peers (and competitors) you may have decided that adoption of Capability Maturity Model Integration (CMMI) process improvement is the direction you need to take your organization.

Such a decision opens up a plethora of questions and issues to be investigated and resolved. What tools are available to help you track data, automate procedures, communicate information and ultimately achieve the goal of CMMI compliance?

This white paper discusses the capabilities of Polarion application lifecycle management (ALM) software from Siemens PLM Software and how this comprehensive solution can help you bring your organization to CMMI Level 2 or Level 3. It concludes with 10 more reasons you might want to evaluate Polarion ALM.

The natural path to CMMI

Polarion ALM differs from some other tools and systems you may encounter in your research – it is not intrinsically designed as a system for implementing CMMI, although it does include some CMMI metrics and reporting features. Polarion is a robust platform for managing the software development lifecycle end-to-end. This focus, along with an unprecedented level of flexibility, customization and ease of use means that organizations using Polarion are not forced to follow a specific workflow or use a defined tool set in order to pursue CMMI compliance. By its very nature, Polarion supports whatever processes you need to put into place to take your organization to CMMI Level 2 and 3. Additionally, it supports both staged and continuous CMMI representations.

The remainder of this paper examines how Polarion ALM can help software development organizations of all sizes achieve CMMI Level 2 and higher. It presents a series of tables that map CMMI process areas to relevant features and capabilities of Polarion ALM. It assumes that you are already familiar with the maturity models behind CMMI.¹

The following sections look at the CMMI process areas for Maturity Levels 2 and 3, and explain exactly how Polarion ALM supports them.

Polarion and CMMI Maturity Level 2 (staged view)

Polarion ALM delivers tools that support the following process areas for CMMI Maturity Level 2.

Requirements management

- Requirements are a type of artifact and are tracked and versioned in the repository the same as any other artifact.
- Every requirement can be linked to the engineering tasks that implement it, thus providing end-to-end traceability from requirements to code via a unique traceability matrix.
- Real-time dashboards on the actual state of requirement-linked engineering tasks provide transparency and reveal actual progress towards fulfillment of requirements.
- Documents, discussion, and other collateral artifacts are part of the actual requirement and maintained in the same repository.

Project planning

- Project planning is largely automated. Project members concentrate on defining engineering tasks that link to requirements. Each task has data fields for estimated completion time, actual time remaining to complete, current status, dependency on other tasks and more.
- Data for all project tasks is rolled up and correlated to project planning constraints such as beginning/ending dates, and a “live” project plan in Gantt format is generated from the data at regular, customizable intervals or on demand.
- The “live” project plan is exportable to other formats including Microsoft® Excel® and Project, for use by those who need to work with such formats.

Project monitoring and control

- The “live” project Gantt chart is updated on the basis of actual data as project members close tasks and fulfill requirements.
- Dashboards on the project reveal the true state of the project based on actual task data that is updated as engineers complete tasks. The same types of data are summarized for all projects in other dashboards to reveal the actual state of development organization-wide.
- Audits and metrics on key areas such as test coverage and team workload reveal potential bottlenecks before they reach critical mass and enable managers to take early corrective action.
- Watches enable focus on high-priority issues.
- Special roadmap view enables easy assessment of project milestones.
- Automated reports on customizable schedules show planning accuracy, comparing estimated time to actual time.

Supplier agreement management

- A dedicated project for supplier management can be created in the repository, with subprojects for each supplier.
- Contracts, comments and other artifacts for each supplier are automatically tracked and versioned in the repository.
- Supplier project access can be controlled via standard user management, and built-in security features protect confidentiality.

Measurement and analysis

- Polarion ALM comes with an extensible metrics and audits engine which is capable of generating many useful measurements right out of the box.
- Preconfigured metrics can analyze and report statistics for:
 - Requirements
 - Work items (tasks, change requests, etc.)
 - Test cases
 - Traceability and impact
 - Process key performance indicators (KPIs) for Extreme Programming (XP)

Process and product quality assurance

- Process quality assurance (QA) can be accomplished by measuring how closely people are working on process KPIs.
- Out-of-the-box metrics and audits report on various product quality issues. Metrics and audits can be customized to meet additional or modified QA requirements.
- Product quality aspects can be supported by specific metrics identifying key areas (categories, subprojects, components) of a project/product.

Configuration management

- Configuration management is integral to Polarion ALM's architecture, which based upon Subversion, an increasingly popular open-source versioning solution.
- Entire development environments can be placed into version management to maintain proper configurations.
- All artifacts, including requirements, work items, design data, and others are intrinsically tracked and managed by the underlying Subversion repository.

CMMI Maturity Level 3 (staged view)

Polarion ALM includes capabilities that support the following CMM Maturity Level 3 process areas.

Requirements development

- The unique "Live Documents" feature of Polarion enables document-oriented requirements professionals to use familiar office applications to define requirements. When checked in to Polarion ALM, requirements defined in an office document translate into tracked requirement artifacts. Changes to either the artifact or the document are synchronized.
- Polarion enables integrated discussion via comments. Comments are tracked with every requirement artifact.
- Polarion's integrated approval process support enables assignment of one or more approvers to every requirement.
- Each requirement can include attached and/or linked internal or external resources or references.
- Impact analysis reveals the cost to fulfill requirements, which aids development of new requirements or changes to existing requirements.

Technical solution

- Polarion ALM provides a comprehensive platform for managing the entire software development lifecycle. The single-source, repository-based architecture is built around leading open-source frameworks such as Eclipse, Subversion, Apache, WebDAV and others, thereby reducing the cost of entry and ownership, and eliminating lock-in to proprietary technologies.
- The Polarion ALM platform ends the "islands of automation" scenario with fully integrated, state-of-the-art tools for key areas including issue tracking, task management, project planning and version/configuration management.

Product integration

Workflow is extensively customizable via graphical user interfaces or easily understood extensible markup language (XML) structures. It is not difficult to modify the standard workflow to cover product integration steps, including tests, approvals and others.

Verification

Polarion ALM supports unit testing, including metrics on test coverage and management of test cases. It includes the capability to track dependencies across projects.

Validation

Polarion delivers an integrated, customizable notification scheme supporting email and RSS feeds, combined with customizable workflows that enable validation by customer and/or other stakeholders responsible for validating project results.

Organizational process focus

- Polarion ALM by definition focuses an organization on process. Once defined, process is implemented through development projects based on the process.
- Process is built into development projects through project templates that include customized workflows defined by the process. People working on projects follow processes simply by using Polarion ALM to manage daily tasks.

Organizational process definition

- The process itself can be defined and refined via special projects and subprojects dedicated to process. Documentation, communication and approvals, history and tracking are all intrinsically supported.
- Project templates can be built based on the process, including the necessary workflows to support the process.

Organizational training

- All artifacts, including training documents and external URLs, are readily associated with process and/or development projects, and/or with individual tasks/change requests.
- A built-in Subversion-based wiki supporting multiple spaces for the entire organization, and for each individual project, facilitates creation of focused, readily accessible documentation of policies, processes, coding standards and more.
- Project and item history, automatically maintained and fully searchable, contains all comments and discussion relevant to the development of features or fixing of bugs – all potentially helpful in bringing new people up to speed.

Integrated project management

- Projects can own their own process derived from corporate and/or industry standards.
- Project management is built into the data design to support robust project tracking, measurement and reporting.
- Progress reporting is automatic and painless. Developers simply close tasks and move on. Managers monitor dashboards, check audits and metrics, and generate reports and review the project plan (which is always based on the actual state of development).
- The actual up-to-the-minute state of development of any project, based on defined begin/end dates and milestones and the actual status of all defined tasks, is always readily available for review.

Risk management

- Each project contains a work item data type “risk,” which describes the identified risks for the project.
- Risk can be monitored and tracked for all projects.
- All other work items, like requirements, defects and change requests, can be related to a specific risk for tracing and monitoring.
- Risk can be viewed and managed at the project, project group, or corporate level.

Integrated teaming

- Team collaboration is integral to the Polarion ALM architecture. For example, Apache HTTP enables use of industry-standard secure web protocols for collaboration both inside and outside the corporate firewall.
- The web-based portal interface using Asynchronous JavaScript and XML (AJAX), Simple Object Access Protocol (SOAP) and other state-of-the-art web application technology is accessible by team members regardless of physical location.
- Role-based access and user management ensures that all stakeholders get access to the information they need to accomplish their tasks – no more, no less.
- Notification schemes map actions against roles to make sure all stakeholders stay up to date.
- Custom views on data and functionality provide only the information actually needed for any role.
- Comment threads are tracked with each work item and maintained in history, thereby facilitating communication and discussion among team members.
- Subversion-based wiki enables content contributions and updates from any stakeholder with write access to the project or repository root.

Integrated supplier management

- Suppliers are defined as users in relevant projects and fully transparent status of their work is available immediately.
- Suppliers can be assigned tasks in relevant projects, and communication is integral to every task via comments, notifications and watches.
- Mission-critical issues to projects under responsibility of a supplier can be put on individual watch for real-time interaction.
- Use of industry-standard web protocols enables collaboration with suppliers who live beyond the corporate firewall.

Decision analysis and resolution

Workflows can be customized to ensure that those responsible for decisions are notified at appropriate time points or milestones. Built-in approval mechanisms support the decision process and automatically move the process forward (with appropriate notifications) when decisions are made.

Organizational environment for integration

- As a unified ALM platform solution (as opposed to a mere ALM tool), Polarion ALM eliminates information silos and enables organizations to adopt a single, central environment to manage both process and day-to-day development organization-wide.
- Based upon leading state-of-the-art open-source frameworks and standards (Eclipse, Subversion, Apache, Web DAV, and others), Polarion eliminates lock-in to proprietary technologies, ensures long-term compatibility, and actually eliminates the need for a great deal of potentially unstable or fragile integration.

Polarion inherently (or through some straightforward customization) addresses the process areas that must be addressed when a software development organization implements a CMMI Maturity Level 2 and 3 compliant process. At the same time, Polarion ALM provides the tools that various people in the organization need on a daily basis to organize and manage their work throughout the software lifecycle, from executive managers to project leaders to software engineers.

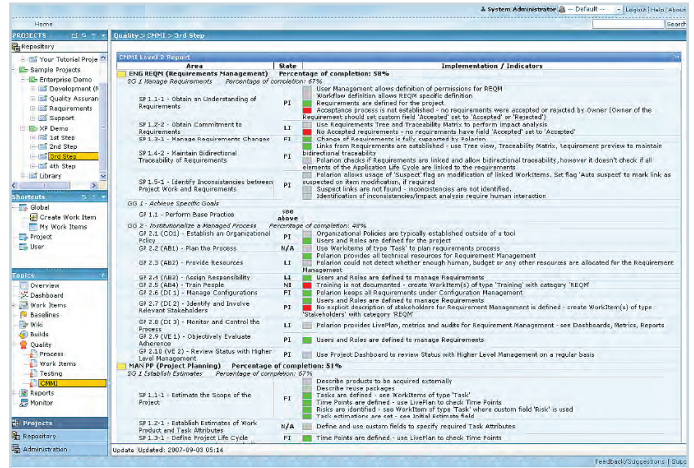
Top 10 reasons to evaluate Polarion ALM

The following are some more good reasons why you might want to take a closer look at Polarion.

1. Polarion is proven in production environments in companies like Swisslog, T-Systems, Phoenix Contact, Northrop Grumman and more than 300 others for more than 10 years as a comprehensive solution covering all major aspects of ALM.
2. Polarion uses open-source frameworks with strong communities for key subsystems (Eclipse, Subversion, Apache and Maven, for example). These robust community solutions provide everything most software development organizations will ever need from the respective subsystems. This means greater technology independence – you are not locked into vendor-proprietary technologies. If a better technology comes along in the future, Polarion can readily adopt it.
3. Polarion features a single-source, repository-based architecture atop Subversion, using it to store and version all development artifacts, not just source code. Requirements, tasks and even wiki pages are all managed in the underlying Subversion repository.
4. No more “information silos.” Polarion ALM’s single-source integrated platform approach eliminates stitched-together point solutions that have heretofore been the norm. You never worry about whether an upgrade here will break something else there.
5. Painless ALM. Polarion ALM is designed to be easy to acquire, easy to install, easy to configure, easy to administer and easy to use, day in and day out. A single, consolidated web-based interface, adjustable to user roles, shortens learning curves imposed by point solutions and reduces training costs.
6. Polarion ALM’s technology reveals the true state of your company’s development, project by project or company-wide, in real time, eliminating guesswork and enabling decisions based on actual up-to-the-minute production data. Document-centric requirements specialists are not forced to use data-driven engineering tools, nor are engineers forced to develop against documents. Polarion’s exclusive Live Documents technology enables all stakeholders to work in the paradigm where they are most productive and keeps everybody in sync.
7. Reduced entry and ownership costs of Polarion ALM deliver significant return-on-investment. By building on top of open-source frameworks, Polarion saves the cost of implementing similar functionality. The low up-front costs combined with better decision-making and improved management, along with overall improvements in quality and on-time, on-budget projects, quickly repay your upfront investment.
8. Polarion is fully web-based. There is no fat client software to install and configure across the entire organization.
9. Polarion ALM is customizable and extensible, enabling key customizations including workflow. Its open Java™ API and web services deliver the capability to extend and adapt standard capabilities and features to your organization’s specific needs.
10. Polarion is available now. There is no need to gamble your development success on products and technology that are not yet available and/or not yet proven in real world production environments in multiple industries.

Next steps to evaluate Polarion ALM

You can experience Polarion ALM online on the demo server at <https://polarion.plm.automation.siemens.com/products/alm/demo>, or download an evaluation copy at <https://polarion.plm.automation.siemens.com/downloads/alm> and try it in your own environment. Downloads are available for Windows and several popular Linux variants. You will automatically receive an evaluation license by email when you download. Contact Siemens PLM Software if the standard license is not sufficient to support your evaluation cycle. We are eager to assist you with a satisfactory evaluation of our product.



References

1. If you need more information, the definitive source is Carnegie Mellon University's CMMI description: "CMMI for Development, Version, 1.3," [hyperlink to <http://www.sei.cmu.edu/reports/10tr0+33.pdf>] November 2010



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