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PTC 111 - PTC ALM Strategy, Vision and Roadmap



PTC ALM Strategy, Vision and Roadmap

- The PTC Integrity Product Family
- 2015 Launch
- Software and the Digital Twin
- The Road Ahead



What is PTC Integrity?

A family of **software and** systems engineering products that accelerate product innovation.



PTC Integrity enables a holistic software and systems engineering approach by improving collaboration, automation and reuse across teams and disciplines.

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APPLICATION LIFECYCLE MANAGEMENT (ALM)

GLOBAL SOFTWARE DEVELOPMENT

PTC Integrity^{**} Modeler^{**}

Software Design



PTC Integrity[™] Lifecycle Manager

Software Process & Workflow



PTC Integrity⁻ Lifecycle Manager

Configuration and Release Management



PTC Integrity: Delivering Customer Value

Requirements and Validation



Reduction in time spent on ISO 26262 compliance

"To succeed in increasingly fierce global competition, we needed to introduce tools that further **increase our software quality and development efficiency**."

– Yoshihiro Miyazaki, Hitachi

HITACHI Inspire the Next

Model-Based Systems Engineering



Expected reduction in integration & test effort

"PTC modeling technology significantly improved quality and reduced effort through-out the design lifecycle."

– Marco Ferrogalini, Alstom Transport

Software Development



Gain in software development productivity

"With the PTC Integrity Lifecycle Manager platform I see activity in real time...which helps us develop a better product." "PTC Integrity Process Director makes it easier for our systems engineers to **do things right the first time**."

– Eric DePaul, Senior Principle Systems Engineer, Hologic





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Process Authoring & Governance



More efficient process authoring

– Nicolas Gueit, Development Methods Unit Manager, SAFRAN

PTC Releases Industry-First Capabilities to Transform Software and Systems Engineering in the IoT Era





Capture best practices as you type with **Natural Language** Director



Design higher quality, more profitable product lines with Modeler



Speed IoT systems design with **Drag-and-Drop Web Service** Cataloging and Reuse in PTC Integrity Asset Library





Diagramming in Integrity Process

Variable Parameters for Product Line Engineering in PTC Integrity

PTC Integrity Process Director 4.0

Establish, measure and improve your organization's operational, engineering and development processes.

Natural Language Diagramming

- Capture best practices as you type •
- Reduce barriers to process modeling
- Speed process documentation
- Accelerate process engineering workshops





(BPMN)

Industr

FIRST

- ____
- - and tablets
- - loop-backs

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Expanded Business Process Modeling Notation

Make your process executable with any BPMN-compliant process engine

Visual Meta Modeling

- Graphically design process templates

Meta-model export and import

Mobile Web Ready

Access from smartphones

Predecessor Steps

Design complex process

Map to real world process definition

PTC Integrity Asset Library 2.0

Intuitive Asset Cataloging, Management and Reuse

Drag-and-drop Web service cataloging and reuse

- Auto-document and reuse Web Services
- Easily design Internet of Things (IoT) systems from a palette of reusable services
- Make reuse practical and time-saving lacksquare





Open Services for Lifecycle **Collaboration (OSLC) Extensibility**

- Catalog, publish, search and reuse assets of any OSLC-compliant lifecycle tool
- Drag-&-drop modular SoS design with PTC Integrity Modeler

Pure::Variants Integration

- Publish & Reuse Variable Assets Extend into Model-based Product Line Engineering

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PTC Integrity Modeler 8.2

Design before you build with standards-based systems, software and product line modeling.

Variable Parameters for Product Line Engineering

- Fully explore and articulate real-world choices in product lines and variants
 - Inclusion/exclusion; attribute values; multiplicity; calculated variables
- Improve model quality by specifying and enforcing design constraints
- Build in design intelligence with pass-through values and powerful scripting

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• PTC Integrity Lifecycle **Manager Requirements Synchronization**

Full lifecycle traceability across requirements and models

UI Simplification

- Create custom UI's for role-based access to menu items
- adoption
- **Web Model Viewer**
 - Live Model Browsing on the Web
 - Enhance access and collaboration

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- Bi-directional import and synchronization

Reduce time-to-value; lower barriers to

PTC Integrity Lifecycle Manager 10.7

Accelerate product innovation through software while addressing predictability, quality and development cost challenges.

Time-based SCM milestones

- Support continuous integration processes to speed software delivery cycles
- Capture historical baselines across all artifacts
- Enhance developer productivity



Repository Management

- - test case evolution

Productivity Tools

- Source offerings
- **Performance**

 - Code differencing
 - Document manipulation

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Evolve repository location of artifacts with logical needs

Navigate Document and Content Genealogy

Facilitate "where used" for requirements, tests and other document contexts

Report on requirement and

Speed adoption and migration from Open

Improve individual developer productivity **Improved Scalability and**

Checkpointing large code structures Relationship storage

PTC Integrity Requirements Connector 3.0

Deliver requirements interchange across applications and organizations.

PTC Integrity Lifecycle Manager Support

- Exchange requirements with Integrity Lifecycle Manager (ILM), IBM DOORS and other RegIF-compliant applications
- Share high-fidelity requirements information across vendor boundaries
- Include rich text, images, OLE objects, and relationships



Automated Baseline Creation

ReqIF support

- **Flexible mapping**
- DOORS
 - - 9.1 to 9.6

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Manage requirements over time Meet compliance reporting needs

 Standardized exchange format with any requirements application

Increase performance

- Faster export/import; 64-bit support

 Configurable to support variety of attributes and requirements

Direct integration with IBM

Compatible with 8.1 to 8.3 &

What We're Hearing

"We need greater..."

"IoT Innovation"

- "We need to move from preparation to action."
- "We need to balance innovation with rigor for safety-critical products."

"Simplicity"

- "We want to help teams focus at the right level of abstraction for the task at hand."
- "We want to make it easy to do the right thing with integrated process guidance and workflow."

"Interoperability"

- "We want to protect our technology investments by aligning with industry standards."
- "We want
 lifecycle da tools."



- "We want the flexibility to share
- lifecycle data with heterogeneous

Enabler # 1: Open Services for Lifecycle Collaboration

PTC will utilize OSLC as a foundational layer to satisfy key customer use cases – extended as needed to deliver more robust interoperability.

Standards-based

- Extends the value of ALM investments
- RESTful Web Services architecture
- PTC co-chairs OSLC Core group ensuring our customers' needs are represented
- Designed for maintainability
 - Source application owns both data and UX
 - No data transformations, replication or synchronization

Open / extensible

- Enables use cases for cross-vendor interoperability
- Supports N:N relationships ideal for selective data sharing across supply chain



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Enabler # 2: Task-based, Role Appropriate Apps

Efficiency and ease-of-use

- Only show information and features relevant to the task at hand
- Empower users
 - Provide capabilities that help users be decision-oriented and productivity-focused
- Enhance collaboration
 - Provide easy communication and social sharing
- Enable recognition instead of recollection
 - Provide features, visual aids, and data that match realworld processes





Enabler # 3: ThingWorx Converge – Application Enablement Platform

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TASK BASED APPS

ALM – PLM Application Framework

Resource Provider Catalog

3rd Party

ALM Domain Model

Thing **Worx** Application Enablement Platform

Web Services Asynchronous Messaging Info*Engine Asynchronous Messaging

PTC Windchill PDMLink

 CONNECT Engineering with the connected product in support of Closed Loop Lifecycle Management

Thing Worx

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- ENABLE composite PTC solutions further through ThingWorx based Task Based applications
- **EMBRACE** a marketplace for third party packaged and built applications

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Traditional Reality: Distinct and Separate

DIGITAL NORLD

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REAL WORLD

New Reality: Distinct but Inseparable

INTERNET Digital World

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THINGS Real World

PTC's Enterprise IoT Vision

Produce and manage Smart, Connected Products



Leverage Smart, Connected Product data to improve products

Connected ALM – ALM on the Stack

Twin Comprehensive configuration management of software *digital twin*, runtime software traceable to development artifacts (source, binaries, etc.)

Software Digital

Software Delivery & Entitlement

Managing release of software across organizations, enabling service scenarios as well as provisioning of configuration and feature entitlements.



Software Issue Management

Alerting of service and quality issues along with related diagnostics to enable quick timeto-resolution by assigned software engineers.



Software Feature & Reqts. Usage

Application to monitor performance of software and to track usage of software features & settings.

Software Security

Visibility of software security analysis against related software configurations (source through runtime).

Software Collaboration

Ability to track and manage software IP, enable internal collaboration on software projects as well as external collaboration.





With Augmented Reality (Software Configuration)

Product is identified (QR, Barcode, Serial Number, etc.)

- As manufactured, or latest as maintained, Software configuration obtained from the product cloud.
- Product publishes software configuration to App

• Differences highlighted to the user

- Software updates that are available
- Known issues against existing configuration
- Critical security vulnerabilities

• Opportunity presented to:

- Learn more about findings
- Update software OTA



With Augmented Reality (Feature Entitlement)

- Operational data streamed from the product
- Data compared with engineering norms in the product cloud
- Optional software updates to improve product performance are presented
 - Learn more about findings
 - Update software OTA May require new licensing terms (and hence new revenue opportunities for vendor)
- Access to role-based control app(s) to tune and manipulate the product



Software Delivery Enables On-Site or Remote Access

- Remote access Apps generated or created by the manufacturer are presented to the user
 - May be several relevant for different users or roles (operator, junior service tech, master service tech, OEM)
- App SDK enables AR, Mobile or Desktop user interfaces.
- Product is connected such that access does not have to be "on site"



Consistent Task-based Mobile & Thin Desktop Experience

For all core, smart & connected apps...

- Application is Focused on a Task
- Applications can be bundled into a Collection and have a Homepage
- Applications shall support contextual navigation (e.g. drilldown or view object in context of another app)
- Applications should be customizable / extensible
 - 3rd party apps can be deployed alongside provided applications
 - Contextual navigation can be made accessible to 3rd party apps
- Links in apps should support rich hyperlinking (link expansion, e.g. Slack / OSLC)



PTC Integrity Product Family

Strategy and Vision

SMART

Software intensive products with high rates of change, personalization and criticality to overall customer experience.

For the Software Engineer

- Enable process agility and lean • software development
- Support diverse tool chain interoperability
- Design & auto-generate complex device software

For the Systems Engineer

- Architect variability early •
- Coordinate HW/SW design change
- Model and validate HW/SW dependencies and interfaces



CONNECTED

Capabilities delivered across device, cloud and environment supported by closed-loop engineering and service feedback process from inception to retirement.

For the Software Engineer

- Enable late stage and OTA updates
- Facilitate feature utilization and software entitlement models
- CBD & SOA modeling

For the Systems Engineer

- Provide context based usage feedback
- Design and validate complex Systems of **Systems**

Highly complex systems with many independent components engineered and released across different development teams, disciplines and organizations.

- delivery models
- product lines

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PRODUCT

For the Software Engineer Provide continuous integration and Enable and manage software

For the Systems Engineer Design and communicate allocation of functions to disciplines Manage HW/SW and ondevice/cloud compatibility Model and validate system and product line behaviors Support innovation through rapid evaluation of alternatives

PTC Integrity Product Family

Technology Roadmap

- Regular cadence of platform releases
 - Scalability, Performance, Reliability
 - Interoperability _
- Expanding set of task-based Apps addressing the needs of the systems and software engineers
 - Intuitive Simplicity without Sacrifice
 - Productivity and Efficiency
- Innovation within connected systems and software development
 - Supporting both core ALM and IoT



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Architecture

- UX Improvements
 - Web-based Design
 - Web-based Model
 - Review/Feedback

Process Governance

Disciplined Agile practices

New for 2015! ALM Training Seminars

Advanced registration is strongly suggested, but not required.*

Tuesday, June 9 Training Seminars

10:00 a.m. – 12:00 p.m.	SysML Modeling with PTC Integrity Modele Matthew C. Hause, PTC
1:00 p.m. – 3:00 p.m.	Requirements Engineering with PTC Integrity Lifecyce Sheilah Fournier , PTC
4:00 p.m. – 6:00 p.m.	Create and Automate Any Process with PTC Integrity Pr Jonathan Archer, PTC

Wednesday, June 10 Training Seminars

7:45 a.m. – 9:45 a.m.	SysML Modeling with PTC Integrity Modele Matthew C. Hause, PTC
10:00 a.m. – 12:00 p.m.	Requirements Engineering with PTC Integrity Lifecyc Sheilah Fournier, PTC

* Each session has room for 24 attendees to sit and share 12 computers. Anyone above the 24 cap will be an observer.

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