PLM Solutions Update and Roadmap

Jeff Zemsky
Director, PLM Solution Management

November 2014
User Experience (UX) Lab

- UX Lab – Design Room 2 (D2)
- Registration at the Conference UX booth or UX Lab
- 40 min. 1:1 research session with our UX designers

UX Session and profiles:
- Administrators CAD and/or Windchill
- Logical/Conditional Expressions Users
- Product Requirements Users
- Smart Connected Products
- PTC Creo Performance and Availability Monitoring
- Creo Parametric Users
Agenda

• PTC PLM Solutions Update & Roadmaps
• Windchill Platform Update
Forces Driving PLM Evolution

PTC Product Lifecycle Management Evolution

1990s – Toolkit of Technologies
A collection of capabilities delivered as a large set of applications
• High customization
• Long deployment
• Difficult upgrades
• Technology-driven

2000s – Packaged Products
Discrete applications delivered as products + services
• Reduced customization
• Faster deployment
• Improved upgrades
• Process-led

Today - Products + Solutions
Customer-proven solutions that solve business problems
• Minimal customization
• Rapid value delivery
• Easy upgrade
• Process-based

Windchill
Engineering FACTOR!
Sourcing FACTOR!
Product Management FACTOR!
Manufacturing Planning FACTOR!

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PTC PLM Solutions

- **GLOBAL QUALITY**
- **GLOBAL PRODUCT DEVELOPMENT**
- **GLOBAL PLATFORMS**
- **PROJECT MANAGEMENT**

**Product information backbone** for companies and the extended enterprise.

**Capture, control, and management** of the product definition as it evolves throughout the lifecycle.

**Secure, role-based global access** to the right personnel at the right time.

**Workflow-governed for repeatable best practices and standardized business processes**.
A Solution …

• Addresses a specific business problem
• Delivers rapid time-to-value
• Offers proven, scalable deployment
PTC Global Product Development Solution

Before
Disconnected global teams working on unsecure pieces of product information

After
Drive business growth by securely sharing product knowledge throughout your value chain

An enterprise solution to…
- **Manage** a single source of truth for product-related information
- **Share** information and processes across engineering teams
- **Reuse** parts, manufacturers and vendors to help control product development costs

...achieve high-performance teaming
- 80% improvement in design and process reuse
- 25% decrease in product development time
- 40% reduction in change cycle time

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1. *These metrics have been documented by CIMdata (2010) – benefit ranges are based on actual PLM customer experiences*
2. Addressing the Change and Configuration Management Imperative, PTC Whitepaper. Pg. 8
3. Addressing the Change and Configuration Management Imperative, PTC Whitepaper.
# Global Product Development

## Solution Scope

### Global Product Development

<table>
<thead>
<tr>
<th><strong>GLOBAL PRODUCT DEVELOPMENT</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DOCUMENT MANAGEMENT</strong></td>
</tr>
<tr>
<td>- Document Management</td>
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<tr>
<td>- Engineering Calculation Management</td>
</tr>
<tr>
<td><strong>MECHANICAL CAD DATA MANAGEMENT</strong></td>
</tr>
<tr>
<td>- MCAD Data Management</td>
</tr>
<tr>
<td>- MCAD Library Management</td>
</tr>
<tr>
<td>- Large MCAD Assembly Management</td>
</tr>
<tr>
<td><strong>ELECTRONIC CAD DATA MANAGEMENT</strong></td>
</tr>
<tr>
<td>- PCB Design Data Management</td>
</tr>
<tr>
<td>- ECAD Library Management</td>
</tr>
<tr>
<td><strong>CHANGE MANAGEMENT</strong></td>
</tr>
<tr>
<td>- Standardized, automated change mgt.</td>
</tr>
<tr>
<td>- Integrated, x-discipline change mgt</td>
</tr>
<tr>
<td>- Integrated product issue mgt</td>
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<tr>
<td>- Deviation / Waiver Management</td>
</tr>
<tr>
<td><strong>CONFIGURATION MANAGEMENT</strong></td>
</tr>
<tr>
<td>- Product config lifecycle mgt</td>
</tr>
<tr>
<td>- Integrated, cross-discipline BOM</td>
</tr>
<tr>
<td>- Product config sharing to enterprise</td>
</tr>
<tr>
<td>- Basic BOM Creation</td>
</tr>
<tr>
<td><strong>DESIGN COLLABORATION</strong></td>
</tr>
<tr>
<td>- ECAD/MCAD Collaboration</td>
</tr>
<tr>
<td>- Top Down Design</td>
</tr>
<tr>
<td>- Efficient Multi-MCAD Co-Design</td>
</tr>
<tr>
<td>- Context Based Large Assembly Design</td>
</tr>
<tr>
<td><strong>SECURED DIGITAL COLLABORATION</strong></td>
</tr>
<tr>
<td>- Advanced IP protection</td>
</tr>
<tr>
<td>- Content Protection</td>
</tr>
<tr>
<td><strong>EXTERNAL COLLABORATION</strong></td>
</tr>
<tr>
<td>- Distributed Collaboration</td>
</tr>
<tr>
<td>- Traceable product data sharing</td>
</tr>
<tr>
<td>- Partner Change Management</td>
</tr>
</tbody>
</table>

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Global Product Development Roadmap Summary

More Completely Addressing the Most Important PLM Process Needs

- Enhancement to Windchill business rules
- New “Supersedes” Capability
- Add to Workspace from Change tables
- DTI (Document Management) Enhancements
- Replace document upload Applet
- Support for “Save As” CAD assemblies in a Project
- Faster Workspace refresh
- Improvements to support for CATIA V5
- Introduction of the GPD I package
- Streamlined ECAD checkin
- Integration with Cadence Team Design Option
- Security label improvements (UX & batch update)
- Support for Creo 3.0

- Support for Creo 3.0 Unite
- Windchill File System for Inventor
- Support for PDF representations for CED Annotations
- CGR support for CATIA V5
- Support for Mass change actions on assemblies built from CAD
- Save-As with Pruning
- Improvement to security label Collection & Agreements
- Additional mass actions such as Check-In, Check-out

Improvement Themes under Consideration
- IP Protection: Control fidelity of published models
- IP Protection: Security Label Enhancements
- Understanding Change intent
- Improved Configuration Management usability
- Support for CATIA V6
- Enhancements to Creo Elements Direct Workgroup Manager
- Templates for New ECAD Design

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PTC Global Platforms Solution

Enabling companies to streamline Platform-based Development

Share Platform Definition for:
- Manufacture
- Service
- Sales
### Key Engineering Take-aways

**Complexity continues to increase**
- Planning Modular Designs must be in concert with the Rules that drive them
- Rules important for virtual product design

**Design for interchangeability is harder**
- For Higher Part Re-use – # Rules increase
- Modular Interfaces become more critical

**IT Systems struggle to keep up**
- Leads to disparate or homegrown IT systems
- Significant reduced user efficiency

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### Manufacturing Journey to adopt Global Platform Strategies

<table>
<thead>
<tr>
<th>1990s</th>
<th>Platforms 2015</th>
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</thead>
<tbody>
<tr>
<td>Product 1</td>
<td>Product 1</td>
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<tr>
<td>Product 2</td>
<td>Product 2</td>
</tr>
<tr>
<td>Product 3</td>
<td>Product 3</td>
</tr>
<tr>
<td>• 10 E-BOMs</td>
<td>• 10 E-BOMs</td>
</tr>
<tr>
<td>• 1 Pro/E Assy</td>
<td>• 10 Creo Assys</td>
</tr>
</tbody>
</table>

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### Platform Bottlenecks

| Design Productivity   | 1. 40-85% of virtual design time lost |
|                       | 2. Reduced feature/product delivery  |
| Product Quality       | 1. 33% Late re-design due to configs  |
|                       | 2. Virtually validate >.0001% of configs|
| Enterprise Efficiency | 1. Un-scalable mfg planning            |
|                       | 2. Limited serviceability planning    |
|                       | 3. Unable to leverage 3D in Enterprise |
Global Platforms Solution – Practice Groups

Global Platforms

Plan

- Product Family Management
  - Manage product model definitions
  - Manage platform BOM structures

- Platform Planning
  - Requirements analysis and early BOM planning
  - Platform road-mapping & analytics

Develop

- Platform Structures
  - Modular Architecture Definition
  - Platform Change Management
  - Interface Definition and Mgt
  - Configurable Product Platform Design

- Platform Models
  - Top Down Design
  - Platform CAD Structure Mgt

- Platform Validation
  - Platform Visualization
  - Virtual Platform Analysis

Share

- Platform Operations
  - Product configuration logic sharing to the enterprise
New module - PTC Windchill Platform Structures

- Separately licensed module
- Supports modular/advanced configuration management such as…
  - Platform Architecture
  - Platform Logic Management
- Supports compound rules and expressions
- For use with…
  - Windchill PDMLink
  - Windchill MPMLink
  - Windchill Service Information solutions
Windchill Interference Services Manager

- **Solution**
  - Automate interference analysis for Platform Configurations

- **Capabilities**
  - Identify configurations for analysis
  - Schedule interference analysis
  - Virtually Identify component interferences
  - Assign and email clash detection issues to team members
  - Status and resolve issues
  - Loop ➔ Repeat analysis

- **Value**
  - Reduce cost and time with prototypes
  - Enhance product quality
  - Reduce manufacturing re-work costs
Global Platforms Roadmap Summary

Enabling Platform Planning & Product Configuration Logic Sharing to the Enterprise

Available Today

Improvement Themes under Consideration
- Improved platform logic mgmt – nested platforms and quantity mgmt
- Rule validation enhancements
- Publishing Options with ESI
- Additional rule mgmt – calculations
- Viewing multiple states of variants

Future
- Product Family Management
- Improve processes for bringing product offerings into order fulfillment
- Improved sharing of business and configuration logic with the enterprise
- Enhanced platform planning – requirements and early BoM planning
- Technology roadmapping, and analytics to optimize platform offerings
Before

Inability of teams to access, validate, or provide feedback on product designs

After

Drive better decisions by providing enterprise stakeholders relevant capabilities for visual validation and review

An enterprise solution to…

- **Visualize** product data across the enterprise
- **Validate** products before production
- **Review** product information to incorporate stakeholder input

...improve visual decision-making

- Improve design review efficiency
- Improve cross-discipline collaboration
- Reduce scrap and rework
Enterprise Validation and Review

Solution Scope

MCAD VIEWING AND COLLABORATION
- Mechanical data visualization and collaboration

DOCUMENT VIEWING AND COLLABORATION
- Synchronized document reviews

ECAD VIEWING AND COLLABORATION
- Electronic data sharing and collaboration

DESIGN VALIDATION AND REVIEW
- Optimize design reviews
- Accelerate interference checking and analysis
- Enhance design checking

DIGITAL MOCKUP
- Automate interference checking and management
- Validate product designs with interactive animations

MODEL BASED ENTERPRISE
- Publish, check and visualize Model Based designs

CUSTOM VISUAL APPLICATIONS
- Create custom applications
- Re-purpose and optimize product data
- Protect product IP
EVR – Recent Highlights

Improved design reviews with stereo display

Improved interaction with touch-enabled displays and tablets

Configurable UI for specific roles

Publish embedded ITAR content into Creo View data for forced accept/decline for end users
EVR Roadmap Summary

Targeted Capabilities for Enterprise Validation and Review

- Stereo projection
- Support for Windows touch-devices
- MBD for NX
- Publishing support for MS Vision and Project
- Support for ITAR
- Local RMB customization
- Publish/View Offset Cross Sections - beta
- Usability improvements
- Virtual reality integration with Virtalis - beta

Improvement Themes under Consideration
- Collision-free path planning
- Dynamic interference detection
- Enhanced batch-mode interference checking
- Mobile: features/platforms/toolkit
- Improved graphical presentation
- Improve MBE publishing/viewing
- Role-specific viewable delivery/IPP protection

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PTC Global Quality Solution

Before
Disjointed systems to address product and process quality result in costly corrections

After
Manage quality throughout the product lifecycle to prevent issues and reuse lessons learned

An engineering solution to...

• **Plan and predict** quality early during product design and development, before issues arise
• **Establish visibility** with an enterprise-wide source for quality analysis and feedback
• **Close the loop** to resolve issues, reuse lessons learned, and improve product and process quality

...design in product and process quality

• Reduce the cost of quality by up to 3X
• Increase operating margin 25% and reduce failure costs 29% with integrated PLM and quality tools
• Reduce COPQ to increase earnings 10 – 15% with consistent, integrated quality best practices

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### Quality and Reliability Analysis (formerly Relex)
- **Design for Reliability**
  - Reliability Prediction and Simulation
  - Life Analysis & Statistical Modeling

- **Design for Service**
  - Maintenance and Cost Modeling
  - Reliability Centered Maintenance Analysis

- **Product/Process Risk Management**
  - Failure Modes Effects Analysis (FMEA)
  - Fault Tree Analysis
  - Risk Analysis

- **Test and Field FRACAS**
  - Failure Reporting Analysis and Corrective Action System (FRACAS)

### Engineering Connectivity (Multi-Platform)
- **BOM Based Quality Analysis and Validation**
  - BOM Based Quality Analysis and Validation

- **CTQ Characteristic Management**
  - CTQ Characteristic Management

- **Quality Driven Change Management**
  - Quality Driven Change Management

### Quality Management (Windchill)
- **Quality Management Foundation**
  - CAPA (closed loop)
  - Nonconformance Management
  - Complaints & Customer Feedback

- **Quality Governance**
  - Document Management
  - Management Review Reporting
Providing Quality Products

- BoM-Based Analysis and Validation: Sync PLM BoM (part data, product structure, thumbnail views) with Quality BoM
- Quality-Driven Change: Launch change in PLM from any quality tool
- CTQ characteristics: in Creo flagged in Quality
- Web-based Fault Tree
- Windchill Customer Experience Mgmt: Integrated Complaints tool
- Windchill Experienced Risk Model

Improvement Themes under Consideration
- Enterprise Product Quality: manage quality data and analyses in PLM
- Connected Failure Analysis
- Completion of QMS offering (training and audit)
- Integrated Design for Service with SLM tools

Future

Enterprise Manufacturing Quality
- Quality Planning and Risk Management

Requirement Quality
- Integrated Systems Analysis
- Quality-Driven Requirements

Critical Parameter Enhancements
- Centralized Parameter Management

Closed Loop Manufacturing Quality

Connected Test Lab Management

Supplier Quality Management including PPAP (Production Part Approval Process)
An enterprise solution to...

- **Unify** design, manufacturing planning and resources together on a single system
- **Streamline** process planning development leveraging virtual product representations
- **Optimize** manufacturing planning across products and sites

...achieve concurrent, MFG process planning

- Reduce Time-to-Manufacturing **10-50%**
- Productivity **10% increase**
- Reduced production cost via configuration-specific plans

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1 CIMdata: benefit ranges are based on PLM customer experiences
Digital Process Planning

- Associative eBOM to mBOM
- Digitally define process plans
  - Routings, sequences and operations
  - Parts and multi-level BOM allocation
  - Documents and SOPs
  - Resources and standards
- Dynamically generated 3D work instructions
- Engineering to manufacturing change propagation
- Streamline release to Manufacturing
Focus on the Process Plan
- Scalability and Usability with HTML UI
- Final Assembly Management
- Master Process Plan
- MES Integration

Focus on BOM Transformation
- Scalability and Usability with HTML UI
• Creo 3 Support

• Platform Updates
  – Cognos 10.2.1 support
  – Oracle 11 support
  – Mac OSX 10.9 support
  – Windows 8.1 support
  – IE 11 support

• Existing Module Support (not available with PTC Windchill 10.2 F000 or M010)
  – Model Manager Gateway
  – PLM Connector “Creo Packages” support
  – CAD version support updates

• Perfective Maintenance Improvements
  – Change Management
  – Part Supersede
  – “Natural” sorting in structure
  – Part attachments
  – ProjectLink “Back scheduling”
  – Security Labels intellectual property protection enhancements
  – Windchill WGM for ECAD Advanced
  – ECAD Check-in refinement
10.2 Best Performing Release Ever!

Normalized improvements in 10.2 M020 compared to 9.1 M070

- Add to Workspace (9100 objects): 22% Faster
- Initial Check In: 29% Faster
- Save As: 30% Faster
- Check In (499 objects): 25% Faster
- Check Out (499 objects): 28% Faster
- Synchronize Workspace: 64% Faster
Unite Multi-CAD Support*
- Directly Open and Assemble 3rd party CAD directly in Creo
- Eliminates need to manage additional Derived Image CAD documents
* planned for Creo 3.0 M030 with WC 10.2 M030

Improved Windchill Open in Creo dialog
- Enables Creo App selection during Open in action
- Available from Right Click menu in Folder and workspace listing

Proactive notification of out of date objects

Compatibility with Creo 3.0 F000
- Windchill 10.1 M040 - General Support
- Windchill 10.2 M020 - General Support & Support for new capabilities
### Improve Performance and User Experience

<table>
<thead>
<tr>
<th>Applet</th>
<th>Applet Use</th>
<th>Release</th>
<th>Due Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>File Upload</td>
<td></td>
<td>10.2 M020</td>
<td>5/23/2014</td>
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<tr>
<td>Calendar</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>File Attachments</td>
<td></td>
<td>10.2 M030</td>
<td>Feb 2015</td>
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<tr>
<td>Import and Export Utility</td>
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<tr>
<td>Report and Query Builder</td>
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<tr>
<td>Workflow Process &amp; Admin</td>
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<tr>
<td>Product Structure Explorer(s)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Team Admin / Policy Admin</td>
<td></td>
<td>X-26</td>
<td>2015</td>
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<tr>
<td>Manf. Product Structure Explr.</td>
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<tr>
<td>File Vault Admin</td>
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<tr>
<td>Attribute / Quality / Measure</td>
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</tbody>
</table>

**Note 1:** Some applets will remain in the product and be “signed” in a manner that complies Oracle RIA security requirements.

**Note 2:** Applets not shown here are still in the plan but lower in priority due to lower usage.
Windchill 10.2+ Release Strategy

Adoption of Industry Best Practices to Reduce Customer Effort & Risk

• Limited number of feature enhancement releases

• New “CPS” (critical patch set) releases
  – Delivered with a single patch installation
  – Fixes only, no new features

• Improved Quality

• Improved Client Interoperability
  – CPS’s used to certify new CAD tool and client component releases

PTC Windchill 10.2 FCS and later

Major Releases
• Every 12 to 18 Months

Maintenance Releases
• Fewer (2 or 3)
  • Perfective & Preventative Maintenance Releases
  • Includes defect fixes & selected features

Critical Patch Sets (CPS)
• Cumulative, Issued every 30 Days
  • Contain only significant customer fixes
  • NO feature content
Future Windchill Core Release Schedule

**Forward looking — Actual Dates Will Change**

<table>
<thead>
<tr>
<th>Code Name</th>
<th>Release Identifier</th>
<th>Projected RTM Date</th>
<th>Release Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>X-24 M030</td>
<td>10.2 M030</td>
<td>~February 2015</td>
<td>Maintenance Release Final 10.2 MR Long-term CPS support</td>
</tr>
<tr>
<td>X-26</td>
<td>10.3 F000</td>
<td>~Mid-2015</td>
<td>Minor/Point Release Resets support window Significant platform support changes Short-term CPS support</td>
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<tr>
<td>Athens</td>
<td>10.3 M010</td>
<td>CQ4 2015</td>
<td>Maintenance Release Minor platform support changes Short-term CPS support</td>
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<td>Berlin</td>
<td>TBD</td>
<td>CQ2 2016</td>
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<tr>
<td>Cairo</td>
<td>TBD</td>
<td>CQ4 2016</td>
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<td>D...</td>
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<td>CQ1 2017</td>
<td>TBD</td>
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Infrastructure/Performance Roadmap Summary

This Major Release

**Improving Administration**
- Upgrade manager run-to-completion capability.
- Type Manager Improvements
- New Bulk Loading of CAD data
- Expanded tools for rehosting and promotion of WC systems
- Improvements to Application Server Clustering
- Enhanced support for SQL Server and Oracle DB clusters
- PTC System Monitor supports WC, Integrity, Cognos, FlexPLM and Service Center

Next Major Release

**Top Priority Release Themes**
- Improved “Advanced” WC Search
- Security (hardening, authentication, vaulting)
- Applet replacement (Security)
- Expand use of PTC System Monitor in "high priority" PDS Products
- Integrated QueryBuilder & ReportBuilder
- WC Performance

Future Direction

**Improvement Themes**
- Type Manager Capabilities
- Windchill Common Data Exchange
- New Archive Service
- Replace More Applets
- Standards-based data exchange capabilities
- System Validation Framework

Available Today

CY14