



# PLM and ALM Getting Together

Pascal Vera – Siemens PLM

Stefano Rizzo – Polarion Software

# Presenter Background

## Pascal Vera – Siemens PLM Teamcenter Product Management

- Leading Systems Engineering and Mechatronics product initiatives and strategic planning at Siemens PLM
- 20+ years experience in electronics and embedded systems across different industries
- Holding a doctoral degree in industrial computer engineering

### **Philosophy and Focus:**

Mastering complexity to increase innovation while decreasing risk



# Presenter Background

## Stefano Rizzo - SVP Strategy and Business Development

- Responsible of long term Vision and Product Strategy. Corporate spokesperson.
- Academic, technical and sales background. First Product Manager at Polarion Software up to 2010.
- Doctor of Computer Science, University of Genoa, Italy

### **Philosophy:**

What's next?



# Why ALM and PLM get together

# Automotive

CNET / Google joins with GM, Honda, Audi for Android-powered ...

## Google joins with GM, Honda, Audi for Android-powered cars

An expected auto alliance backing Google's OS is unexpectedly broad with the arrival of the world's largest carmaker. The first Android vehicles will arrive this year.



## CES 2014: BMW shows off 'drifting' self-drive cars



BMW's promotional video of its latest autonomous driving technology

BMW has shown off self-driving cars that can "drift" around bends and slalom between cones.



# Aerospace and defense

- Rise in unmanned aircraft for both Military and Commercial activities leads to increase software and embedded systems complexity...

## Inside Google's Secret Drone-Delivery Program

For two years, the company has been working to build flying robots that can deliver products across a city in a minute or two. *An Atlantic exclusive.*

ALEXIS C. MADRIGAL | AUG 28 2014, 6:00 PM ET

Project Wing Test Footage



2,197

Tweet

870

Share

More

00:00 00:22 AUTO

## US Navy trials Rolls-Royce powered surveillance UAV

25 September 2014



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**Rolls-Royce has powered the successful cross-country flight of MQ-4C Triton, a new unmanned aircraft system built for the US Navy.**

A Rolls-Royce AE 3007H turbofan engine powered the 11-hour flight from prime contractor Northrop Grumman's Palmdale facility in California to Naval Air Station Patuxent River, Maryland where the aircraft will be fitted with a sensor suite.



# Heavy equipment

Self-driving Agricultural Vehicle increases farm output and efficiency.



## From precision farming to autonomous farming: How commodity technologies enable revolutionary impact

by Jeremy H. Brown

Environment&Agriculture Views

November 11, 2013

The popular conception of farming as low-tech is woefully out of date. Modern farmers are high-tech operators: They use GIS software to plan their fields, GPS to guide field operations, and auto-steer systems to make tractors follow that GPS guidance without human hands. Given this technology foundation, the transition to full autonomy is already in progress, leveraging commodity parts and advanced software to get there more quickly than is possible in many other domains.

This article outlines some of the key technologies that enable autonomous farming, using the Kinze Autonomous Grain Harvesting System as a case study.





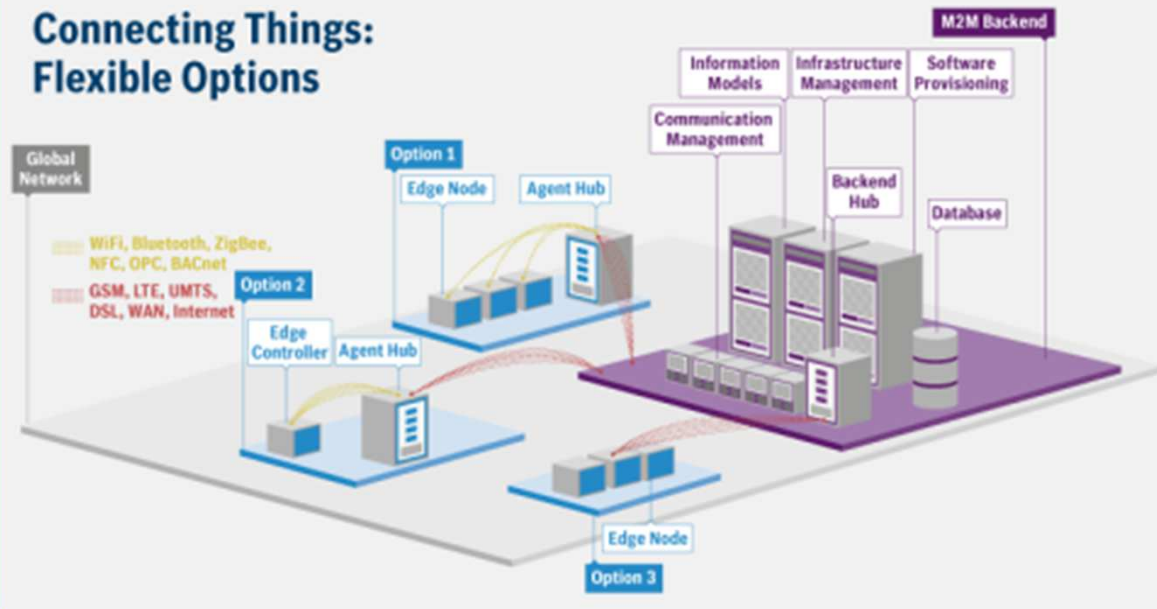
# Consumer products

Smart hardware and domestic appliances all controlled by Internet connected Apps...

## Device Management (M2M)



## Connecting Things: Flexible Options



ation of the internet. By  
 ators, machines and other  
 le new world of business  
 es to increase the comfort of  
 o the virtual world of the internet,  
 enables companies to create new  
 easier and more secure.  
 device management (M2M) but  
 ge of applications and market

Contact EMEA



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# Electronics and software



Google – Nests:

- Internet of Things starts to become a reality...





**Internet of Things**



**New Markets for Software** (wearable, connected)



**Product Differentiation through Intelligent Features**



**Compliance with Evolving Regulations**



**Mass Customization**



**Continuous Innovation**



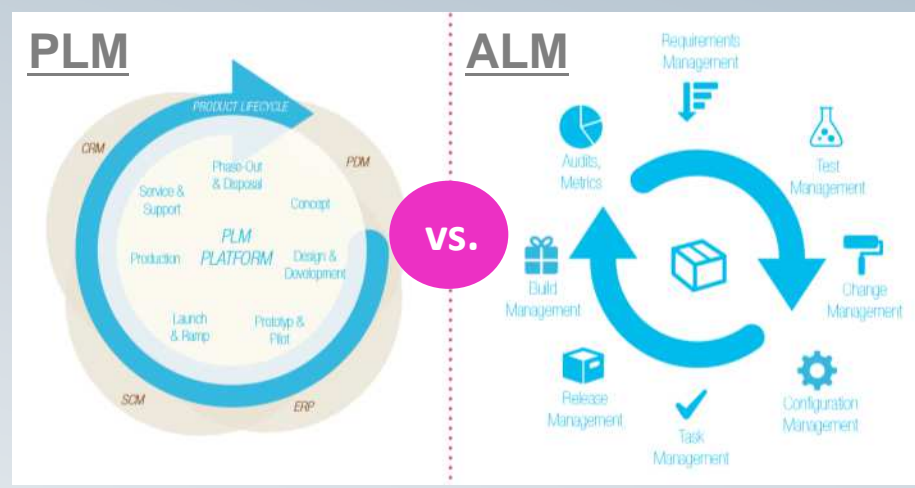
# Wishes

- **Avoid putting faulty products on the market**
- **Global corporations need to optimize their processes and tools**
- **Reduction of the cost of new product introduction**



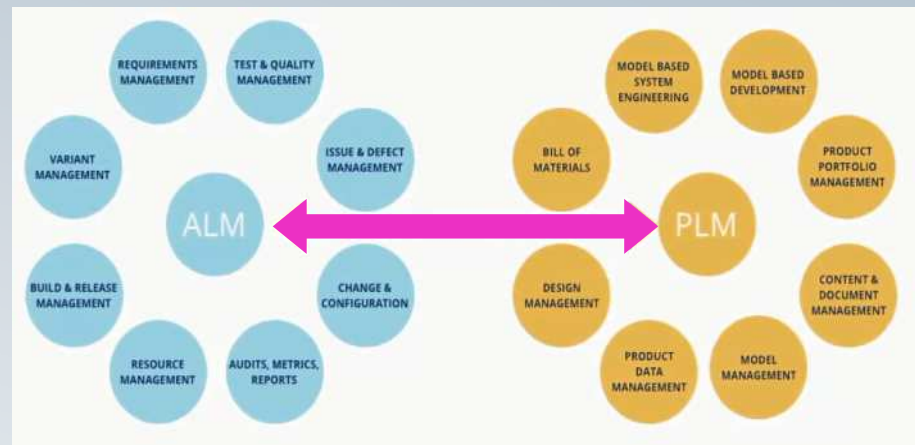
## TODAY

- In the past ALM and PLM have been operating in isolation
- This has compromised product quality and delivery



## FUTURE

- Siemens and Polarion believe PLM and ALM must work in unison to address today's product development demands

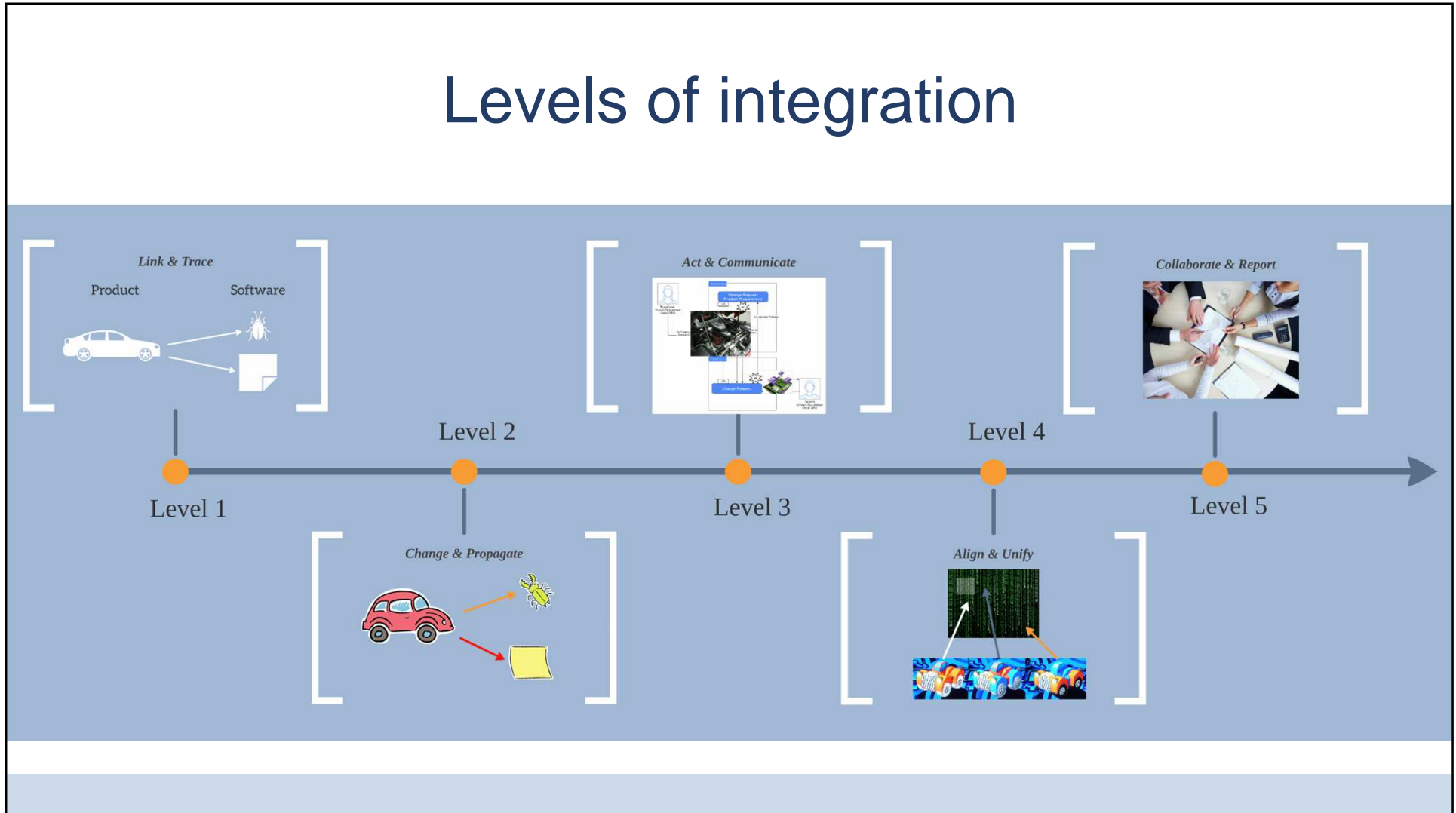


## Business benefits of ALM-PLM integration

- Visibility across all assets
  - Improve search and locate information
- Accurately link firmware with hardware
  - Avoid errors, avoid damage costs, avoid reputation risk
- Traceability of assets for engineers in all lifecycle phases
  - Reduce time wasted
  - Enable effective collaboration across globally distributed units
- Support maintenance, repair, & operations (MRO):
  - Quickly locate parts and manage defect fixes
  - Reduce inoperative time of broken products



# Levels of integration



# Polarion & Siemens



# \$10M Capital Investment

“We took our time to thoroughly investigate the ALM market; and in every analysis, **Polarion showed up as the number one provider** in its category. We look forward to working with Polarion Software to accelerate penetration of the company’s technology across large, distributed teams and enterprises worldwide.”

**SIEMENS**

- Ralf Schnell, CEO,  
*Siemens Venture Capital*



# Foundation Agreement

“Siemens PLM Software is committed to creating partnerships to help enhance the end-user experience of our customers. We are pleased to work with Polarion Software to **provide open, integrated solutions that improve the productivity of our mutual customers**. The partnership addresses the pressing need for integration across enterprises in industries including automotive, medical devices, electronic engineering, manufacturing and aerospace, and we look forward to working with Polarion Software to **bring value** to large, distributed teams and enterprises worldwide. ”

**SIEMENS**

- Eric Sterling, SVP Lifecycle Collaboration Software,  
Siemens PLM Software



# What Market Analysts Think



“Polarion has a first-class ALM solution... In the near future we expect Siemens to be able to offer an **integrated ALM–PLM solution to address the current needs of software engineers**, and the choice of Polarion is a good one”

*Michael Azoff, Principal Analyst, Ovum*



## What Customers Think



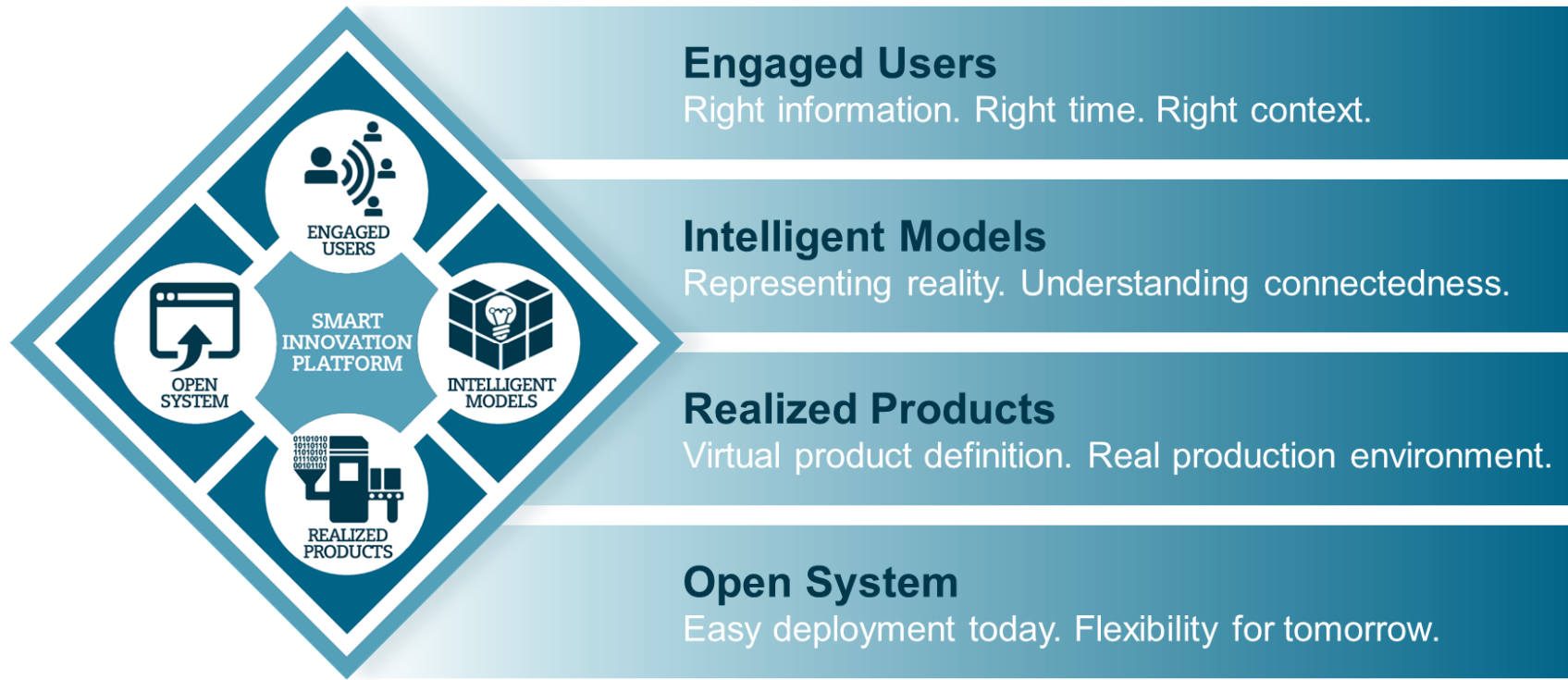
“This is great news that **we’ve been hoping for** ever since we started using both Teamcenter and Polarion. The integration of software and product development processes will allow us to achieve a much better use of our tools and resources and **help our teams bring innovative products to market at a much faster pace.**”

*Edoardo Sivera, System Integration Team Leader, CNHi*



# Siemens PLM Software Systems Driven Product Development

# The Role of Siemens PLM Software: Delivering the Smart Innovation Platform



# System Performance Engineering

## Ex.: Balance Fuel Economy and “Brand” Performance

Eco-Driven Powertrain Concepts



Innovative and Lightweight Design



Creating Brand Value via Performance



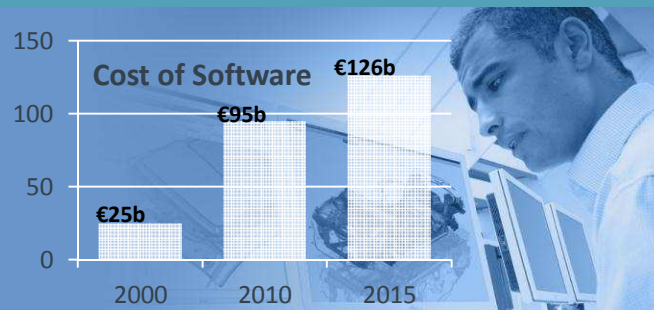
Creating Brand Value through Systems





# Embedded Systems Control Complexity and Manage Risks

Dramatic Growth of Electronics Systems



Exploding Requirements and Test Cases



Multiple Variants and System Architectures



Multiple Sites, Multiple Participants

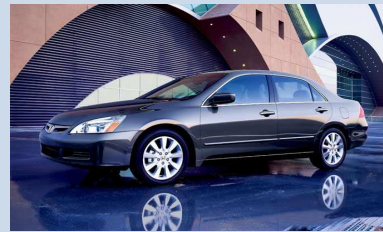


# Every Business Is A Software Business...



*Another manufacturer recalled 160,000 cars with hybrid engines due to a failure of its engine control software.*

*--McKinsey, The Detroit News*



*One Japanese manufacturer recalls 81,000 sedans due to a sensor failure causing the air bag system to default to the fully deployed position, regardless of seat position – CNN*

Embedded/IoT



Mobile

Enterprise/Web IT

**“Software is eating the world”**

*Marc Andreessen, Aug 2011*

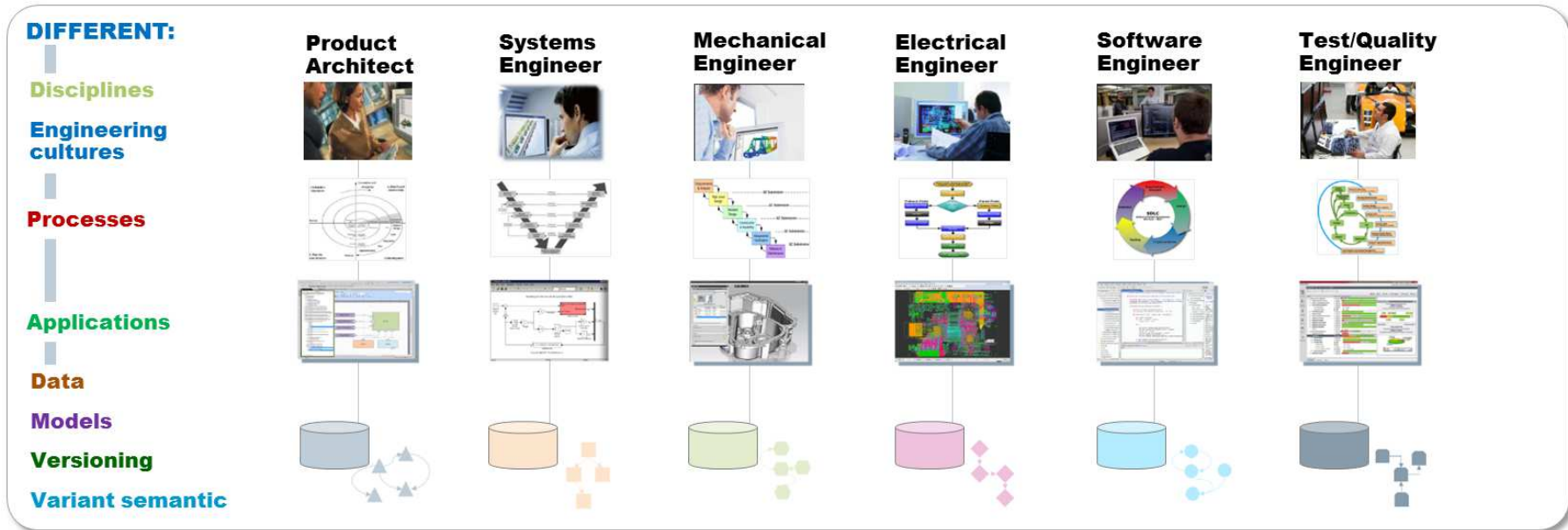


*Segway is recalling all of its high-tech electric scooters because a SW glitch has caused riders to fall off and break teeth and wrists. The problem is fixed by a 15 minute software upgrade...*

**– USA TODAY**



# High heterogeneity between applications ...It isn't just about linking data



- Comprehend complete product definition
- Cross-domain artifact relationships
- Configure data and variants across areas
- Identify cross-impact of changes
- Coordinate planning
- Orchestrate processes
- Complete traceability
- Consistent versioning



# ALM-PLM

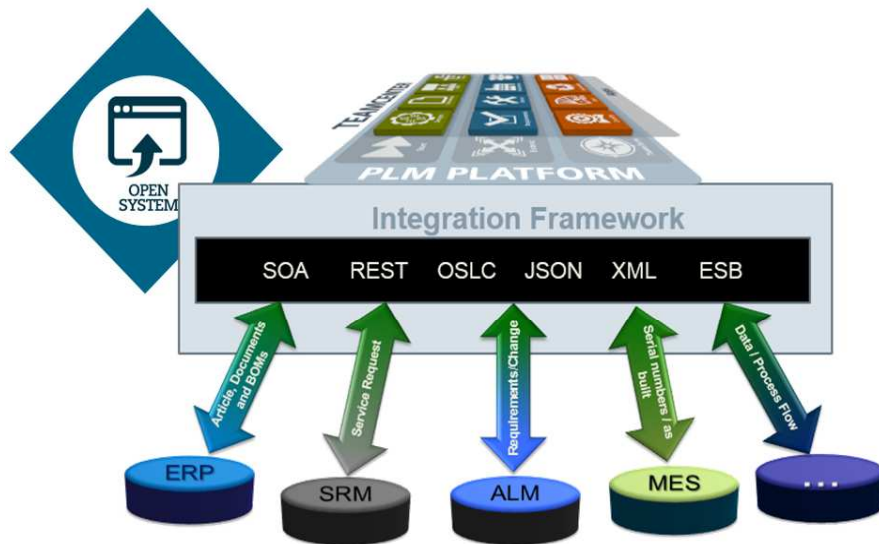
## Taking Care of the User Experience

- Don't migrate, duplicate or even aggregate data from applications but maintain meaningful relationships across these data enabling configuration and view points
- Don't force the engineers to migrate to PLM concepts that are meaningless for their domain but automatically create correspondences that are relevant for their domain
- Don't migrate local engineering workflows but orchestrate the workflows
- Don't imply switching tools but provide the required data and relationship authoring/viewing functions to the engineers from their applications
- Don't overwhelm engineers with data irrelevant to them but expose personalized and immediately relevant product content for their domain
- Don't suggest to manually create and maintain the million relationships between artifacts but capture and automatically create relationships along engineering activities



# Openness and Integration Capability

## A Common Framework for Integrating Multiple Engineering Applications

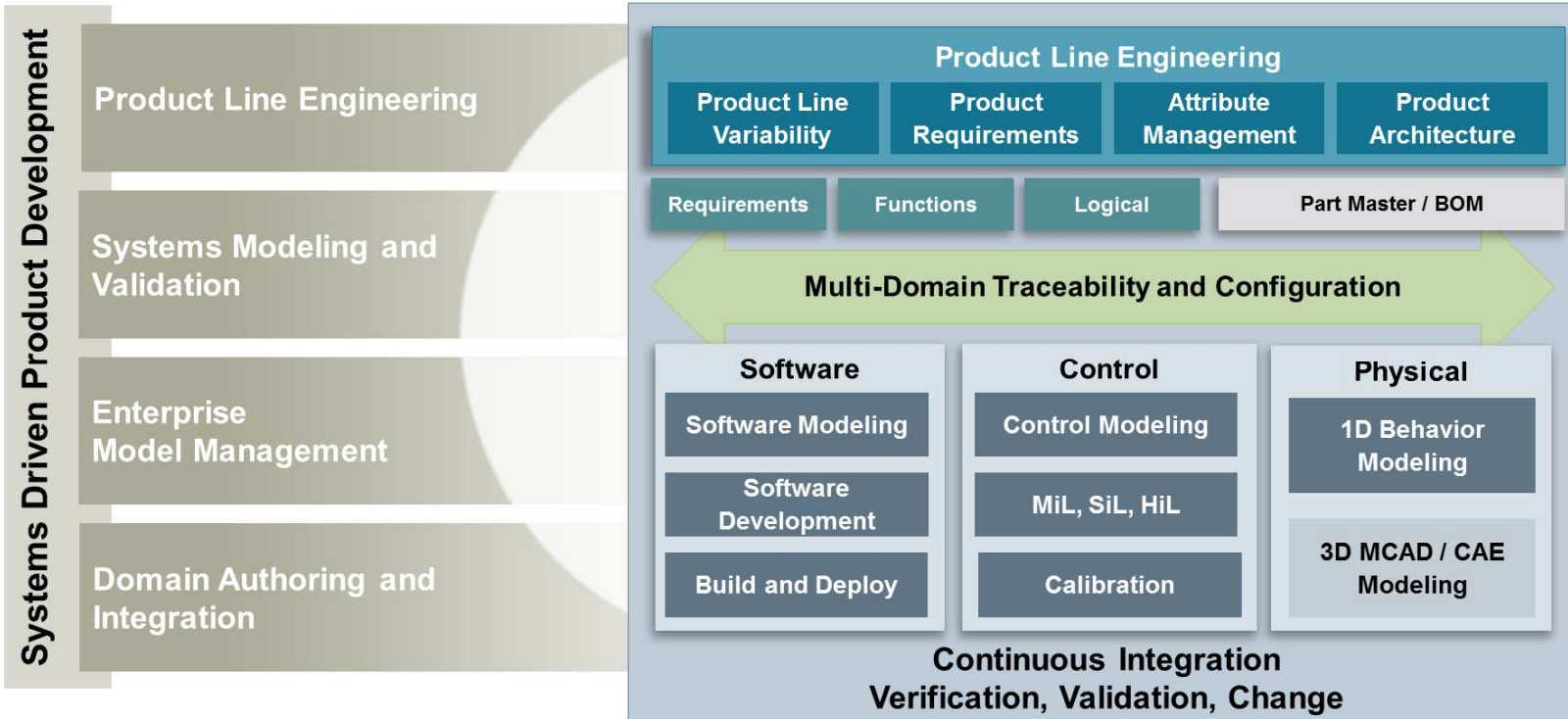


- Avoid point-to-point integration
- Common messaging framework
- Common data communication and transformation capabilities
- Common orchestration and mediation platform
- Use standard frameworks such as SOA, REST, OSLC, JSON, and XML
- Reduces cost of ownership and maintenance of integrations





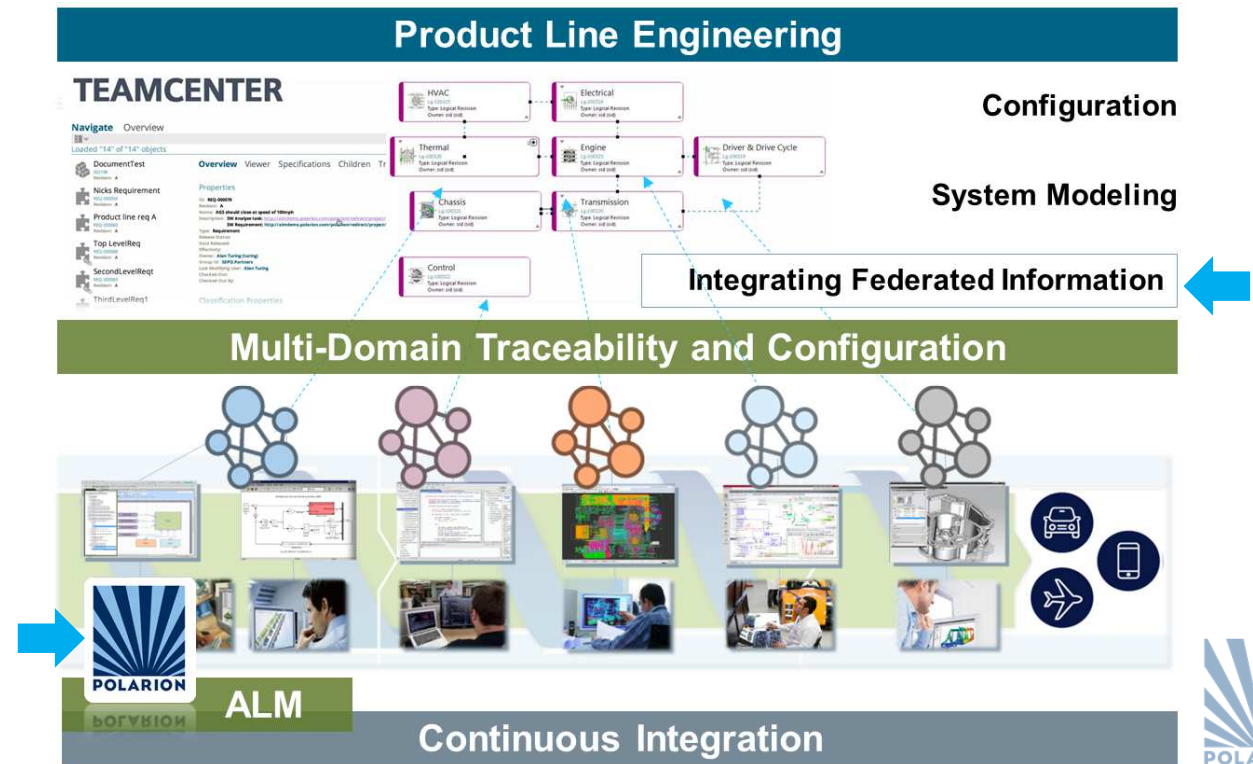
# Systems Driven Product Development Solution Framework



# ALM within Systems Driven Product Development

## MULTI-DOMAIN:

- Governance guided by valid product configurations
- Change Management
- Decision making
- Continuous integration
- Closed-loop validation





# Teamcenter PLM and Polarion ALM Together

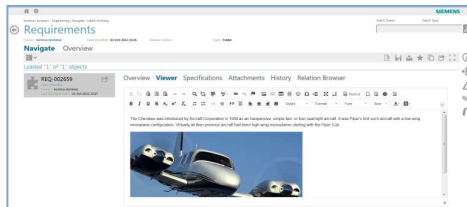
Value points and key use cases

# Polarion ALM – Teamcenter Integration 1.0 GA

## Integrated Requirement Management

### TEAMCENTER

#### Product Requirements



- Bidirectional referencing of SW and product requirements
- Access to product requirements from ALM
- Access to software requirements from PLM
- Product and Software requirements automated traceability



#### Software Requirements

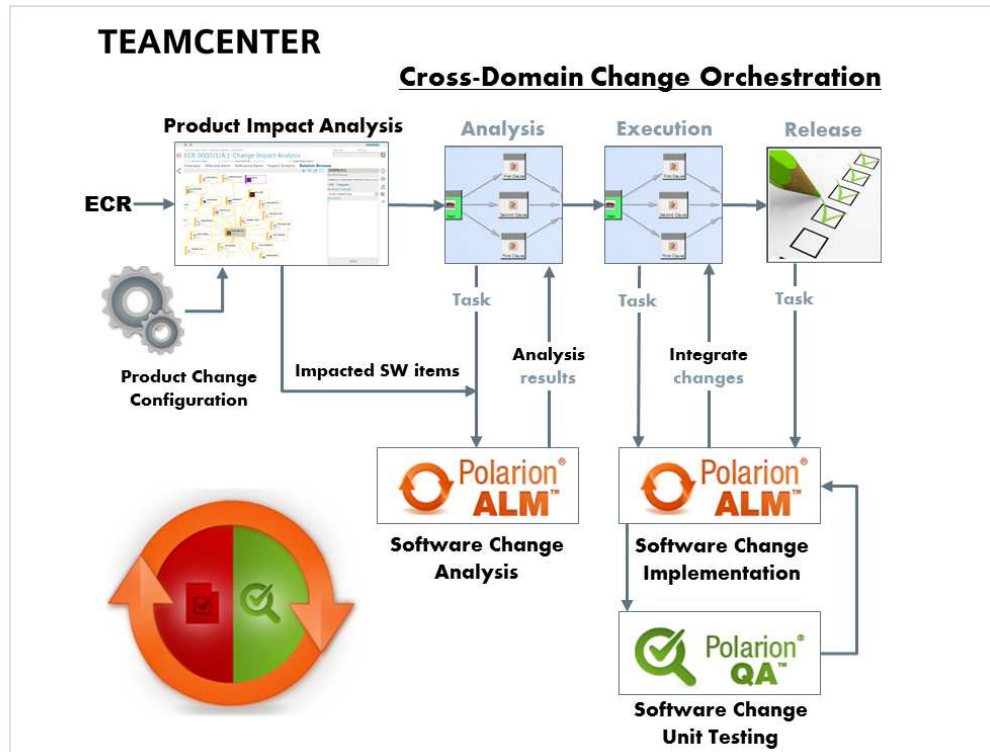


- Ensure and track that SW requirements satisfy product requirements and vice-versa
- Enable SW Engineers to derive product requirements in SW requirements from their ALM environment
- Both PLM and ALM have access to requirements full traceability (i.e.: as needed for change impact analysis)
- Automatically create and maintain mapping
- Enable traversing traceability beyond requirements



# Polarion ALM – Teamcenter Integration 1.0 GA

## Integrated Software Change Management

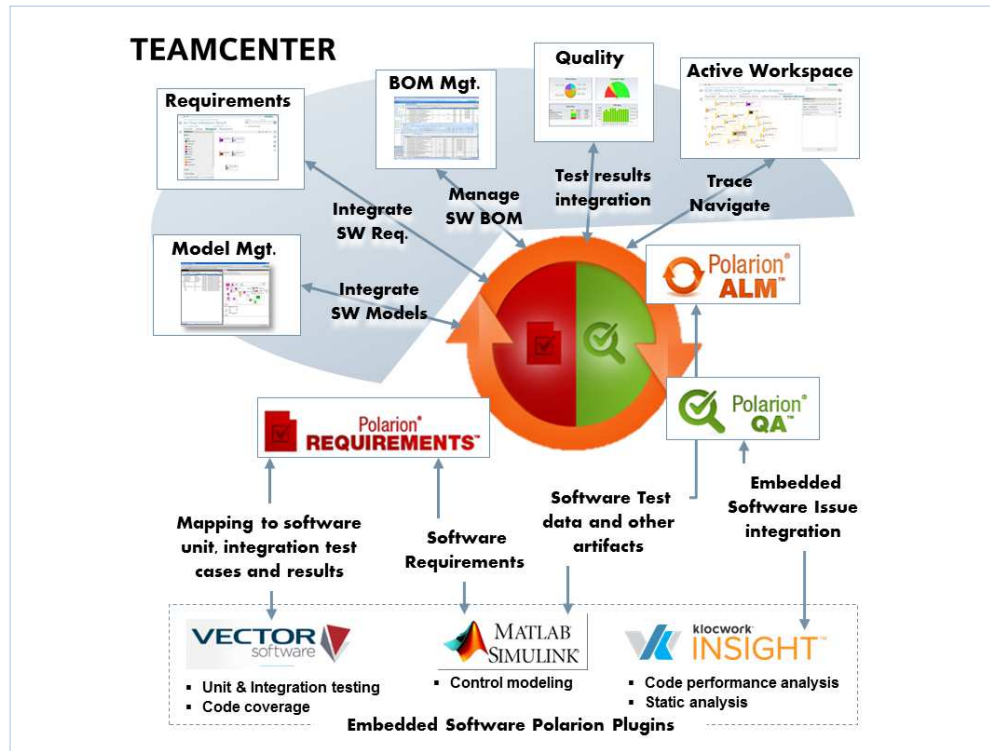


- Ensure complete and accurate software changes
- Orchestrate Software and Product change workflows
- Expose in ALM the impact of Software changes to Product before executing changes
- Consolidate Software change analysis for accurate Product change decisions
- Integrate Software changes from ALM into Product
- Traceability of PR, CR, CN, tasks with Software and Product resulting changes



# Polarion ALM – Teamcenter Integration 1.0 GA

## Closed-Loop Embedded Systems and Software

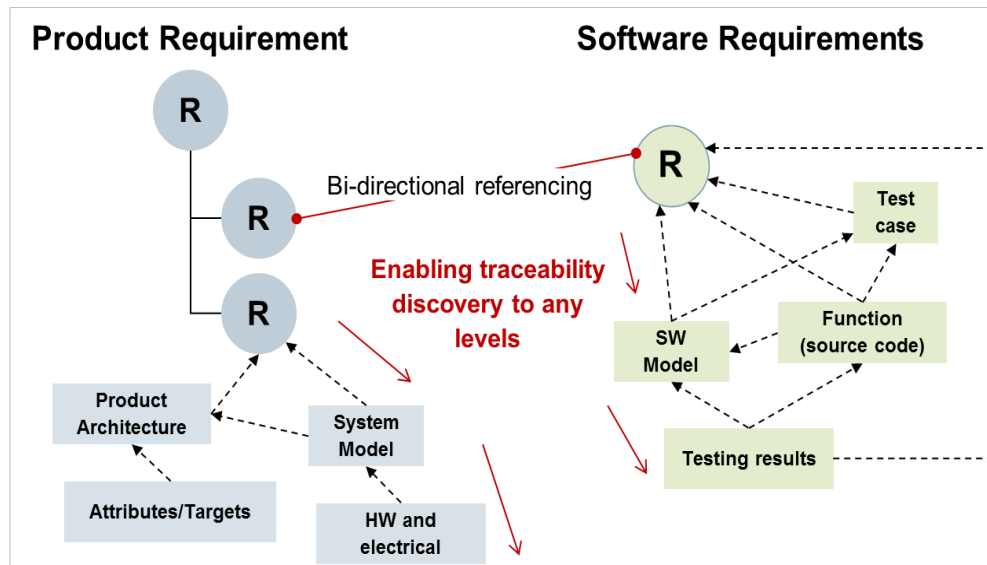


- Integrating SW engineering into PLM cycles
- Complete traceability from requirements to software deliveries, going through models and test data
- ALM tight integration with MBSE process and HW
- Manage Software deliveries as BOMs for product lifetime
- Expose product level data into ALM environment and ALM data to PLM environment
- Integrate software test and quality results for accurate product target assessment



# Polarion ALM – Teamcenter Integration 1.0 GA

## Enabling traceability discovery to all levels



- Traceability based on Remote References - No duplication of data in either PLM or ALM
- Through RDF offer configured data traversal on either end
- Seamless user experience
- The potential of RDF triple store for semantic indexing



# Key Takeaways

## How is it different than what others have made before?

- The first-ever software engineering data and process integration with product lifecycle to provide consistent configuration of multi-domain data
- There are probably niche-tools somewhere that can possibly do better in some areas....BUT from any other vendors you will not find an end-to-end PLM-ALM integrated vision that also encompasses embedded software and MBSE aspects
- It comes with a large set of other capabilities and other integrations you can incrementally adopt at your speed and per your business priorities

***Take advantage of now integrated market recognized  
best-in-class PLM and ALM solutions***



# Benefits

## Productivity

Software development closed-loop with Product Lifecycle Management from Inception to EOL

## Quality

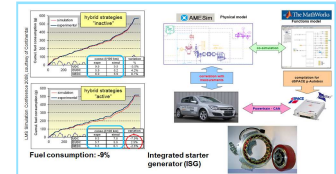
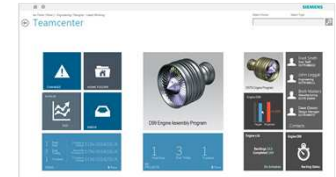
Part of MBSE for continuous software validation  
Leverage modeling & simulation capability

## Cost

Right first time software deliveries and reuse  
Optimize software design decisions in context of overall products

## Scalability

Proven Enterprise infrastructure  
Very minimal changes in your organizations

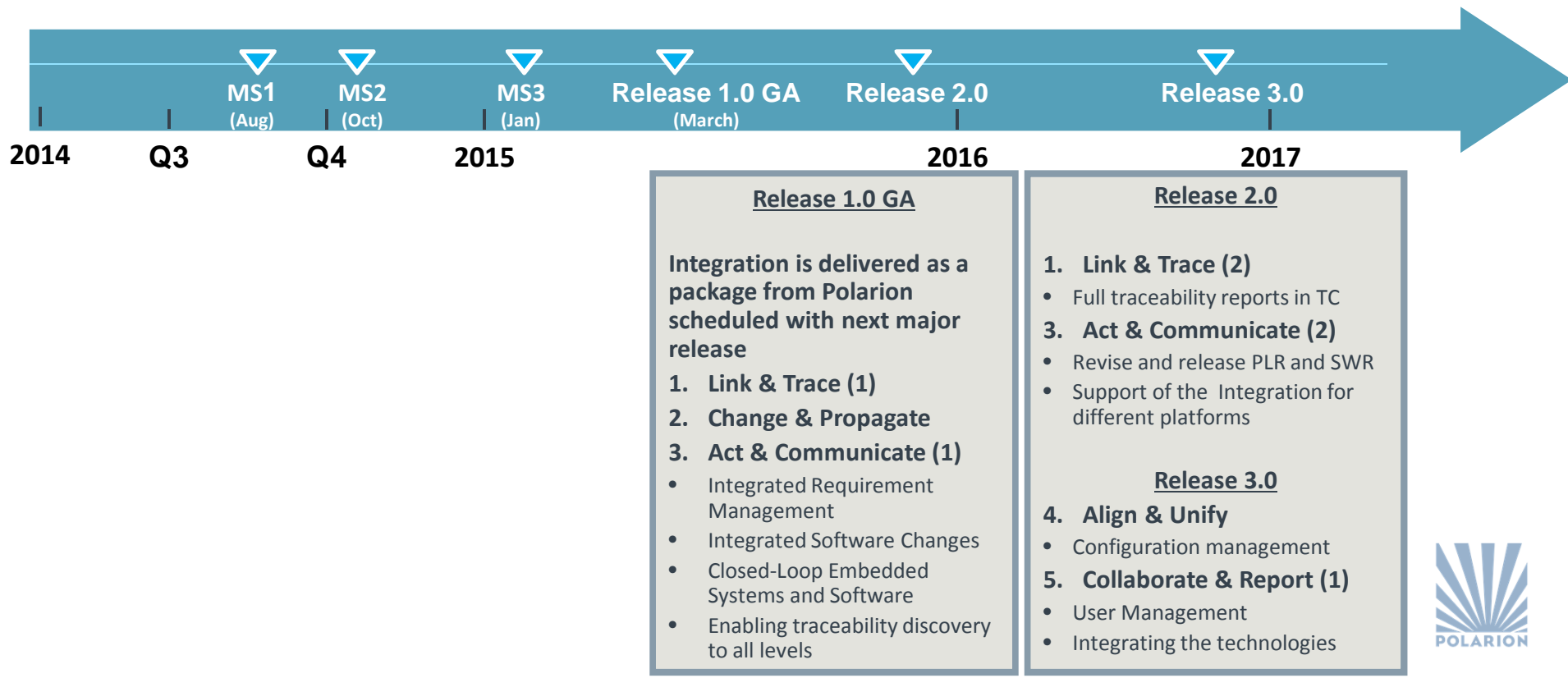




# Roadmap

# Roadmap

Integration based on Teamcenter 10.1.2 onward



Questions?

A graphic consisting of a white circle centered on a blue background. The blue background is divided into two horizontal sections: a lighter blue top section and a darker blue bottom section. The white circle overlaps the top section. The text "Thank you." is written in a dark blue, sans-serif font across the center of the white circle.

Thank you.

