

# PTC® Live Global

## PTC 213 - Introducing Model-Based Systems Engineering

**Hedley Apperly**  
VP Solution Management

June 2015



## Introducing Model-Based Systems Engineering

PTC® Live  
Global

### Agenda

- Systems Engineering Challenges
- The PTC Model-Based Systems Engineering Solution
- PTC Integrity Modeler Demonstration
- Latest PTC Innovations
- Potential Model-Based Systems Engineering Benefits



## Agenda

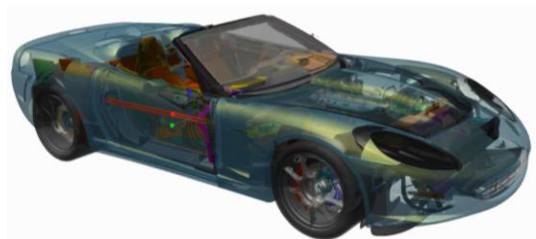
- **Systems Engineering Challenges**
- The PTC Model-Based Systems Engineering Solution
- PTC Integrity Modeler Demonstration
- Latest PTC Innovations
- Potential Model-Based Systems Engineering Benefits

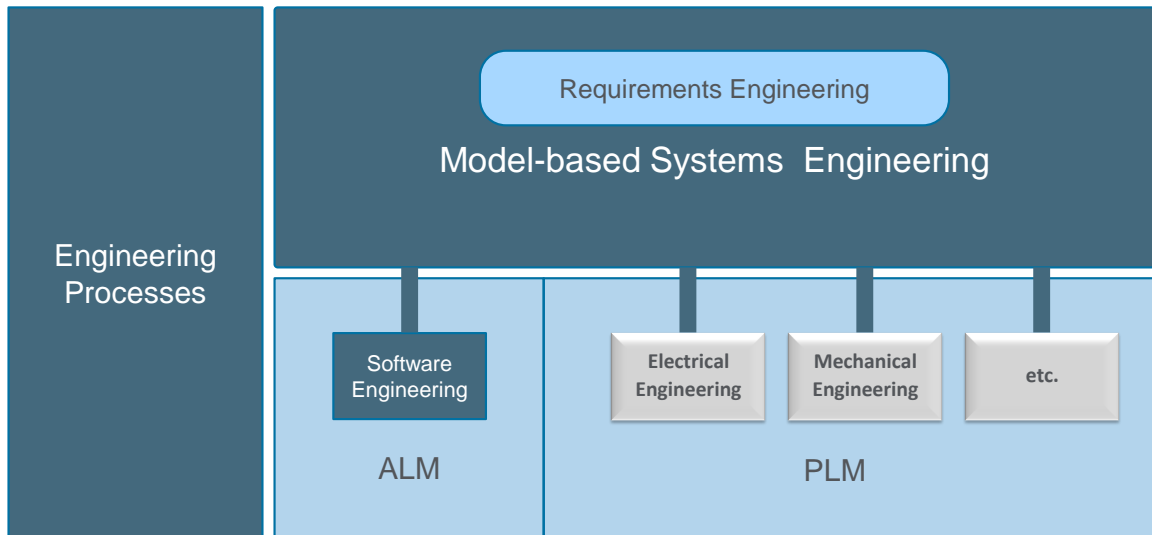


## Systems Engineering Challenges

### Smart connected systems & products

- **Growing complexity & functionality of systems & software**
  - Allocating systems functions to many engineering disciplines
  - Larger share of a products cost & capability is software
  - System & sub-system Integration
  - Customer, certification, regulation & standards compliance needs
- **Larger, more distributed & distinct discipline teams**
  - Communication language barriers & collaboration
  - Implementing common, architected Goals
- **Increasing time pressures**
  - Shorter development cycles
  - Delivering on schedule
- **Quality assurance**
  - Risk of building the wrong system
  - Increased costs of later stage errors
- **Cost & risk reduction demands**





5

## Agenda

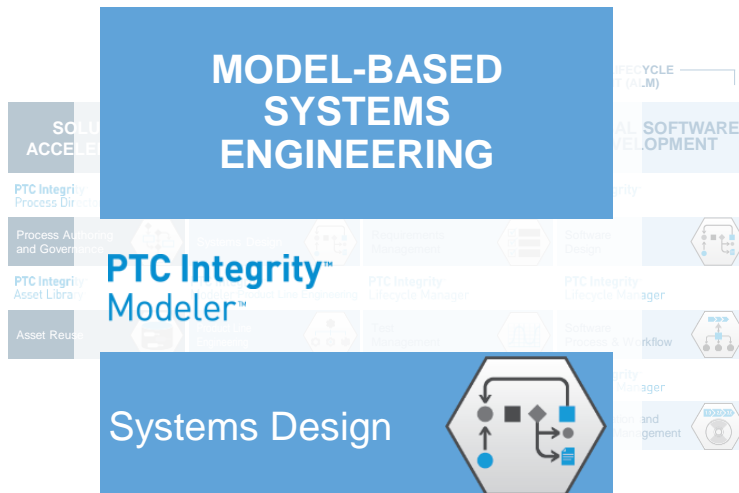
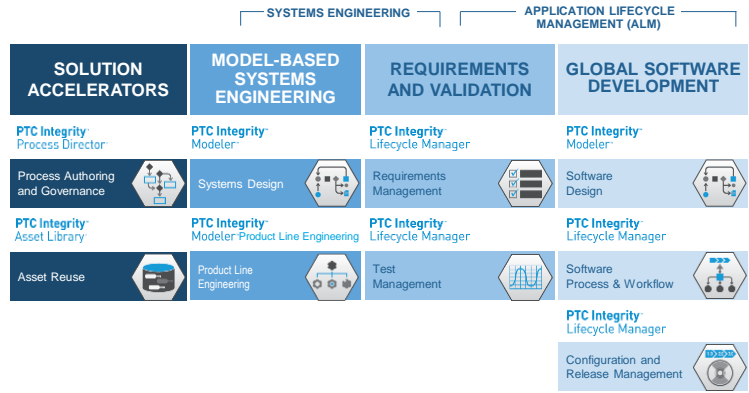
- Systems Engineering Challenges
- The PTC Model-Based Systems Engineering Solution
- Latest PTC Innovations
- PTC Integrity Modeler Demonstration
- Potential Model-Based Systems Engineering Benefits



6

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.



Design before you build

- Standard based graphical modelling
  - Common language
    - Improves understanding
    - Facilitates collaboration
    - Achieves stakeholder buy in
- Systems engineering process automation
  - Abstract designs to review, finding problems earlier
  - Traceability from requirements through models to system
  - Enables Rapid Prototyping, Simulation & Trade Studies
- Reduces the total cost of systems engineering
  - Reduce learning curve & cost with an industry standard language
  - Capture system design IP to reduce risks & retain value
  - Optimized allocation to mechanical, electrical & software engineering
  - Design & build the right systems, right



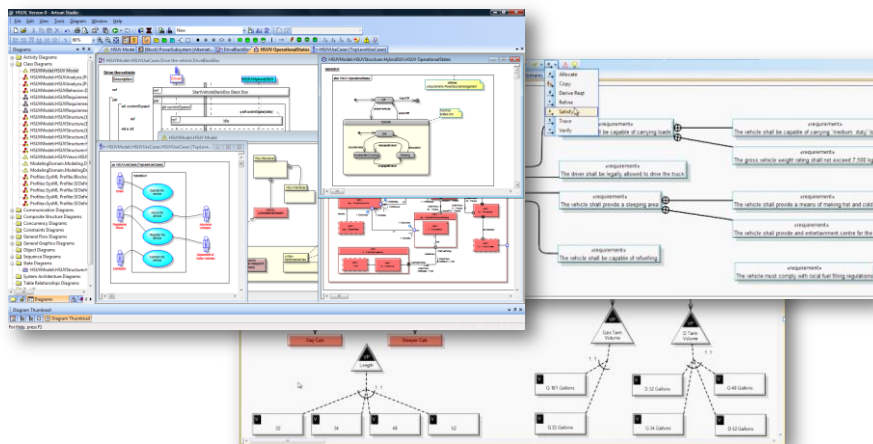
## PTC Integrity<sup>™</sup> Modeler<sup>™</sup>

### PTC Integrity Modeler

#### CAPABILITIES

- Model-based systems engineering (MBSE) with SysML
- Model-based software engineering with UML
- Integrated product line variation modeling
- Fully associative modeling linking all model elements

All the design facilities you need to produce high quality systems and software efficiently and quickly



#### BENEFITS

Design Before You Build

Find Problems Early

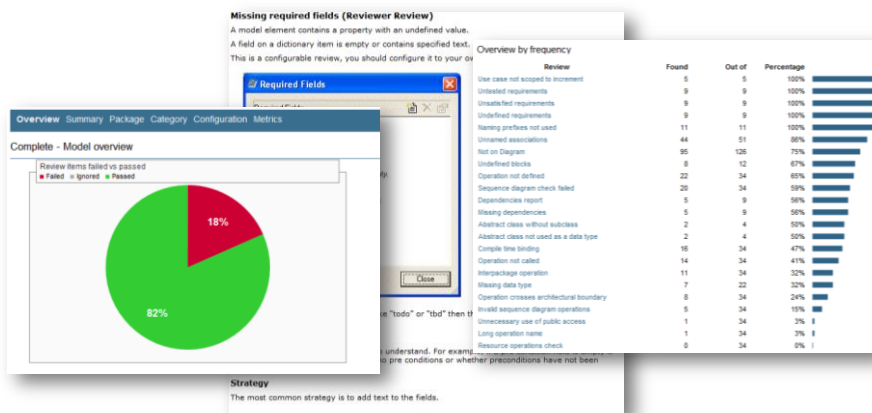
Achieve Stakeholder Buy-in

Trade-off Optimization

## CAPABILITIES

- 100+ out-of-box Model Reviews
- Browser Look & Feel
- Summary & Details
- Fix-it Features
- Active Mentoring
- Modeling Standards

Access on-demand mentoring and quality analysis for higher quality models and more resilient designs



## BENEFITS

Improved Quality through Early Design Review and Consistency

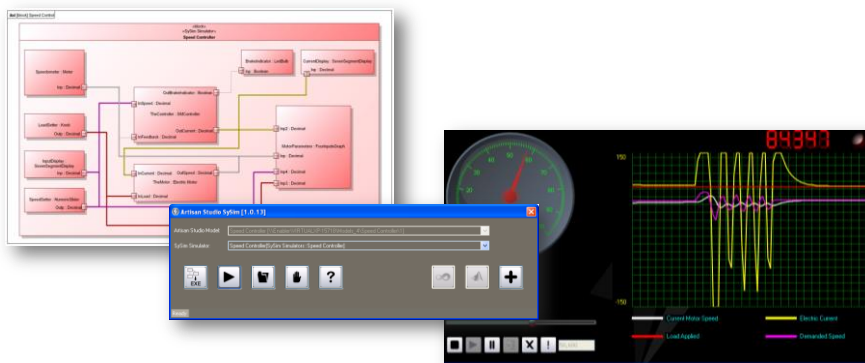
Bring Systems to Market Faster with Automated Error Checking

Cost Reductions from Predefine Reviews & Active Mentoring

## CAPABILITIES

- Visually Simulate SysML models
- Store simulation information within system model blocks
- Drag and Play Simulation
- Connect to third-party simulators (MATLAB Simulink, etc.)

Simulate the behavior of models to visually validate design ideas and improve model quality



## BENEFITS

Validate complex behavior early

Project cost reduction

Reduce design walkthrough efforts

Reduce design errors

### Agenda

- Systems Engineering Challenges
- The PTC Model-Based Systems Engineering Solution
- PTC Integrity Modeler Demonstration
- Latest PTC Innovations
- Potential Model-Based Systems Engineering Benefits



# PTC Integrity Modeler Demonstration

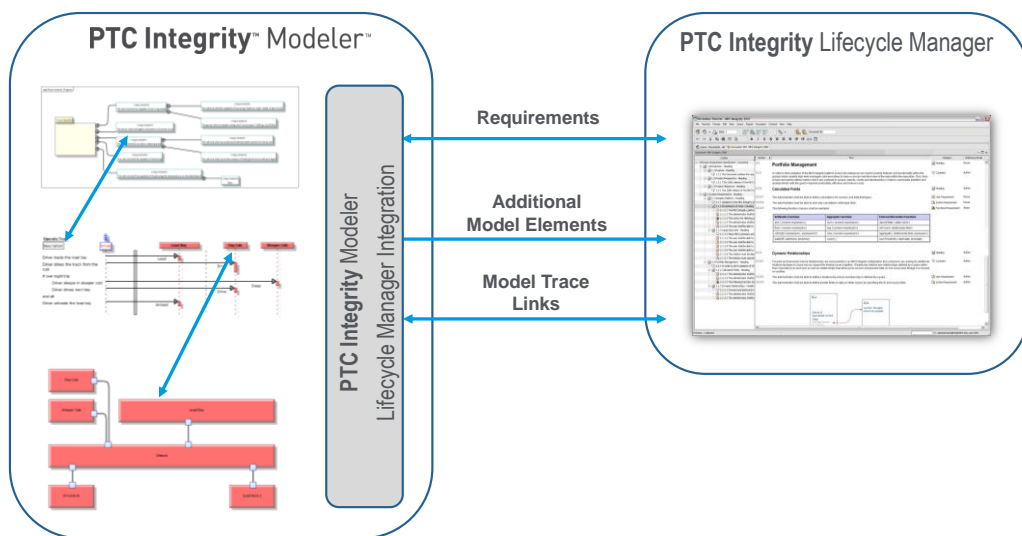


## Agenda

- Systems Engineering Challenges
- The PTC Model-Based Systems Engineering Solution
- PTC Integrity Modeler Demonstration
- Latest PTC Innovations
- Potential Model-Based Systems Engineering Benefits



## PTC Integrity Lifecycle Manager integration





## Benefits

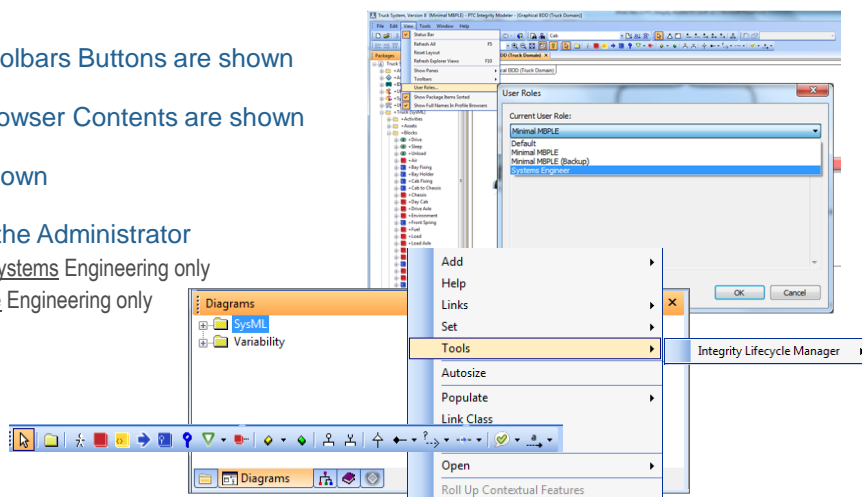
- **Requirements Driven Design**
  - Integrity Lifecycle Manager requirements as a Starting Point for Integrity Modeler designs
  - Powerful textual requirement authoring & editing
  - Include model trace links in Integrity Lifecycle Manager for full lifecycle traceability
- **Model Driven Requirements**
  - Graphical requirements modeling
  - Requirements Workshops & Brainstorming
  - Requirements in System Context of Actors & Connected Systems
- **Flexible Requirement Creation & Authoring**
  - Use the appropriate tool for the job
  - Improves Quality & Productivity



# PTC Integrity Modeler 8.2 – Role-based User Interface Simplification

Objective; Simplify the Modeler UI to show only the things you need to get your job done

- **User Roles are selected by the User**
  - Can be changed at any time
- **Define which Toolbars & Toolbars Buttons are shown**
- **Define which Browser & Browser Contents are shown**
- **Define which Menus are shown**
- **User Roles are defined by the Administrator**
  - For example, Model-based Systems Engineering only
  - Or Model-based Product Line Engineering only



## Benefits

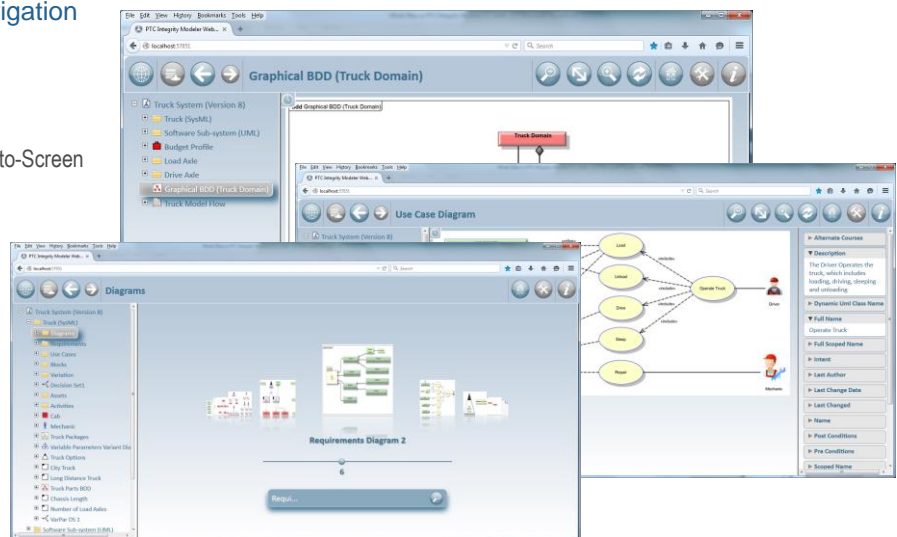
- **Dramatic Simplification of the powerful PTC Integrity Modeler user interface**
  - Shorter learning curve for new recruits
  - Uncluttered UI for new system/software designers
  - Easier for new PTC Integrity Modeler users to understand
- **Role Based user interface**
  - Just the tools you need for your job
  - Quickly swap between roles
- **Modeling Governance**
  - Remove unwanted PTC Integrity Modeler features
  - Ensure consistent tool use



# PTC Integrity Modeler 8.2 - Web Interface

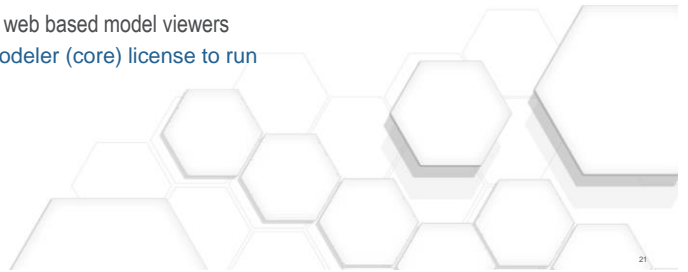
Objective; Provide web-based, live model view access to people who don't have PTC Integrity Modeler installed

- **Repository & Model Navigation**
- **Browse & Search**
- **Diagram Views**
  - Zoom-In, Zoom-Out & Fit-to-Screen
- **Property Views**
  - Diagram Properties
  - Model Item Properties



### Benefits

- **Simple**
  - Access your current models, with no export or additional tasks
- **Distributed**
  - Wide web access to your models for everyone who can benefit from them
- **Current**
  - Latest models are always available and up to date
- **Cost Effective**
  - One Modeler (core) license is used for any number of web based model viewers
    - i.e. a Modeler web server takes a single Modeler (core) license to run

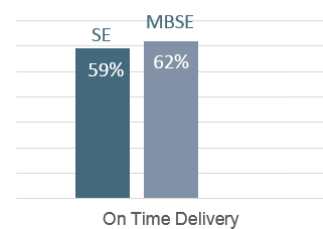
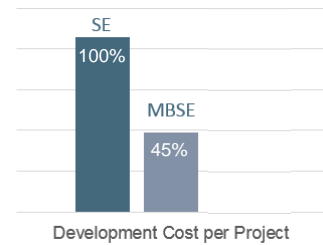


### Agenda

- Systems Engineering Challenges
- The PTC Model-Based Systems Engineering Solution
- PTC Integrity Modeler Demonstration
- Latest PTC Innovations
- Potential Model-Based Systems Engineering Benefits



- Common language, improving stakeholder communication and buy-in
- Whole system visualization to reduce complexity
- Design alternative exploration with tangible tradeoff analysis
- Problem identification during design, when less expensive to fix
- Optimal function allocation to engineering disciplines



\* EMF Survey, based on 667 respondents

23

- Your feedback is valuable
- Don't miss out on the chance to provide your feedback
- Gain a chance to win an instant prize!
- Complete your session evaluation now

24

# PTC<sup>®</sup> Live Global

PTC<sup>®</sup> PRODUCT & SERVICE  
ADVANTAGE<sup>™</sup>