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DIGITAL TRANSFORMS PHYSICAL

PTC APPLICATION LIFECYCLE MANAGEMENT

Dr. Mete Ömerali
Yönetici, Çözüm Danışmanlığı – Gelişen Pazarlar

20 Ekim 2023

METE ÖMERALİ, PH.D.

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Web: www.meteomerali.com

Education

- BSc in Computer Engineering – 2008 (Turkey)
- MSc in Software Engineering & Project Management - 2011 (Sweden)
- PhD in Management Engineering - 2022 (Turkey)

Career

- PTC - GSO Consultant in Nordics (Sweden) – 2011-2014
- PTC - Technical Area Manager – 2014 - …

Hobbies & Achivements

- Cross-Continental Swimmer (Europe - Asia)

AT A GLANCE

Fast Facts

35+ Years
Heritage of Innovation

~$14.5B
Market Cap

~6.5K
Employees

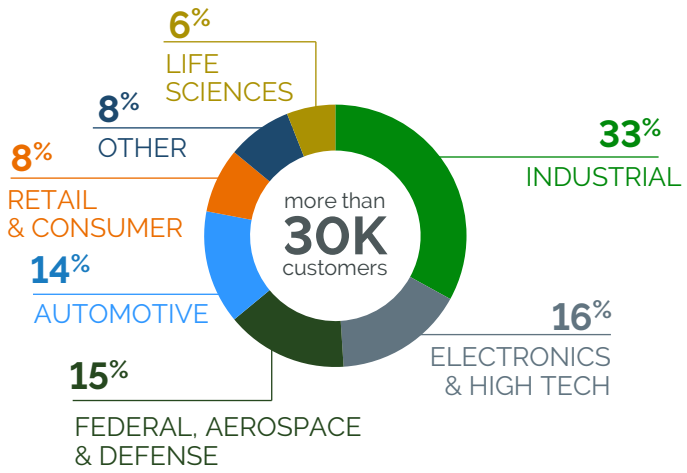
$1.6B
FY'22 ARR

$1.9B
FY'22 Revenue

Global Operations

~25% to 30% from partners

Customer Base



Business Transformation

CAD > ALM > PLM > IoT > SLM > AR

SaaS

POWER TO CREATE

YOU CAN'T GO A SINGLE DAY WITHOUT ENCOUNTERING A PRODUCT ENABLED BY PTC SOFTWARE

100%
of F500

Aerospace & Defense Companies

100%
of F500

Industrial Machinery Companies

82%
of F500

Automotive Companies

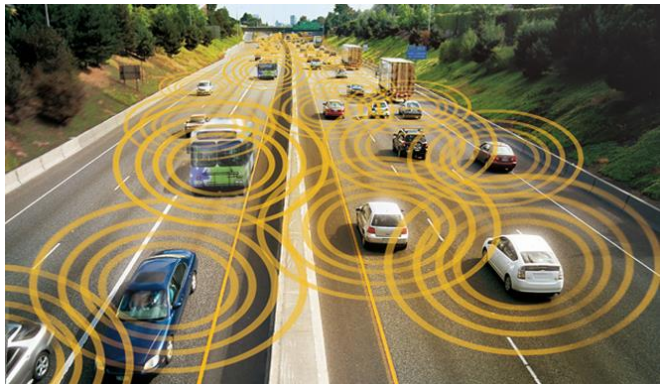
Over half of the **Fortune 100** innovate using PTC

$10,000K+ ARR. Sources: Fortune 500, PTC Customer Data per Oracle BI, / F100 includes all industries (Finance, Retail, Manufacturing, etc.)

SMART, CONNECTED PRODUCT ARCHITECTURE

Smart Connected Products

Connectivity
(inter-product collaboration, communication, avoidance)



Smart Products

- Improved UI
- Software
- Sensors
- Electronic control

Physical Product

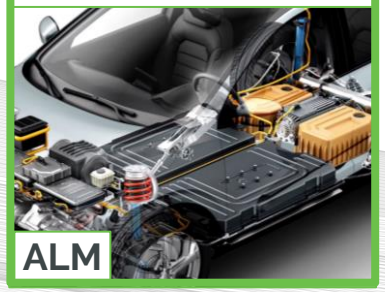
- Electrical
- Mechanical

- **Product as part of a system**
- **Multi disciplinary product development**
- **Closed loop lifecycle management**

HOW DIGITAL TRANSFORMS PHYSICAL

DIGITAL
Defines
PHYSICAL

DIGITAL
Controls
PHYSICAL



DIGITAL
Manages
PHYSICAL

DIGITAL
Connects
PHYSICAL

DIGITAL
Augments
PHYSICAL

DIGITAL
Sustains
PHYSICAL

DIGITAL THREAD

On-Prem / Hybrid / SaaS

Microsoft Azure Ansys Rockwell Automation

INDUSTRY CHALLENGES

ENABLING SYSTEMS & SOFTWARE-DRIVEN PRODUCT INNOVATION

Requirements Management

System of Systems

Configuration Management

Software Engineering

DevOps

Validation

Open Integrations

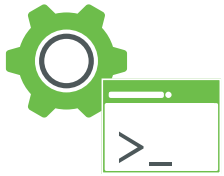
Model-based Systems Engineering

Simulation & Co-simulation

Agile Engineering

Strategic Re-use

Automated Code Generation



Risk Management

Industry Best Practices

PTC'S UNIQUE ALM & PLM PRODUCT PORTFOLIO

codebeamer™

- Requirements Engineering
- Risk Management
- Test Management
- Agile Engineering

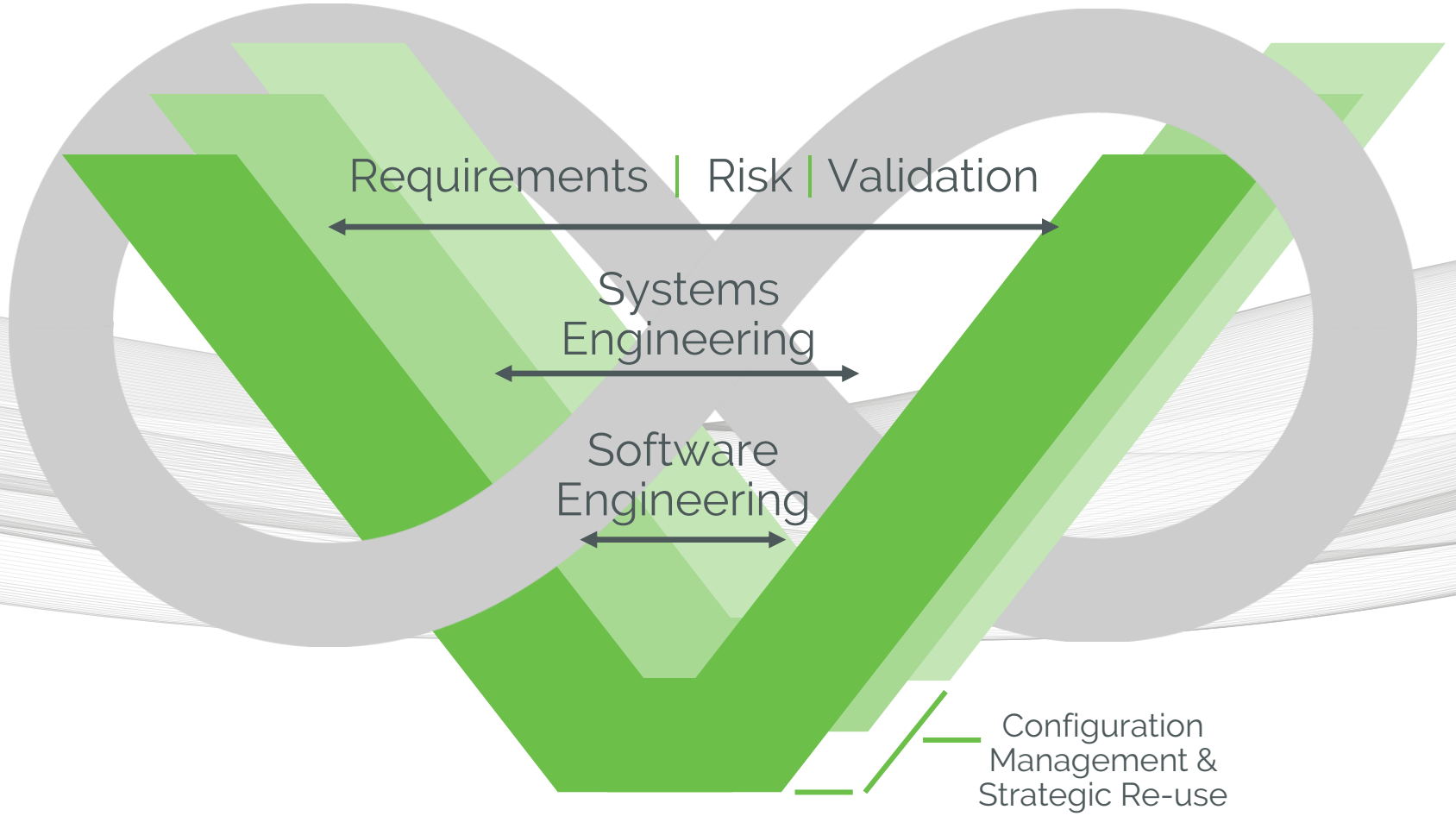
windchill®

- Product Lifecycle Management
- Product Data Management
- BOM Management
- Change & Configuration Management
- Quality Management

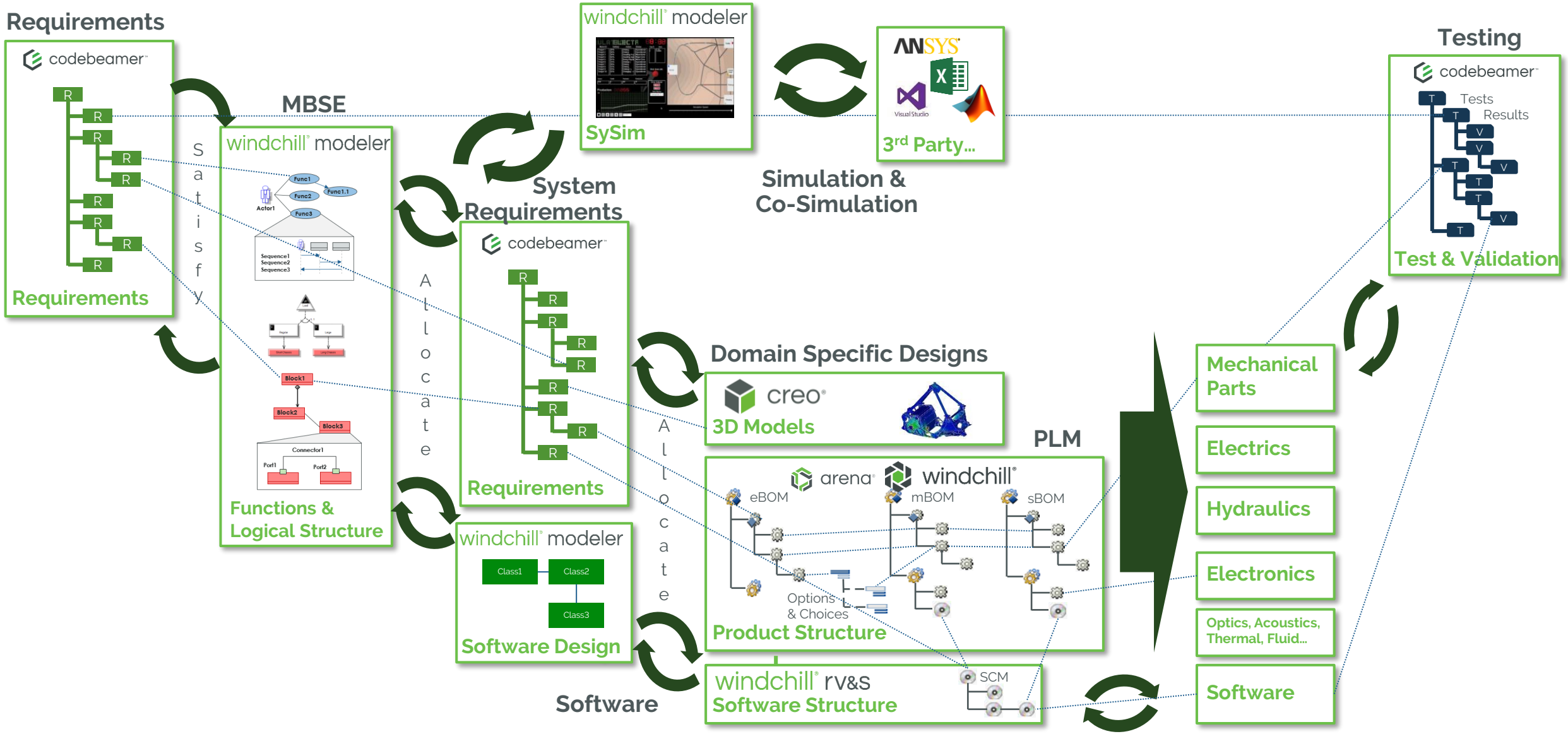
ptc® modeler

- Model-Based Systems Engineering
- Software Modeling
- System Simulation & Co-simulation

NEW ENGINEERING DIGITAL THREAD



WHOLE PRODUCT ENGINEERING - EXAMPLE



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THANK YOU

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MODEL-BASED SYSTEM ENGINEERING

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EROGLU

PTC'S MBSE SOLUTION

Collaborative Model-based Systems Engineering

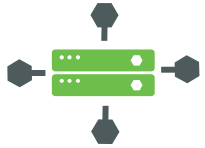
A holistic, multi-disciplinary and collaborative approach to designing and maintaining complex systems

AS-IS CHALLENGES: TIME, COST, AND QUALITY PRESSURES

Understanding & Coordinating Interdependencies

Unclear relationships between components, systems, and systems of systems

No Common Language



Lack of effective communication and stakeholder buy-in

Long Lead Times

No concurrent exploration of options and low rates of reuse impact on-time delivery

Quality & Regulatory Compliance

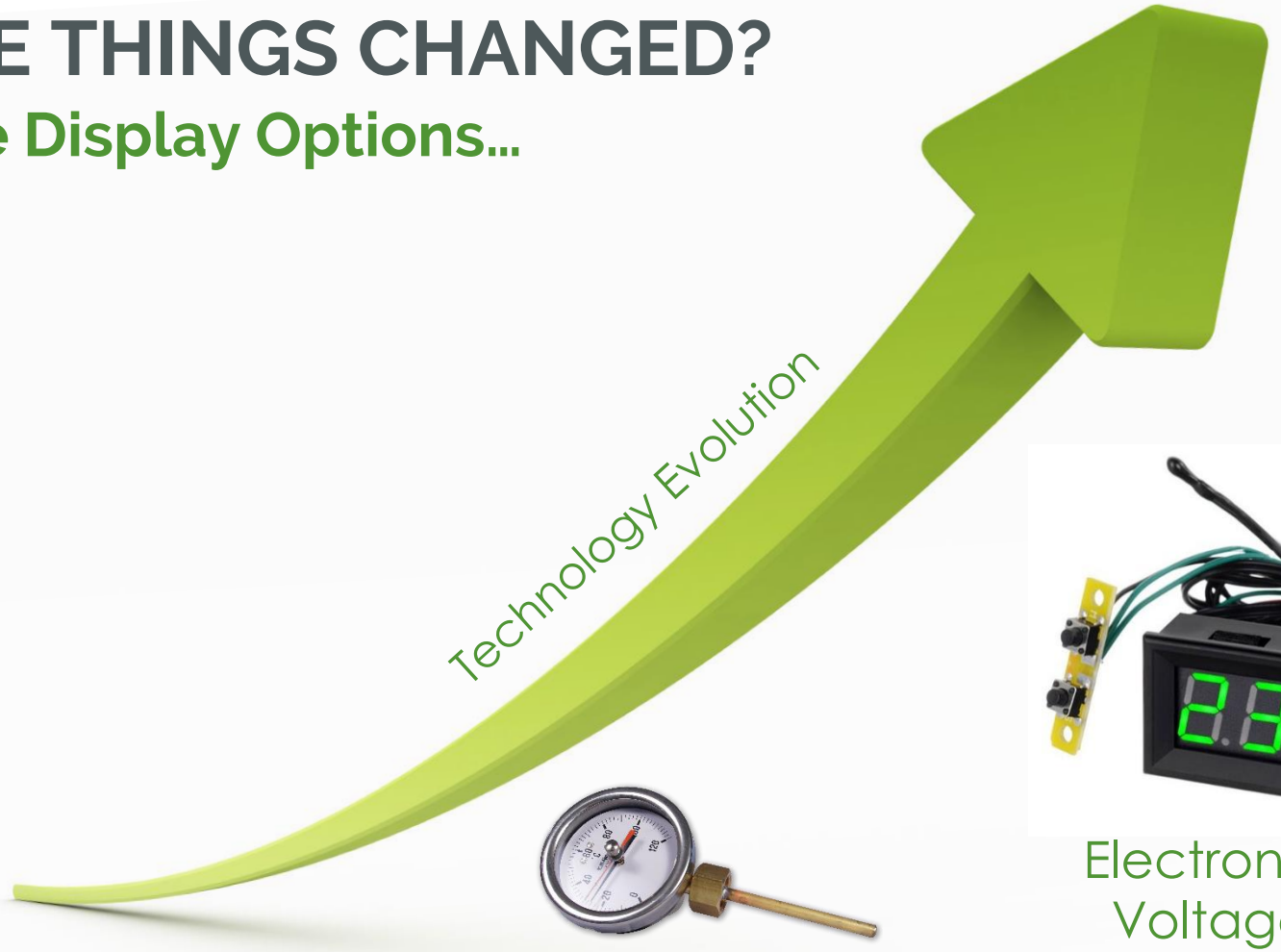
Risks discovered late and limited ability to validate designs

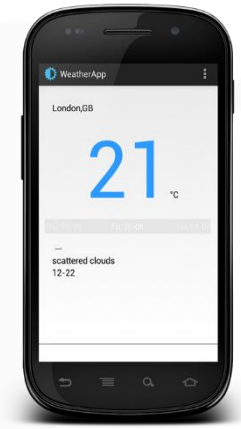
Cost Reduction Demands

Products are unnecessarily complex, and designs are redundant

HOW HAVE THINGS CHANGED?

Temperature Display Options…





Software;
GPS + Web Service

Electronic;
Voltage Thermometer

Mechanical;
Bimetallic Thermometer

Fluid Volume;
Mercury Thermometer

HOW DO YOU DECIDE?

Temperature Display Example…

External Sensor

Electronic

verses

GPS & Web Service

Software

‘Systems Engineering’ Considerations

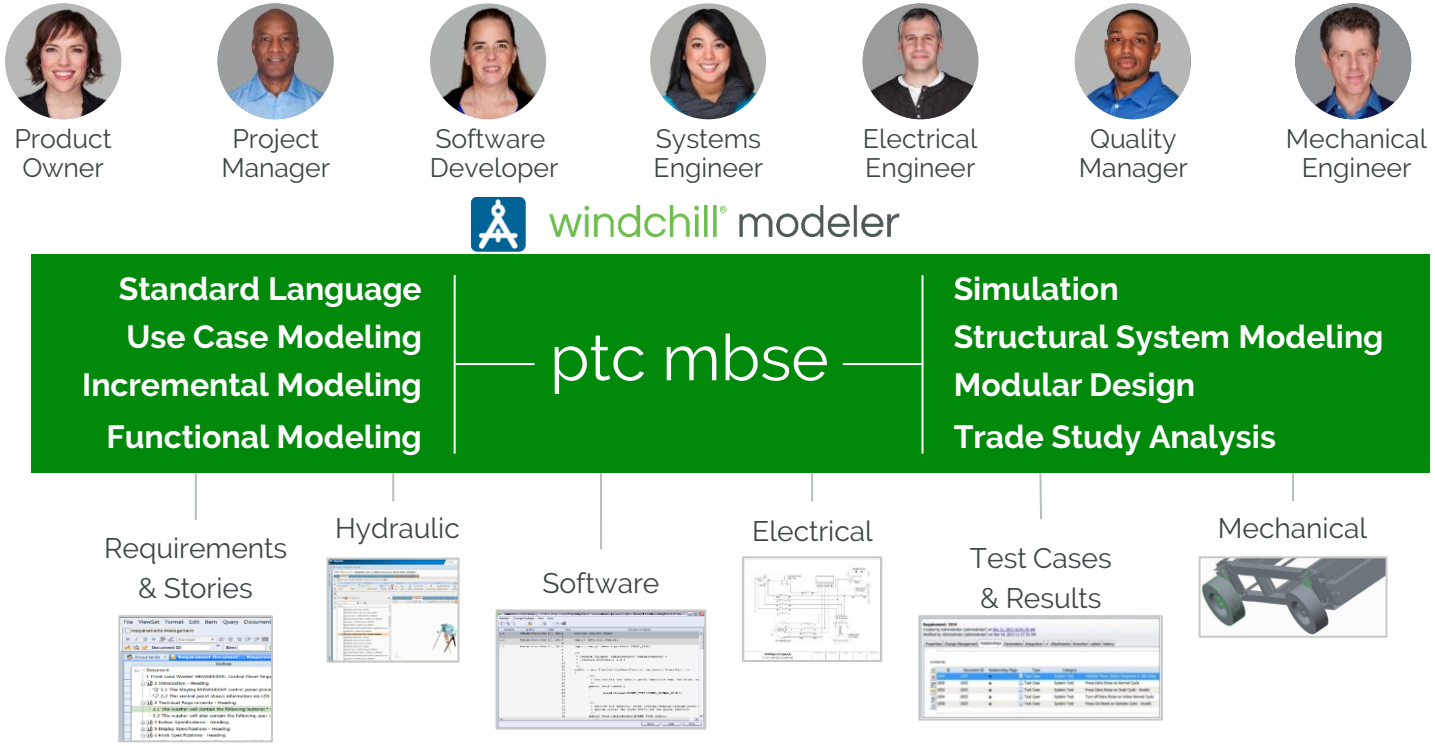
Cost? Resilience? Power Usage? Quality?

Integration? Engineering Complexity? and more …

MULTI-DOMAIN MODEL-BASED ENGINEERING

Capabilities

- Common systems level language (SysML)
- Whole team transparency
- Access to systems of record: OSLC, URL, ThingWorx…
- Stakeholders in-the-loop



Benefits

Shared workspace delivers parallel working productivity

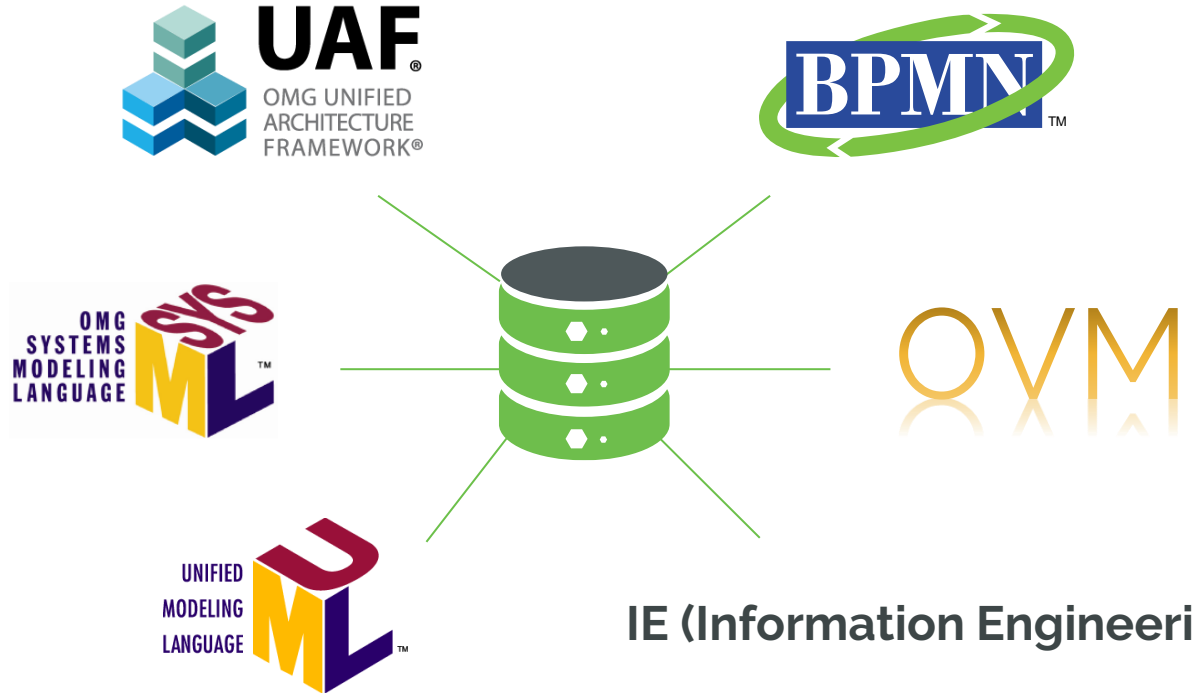
Cross-domain collaboration for complex product engineering

Scalable visual modeling for large teams and projects

STANDARDS-BASED MODELING

For Architecture, Systems & Software

- BPMN & UAF for Enterprise Architectures
- SysML for Systems
- UML for Software
- OVM for Variability
- IE for Data Models
- Visual Modeling with Data & Diagrams



Benefits

Minimized training and ramp up costs

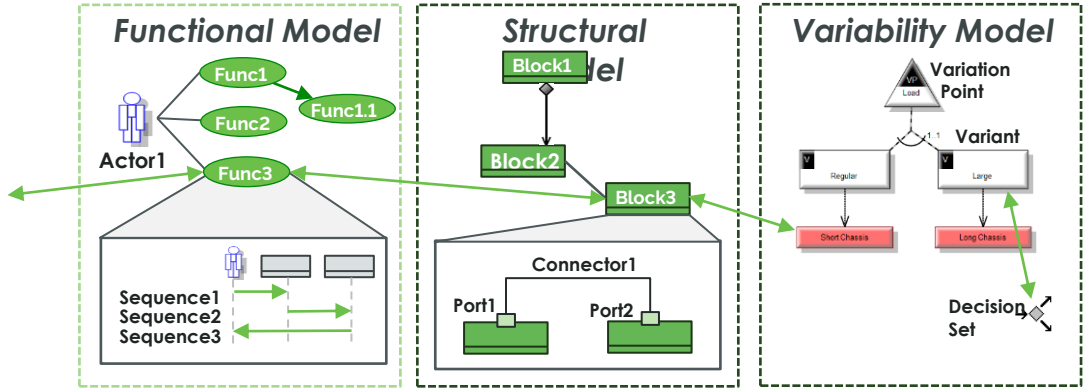
Reduce communication misunderstandings

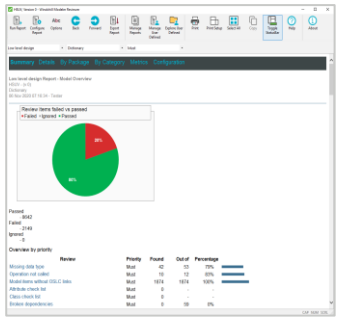
Common language increases productivity

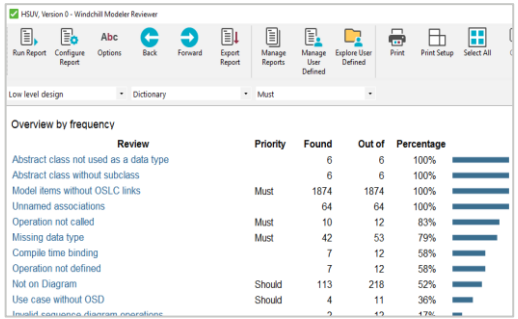
DESIGNED IN QUALITY

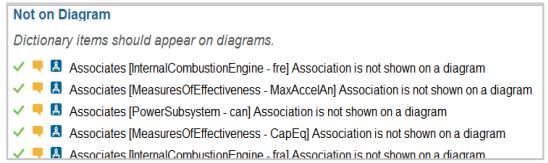
Digital Product Traceability

- Traceability for impact analysis
- Earlier Problem Identification
- Standard language compliance
- User defined reviews









Benefits

Proves that you are building the right products and building them right

Change impact analysis reduces errors and costs

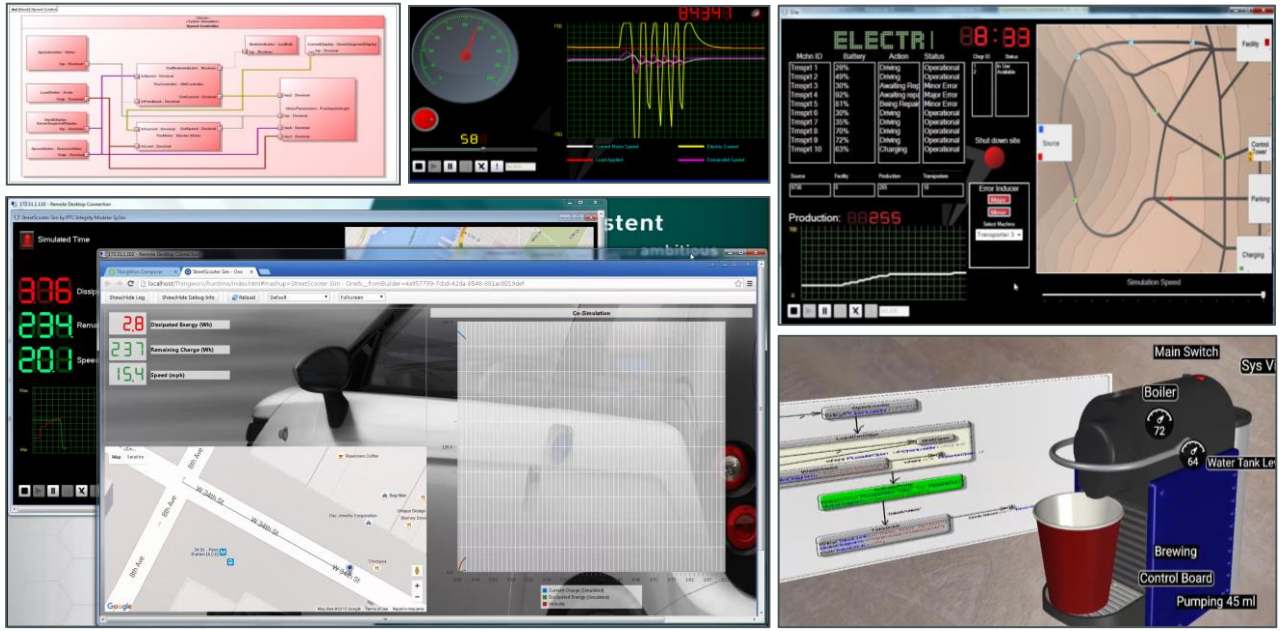
Enables industry regulation compliance

SYSTEM LEVEL VISUAL CO-SIMULATION

Performance Based Analysis

- Stakeholder in-the-loop
- Visually simulate systems model functionality
- Record simulation results for analysis
- Co-simulate with 3rd-party simulators
- Thing Worx Simulation

windchill® modeler sysim



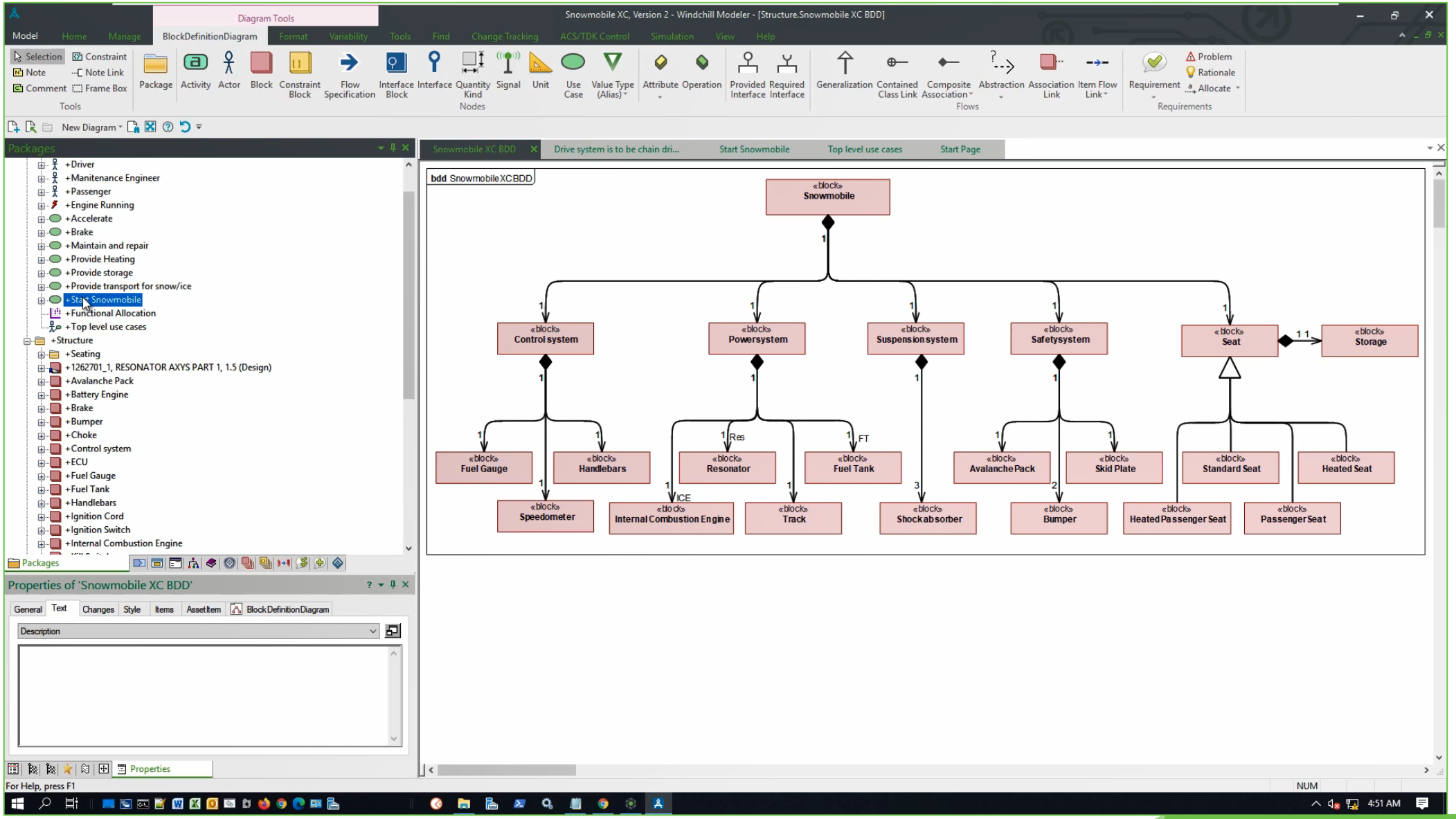
Benefits

Validate complex behavior early, reducing errors & costs

Minimize walkthrough effort and improve understanding

System level trade off study optimization

MBSE DEMO


Snowmobile XC, Version 2 - Windchill Modeler - [Structure.Snowmobile XC BDD]
Diagram Tools
Model
Home
Manage
BlockDefinitionDiagram
Format
Variability
Tools
Find
Change Tracking
ACS/TDK Control
Simulation
View
Help
Selection
Constraint
Note
Note Link
Comment
Frame Box
Tools
Package
Activity
Actor
Block
Constraint Block
Flow Specification
Interface Block
Interface
Quantity Kind
Signal
Unit
Use Case
Value Type (Alias)
Attribute
Operation
Nodes
Provided Interface
Required Interface
Generalization
Contained Class Link
Composite Association
Abstraction
Association Link
Item Flow Link
Flows
Requirement
Problem
Rationale
Allocate
Requirements
New Diagram
Packages
+Driver
+Manitenance Engineer
+Passenger
+Engine Running
+Accelerate
+Brake
+Maintain and repair
+Provide Heating
+Provide storage
+Provide transport for snow/ice
+Start Snowmobile
+Functional Allocation
+Top level use cases
+Structure
+Seating
+1262701_1, RESONATOR AXYS PART 1, 1.5 (Design)
+Avalanche Pack
+Battery Engine
+Brake
+Bumper
+Choke
+Control system
+ECU
+Fuel Gauge
+Fuel Tank
+Handlebars
+Ignition Cord
+Ignition Switch
+Internal Combustion Engine
Packages
Properties of 'Snowmobile XC BDD'
General
Text
Changes
Style
Items
AssetItem
BlockDefinitionDiagram
Description
Properties
Snowmobile XC BDD
Drive system is to be chain dri...
Start Snowmobile
Top level use cases
Start Page
bdd SnowmobileXCBDD
«block» Snowmobile
«block» Control system
«block» Powersystem
«block» Suspensionsystem
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«block» Fuel Gauge
«block» Handlebars
«block» Speedometer
«block» Resonator
«block» Internal Combustion Engine
«block» Fuel Tank
«block» Track
«block» Shockabsorber
«block» Avalanche Pack
«block» Skid Plate
«block» Bumper
«block» Standard Seat
«block» Heated Seat
«block» Heated Passenger Seat
«block» Passenger Seat
Res
ICE
FT
For Help, press F1
NUM
4:51 AM

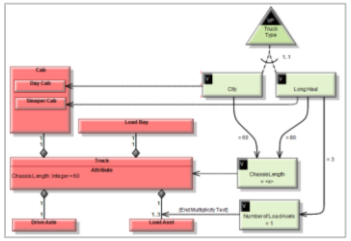
MODEL-BASED PRODUCT LINE ENGINEERING

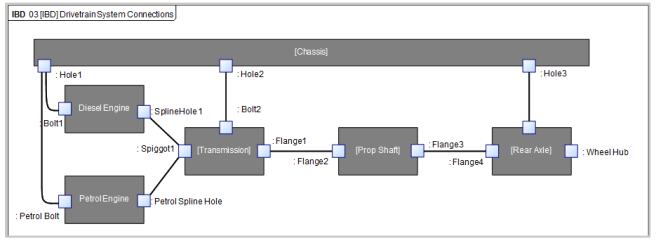
MBPLE

- System product lines
- Drives module inclusion, parameters & numbers of parts
- Define product line configuration logic and rules

Meet customer & stakeholder precise product needs

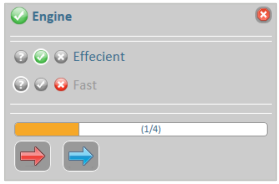
Variability Model

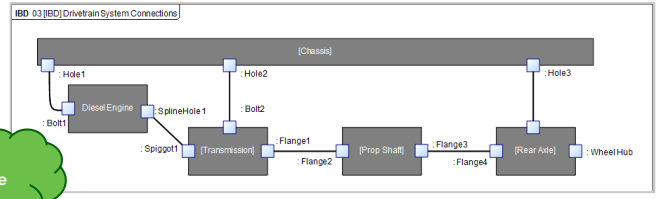




150% Model

Variant Selection





Product Model

Improve system portfolio agility

Improve management of configurations

Improve reuse productivity

Benefits

Increased productivity thru automated product model generation

Managed system product line complexity reduces errors and costs

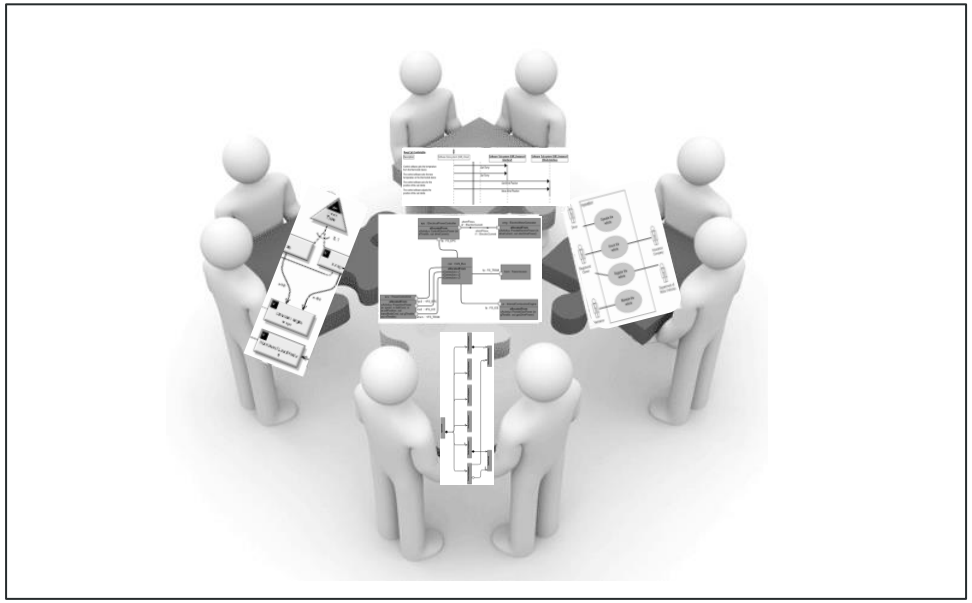
MBSE and full variability in one tool reduces costs

PTC'S INTEGRATED ALM SUMMARY

codebeamer™

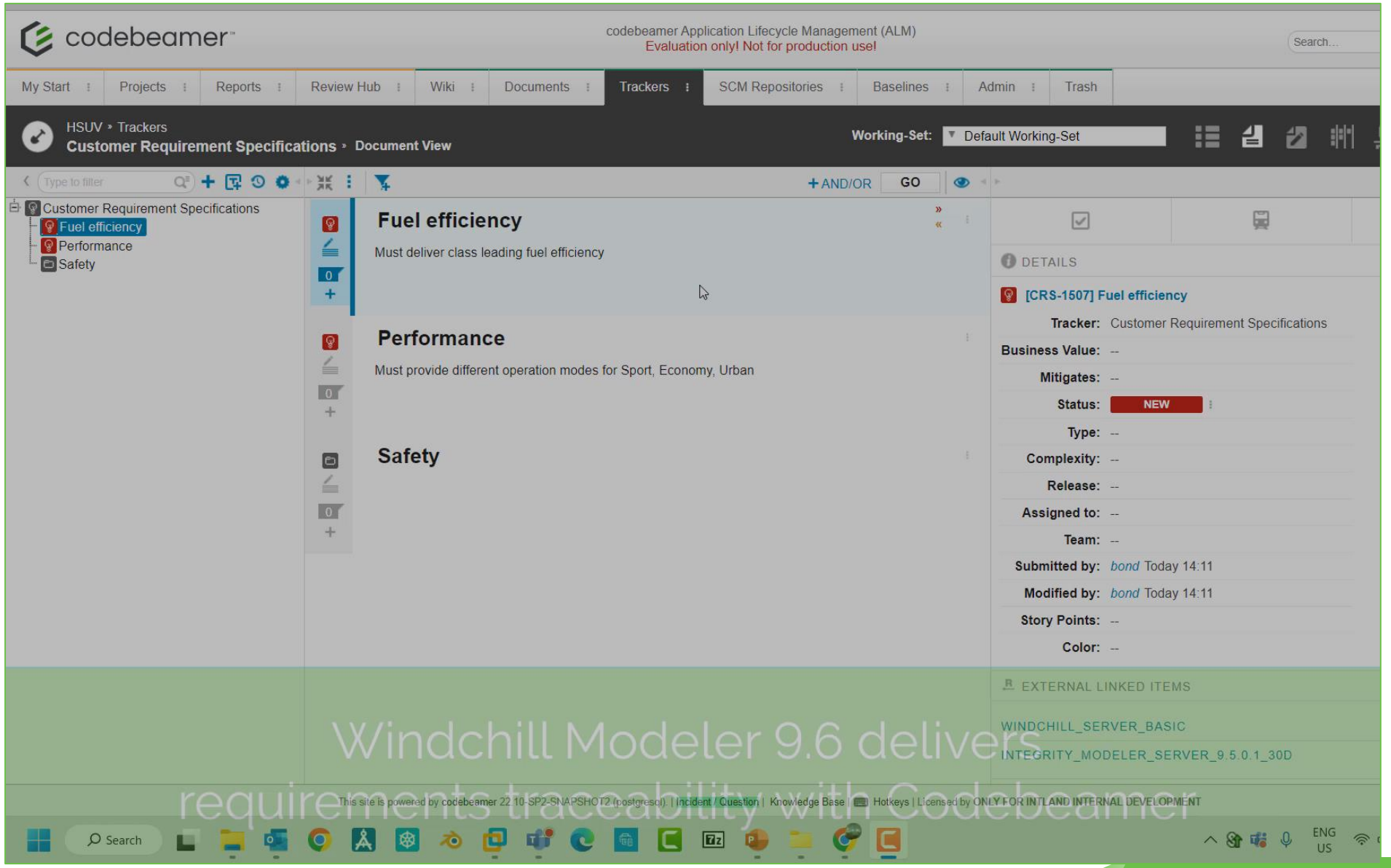
- Requirements Engineering
- Risk Management
- Test Management
- Agile Engineering

ptc® modeler



- Model-Based Systems Engineering
- Software Modeling
- System Simulation & Co-simulation

CODEBEAMER AND MODELER INTEGRATION



Questions & Answers

Please also feel free to contact us offline

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THANK YOU

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