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#PLMConX

Managing Simulation Data in a Multi-PLM Environment

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Company Overview

A vendor neutral / independent engineering services and software company since 1993

OPENPDM® OPENDESC.COM® OPENDXM® GLOBAL 3D PDF Pro PDF GENERATOR 3D

Over 25 years experience
with engineering interoperability, migration, intelligent documents, benchmarking, more

Approximately 250 employees and consultants
based from international locations throughout Europe and in North America

More than 500 Customers
that are leading companies across most industries

Shareholders

BOSCH Continental DAIMLER DELPHI SIEMENS Volkswagen ProSTEP iViP

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PROSTEP – 100% PLM

Consulting and Solution Portfolio

	Strategy	Concepts & Solution Architecture	Implementation of IT & Process	
PLM Implementation Strategy		PLM Architecture & Processes Benchmark & ROI-Analysis PLM Landscape & Complexity Management Product Structure and Variant Management	PLM Migration & Integration OPENPDM® OPENDXM® GLOBAL	– PLM System Selection – PLM Implementation – PLM Process Optimization
PLM for Digital Transformation		PLM for IoT/I 4.0 Solutions Digital Master / Digital Twin	PLM Realization and Roll-out Bill of Material & Change Management Variant & Configuration Management Digital Master / Digital Twin	– Digitalization – Industry 4.0 – IoT
		Model Based Enterprise 3D Master / Systems-Engineering	Technical Data Package Paper-less Processes 3D PDF	
PLM for Collaboration		Cross-company PLM PLM for Merger & Acquisitions PLM for Joint Ventures Partner & Supply Chain Integration	PLM Collaboration Automated PLM Data Supply PDM & CAx Data Exchange OPENPDM® OPENDXM® GLOBAL	– Merger & Acquisitions – Joint Venture – Project Consortia

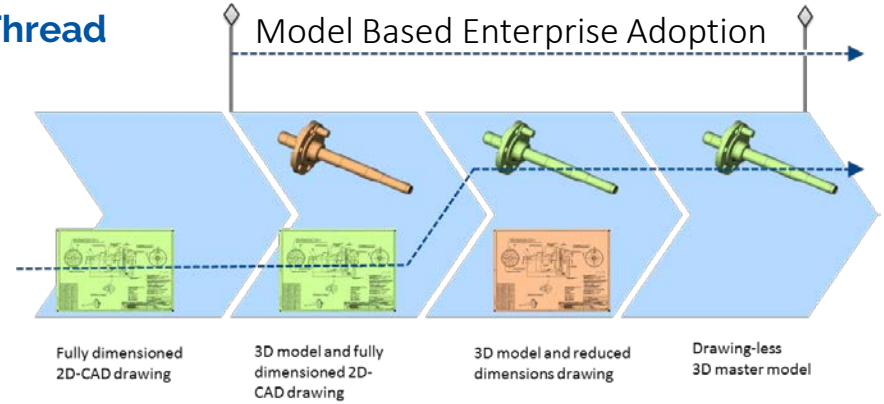
Engineering Data Interoperability - Model Based Enterprise & Digital Thread

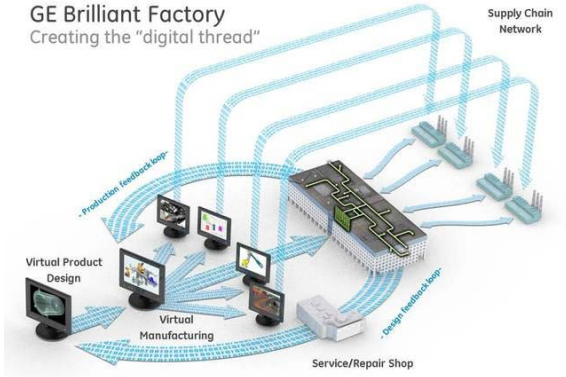
Model based enterprise - MBE is an integrated and collaborative environment, founded on 3D product definition shared across the enterprise, enabling rapid, seamless, and affordable deployment of products from concept to disposal.

- Consumable 3D Engineering data for all parts of manufacturing and business eliminating drawing prints

Digital Thread - To collect information in the design, manufacturing, service, supply-chain setup and provide access to and intelligent analytics for industrial manufacturing and performance data, to identify the root cause easier. Such insights can improve not only service and owner/operator productivity, but also provide critical feedback to the design engineering and manufacturing operations teams for continuous improvement.

- Integration of product data from all systems to get exceptional performance, cost and issues visibility throughout the enterprise.



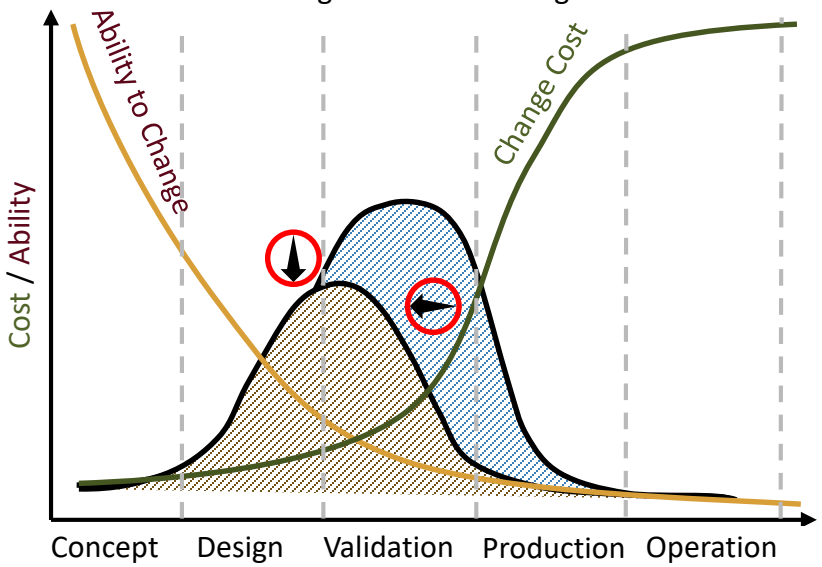


The Need for Digital Thread

Added Costs of Complexity

- Longer Time to market with a larger development effort and cost
- Wider distribution of product developers in suppliers
- Increasing use of Software
- Larger volume of components
- More Computer Aided Analysis for More Purposes
- More domain and organizational complexity
- More technical delivery content and packages
- Automation of non-value work
- More “Cumulative” Risk from inputs
- Expense of re-authoring
- Time and information loss of manual processes
- Data preservation for Sustainability
- Knowledge Retainment and Acquisition

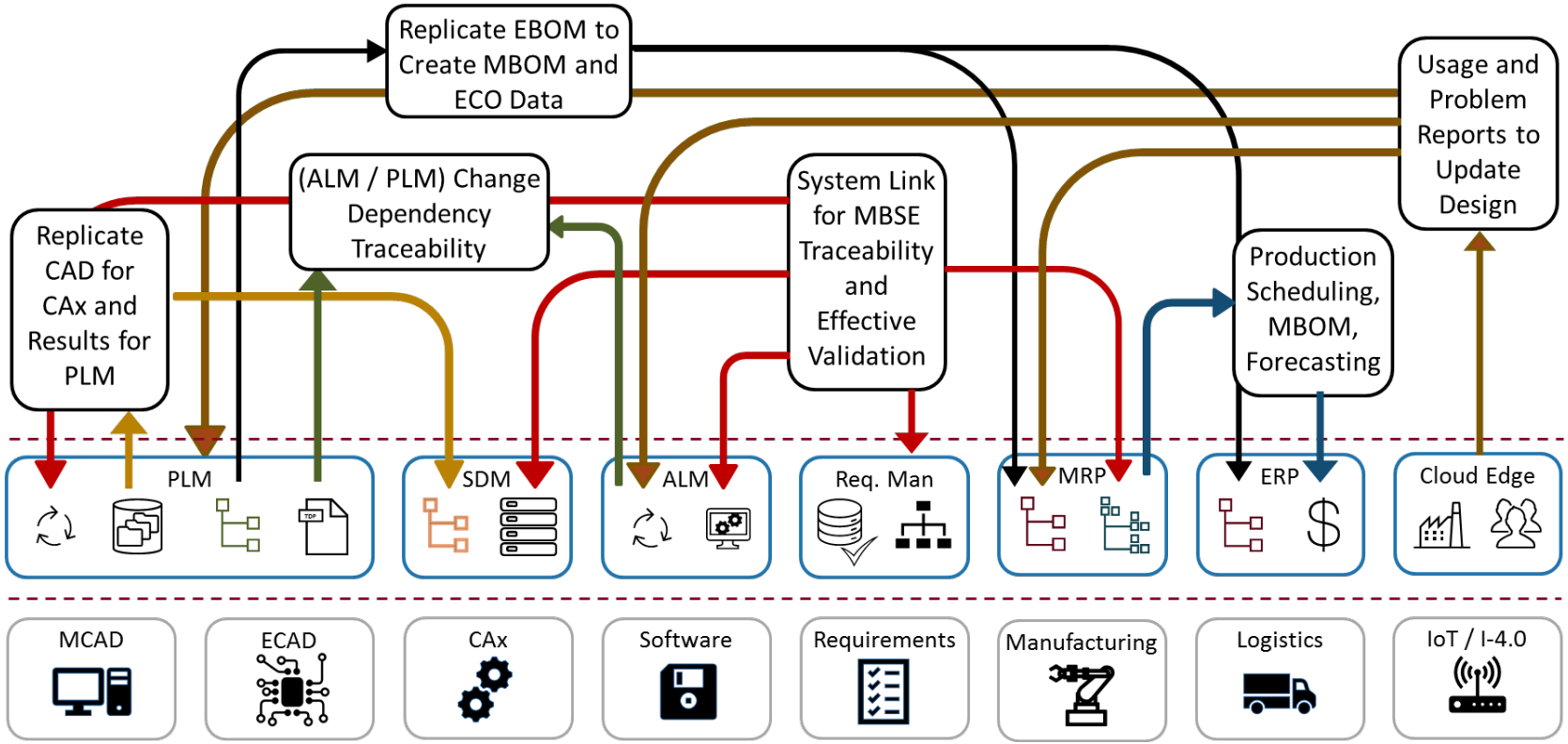
Lowering the Cost of Change



Timely, Accurate, Complete, Up-to Date information and Inter-domain System Validation expose problems earlier in the cycle

Lower the duration, frequency, and quantity of changes with the better up front information, traceability and readily available data

A Path To the Digital Thread



API for the Digital Thread

Replicate
- Share required data - CAD data is required for CAE, BOM for manufacturing
- Automatic synchronization of shared data between systems

OPENPDM®

Federate
- Provide intelligent traceable links between systems
- Real time system access of data managed in another system

OPENPDM®

Collaborate
- Automatically share with suppliers and customers
- Secure IP with encrypted transport and DRM

OPENDXM® GLOBAL X

Communicate
- Generate 3DPDF Manuals and TDP's that contain the combine intelligence of all systems

3D PDF 3D PDF Pro

Background Process Logic | SOAP | REST | OSLC | Administration | Secure Transport | 3DPDF Generator | STEP Converter

PROSTEP's API for the Digital Thread

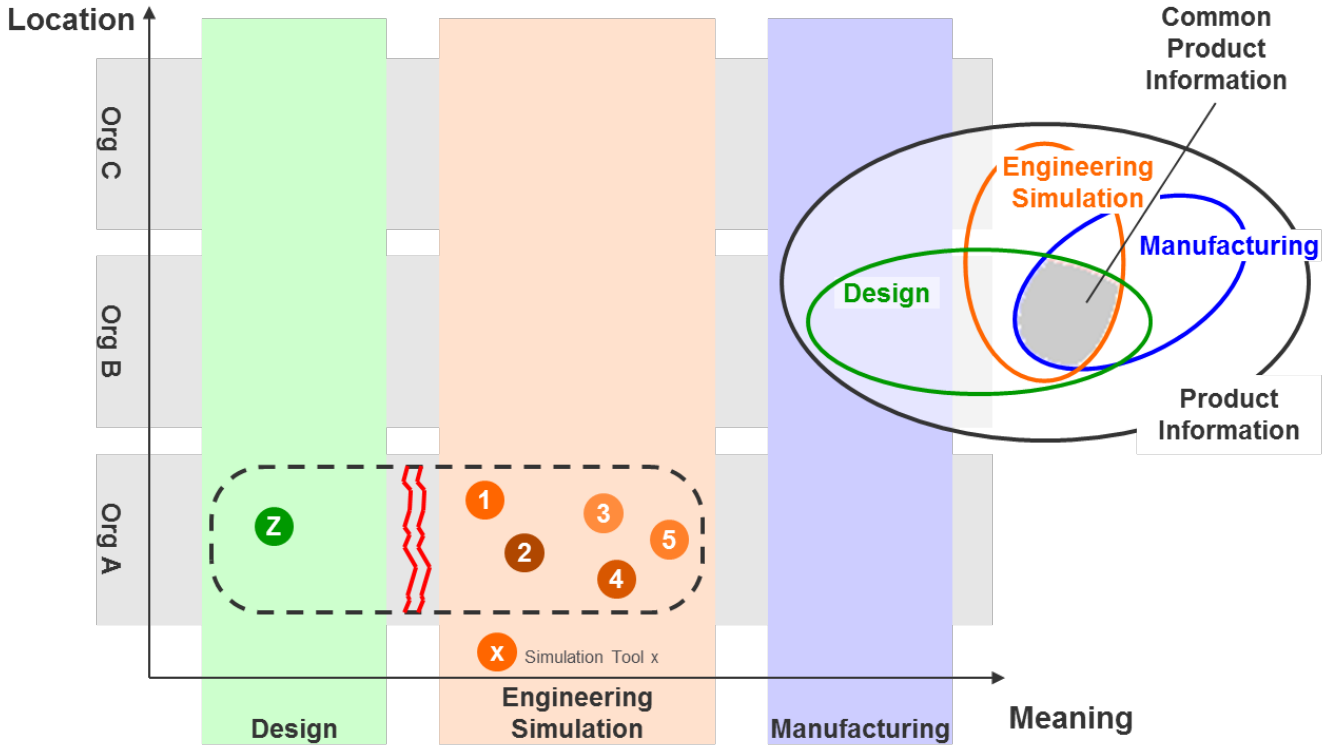
Connector | Connector | Connector | Connector | Connector | Connector | Connector

PLM | SDM | ALM | Req. Man | MRP | ERP | Cloud Edge

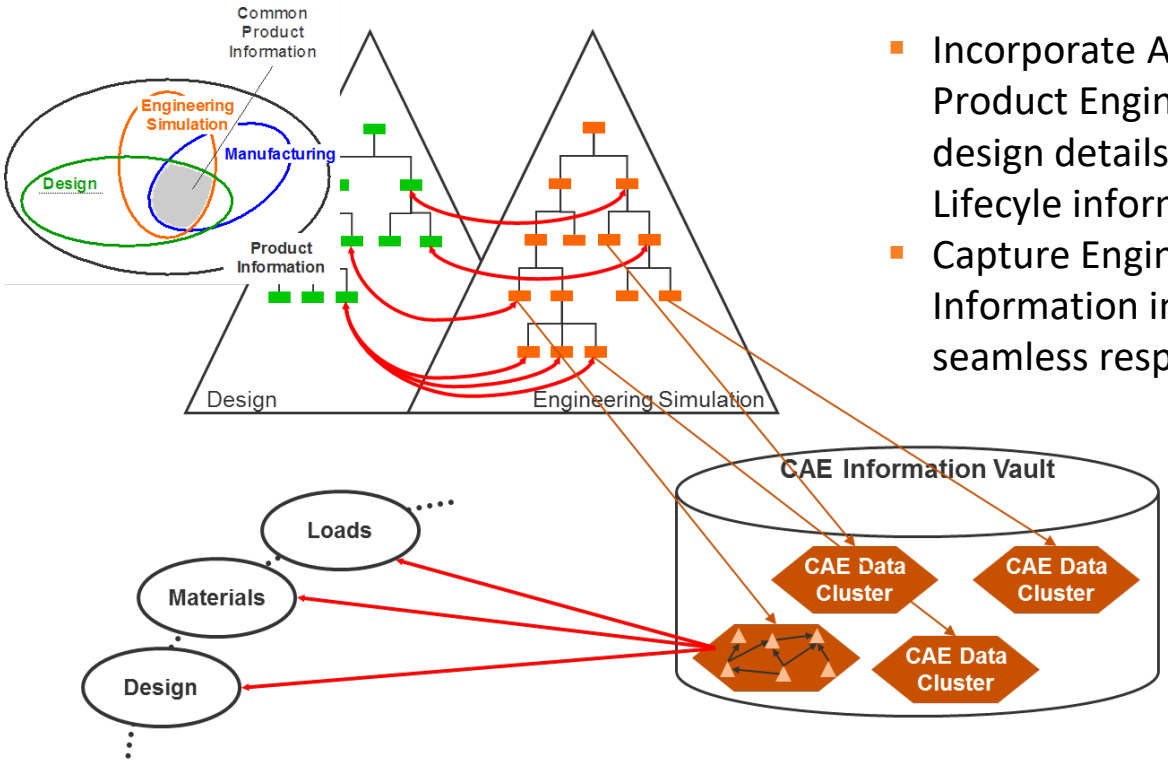
MCAD | ECAD | CAx | Software | Requirements | Manufacturing | Logistics | IoT / I-4.0

A Need for Enterprise Application Integration of Common Product Information

- Integration Over Different Domains and Semantic Breaks
- Integration Between Different Vendors Established Systems
- Each Domain Shares data at the overlap!



Incorporating Design and CAE together provides complete information

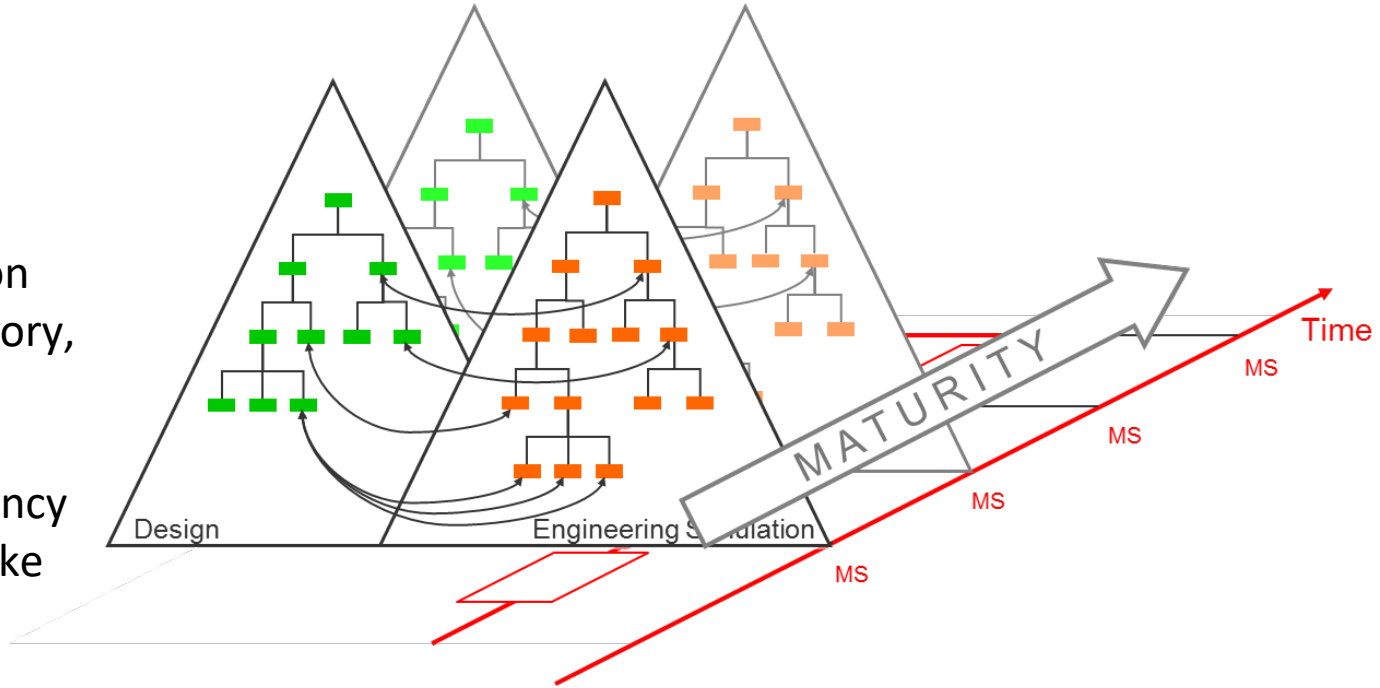


- Incorporate Automated Exchange During Product Engineering Process CAD as well as design details, documents, and Product Lifecyle information to SDM system
- Capture Engineering intent and Context Information into Analysis and Provide seamless response to PLM

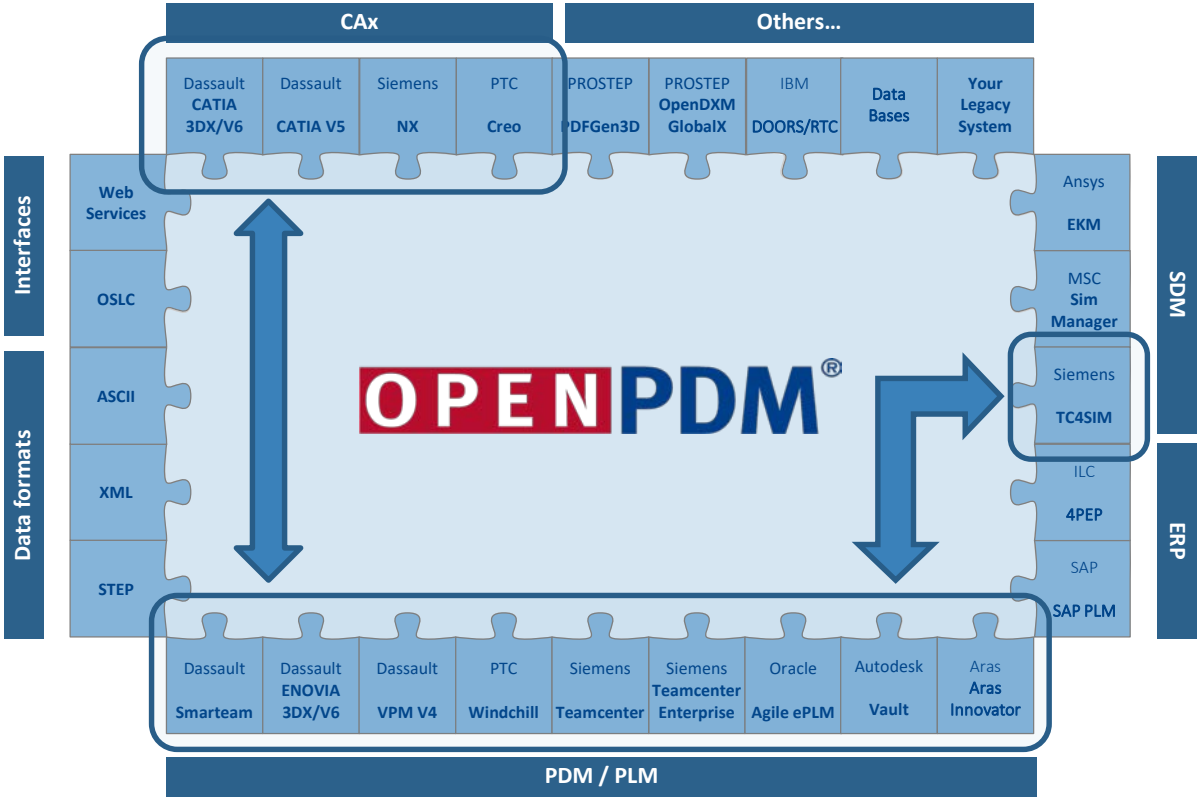
Align and Re-use BOTH PLM/CAD and CAE Data

Providing synchronization of updates over time allows consistency

- Re-use simulation results from history, only focus on changes!
- Provide consistency from PLM to make data traceable



Integrating TC4SIM and PLM



OpenPDM Architecture Example – Teamcenter Windchill Integration

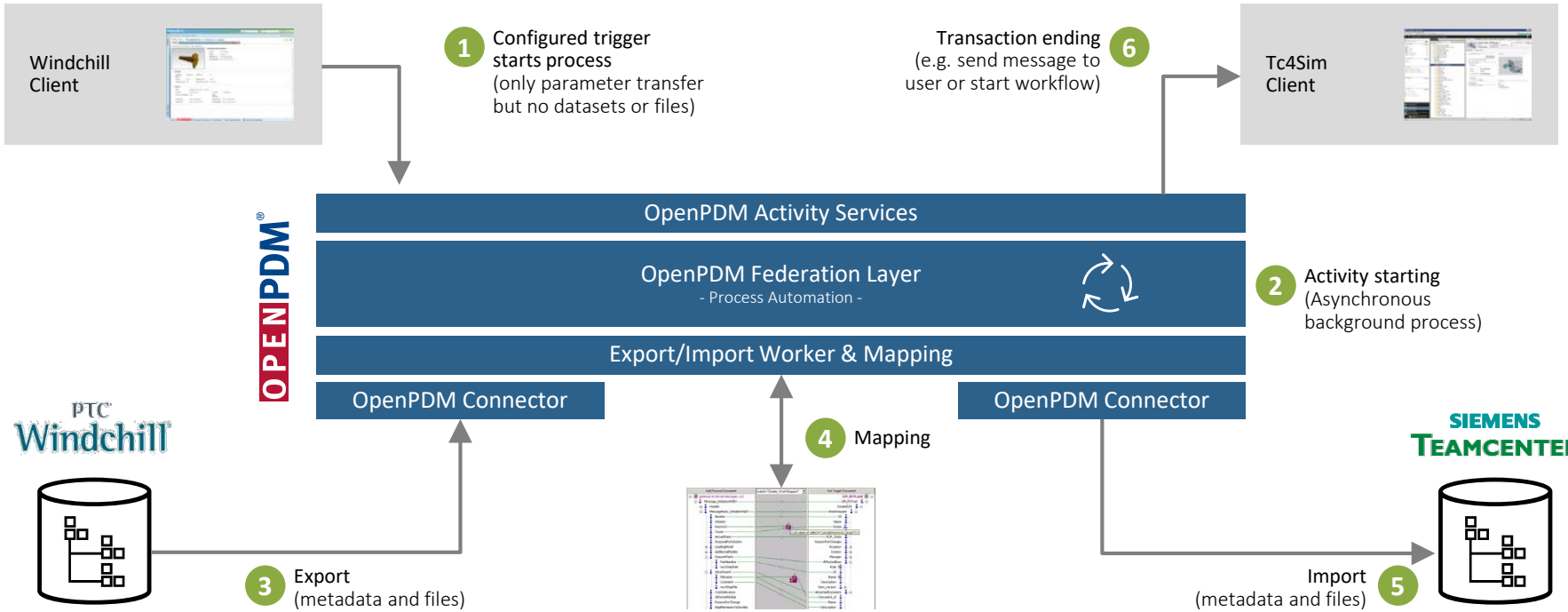
- Leverage COTS Connectors for Integration
- Automate at events the processing of data between systems
- No customization in PLM Systems to run OpenPDM
- OpenPDM runs independent to PLM Systems

Legend:

OpenPDM Product Software

Customer-Specific Integration Logic or Configuration

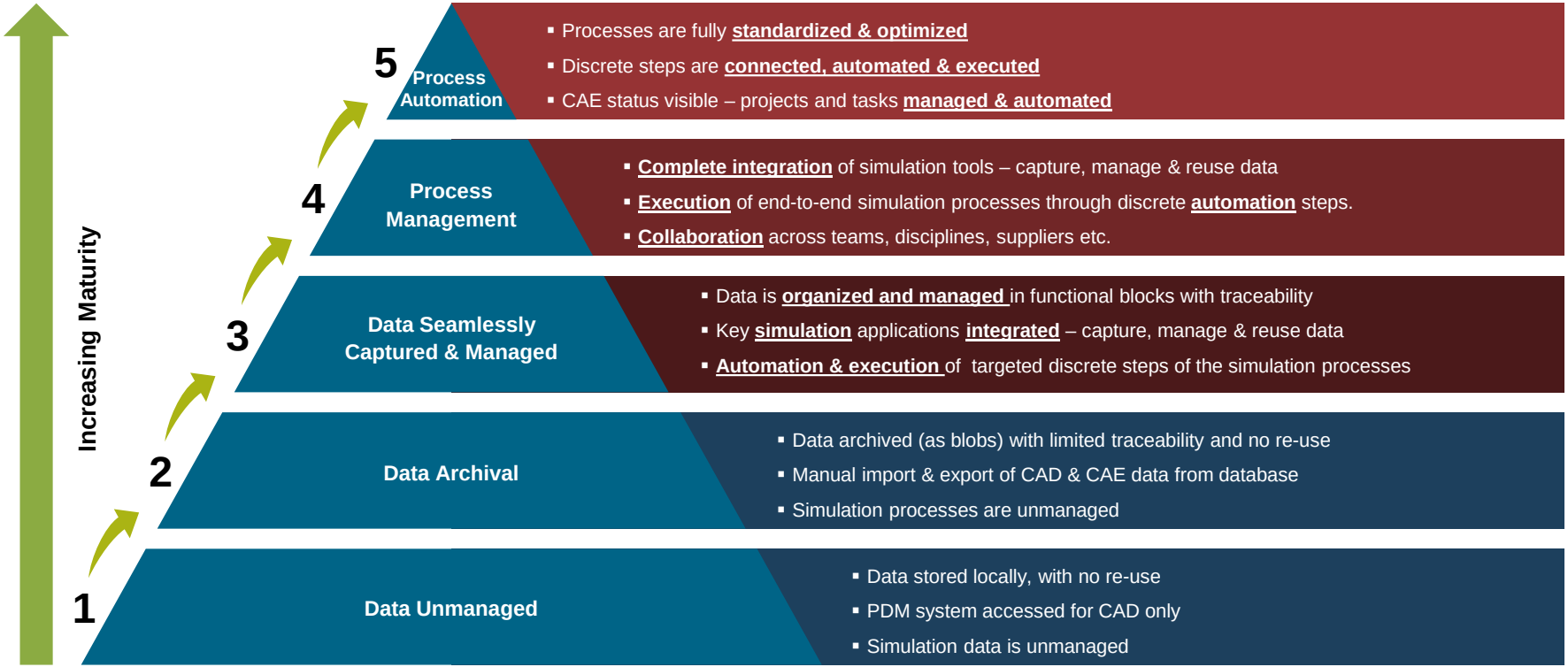
Example Process – Windchill Tc4Sim Integration



Drivers for CAE Simulation Management

- Analyst Productivity & Simulation Efficiency
- Distributed & Disconnected Simulation Teams
- Massive Amounts of Simulation Data
- Increasing Product Complexity
- Variety & Complexity of Simulations
- Reliance of Simulation for Product Decisions

Stages of CAE Simulation Management Maturity



Note: An organization may have different groups or disciplines at different levels of maturity

Challenges In A Traditional Simulation Process

What is the right representation of product geometry?

Which parts are critical for CAE?

Where are the right parts?

Product Configuration → CAE Marking

What type of connections?
Can I connect via .mcf?
How to gather distributed sub-assemblies?

Collect Sub-Assemblies → Collect Connections → Build CAE Assemblies

Which results to keep?
Where to store?
How to share results?

Standard Results → Secondary Results

Product → **Pre-Processing** → **Assembling** → **Solve** → **Post-Processing** → **Test Correlation**

Structure Mapping → Populate Eng. Properties → Component Meshing → Build CAE Sub-Assembly

What level of abstraction?
Do we have the right material properties?
Do I have the right version of CAD?

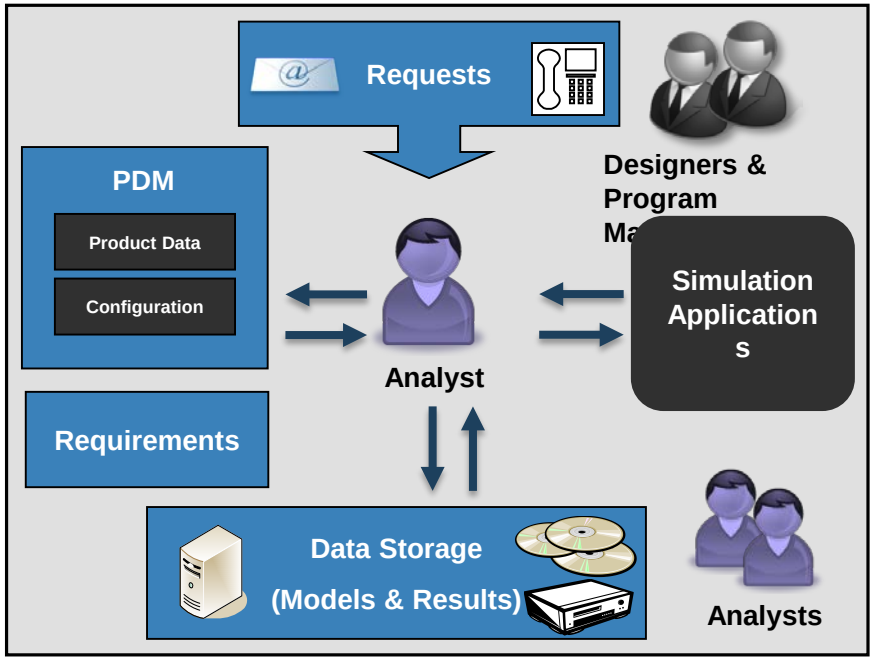
Which type of mesh?
Which mesh attributes?
For what type of analysis? Crash, NVH?
How to batch mesh data with high quality?

Job Submission → Job Control

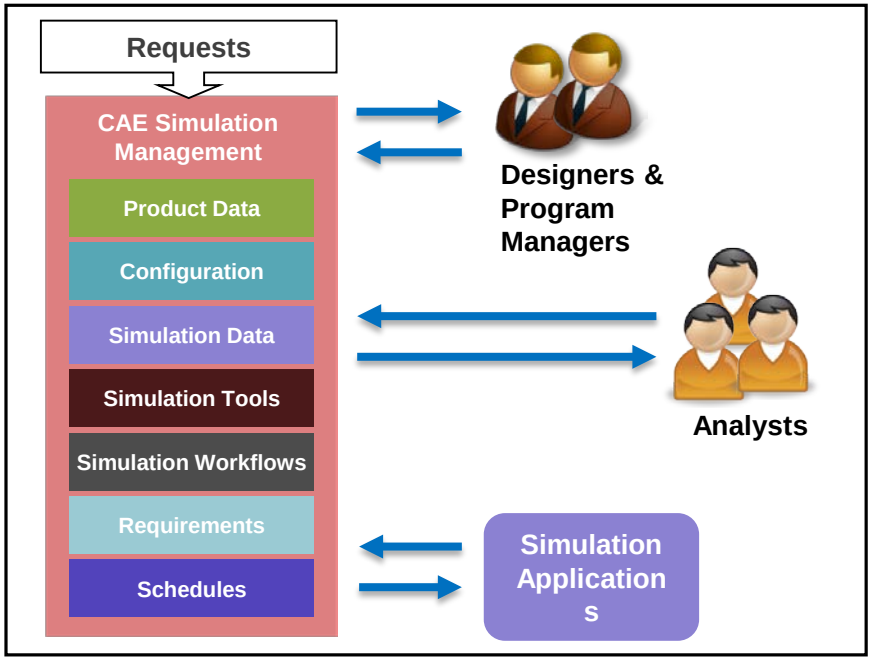
Which analyses to perform?
Which solver required?
Do I have enough compute resources?

CAE Simulation Management
Before & After

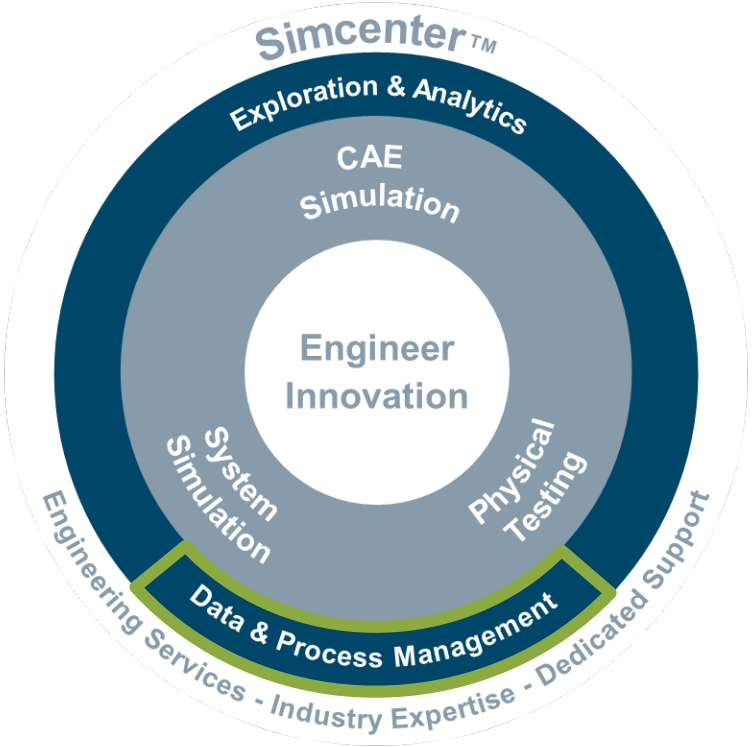
Typical Unmanaged Analyst Environment



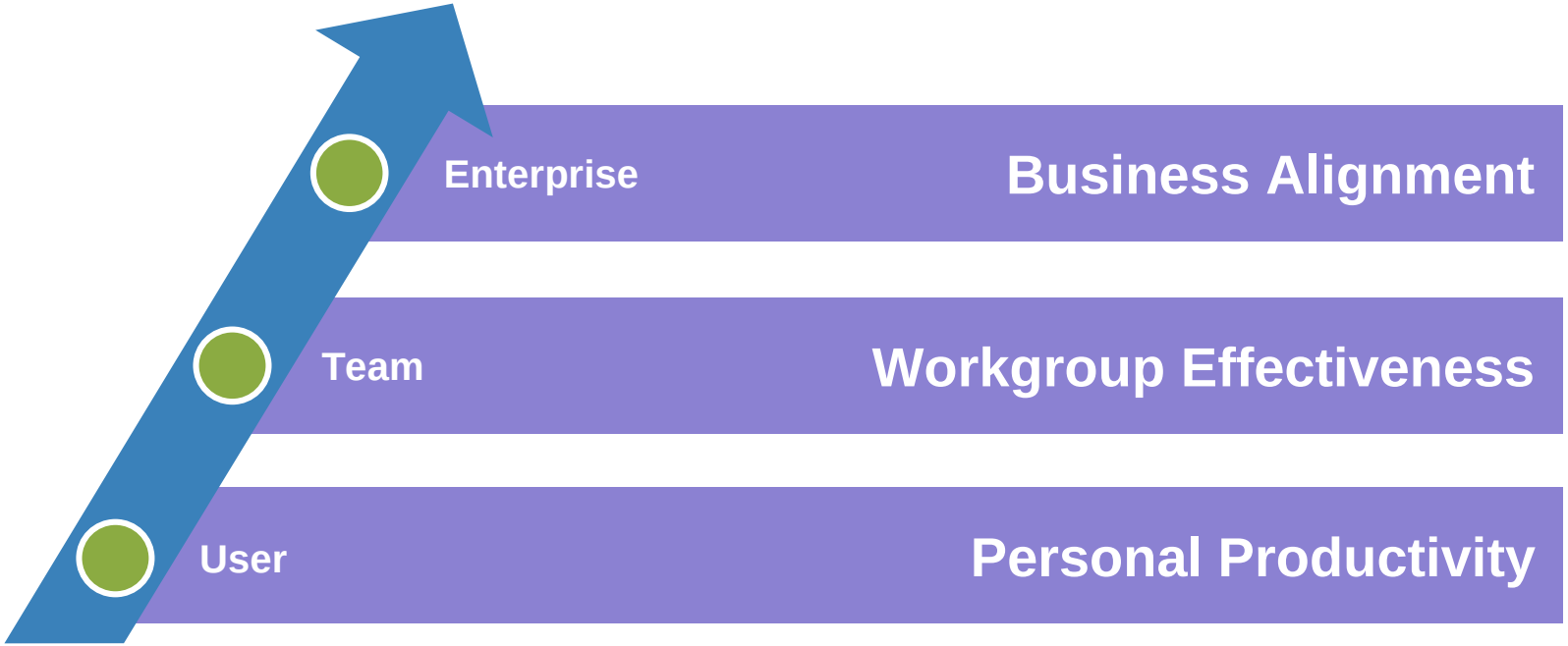
Managed & Streamlined Analyst Environment



CAE Simulation Management



Potential Impact of CAE Simulation Management



CAE Simulation Management Capabilities

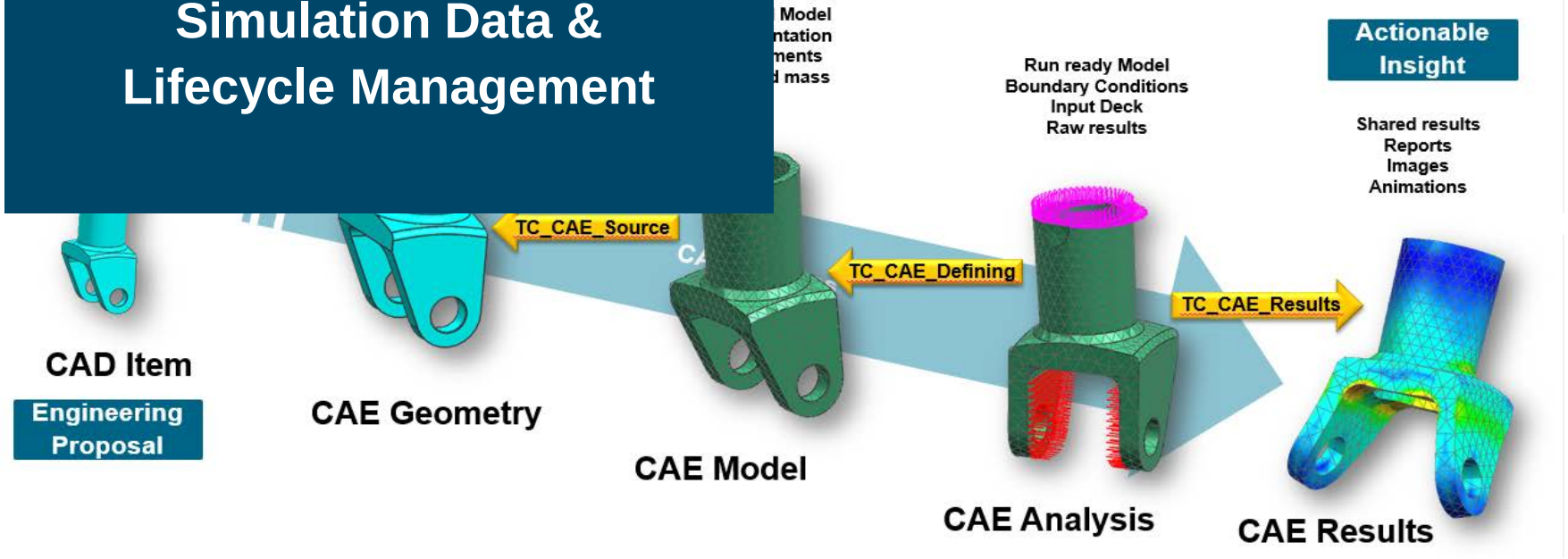
Simulation Data & Lifecycle Management

Simulation Structure Management & Automation

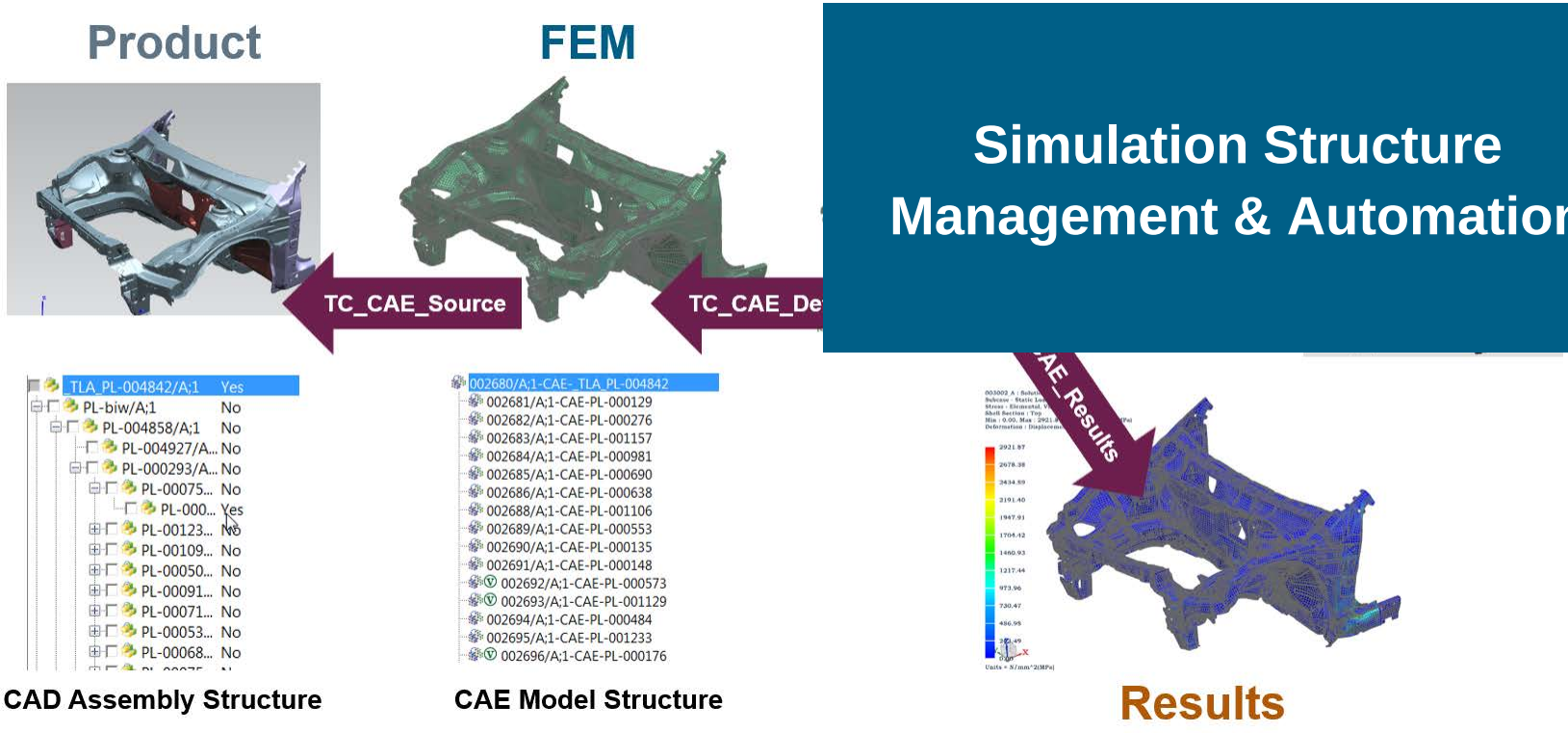
Simulation Tool & Process Management

Simulation Results Visualization & Reporting

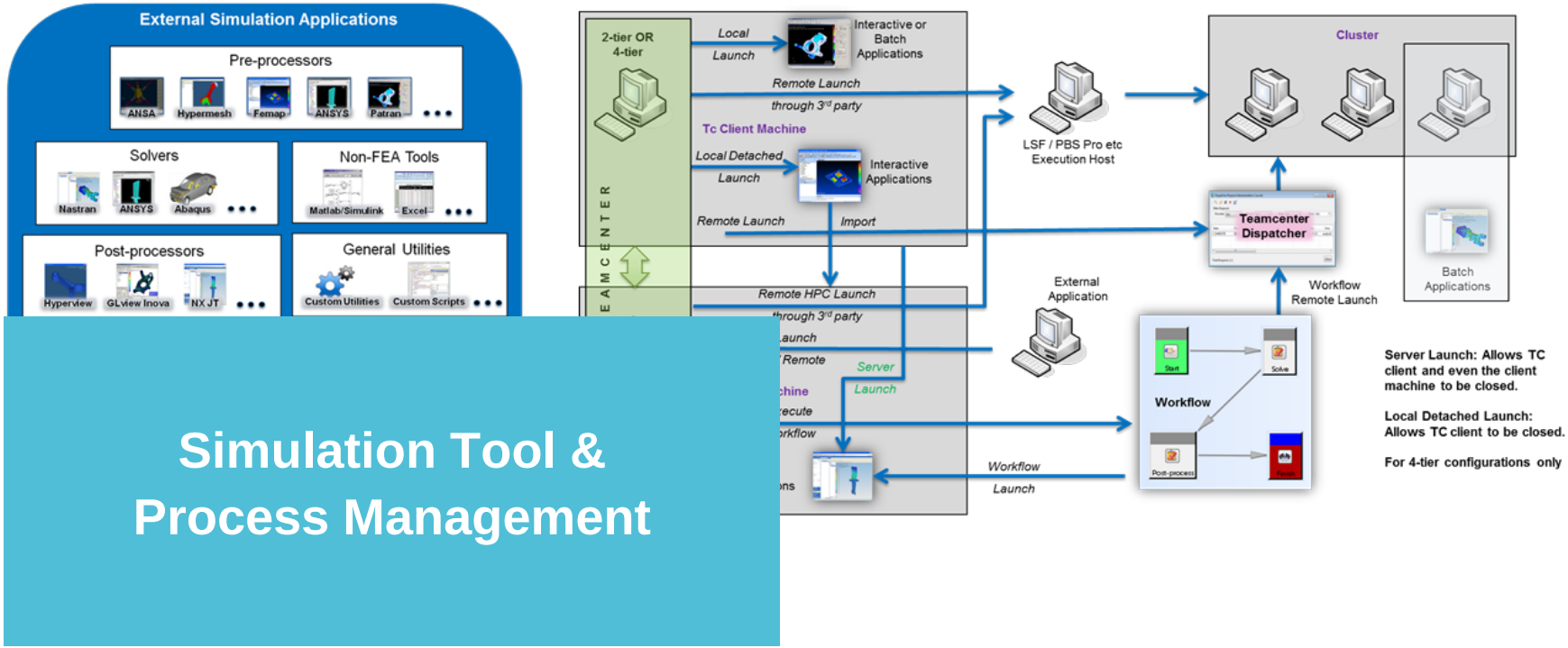
Simulation Data & Lifecycle Management



Simulation Structure Management & Automation

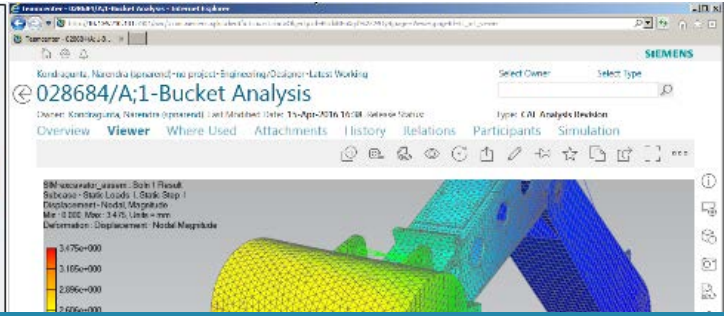


Simulation Tool & Process Management



Simulation Tool & Process Management

Simulation Results Visualization & Reporting

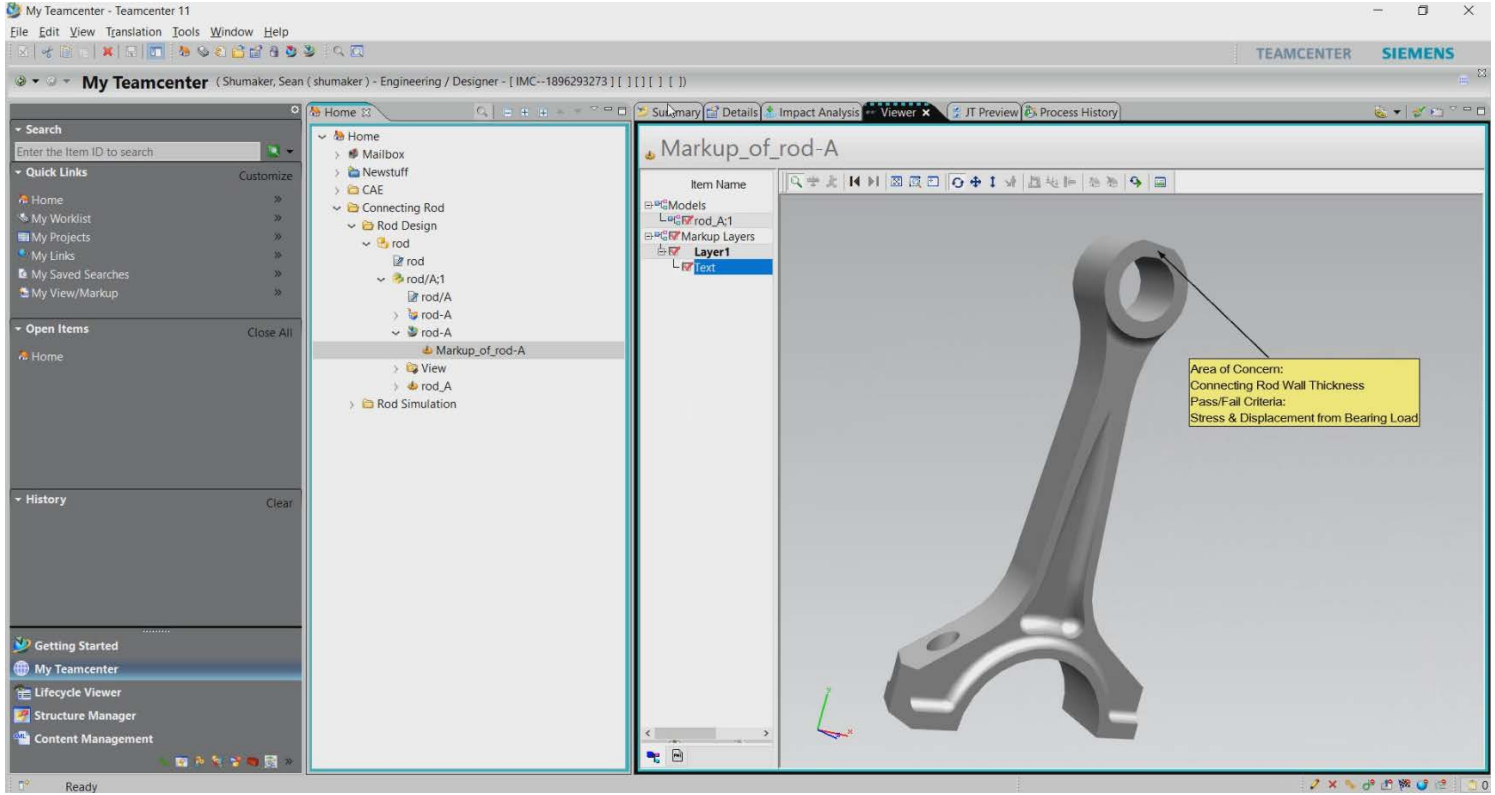


Simulation Results Visualization & Reporting

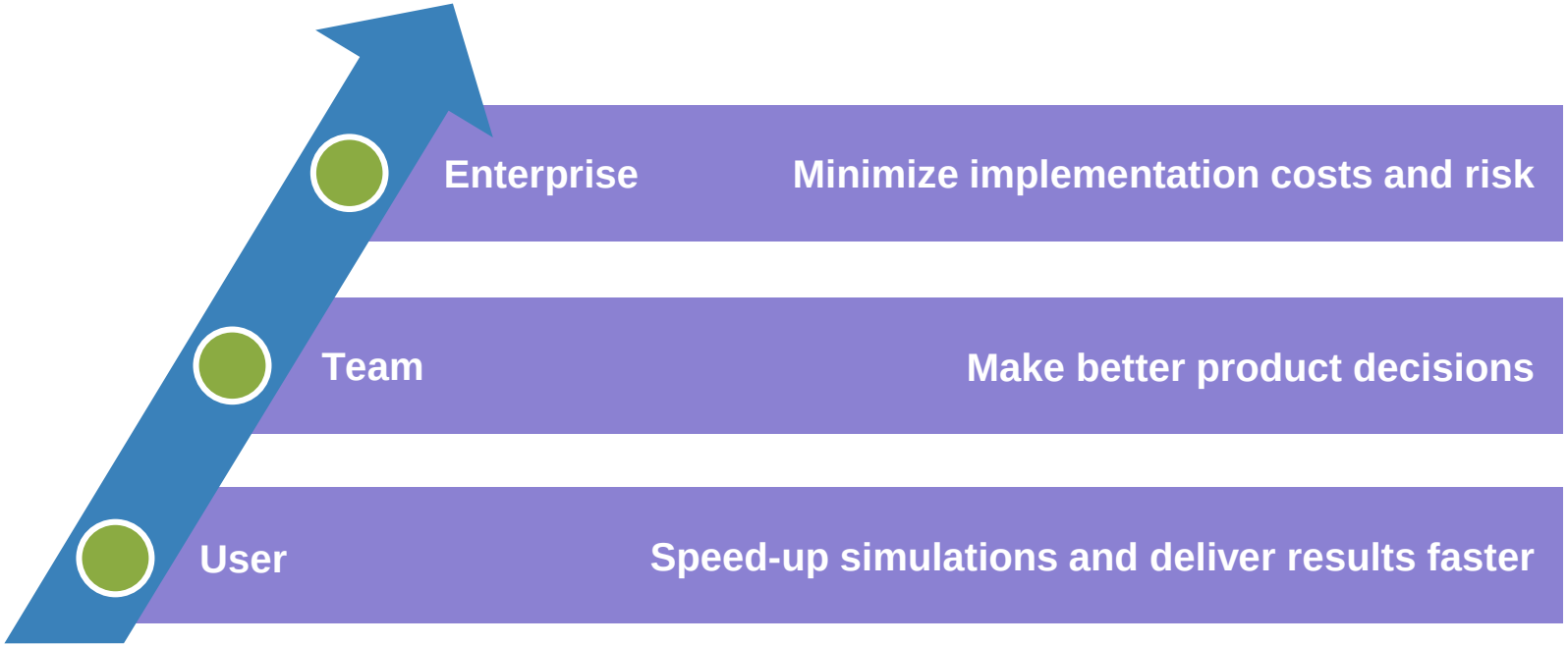
Benefits of CAE Simulation Management

- Remove Clerical Tasks & Eliminate Rework
- Distribution & Execution of Simulation Tasks In A Collaborative Environment
- Configure & Organize Only Relevant Data with End-to-End Traceability
- Efficient Model Build Process Through Automation & Reuse
- Streamlined & Guided Simulation Processes
- Deliver Timely Results With Increased Confidence

Demonstration



Realized Impact of CAE Simulation Management



Questions?

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THANK YOU!

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