



MOVING FROM DRAWING-CENTRIC TO PART-CENTRIC DESIGN

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Senior Director: PLM Solutions

8th June 2016

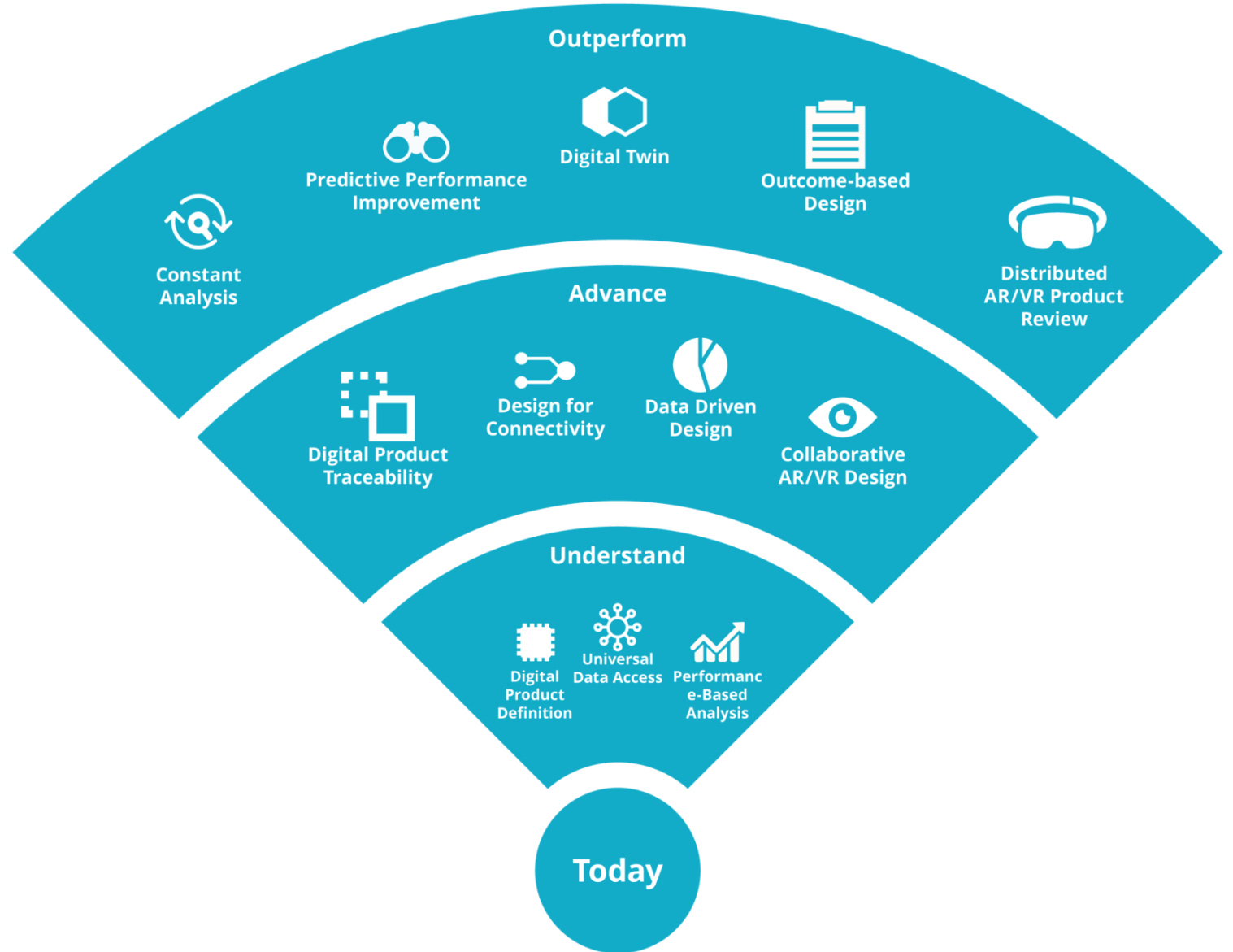


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DIGITAL ENGINEERING TRANSFORMATION

... TAKE A FRESH
LOOK AT
ENGINEERING

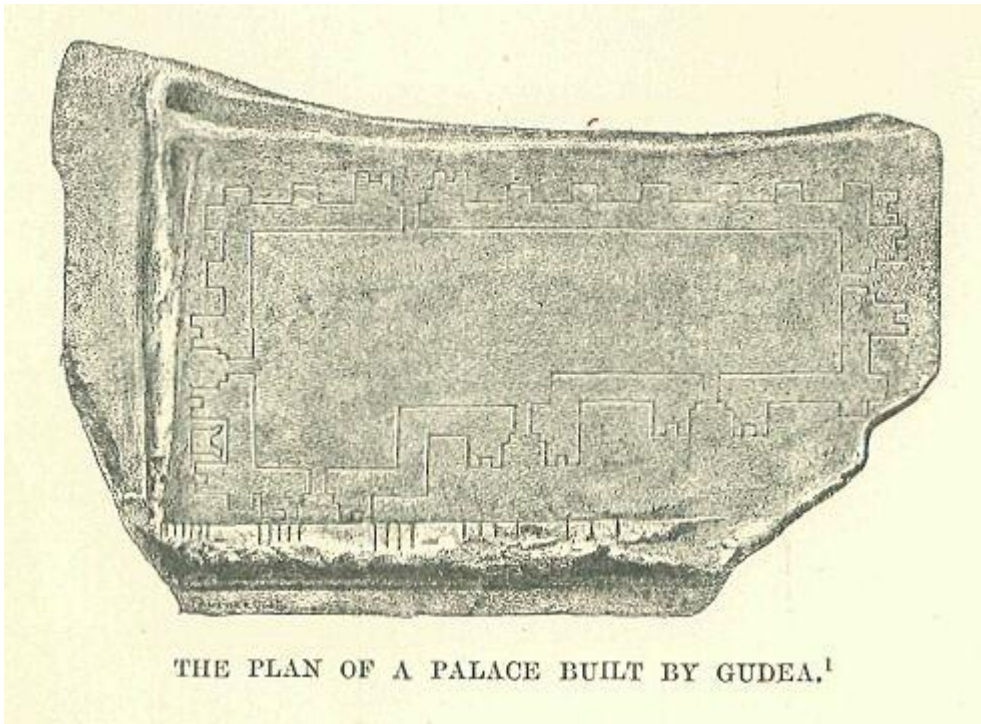


AGENDA

- What's the problem?
- Can we take a fresh look at an old process?
- Windchill 11.0 Enabling Features
- Summary

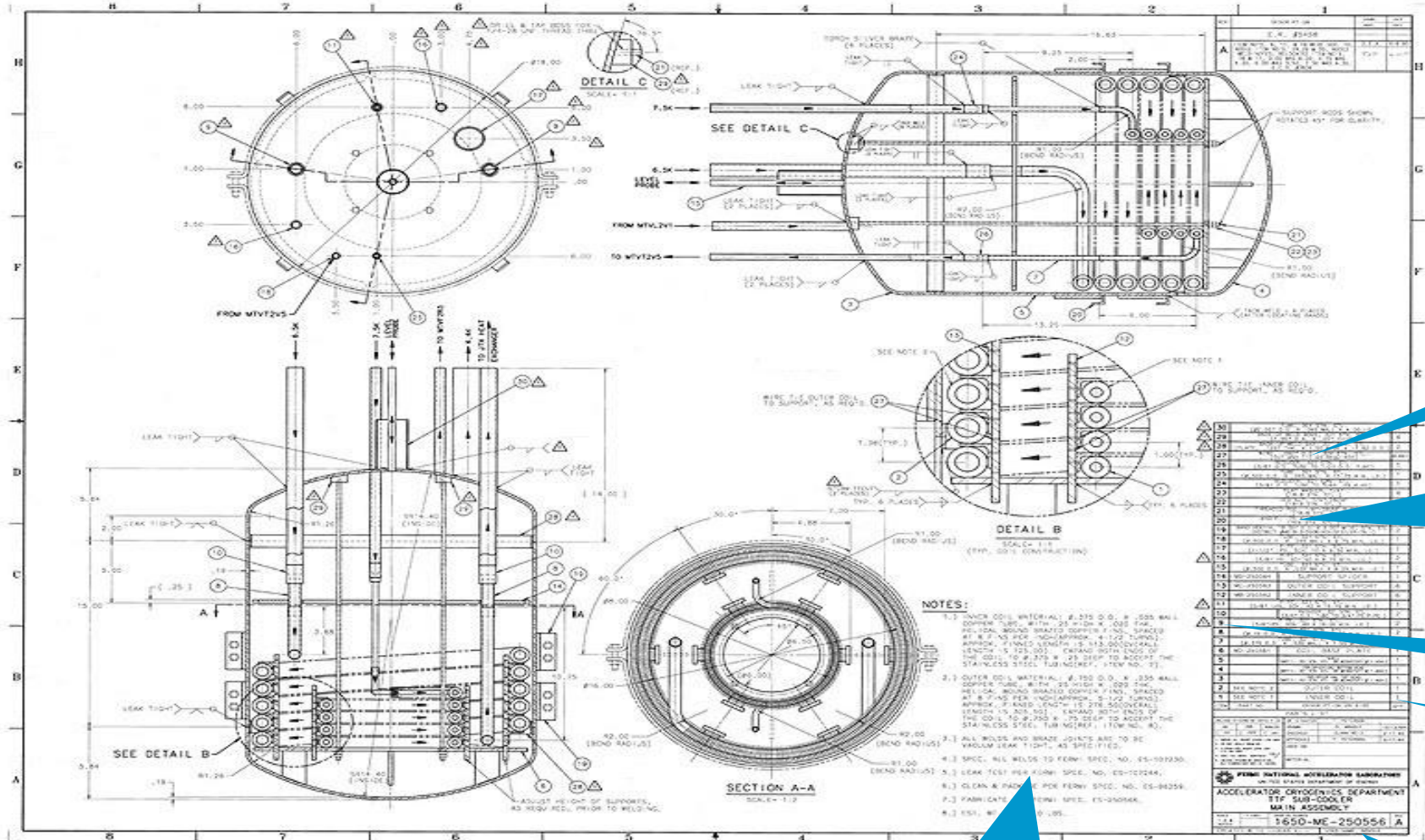
DRAWINGS HAVE BEEN AROUND FOR QUITE SOME TIME

Gudea 2130 BC



Gudea then employed a "diviner, maker of decisions" and a "searcher of secrets" to locate the site, on the city's outskirts, where the god wished his temple to be built. He then recruited 216,000 people for the construction job.

ANATOMY OF A DRAWING



BOM

Component Name & Number

Find Numbers

Quantity

Process Reqts

Part Name + Rev

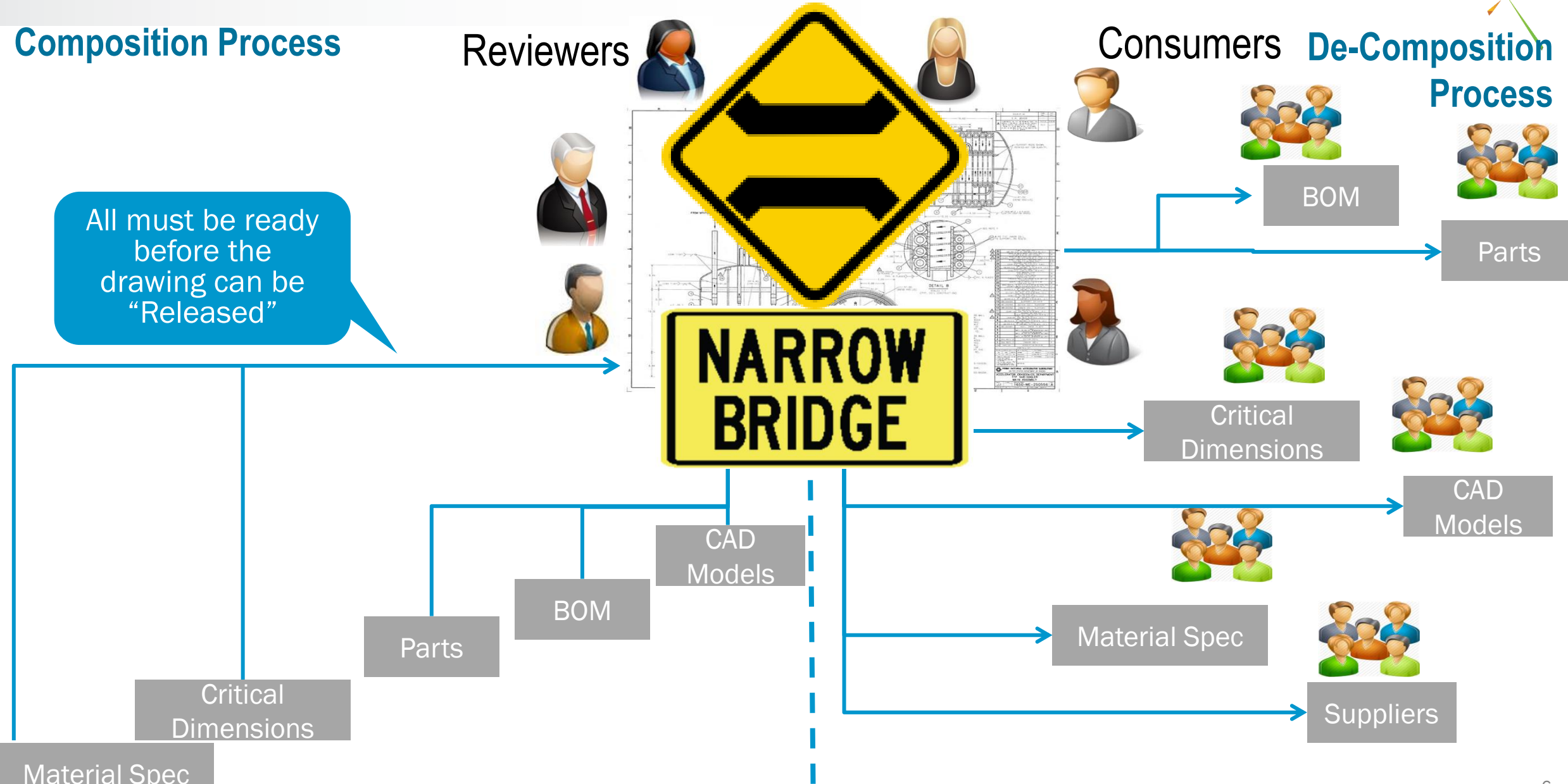
DRAWING-CENTRIC PROCESS

Composition Process

Reviewers

Consumers **De-Composition Process**

All must be ready before the drawing can be "Released"



THIS PROCESS CONSTRICTION GETS EXPENSIVE



• Tracking Changes

- Quantity changes => Drawing Change
- Process changes => Drawing Change
- Part Number => Drawing Change
- Part Name changes => Drawing Change
- New Assy BOM => Drawing Change
- Replace a Part => Drawing Change
- Change a Find Number => Drawing Change



What Changed??



1 Change on a Drawing may affect 10x downstream activities & deliverables

DRAWINGS

- Drawing Centered World

- Product Content

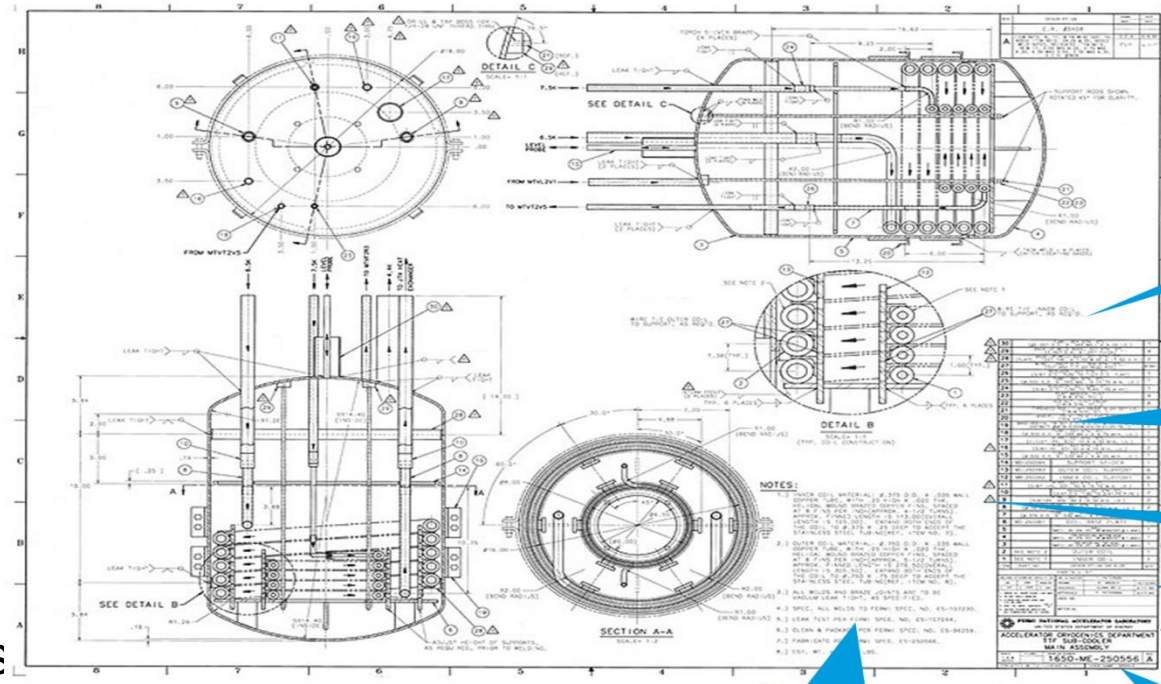
- Part Drawings
- Assy Drawings
- Table Drawings
- Mfg/assy

- Suppliers

- Spec Control Drawing

- Governance

- Design Review of Drawings
- Change Control of Drawings



BOM

Part # + Part Name

Find Numbers

Quantity

Process Reqs

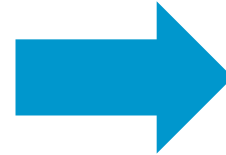
Part Name + Rev

MOVING TO PART-CENTRIC CONFIGURATION MANAGEMENT



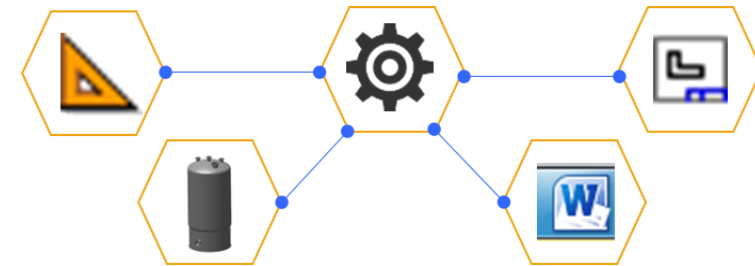
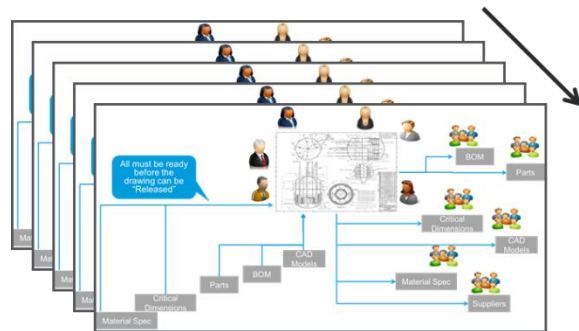
- Drawing Centered Process

- Product Content
 - Part Drawing
 - Assembly Drawings
 - Table Drawings
 - Mfg/assy Drawing
- Suppliers
- Governance of Product Definition



- Part Centered Process

- Product Content
 - Parts
 - BOM
 - Related information
 - Configurable Designs
 - Manufacturing, Supplier and Service information
- Governance of Product Definition



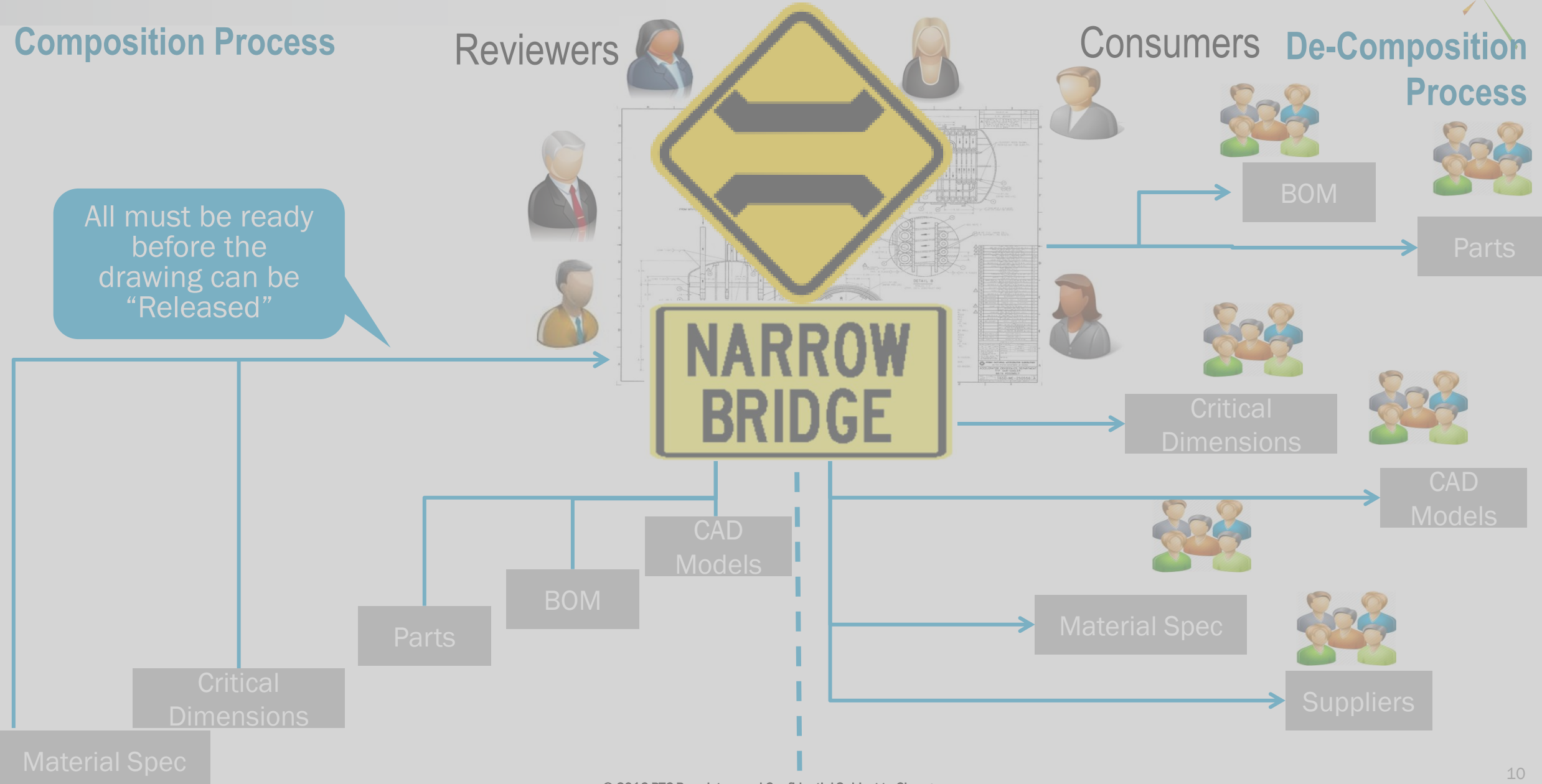
DRAWING-CENTRIC PROCESS

Composition Process

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All must be ready before the drawing can be "Released"

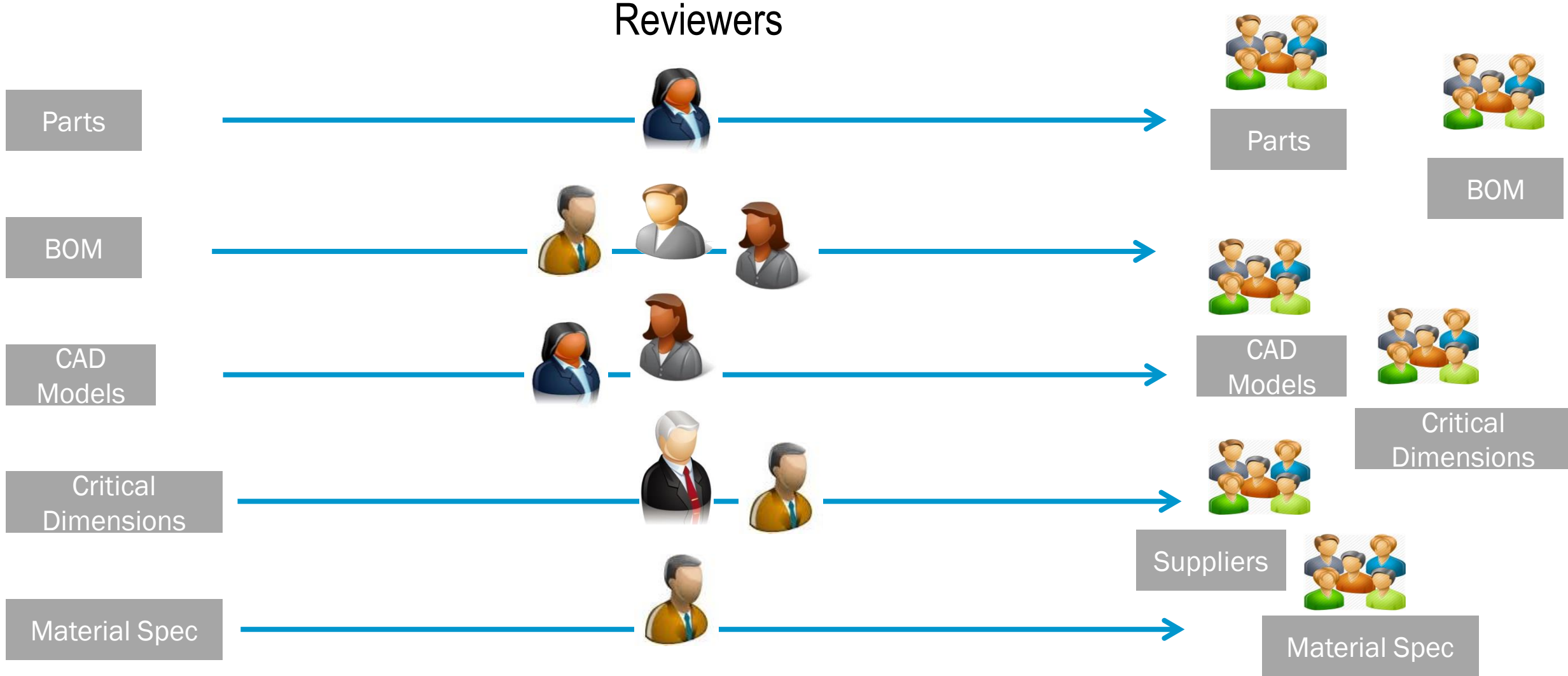


PART-CENTRIC PROCESS



Composition Process

Consumption Process



iRobot®

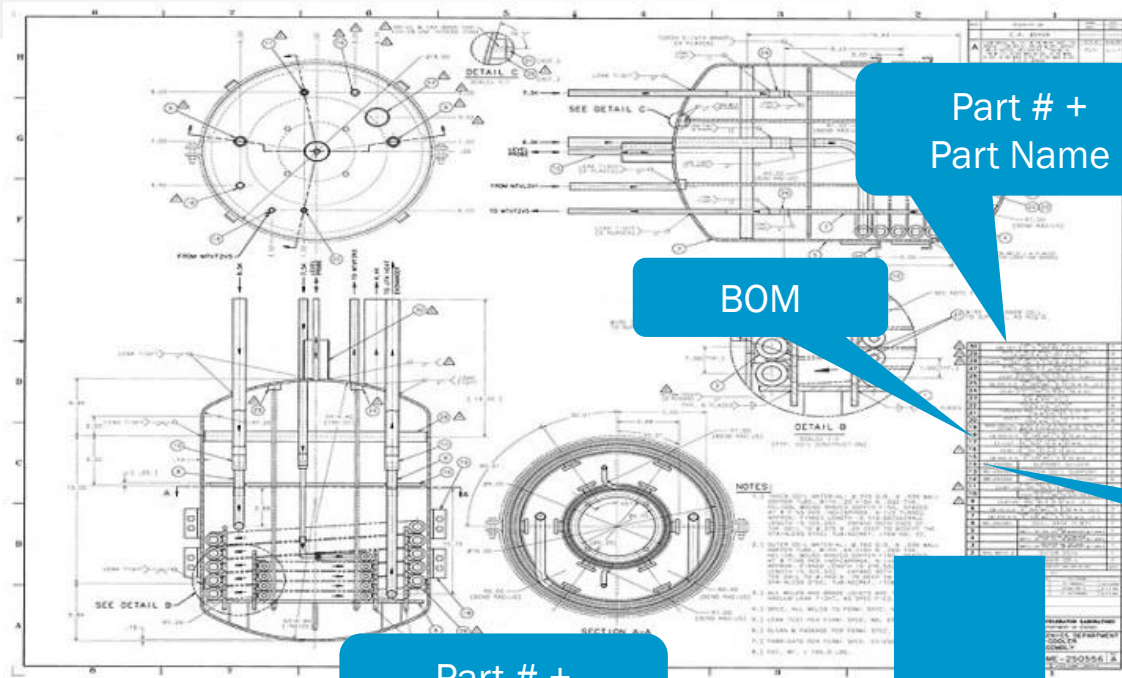
“Anyone in the company has the luxury of grabbing a bill of materials at any point in time and having confidence that what they’re looking at is the correct and up-to-date information.”

– Kar Dehal
Senior Windchill Business Analyst
iRobot

<http://www.ptc.com/webcast/accelerated-product-development>



ASSEMBLY DRAWING TO PART-CENTRIC BOM



Part # +
Part Name

BOM

Quantity

Find Numbers

Part # +
Part Name

Quantity

Find Numbers

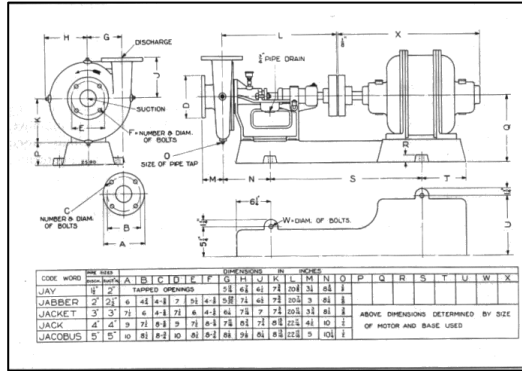
BOM

Attributes Occurrences Visualization										
	Number	Name	Version	End Item	Line Number	Quantity	Unit	Trace Code	Reference Designator	Find Number
⚙️	070009	CAPACITOR, 10uF, 16V, SMD	A.1 (Design)	No	10	1	each	Untraced	C4	30
⚙️	070021	DIODE, SCHOTTKY, 30V, 200mA	A.1 (Design)	No	20	4	each	Untraced	D1-D4	190
⚙️	070023	JUMPER, CONN HEADER, 2POS,	A.1 (Design)	No	30	7	each	Untraced	JP1,JP7,JP10-JP12,TP1-TP2	210
⚙️	070024	JUMPER, CONN HEADER, 3POS,	A.1 (Design)	No	40	7	each	Untraced	JP2-JP6,JP8-JP9	220
⚙️	070028	LED, RED, CLEAR, SMD	A.1 (Design)	No	50	7	each	Untraced	LED1-LED7	290
⚙️	070036	RESISTOR NETWORK, COMMON ...	A.1 (Design)	No	60	6	each	Untraced	RP3-RP8	390
⚙️	070066	CAPACITOR, 100nF, 50V, 10%, SMD	A.1 (Design)	No	70	40	each	Untraced	C1-C3,C5-C6,C9,C11,C13...	20

TABLE DRAWINGS TO PART-CENTRIC FAMILIES

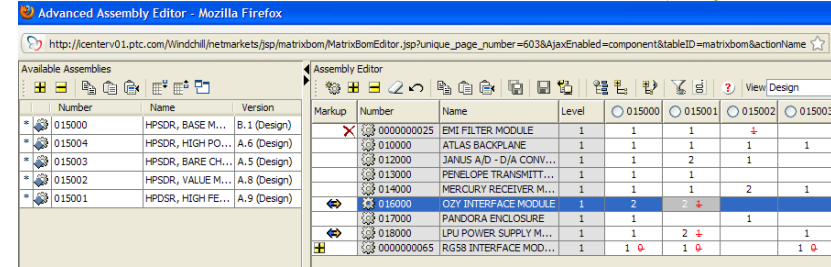
- **Typical Needs**

- Define a related set of parts or assemblies with varying dimensions or attributes



- **Family Definition in Windchill**

- Create/Manage BOMs
 - Save-As Part Structures
 - Assembly Table Editor – Edit multiple family members
- Manage related Drawings
 - Relate Drawings to Multiple Parts
- Platform Structures Module
 - Excel Product Family



Line Number	Find Number	Unit of Measure	Quantity	Name	Number	GC0000001	GC0000002	GC0000003	GC0000004	GC0000005	GC0000006	GC0000007	GC0000008	GC0000009	GC0000010
1		ea	-	b		1									
1		ea	-	c		1									
2	65	ea	-	CP001-01	1	1	1	1	1	1	1	1	1	1	1
3	70	ea	-	CP001-02	1	4	1	5	1	1	1	1	1	1	1
4	75	ea	-	CP001-03	1	1	1	1	1	1	1	1	1	1	1
5	80	ea	-	CP001-04	1	1	1	1	1	1	1	1	1	1	1
6	85	ea	-	CP001-05	1	1	1	1	1	1	1	1	1	1	1
7	90	ea	-	CP001-06	1	1	1	1	1	1	1	1	1	1	1
	110	ea	-	CP0200-01	1	1	1	1	1	1	1	1	1	1	1
	105	ea	-	CP0200-01	1	1	1	1	1	1	1	1	1	1	1
	91	ea	-	CP0200-02	1	1	1	1	1	1	1	1	1	1	1
	87	ea	-	CP0200-03	1	1	1	1	1	1	1	1	1	1	1
	83	ea	-	CP0200-04	1	1	1	1	1	1	1	1	1	1	1
	79	ea	-	CP0200-05	1	1	1	1	1	1	1	1	1	1	1
	75	ea	-	GC0000002	1	1	1	1	1	1	1	1	1	1	1
	71	ea	-	GC0000019	1	1	1	1	1	1	1	1	1	1	1
	67	ea	-	GC0000038	1	1	2	3	4	5	6	7	8	9	10
	63	ea	-	GC0000040	1	1	1	1	1	1	1	1	1	1	1
	59	ea	-	JZ01	1	1	1	1	1	1	1	1	1	1	1
	55	ea	-	JZ02	2	2	2	2	2	2	2	2	2	2	2

Manage Table of Family Members

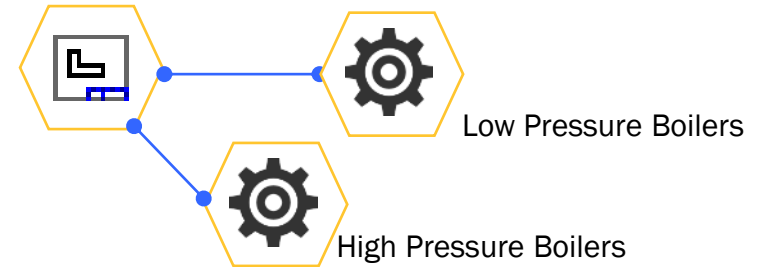
Windchill 10.2 M030

Edit Usage attributes

Quickly add additional Parts to the Table

- **Review Processes**

- WIP - Promotion Process with Baselines
- Release – Change Process

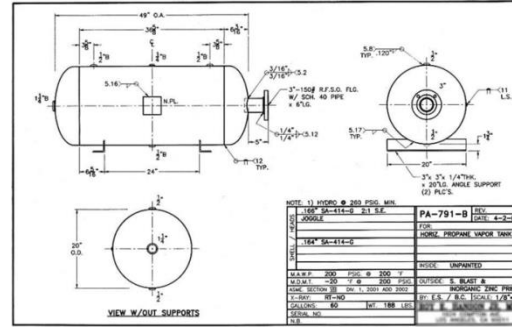


REVIEW PROCESSES - CHANGE MANAGEMENT AND PROMOTION REQUESTS



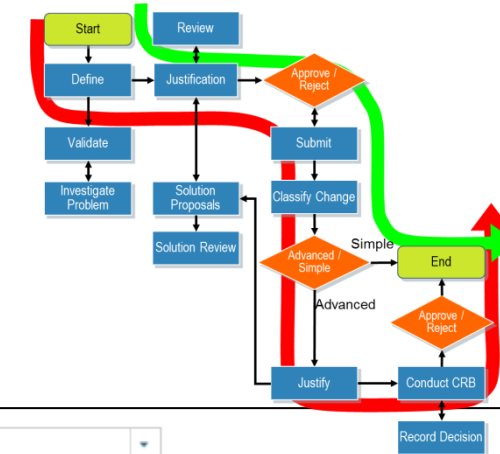
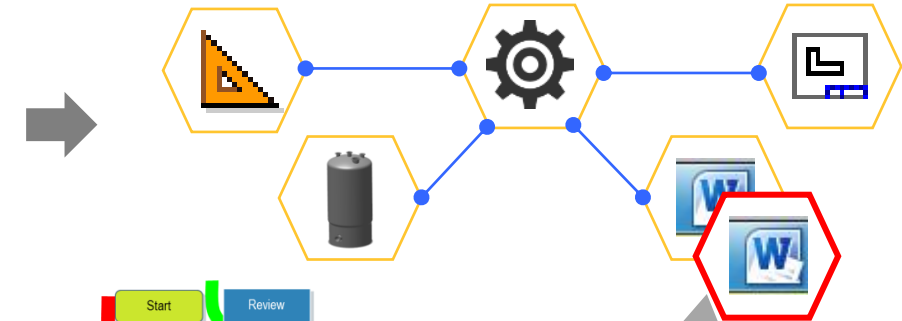
- **Typical Needs**

- Drawing Review and Release
- Revise Drawings, Review and Release
- Identify other affected drawings and change them



- **Review Processes in Windchill**

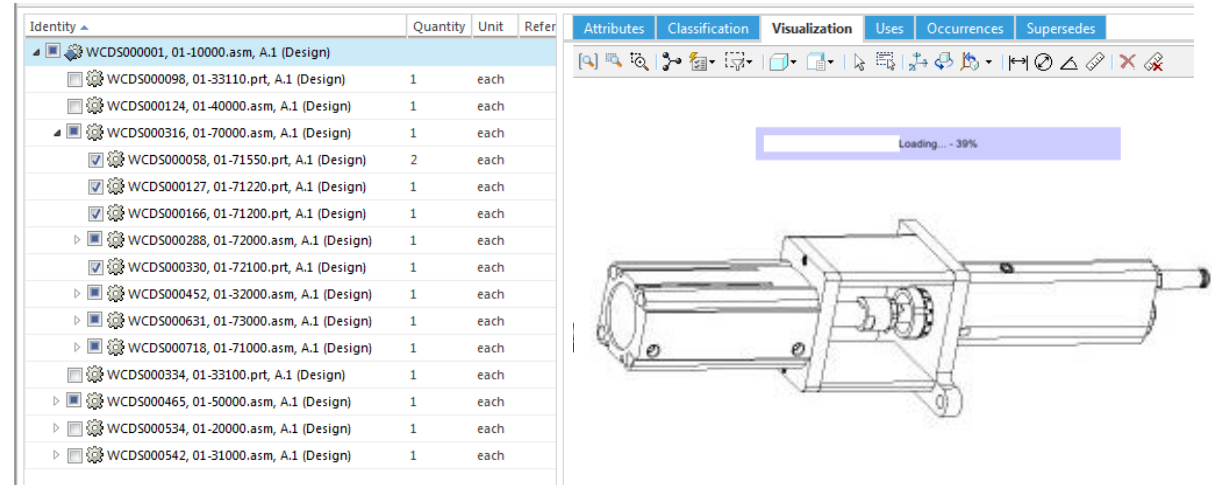
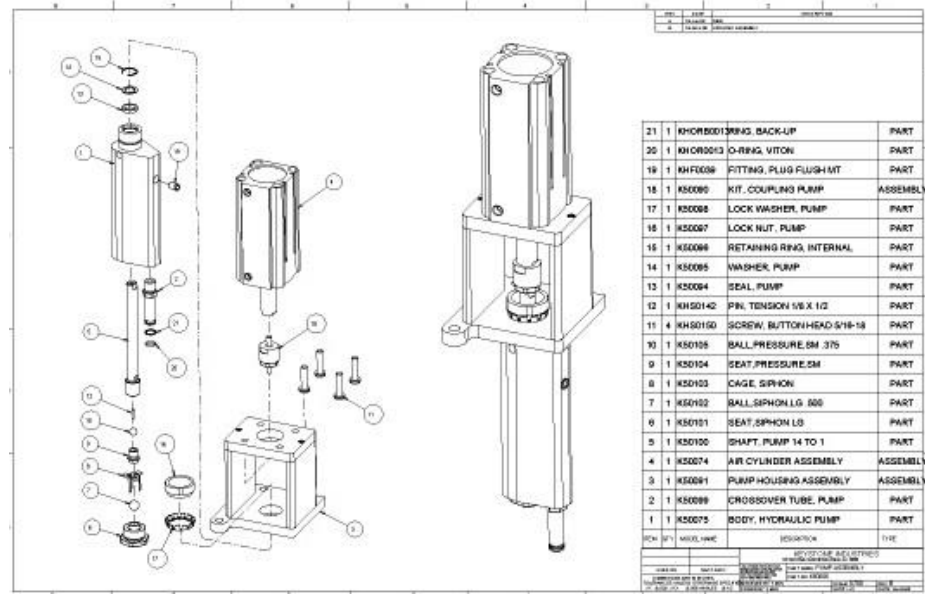
- Change Management
 - Review and Govern each important deliverable
 - Better understanding of what deliverable changed
 - Highly scalable from simple changes to robust enterprise changes
 - Easily gather related data including Parts, CAD, Documents, Supplier Parts, Option Logic and more.
- Promotion Request
 - Light weight process to manage WIP data state changes



Review what Changed – **Not** what did not Change

Change Summary User View 2									
Actions									
		Number...	Version	Name	State	On Order	Work-in-Process	Finishe	
		010000	A.3 (Design)	ATLAS BACKPLANE	Released	Not Applicable	Rework	Scrap	
		010000	B.1 (Design)	ATLAS BACKPLANE	In Work				
		070002	A.1 (Design)	CAPACITOR, 0.1uF, SMD CE...	Released	Return	Return	Scrap	
		070002	B.1 (Design)	CAPACITOR, 0.1uF, SMD CE...	In Work				
		070008	A.1 (Design)	PCB, ATLAS	Released	Return	Rework	Repair	
		070008	B.1 (Design)	PCB, ATLAS	In Work				
		070009	A.1 (Design)	CAPACITOR, 10uF, 16V, SMD	Released	Return	Return	Scrap	

MOVING FROM DRAWING-CENTRIC TO PART-CENTRIC



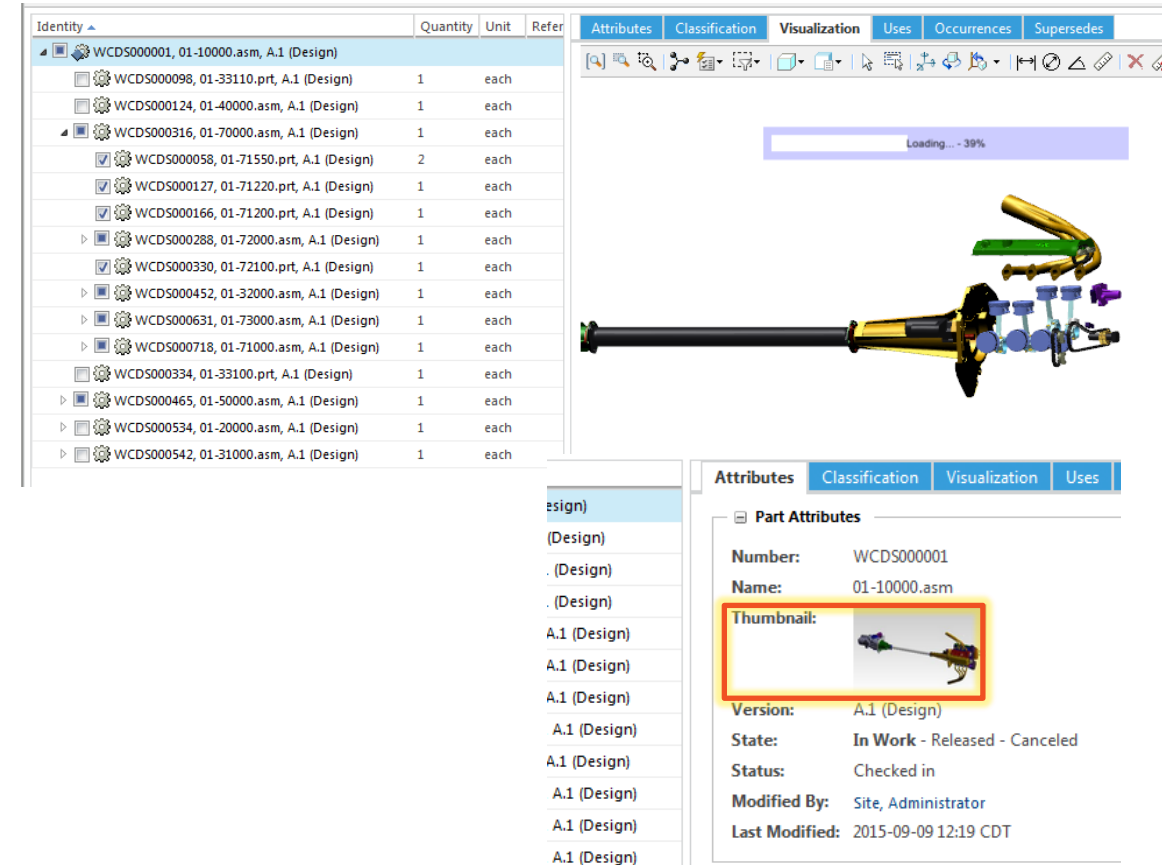
BOM IMPROVEMENTS: VISUALIZATION



• Visualization Usability

- Enable the Visualization Tab to start empty and load the representations that the user selects
 - Load or hide representations based upon selection or branch
- Thumbnails in the Attribute Tab
 - Display the thumbnail representation and launch CreoView
- Hide the Visualization Tab
 - Remove for environments with no viewables or users that don't use it

Benefits: Improve the daily experience of users working with large complex structures



Best Practices for Managing and Validating Product Configurations

Wednesday, June 8 3:30 PM - 4:15 PM

Presenter(s): [Jeffrey Zemsky](#) PTC, [Mark Lobo](#) PTC

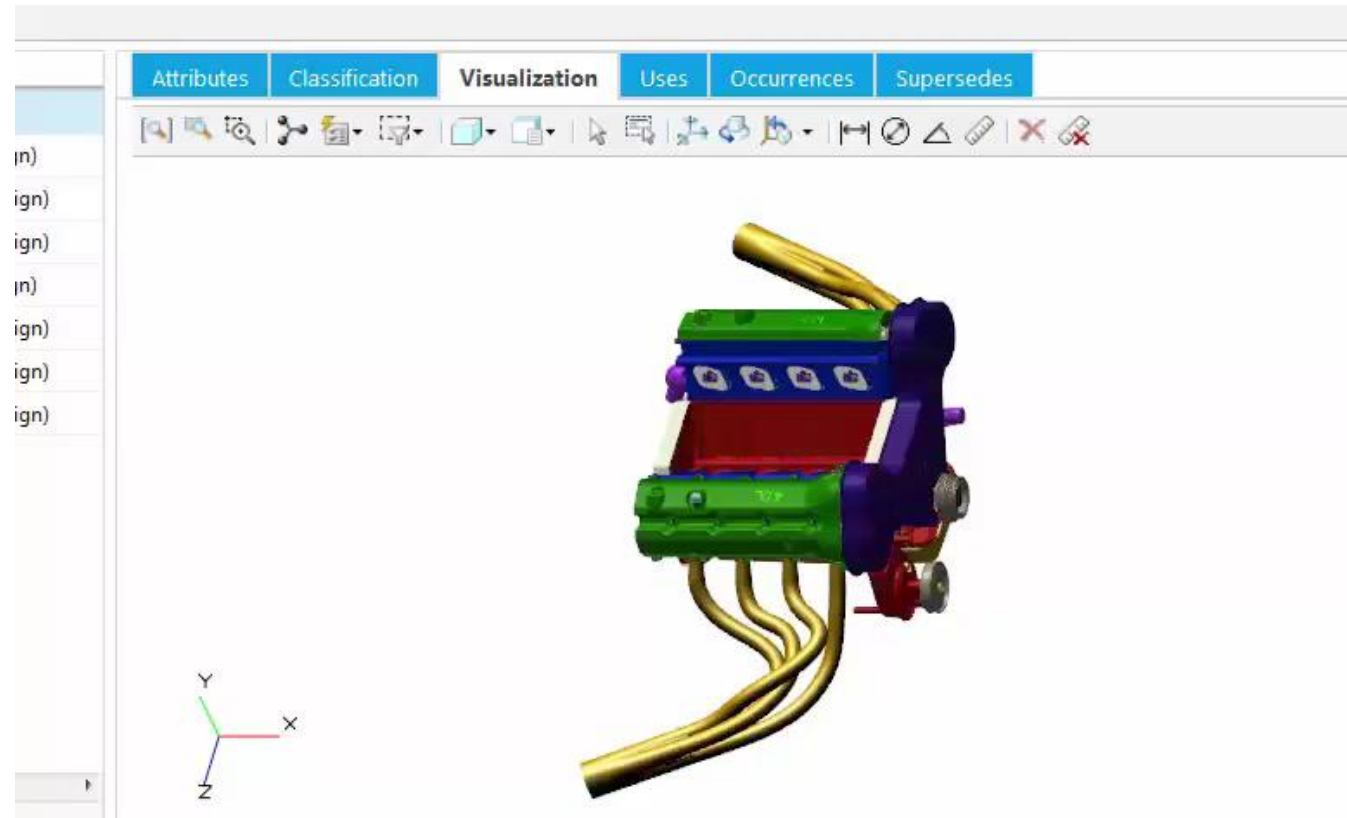
PTC Product Family/Content Theme: PTC Windchill

Track: Design

BOM IMPROVEMENTS: VISUALIZATION

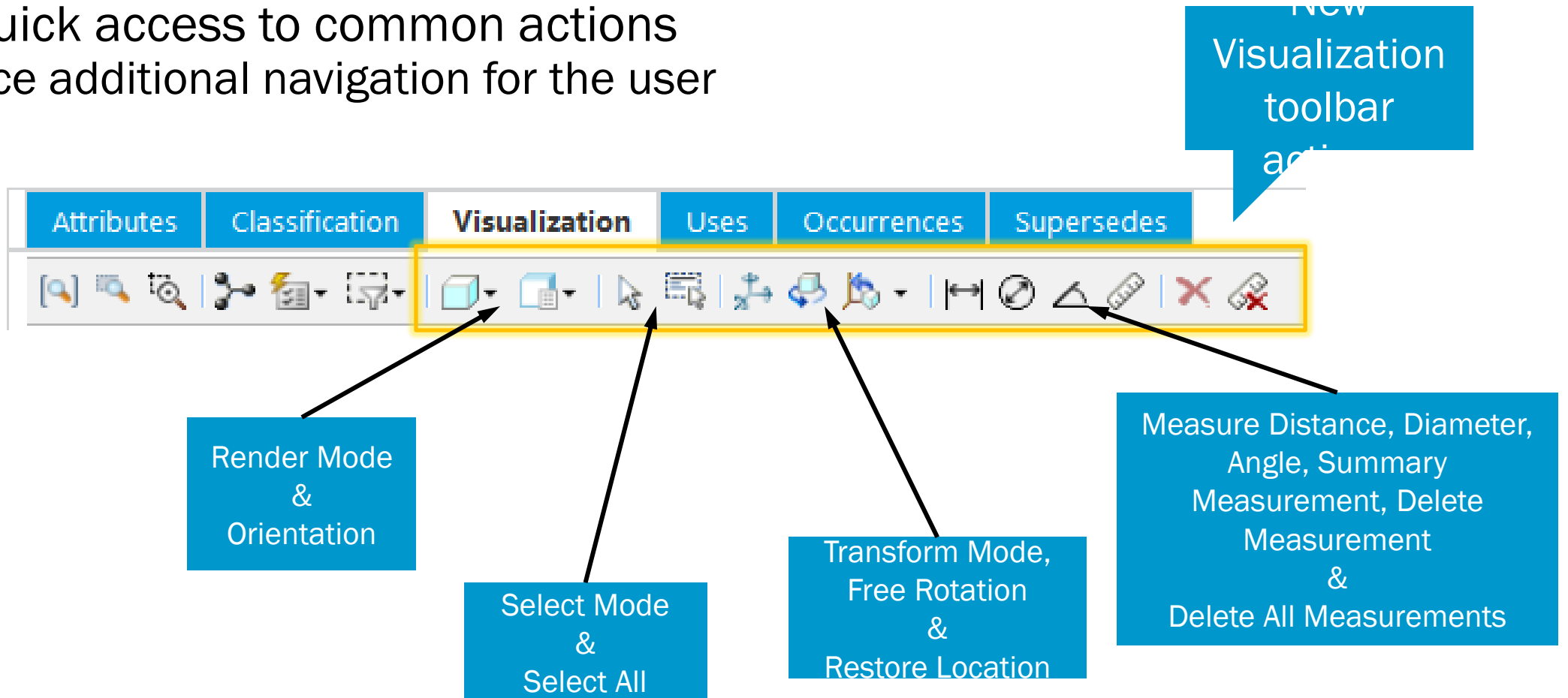


- NEW Visualization ToolBar Actions
- Deliver quick access to common actions
 - Reduce additional navigation for the user
 - Change Render Mode & Orientation
 - Move and Rotate parts
 - Measure
 - Distance
 - Diameter
 - Angle
 - Summary Measurements



BOM IMPROVEMENTS: VISUALIZATION

- Visualization Toolbar Actions
- Deliver quick access to common actions
 - Reduce additional navigation for the user



BOM IMPROVEMENTS: VISUALIZATION



- Improved Usability for Related Information
 - Improve Access to Related Part Information
 - Set Defaults of Related Part Information
 - Simplify steps to Show or Hide Related Document Information
 - Split Show/Hide Actions to reduce clicks for users
 - Predefine which Related Information to Show when using Show Action
 - Provide ability for the user to define which Related Information to Show by default
 - Preference under Structure: Part Structure Related Information
- Benefits:
 - As companies increase Part-centric adoption, direct access to related information
 - Improve adoption by making the information more easily accessible

The screenshot shows the software interface with the 'Viewing' ribbon active. The 'Show' and 'Hide' buttons are highlighted in a red box. Below, the 'Part Structure Related Information' preference is highlighted in a red box. At the bottom, a 'Set Preference' dialog box is shown with a dropdown menu for 'Replacements' set to 'Show and Display Automatically'.

Category	Value
Incremental Loading in Visualization Tab	Yes
Part Structure Related Information	AML/AVL: Documents: Show CAD Documents: Show Replacements: Show

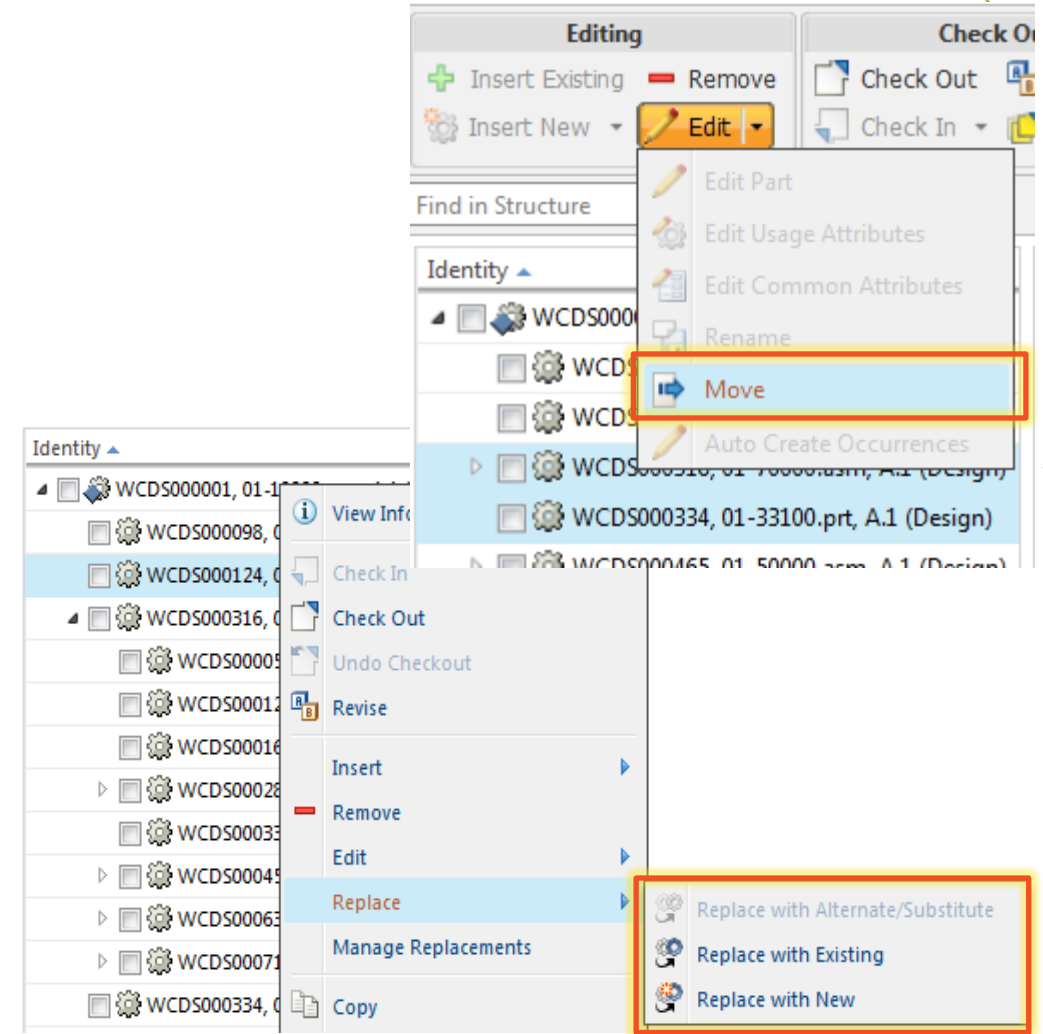
Name : Part Structure Related Information
Description : A Show button toggles on the display of related information in the part structure tree pane. Define the related information that is displayed by the Show button by selecting the Show option. Select the Show and Display Automatically option to enable the display when selecting the Show button and to display the related information automatically when initially navigating a part structure. Leaving the field blank means the given type of related information will not be displayed when the Show button is clicked.
Context : User - Demo, User (demo: Demo Organization)
Value : AML/AVL: [Dropdown]
Documents: Show [Dropdown]
CAD Documents: Show [Dropdown]
Replacements: Show [Dropdown]
Show and Display Automatically [Dropdown]
Comments :

Show: Determines which Related Information is Shown by Default
Show and Display Automatically: Determines which Related Information to Show when the user enters PSB

BOM IMPROVEMENTS: PRODUCT STRUCTURE EDITING



- Improved WIP actions in Product Structure Browser
 - Unify and enable all Replace actions in Product Structure Browser
 - Replace with Existing
 - Replace with New added
 - Unify Replace actions using Right Mouse Click
 - Provide Move action to enable working on Parts without leaving Product Structure Browser
- Benefits: Deliver common WIP actions within Product Structure Browser
 - Reduce need for additional navigation



BOM IMPROVEMENTS: PRODUCT STRUCTURE EDITING



- Product Structure Explorer is Now Hidden By Default
- The new default is to hide the PSE applet
 - Fewer Customers need to access
- PSE Can be enabled via Preference (Site or Org)

The screenshot shows a software interface with a context menu open over a 'PSE' applet. The menu options are: 'Open in' (highlighted), 'Check In', 'Check Out', 'Check Out and Edit', and 'Undo Checkout'. The 'Open in' sub-menu is expanded, showing options: 'Open in Creo View', 'Open in Manufacturing Associative Part Structure Browser', 'Open in Manufacturing Product Structure Explorer', 'Open in Advanced Assembly Editor', and 'Relationship Explorer'. Below the menu is a table of preferences.

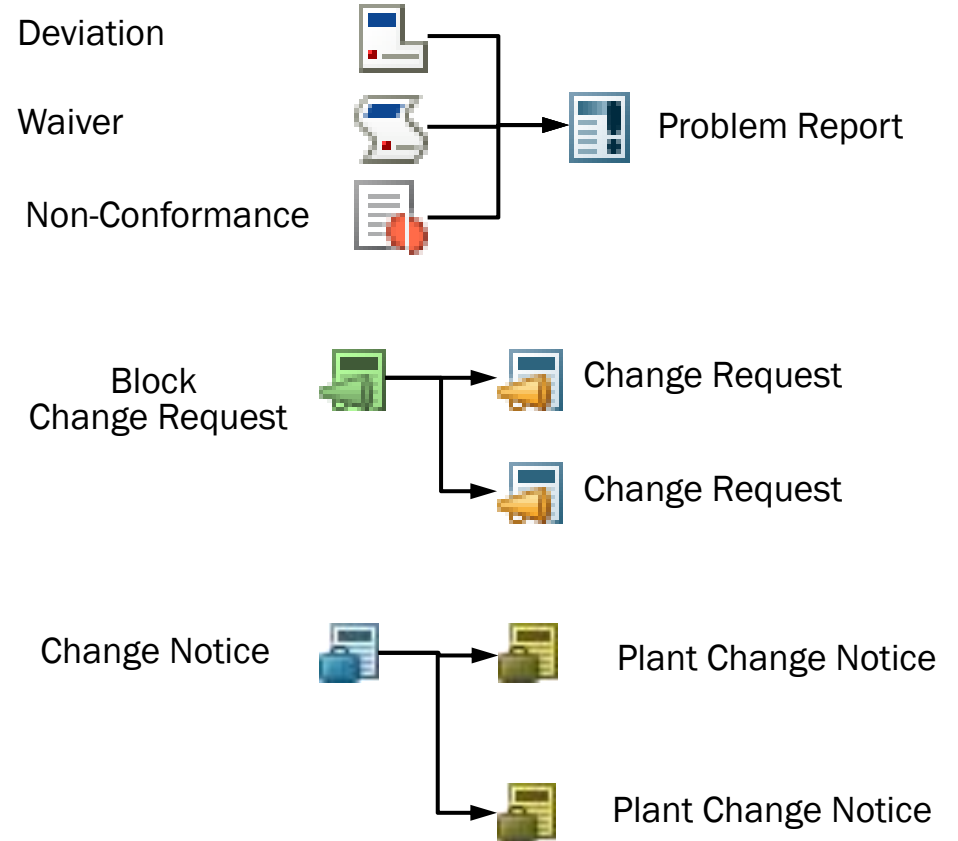
Check in Deferred Changes	No
Close Structure After Changes Are Applied	No
Copy part usage information on cut/copy/...	Yes
Data Entry Results Threshold	10
Default checkout preference selection.	No
Enable Product Structure Explorer (PSE)	No

CHANGE MANAGEMENT - FLEXIBLE CHANGE ASSOCIATIONS



Easily Support Change Relationships

- Change Management Process Flexibility Improvements
 - Provide the ability for Administrators to configure Change Associations between Change objects
 - Create Associations that support customer specific change process needs
 - For Example: Link a Problem Report to a Change Notice
 - Easily build processes between Change objects and subtypes
 - Provide constraints to enforce the use of correct types and cardinality on the links
- Benefits:
 - Improved ability for an organization to easily configure their Change Management process needs
 - Reduced Customization and Easier Upgrades



[Best Practices for Supporting Change Management with Flexible Change Association](#)

Wednesday, June 8 10:45 AM - 11:45 AM

Presenter(s): [Jeffrey Zemsky](#) PTC

PTC Product Family/Content Theme: PTC Windchill

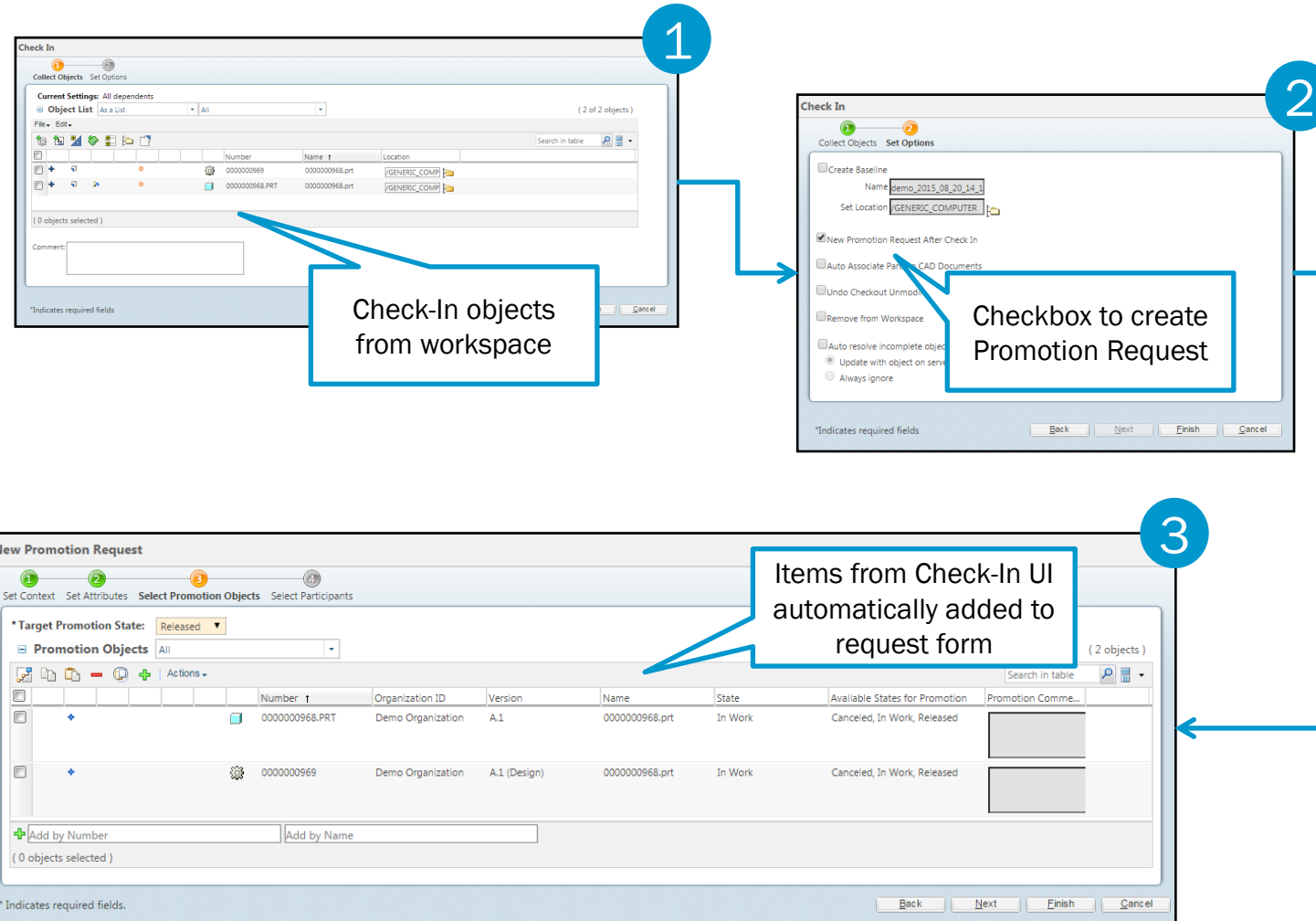
Track: Design

ENHANCED PROMOTION REQUEST ACCESS



Create Promotion Request during check-in process

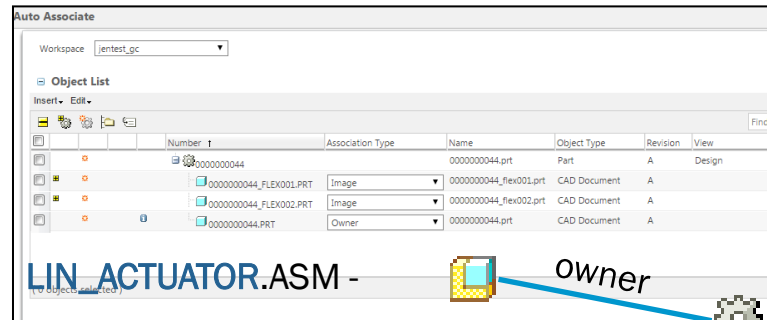
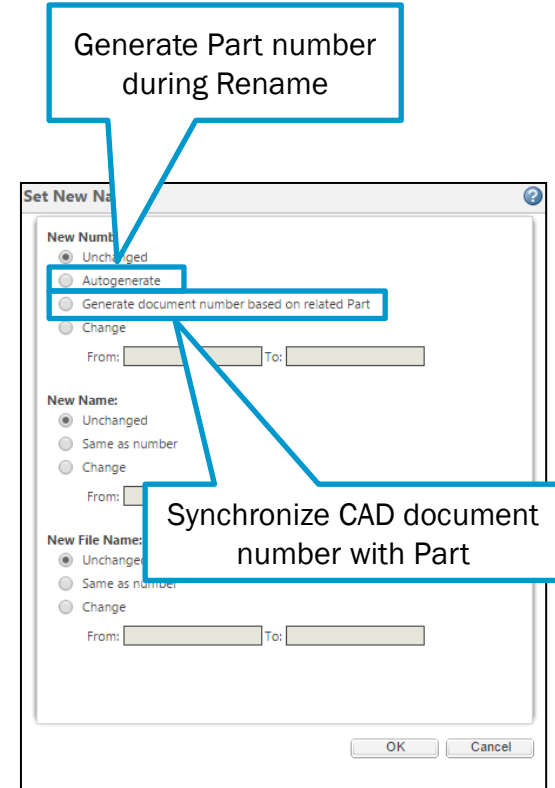
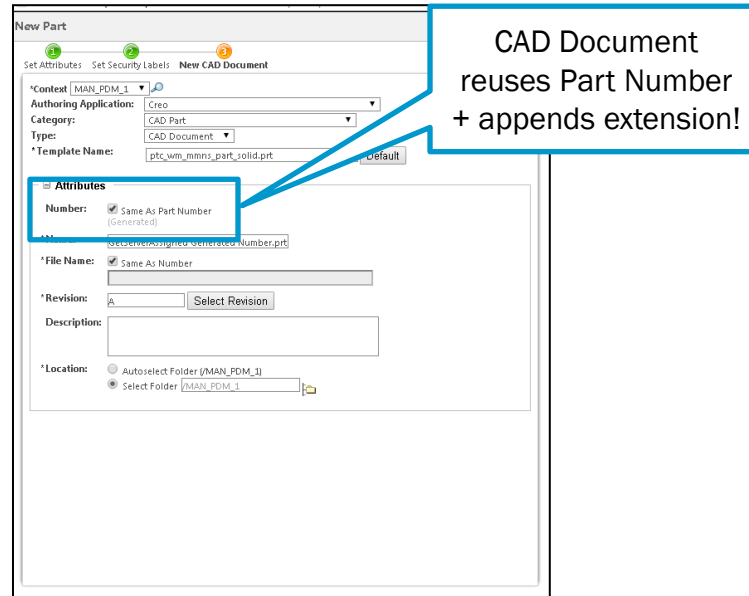
- Automatically launches Create New Promotion Request form
- Items from check-in form automatically added to Promotion Objects list



BOM IMPROVEMENTS: CAD DRIVEN BOM



- Synchronizing Name and Number
 - Top-down and bottom-up support
 - Create Parts and CAD document keeping Name/Number in sync
- Associate CAD documents to Part using a common base number
- Enhanced Rename Support
 - Multi-object select from Folder & Search results
 - Collection capabilities
 - Option to set same Number for Part and related CAD



LIN_ACTUATOR_01.ASM -



im

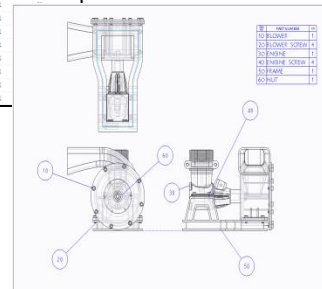
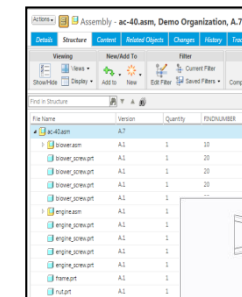
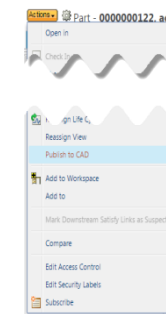
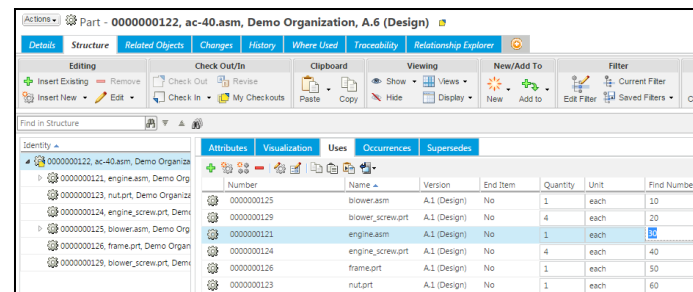
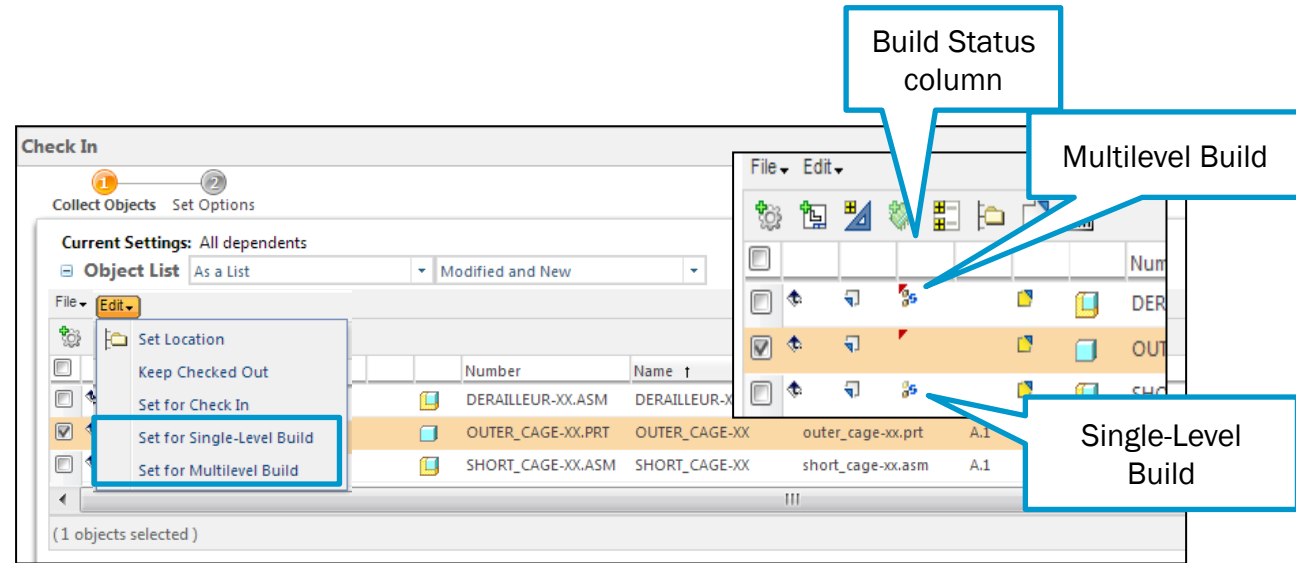
LIN_ACTUATOR

Getting the Most Out of PTC Creo and PTC Windchill 11
 Thursday, June 9 11:30 AM - 12:15 PM
 Presenter(s): [Steve Shaw](#) PTC
 PTC Product Family/Content Theme: PTC Windchill
 Track: Design

BOM IMPROVEMENTS: CAD DRIVEN BOM

Flexible CAD driven eBOM

- Select build during CAD check-in
 - Select what to build or not to build at time of Check-in
 - Control default behavior via preference
- Select Part Type in Associate UI
- Top Down Editing of Find/Line Number



PTC NAVIGATE: BUILD NEW CONNECTIONS & EXPERIENCES



HOW WOULD YOU **BUILD** NEW CONNECTIONS FOR BETTER BUSINESS INSIGHTS?

- **Extensible:** to new data sources, new systems
- **Agile:** deploying new UIs quickly, “try fast / fail fast”
- **Seamless:** data source changes do not impact UI
- **Flexible:** sources can be cloud, on premises, SAAS, mixed

CREATE BETTER INSIGHTS, NEW CONNECTIONS, NEW APPS



Dynamic, real-time connections to multiple systems of origin

Highest fidelity to source and change for confident decisions

Tailor and deploy apps quickly, leveraging Rapid Application Development

Upgrade, improve or replace backend systems without impact

PTC® Navigate View Part Structure

Welcome Administrator

Back To Search

PART DETAILS

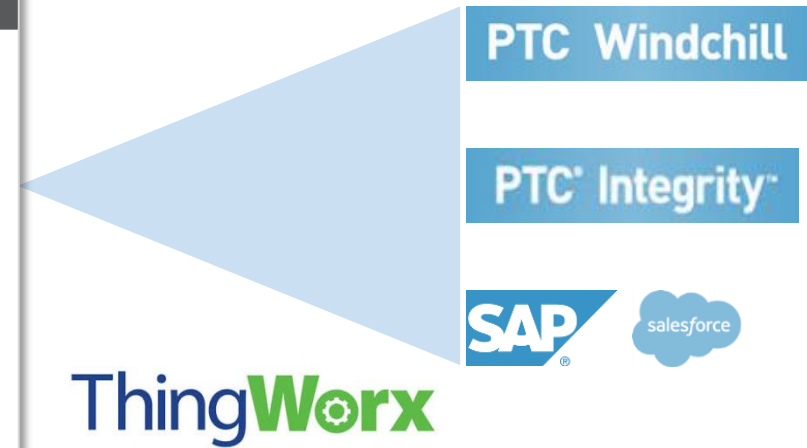
Number: 0000000212
Name: SHOWER HEAD
Version: 1.1 (Design)
State: Design

SELECTED PART

Number: 0000000248
Name: CONTROL KNOB - 2ND SHOT
Version: 1.1 (Design)
State: Design

PART STRUCTURE

Number	Name	Version	State	Last Modified
0000000212	SHOWER HEAD	1.1 (Design)	Design	8/23/2015
0000000214	CONTROL KNOB - LARGE	1.1 (Design)	Design	8/23/2015
0000000281	CONTROL KNOB - 1ST SHOT	1.1 (Design)	Design	8/23/2015
0000000248	CONTROL KNOB - 2ND SHOT	1.1 (Design)	Design	8/23/2015
0000000311	ENGINE COWLING	1.1 (Design)	Design	8/23/2015
0000000292	LINKAGE KNOB	1.1 (Design)	Design	8/23/2015
0000000244	REAR HOUSING	1.1 (Design)	Design	8/23/2015
0000000202	LINKAGE STEM	1.1 (Design)	Design	8/23/2015
0000000284	ENGINE NUT	1.1 (Design)	Design	8/23/2015
0000000249	SHOWER BALL	1.1 (Design)	Design	8/23/2015
0000000290	FRONT HOUSING	1.1 (Design)	Design	8/23/2015
0000000219	SHOWER FLOW CONTROL	1.1 (Design)	Design	8/23/2015
0000000296	FLOW CONTROL VALVE	1.1 (Design)	Design	8/23/2015
0000000308	FLOW CONTROL HOUSING	1.1 (Design)	Design	8/23/2015
0000000262	O-RING	1.1 (Design)	Design	8/23/2015
0000000271	BALL SEAL	1.1 (Design)	Design	8/23/2015
0000000264	LINKAGE	1.1 (Design)	Design	8/23/2015



Pick component

Row in BOM Structure highlighted

Selected part properties displayed

Include columns from other systems (e.g., stock, cost...)

PTC NAVIGATE: VIEW PART STRUCTURE

- Benefits
- Dynamic version of assembly drawing with callouts
- Visually identify part & 3-D location of part in assembly from number
- Select part from 3-D model and quickly find number and attribute information in BOM structure
 - Cost from ERP
 - Stock or quantities in process from ERP or MES
- Include dynamic information from other systems
 - Cost from ERP
 - Stock or quantities in process from ERP or MES

PTC® Navigate View Part Structure

Welcome Administrator Powered By ThingWorx

Back To Search

PART DETAILS

Number: 000000212
Name: SHOWER HEAD
Version: 1.1 (Design)
State: Design

SELECTED PART

Number: 000000248
Name: CONTROL KNOB - 2ND SHOT
Version: 1.1 (Design)
State: Design

PART STRUCTURE

Number	Name	Version	State	Last Modified
000000212	SHOWER HEAD	1.1 (Design)	Design	8/23/2015
000000214	CONTROL KNOB - LARGE	1.1 (Design)	Design	8/23/2015
000000281	CONTROL KNOB - 1ST SHOT	1.1 (Design)	Design	8/23/2015
000000248	CONTROL KNOB - 2ND SHOT	1.1 (Design)	Design	8/23/2015
000000311	ENGINE COWLING	1.1 (Design)	Design	8/23/2015
000000292	LINKAGE KNOB	1.1 (Design)	Design	8/23/2015
000000244	REAR HOUSING	1.1 (Design)	Design	8/23/2015
000000202	LINKAGE STEM	1.1 (Design)	Design	8/23/2015
000000284	ENGINE HUT	1.1 (Design)	Design	8/23/2015
000000249	SHOWER BALL	1.1 (Design)	Design	8/23/2015
000000290	FRONT HOUSING	1.1 (Design)	Design	8/23/2015
000000219	SHOWER FLOW CONTROL	1.1 (Design)	Design	8/23/2015
000000298	FLOW CONTROL VALVE	1.1 (Design)	Design	8/23/2015
000000308	FLOW CONTROL HOUSING	1.1 (Design)	Design	8/23/2015
000000262	O-RING	1.1 (Design)	Design	8/23/2015
000000271	BALL SEAL	1.1 (Design)	Design	8/23/2015
000000264	LINKAGE	1.1 (Design)	Design	8/23/2015

1 Pick component

→ Row in BOM Structure highlighted

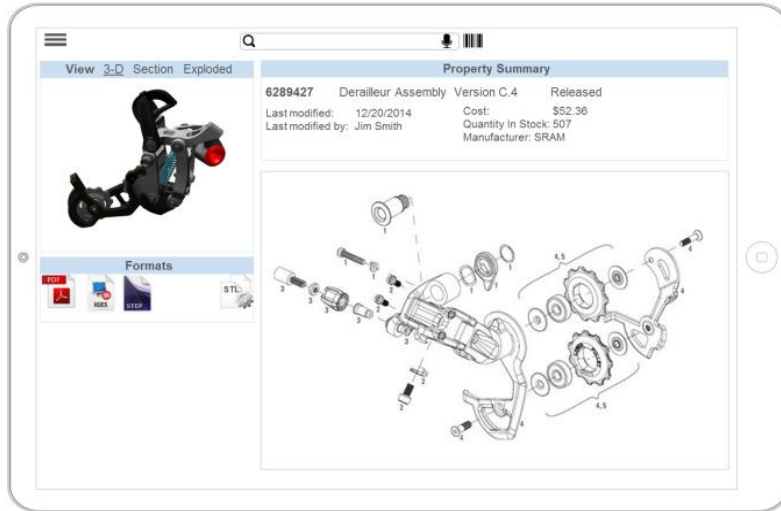
→ Selected part properties displayed

Include columns from other systems (e.g., stock, cost...)

PTC NAVIGATE ROADMAP

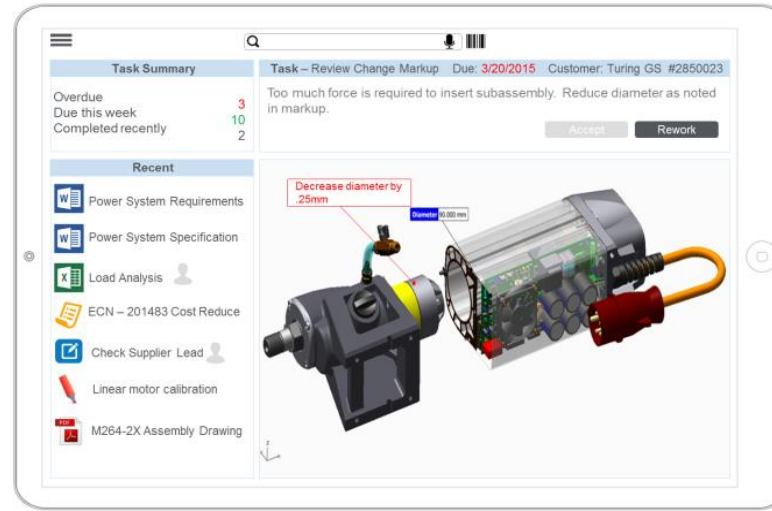


View



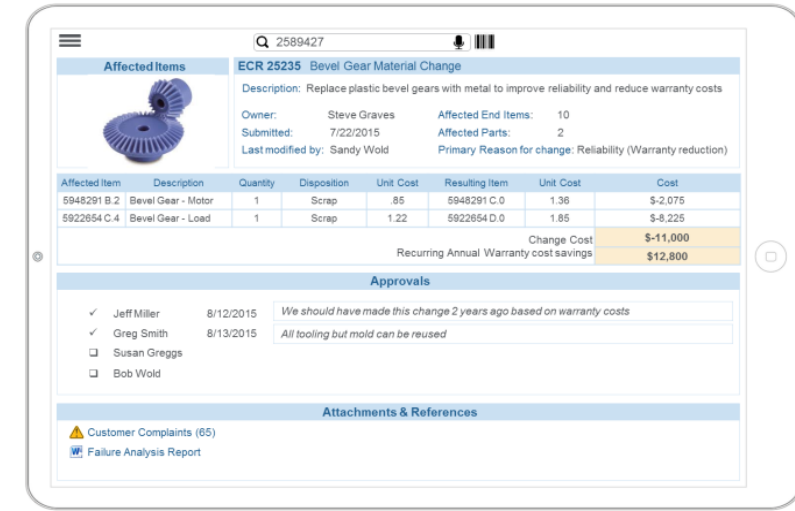
- ▶ View Document
- ▶ View Drawing
- ▶ View Parts List
- ▶ View Parts Structure
- ▶ Download design files
- ▶ View 3-D & Measure
- ▶ View Requirements (from Integrity)
- ▶ View Where-used*
- ▶ View ECN*

Contribute



- ▶ Markup
- ▶ Review & approve
- ▶ Complete task/action
- ▶ Attach/edit document
- ▶ Create problem report
- ▶ Create deviation/waiver
- ▶ Create non-conformance

Author



- ▶ Manage documents
- ▶ Manage collaborations
- ▶ Manage changes
- ▶ Manage releases
- ▶ Initiate processes
- ▶ Create reports

GETTING FROM
HERE TO THERE



PTC GLOBAL SERVICES PROVIDES THE RIGHT APPROACH FOR YOU



Core PLM Blueprinting

- Value-Based Approach
- Define the right strategies
- High level design

EBOM Management VRD

- Address CAD-BOM Challenges
- Pre-configured for out of the box features
- Adopt new practices

Additional PLM VRDs

- Process Transformation
- Accelerated deployment
- Role base adoption

Contact your PTC Sales rep
or

Lisa Hayes (Service Practice Lead for Digital Engineering) lhayes@ptc.com

<http://www.ptc.com/services>

The image features several colorful geometric shapes, primarily triangles and lines, scattered across the background. A large, multi-colored triangular shape is prominent on the right side, composed of various shades of blue, green, yellow, orange, and purple. Several thin, colored lines (blue, pink, green, orange) radiate from the center of the text area. The text 'LIVE WORX 16' is the central focus, with 'LIVE' in a thin, outlined font and 'WORX 16' in a bold, solid black font. A small 'TM' trademark symbol is positioned to the upper right of the '6'.

LIVE
WORX 16™

TAKE A FRESH LOOK AT THINGS

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