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CUST 124 - Linked Data in Real Life:
How “Owner Links” Change Everything

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CAD Support Specialist

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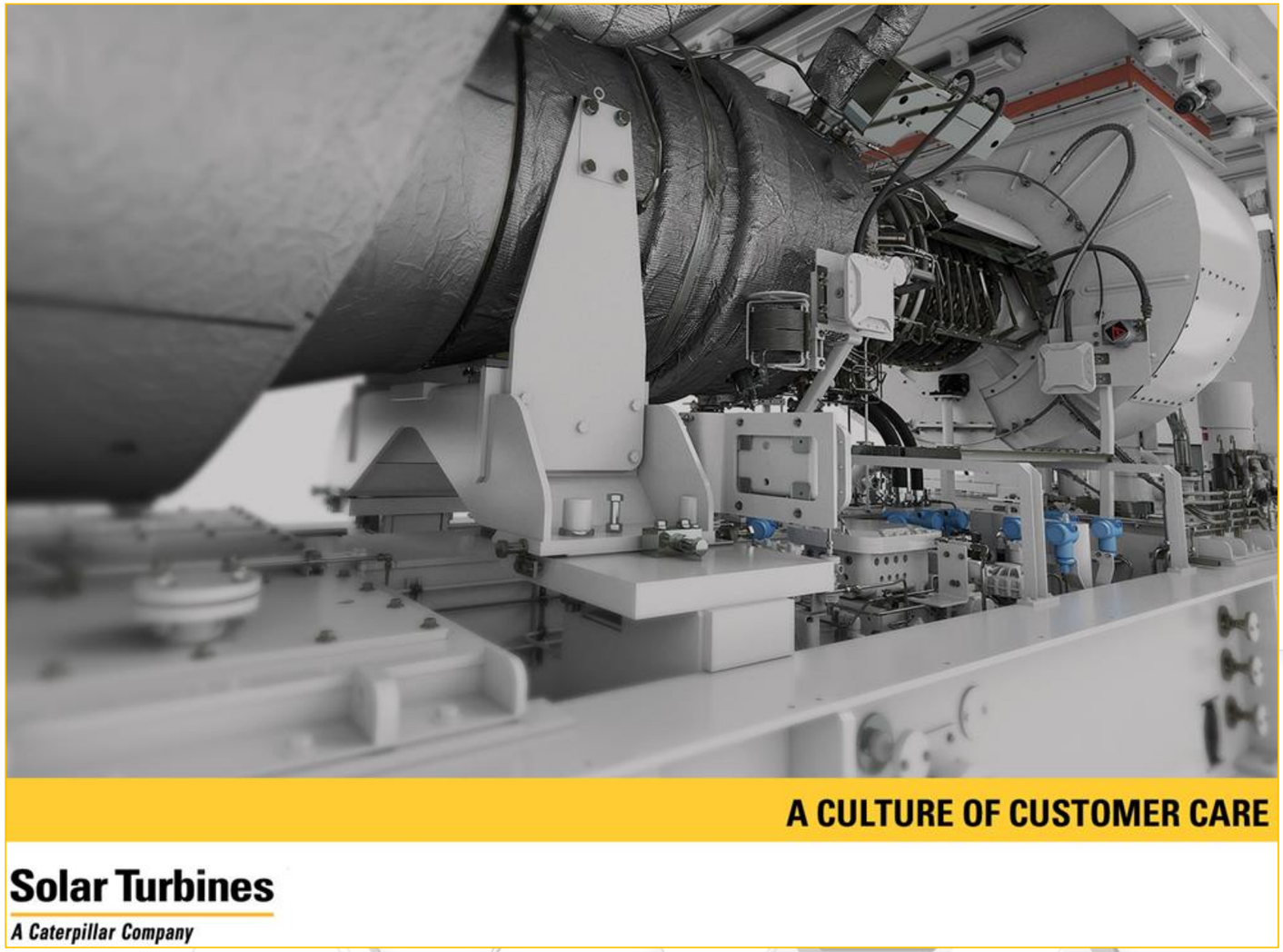
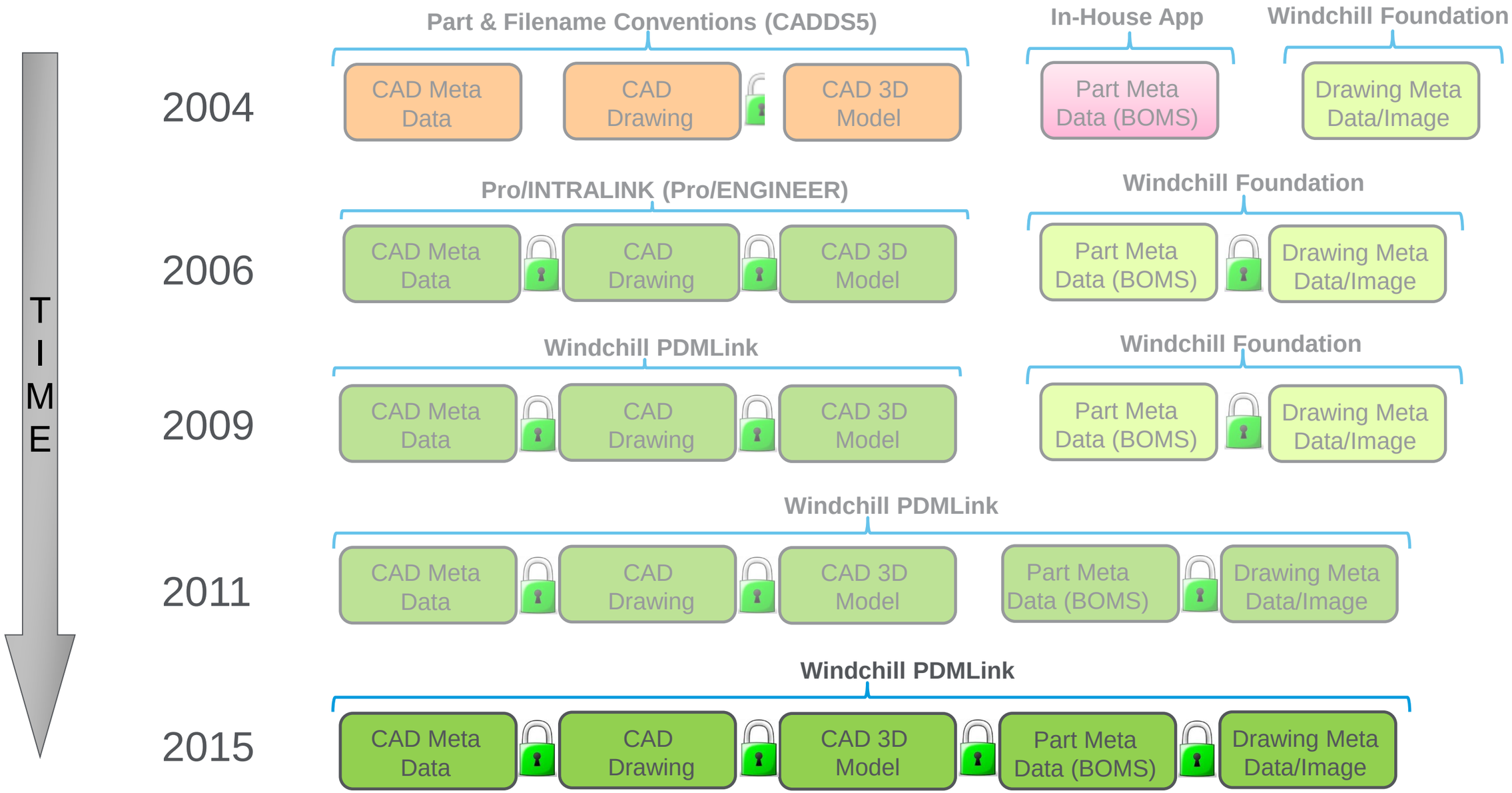
Outline – Linked Data in Real Life

- Introduction
- Our Linked Data Evolution
- Why Links Matter
- Linked Data Basics
- Data “Conversions” Required
- Structure Your Approach
- Linked Data in Action Using PTC Products
- Key Lessons Learned



“Linking” Data – Higher Level View (Our Evolution)



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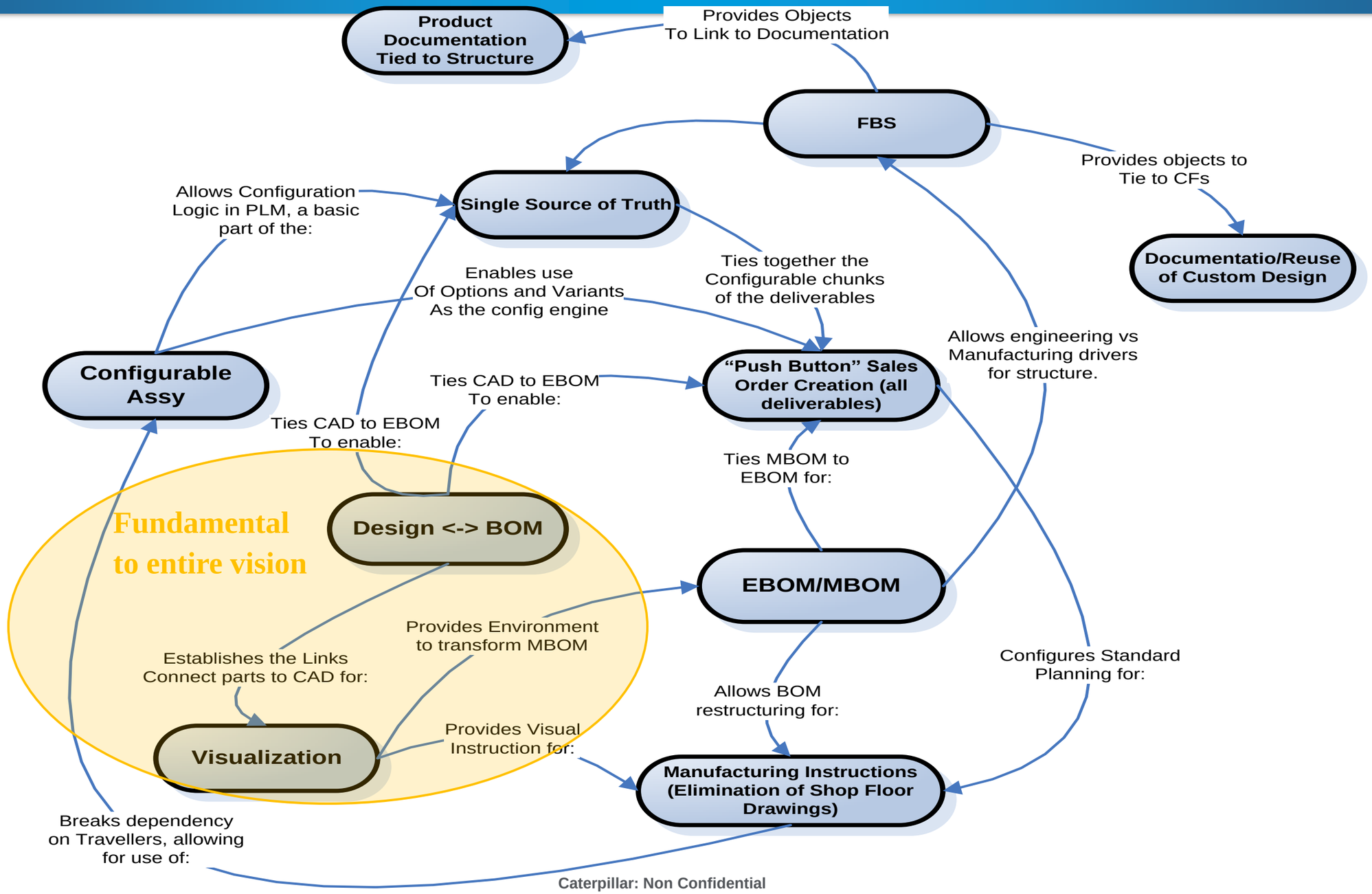
Why Links Matter (Functional Interdependencies)



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Linked Data Basics -- Simple ‘Linked Data’ View

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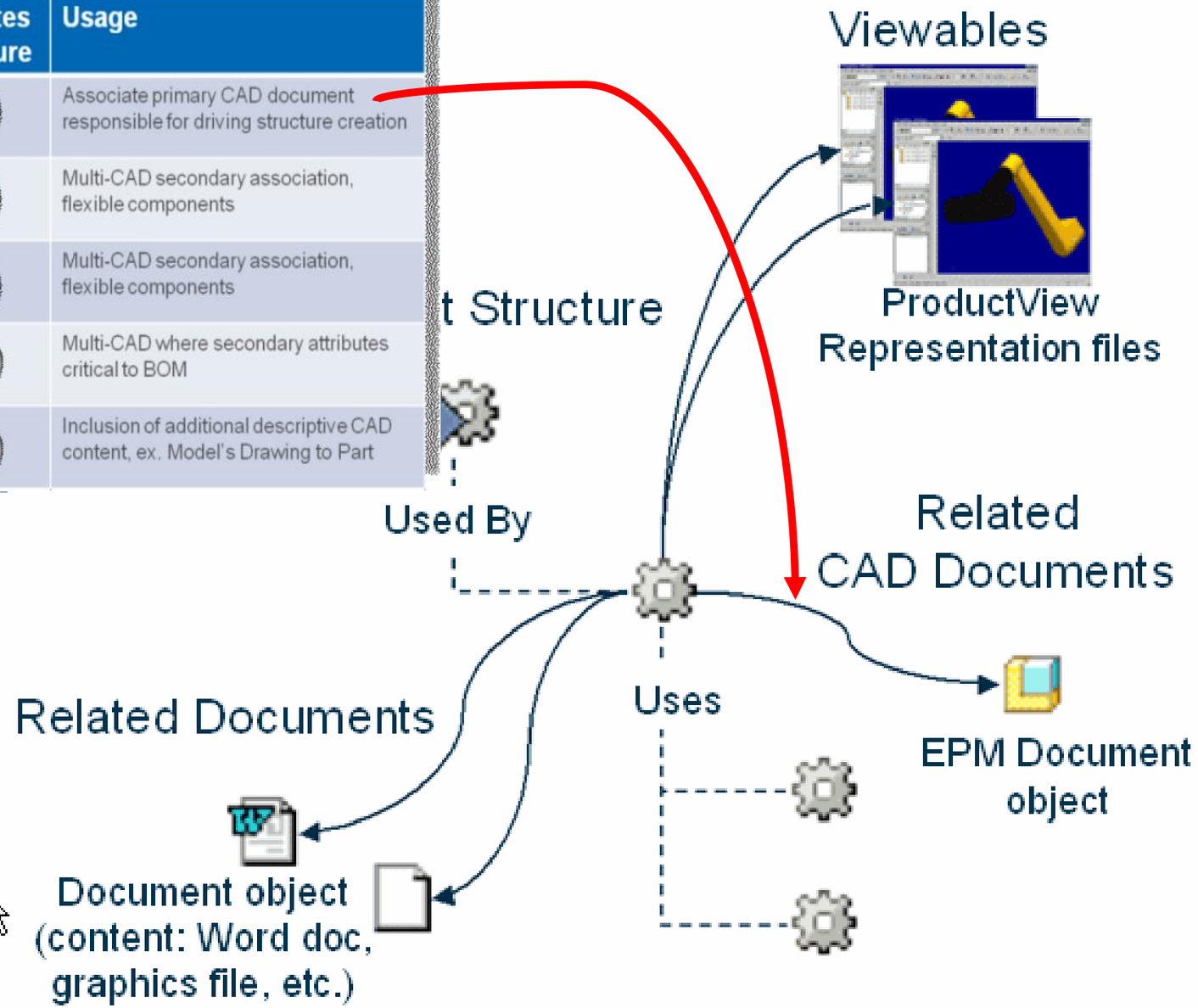
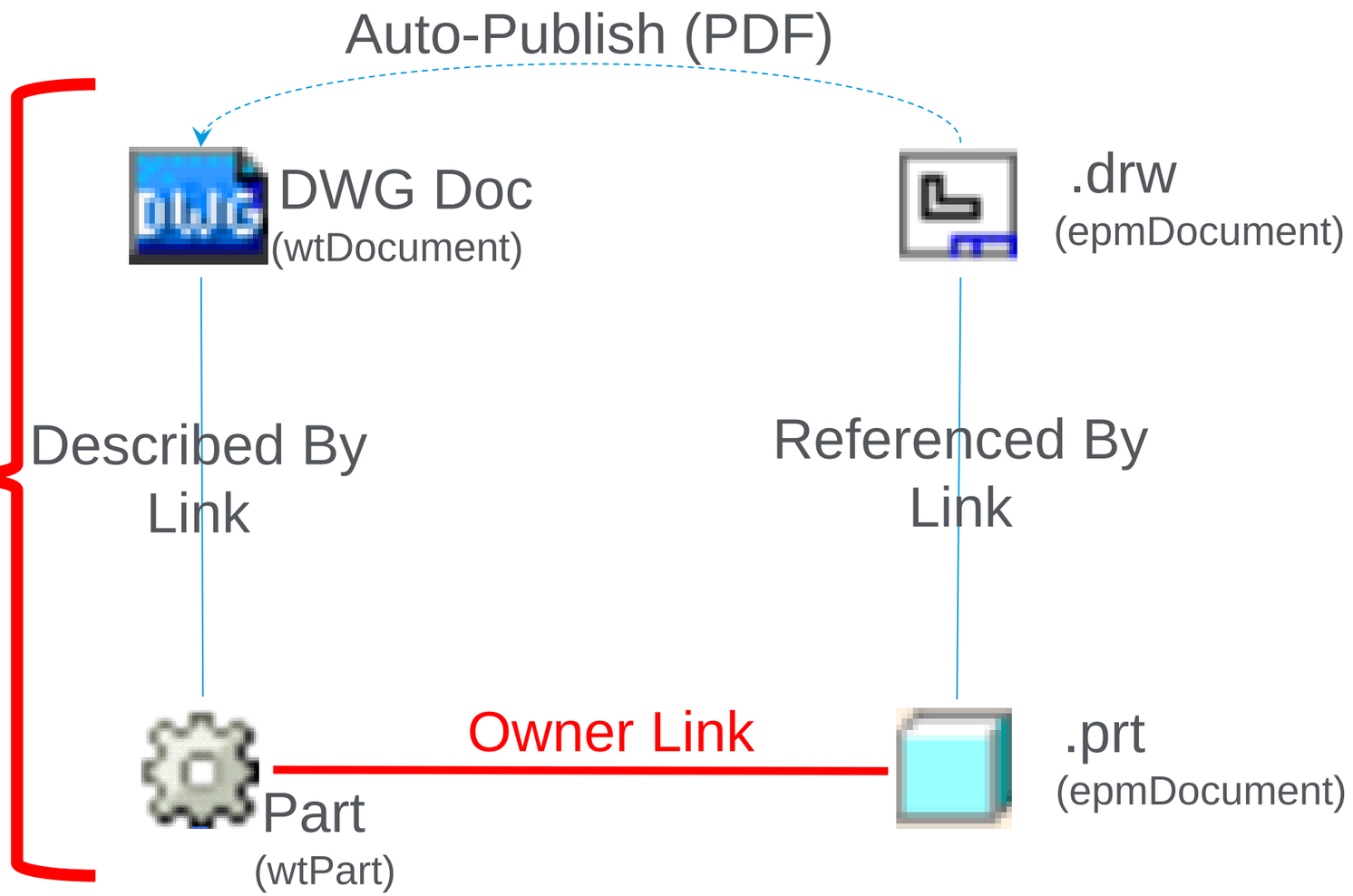
Association Type	Builds Structure	Attribute	Reps	Contributes to Structure	Usage
Owner	✓	✓	✓	✓	Associate primary CAD document responsible for driving structure creation
Contributing Image	✗	✓	✓	✓	Multi-CAD secondary association, flexible components
Image	✗	✗	✓	✓	Multi-CAD secondary association, flexible components
Contributing Content	✗	✓	✗	✗	Multi-CAD where secondary attributes critical to BOM
Content	✗	✗	✗	✗	Inclusion of additional descriptive CAD content, ex. Model's Drawing to Part

- Domain Policies
- Life Cycle
- Workflow
- Principals
- Teams and Roles



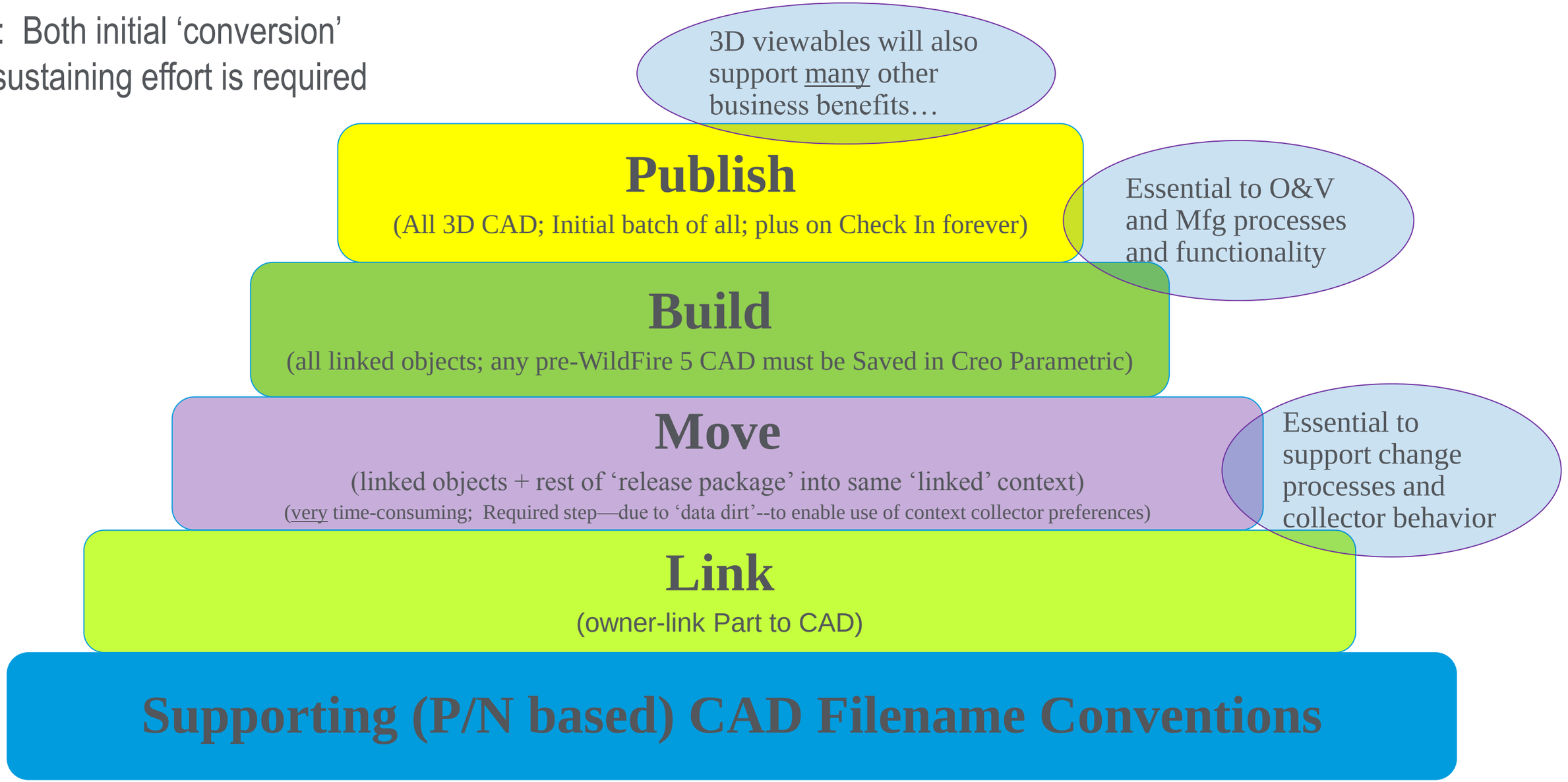
Our Data Model – Simple Case

Revised & Released Together!!!



What About Existing Data? Can I Just Link It?

Note: Both initial 'conversion' and sustaining effort is required



Determine Your Strategy/Approach

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Guidance (Linking Strategy):

1. Always use '**Owner**' *(which is the default)* links for matching objects (.pr
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Practice (Initial Linking):

Note: See Ap

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   associa
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Note1: Ma

Guidance (Build Strategy):

Background: Once objects are linked, a 'build' operation must occur to sync the objects, and s
automatically
Note8). The f

General Rule
first, then 'buil
objects can be
newly assigne

1. Build o
2. Compa
   'Compare' tools *(Spend time familiarizing yourself with the various icons/glyphs and their meanings; Become an expert in understanding/using this tool)*
3. Child wtPart objects that don't/shouldn't also exist in the CAD assembly will be 'excluded' from builds *(default behavior)*. All other objects should be 'included' *(showing as Completed or To Be Built in Compare tool)*.
4. Ad hoc builds of either object may be done using the WC 'Compare' tools, and an associated wtPart may be built from the linked CAD object Actions menu ('Build Associated Part').
5. CAD assemblies containing child objects that shouldn't exist in the wtPart structure (i.e. _pp objects) should not be built from the wtPart (see Note3 below)

Note1: CAD object Check In will fail if linked wtPart is not writeable by the user

Guidance (Revision/Revise Strategy):

Background: Once objects are linked, rules regarding object Revision letters and processes are necessarily different. The following provides guidance on how this should typically be handled.

1. When revising linked objects, all linked objects must be revised **at the same time** (ideally on an ECT). **NEVER Revise a linked CAD object nor a WTPart by itself!!** *(see Note1 & Note2, and reference diagrams at beginning of this section; Revise collector will typically show all related objects to be Revised together)*
2. When revising linked objects, set all linked objects to same Revision as the Sol

Linked Data in Action Using PTC Products

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Linked Data Enables Variant Work Instructions using PTC Creo View Images Reordered by Manufacturing Operations.

Windchill Options and Variants Capabilities

Windchill offers the following capabilities to support product variability and variant generation.

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Product: Windchill PDMLink

Release: 10.1

Datecode: M020

Managing Part-CAD Document Relationships

Since the first release of the Windchill Workgroup Managers, we have provided customers with the ability to drive part structures from CAD structures so that (where they are the same) the two will be kept in sync (CAD-driven product structure, sometimes referred to as "bottom up" design). In release 10.0, we provide customers with tools to drive CAD structure from part structure (top down design).

The following sections discuss how structures display and behave in Windchill. For more information, see the Windchill Help Center.

PTC® Creo® Parametric™

Release: 2.0

1

PTC Creo Options Modeler

Home > Products > PTC Creo > 3D CAD > Options Modeler

2

Working with Manufacturing Parts and Bills of Materials

Using the eBOM and the digital mock-ups, manufacturing engineers establish strategies on how to build a product that satisfies these engineering specifications. Manufacturing engineers re-organize and re-structure the eBOM into a manufacturing bill of materials (mBOM) that outlines the product from a manufacturing process and strategy point of view.

3

Process Plan Information Page

A process plan is the detailed description of the tasks to be done on the shop floor in order to produce, inspect, assemble, repair or maintain a given part or assembly.

4

Viewing a Work Instruction

A work instruction is a dynamically generated HTML page that combines process plan information (sequences, operation, part allocation, resource allocation, time, etc.) and all related documents such as drawings, images and 3D sessions with annotations.

Windchill 10.1 MPMLink

5

Creo View

Product: PTC Creo View Lite

Version: Creo 3.0

1. Engineering Variant

a) PTC Options & Variants create an E-BOM in PDMLink

b) PTC Options Modeler creates a CAD BOM in PDMLink

c) PDC PDMLink auto associates E-BOM to CAD BOM with Owner Links

2. Manufacturing Variant

a) PTC MPMLink and Options & Variants create an M-BOM in PDMLink

b) Solar enhancement "stitches" variant E-BOM to M-BOM.

3. PTC MPMLink publishes Variant updates to Process Plan

4. MPMLink Work Instructions to Manufacture Design by Virtual Operations

5. Creo View Operations available to Shop Floor

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Linked Data in Action Using PTC Products

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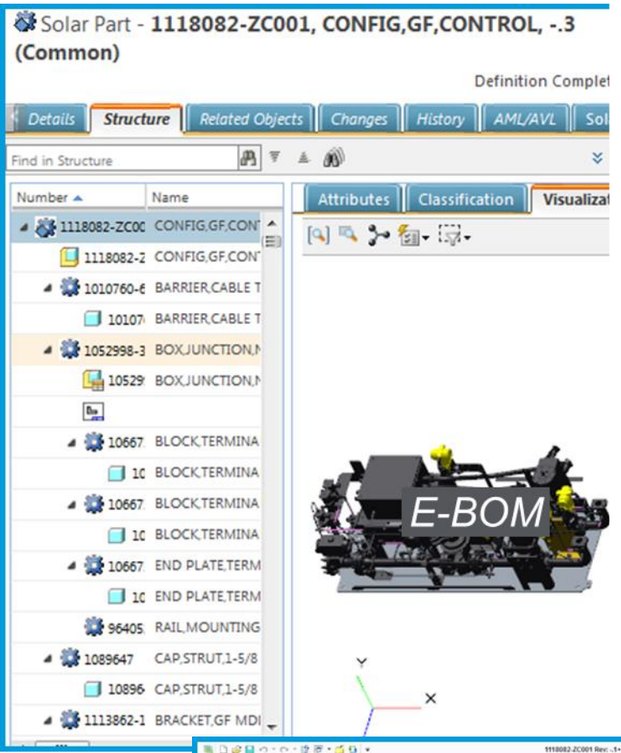
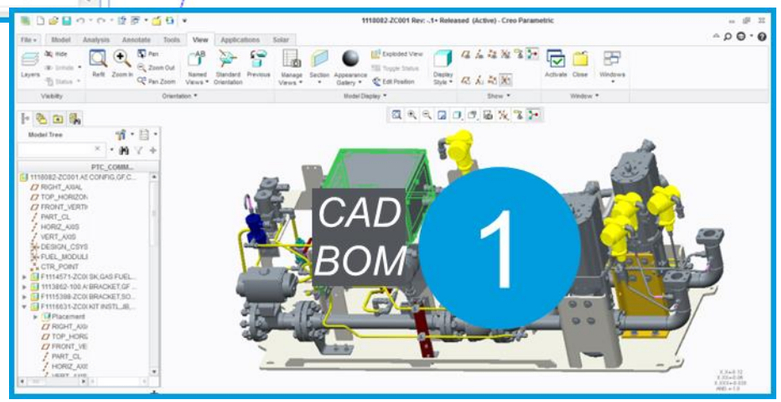
Linked Data Enables Variant Work Instructions using Creo View Images Reordered by Manufacturing Operations.





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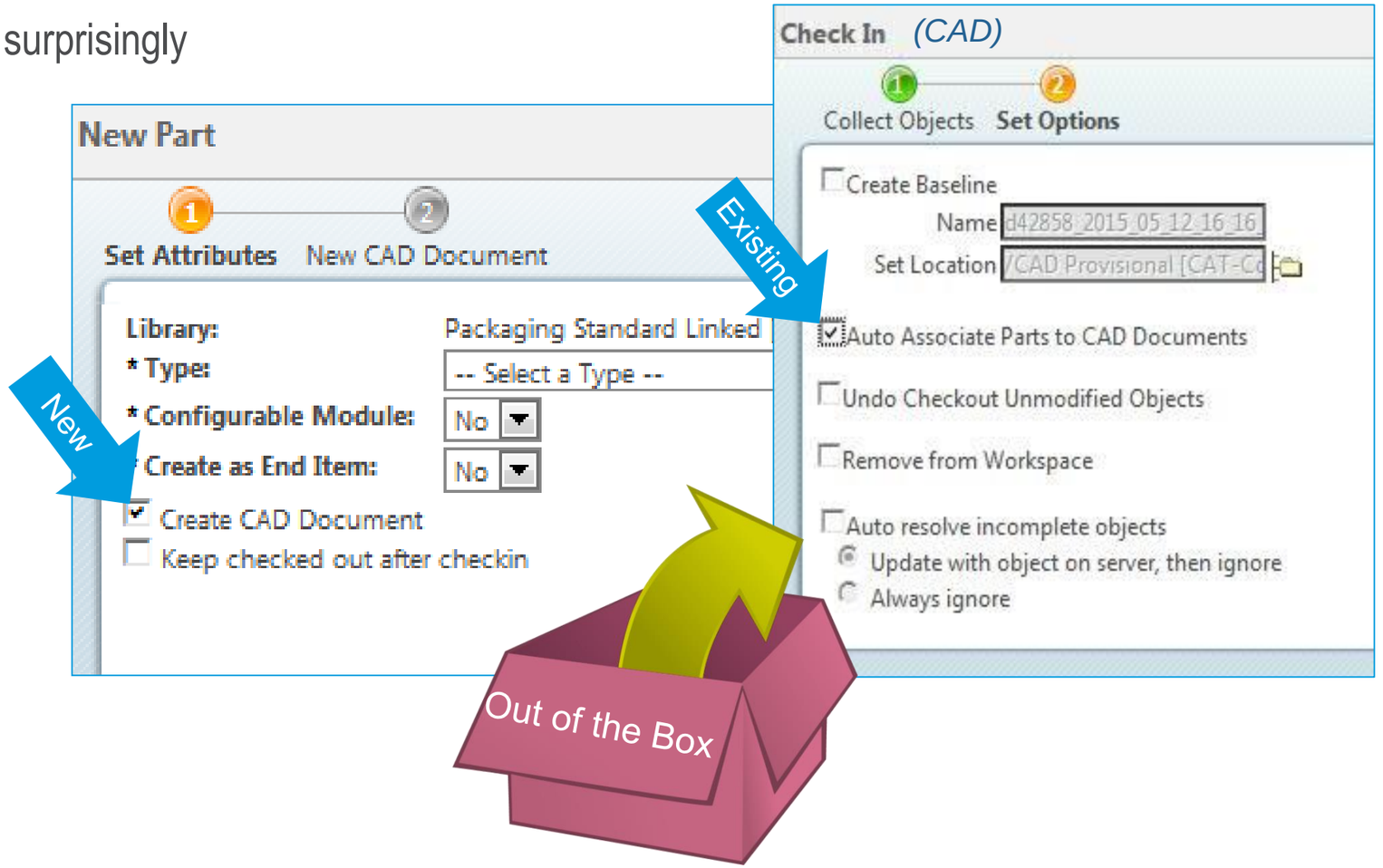
Key Lessons Learned

General Lessons

- Part & CAD Creation Process
  - Linking a WTPart to an EPMDocument is surprisingly easy!



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- Part & CAD Creation Process
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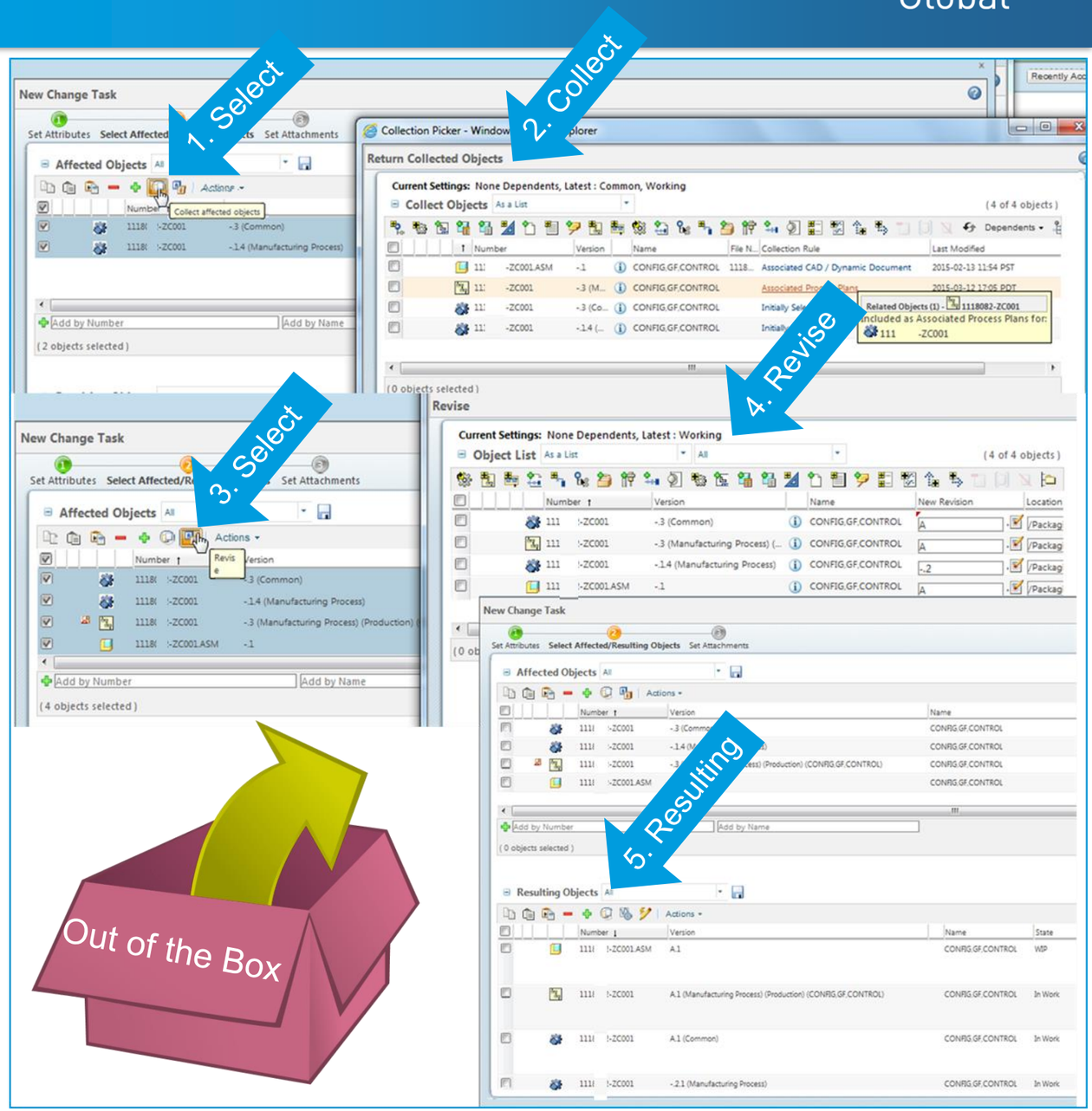
  - Pre Release Checks – *"Easy to do right. Easy to do wrong. Hard to clean up."*



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- **Engineering Change & Release Process**
  - Revision Rules & Collector Preferences
  - Pre Release Checks – *"Easy to do right. Easy to do wrong. Hard to clean up."*
- **Operational Definitions are Essential**

Functional Breakdown Structure Taxonomy General Terms and Usage

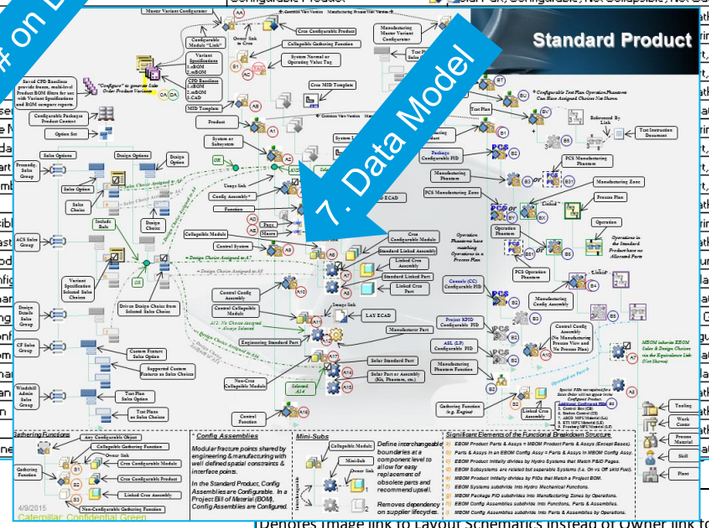
Prefixes in order of appearance, as applicable.	Primary Terms
Manufacturing Denotes a Manufacturing Process View Version.	**Product** Denotes "Standard", "Configurable", "Not Collapsible", "Common View Version", "Not Gathering Part", "Not Manufacturing Phantom Part", "End Item", and "Linked."
Configured "Configured" Denotes "Sales Order Variant" in the "Packaging Sales Order Linked" library.	
Configured "Configured" Denotes "Sales Order Variant" in the "Packaging Sales Order Linked" library.	**System or Subsystem** Denotes "Standard", "Configurable", "Not Collapsible", "Common View Version", "Not Gathering Part", "Not Manufacturing Phantom Part", "End
Control	
Context "Linked" or "Configurable" in the context name Denotes "Linked."	
PCS	

Denotes Image link to Layout Schematics instead of Owner link to CAD.

buildable configurations of Operation Phantoms and/or Solar Parts are referred to as "Subassemblies." In one case, a Manufacturing Subassembly is referred to as a "Test Plan" where it only uses Operation Phantoms without any Solar Parts in order to configure a project Test Plan.

Functional Breakdown Structure Object Types and Associations

FN	Part Package Description: Except for Reference Documents, Choices, and Engineering Standard Parts, all linked objects in each row "Revise" together.	Creo with Owner Link to Windchill	Windchill Diamond in Lower Left corner and Gear in Lower Right Corner = "Configurable" Overloaded, not collapsible, configurable, end item in the "Standard" Product. Diamond in Lower Left Corner = "Configured" Sales order variant instance of a "Configurable" end item in the Configured "Sales Order" Product. Gear in Lower Right Corner = "Collapsible" for Functions; "Configurable" for Solar Parts Overloaded, collapsible (Function) or not collapsible (Solar Part), not end item in the "Standard" Produc
AA	Master Variant Configurator	Configurable Product	Function, Configurable, Not Collapsible, Gathering Part, Not Manufacturing Phantom Part, End Item
AB	MID Template	Configurable Product	Function, Configurable, Not Collapsible, Gathering Part, Not Manufacturing Phantom Part, End Item
AC	System Normal or Operating Value	None	Tag, Configurable, Collapsible, Not Gathering Part, Not Manufacturing Phantom Part, Not End Item
AD	Page	None	Page, Configurable, Collapsible, Not Gathering Part, Not Manufacturing Phantom Part, Not End Item
AE	Macro	None	Macro, Configurable, Collapsible, Not Gathering Part, Not Manufacturing Phantom Part, Not End Item
A1	Product	Configurable Product	Function, Configurable, Not Collapsible, Not Gathering Part, Not Manufacturing Phantom Part, End Item
A2	System or Subsystem	Configurable Product	Function, Configurable, Not Collapsible, Not Gathering Part, Not Manufacturing Phantom Part, End Item
A4	Config Assembly	Configurable Product	Solar Part, Configurable, Not Collapsible, Not Gathering Part, Not Manufacturing Phantom Part, End Item
A5	Function		Gathering Part, Not Manufacturing Phantom Part, End Item
A6	Collapsible Mo		ring Part, Not Manufacturing Phantom Part, End Item
A7	Standard Li		t, Not Manufacturing Phantom Part, Not End Item
A8	Standar		t, Not Manufacturing Phantom Part, Not End Item
A9	Conti		Gathering Part, Not Manufacturing Phantom Part, End Item
A10			Gathering Part, Not Manufacturing Phantom Part, End Item
A11	sible M		ring Part, Not Manufacturing Phantom Part, Not End Item
A12	g Standa		t, Not Manufacturing Phantom Part, Not End Item
A14	d Part		t, Not Manufacturing Phantom Part, Not End Item
A15	Solar Part or Assemb		t, Not Manufacturing Phantom Part, Not End Item
A16	Control Function		Gathering Part, Not Manufacturing Phantom Part, End Item
A17	Non-Creo Collapsib		ring Part, Not Manufacturing Phantom Part, Not End Item
BA	Manufacturing Mast		Gathering Part, Not Manufacturing Phantom Part, End Item
B1	Manufacturing Prod		urable, Not Collapsible, Not Gathering Part, Not Manufacturing Phantom Part, End Item
B2	[Name of PID] Confi		lapsible, Not Gathering Part, Not Manufacturing Phantom Part, End Item
B3	Manufacturing Phar		Gathering Part, Not Manufacturing Phantom Part, Not End Item
B31	PCS Manufacturing		Gathering Part, Not Manufacturing Phantom Part, Not End Item
B4	Manufacturing Conf		gurable, Not Collapsible, Not Gathering Part, Not Manufacturing Phantom Part, End Item
B5	Operation Phantom		Gathering Part, Manufacturing Phantom Part, Not End Item
B51	PCS Operation Pha		lapsible, Not Gathering Part, Manufacturing Phantom Part, Not End Item
BT	Top Level Test Plan		Gathering Part, Not Manufacturing Phantom Part, End Item
BU	Test Plan Function		Gathering Part, Not Manufacturing Phantom Part, End Item
BV	Test Plan		Gathering Part, Not Manufacturing Phantom Part, End Item
BX	Manufacturing Zone		Gathering Part, Not Manufacturing Phantom Part, End Item

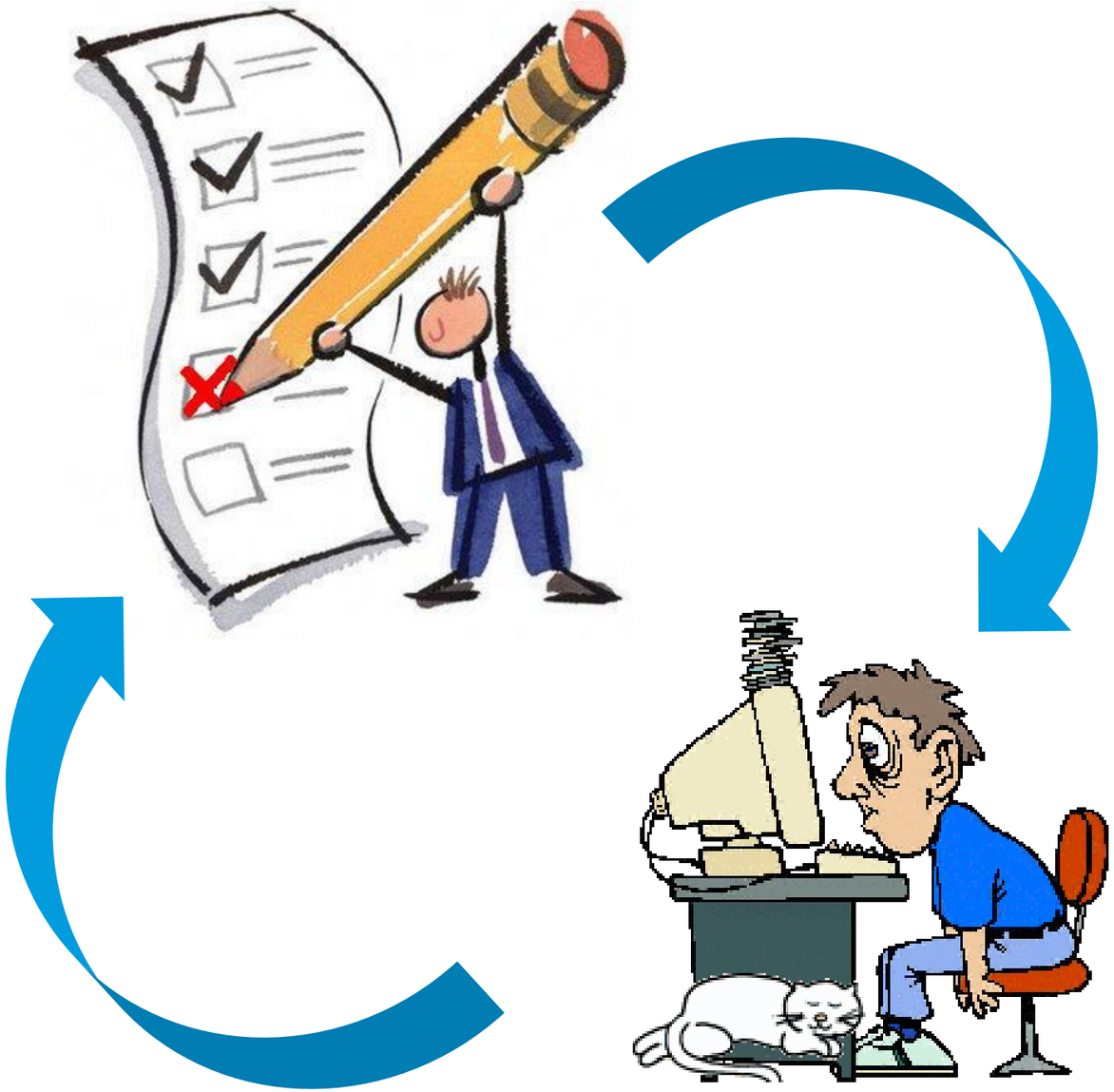


1. Objects
2. Nouns
3. Modifiers
4. Attributes
5. Icons
6. Find # on Data Model
7. Data Model

Key Lessons Learned

Linked Data

- Part & CAD Creation Process
  - Linking a WTPart to an EPMDocument is surprisingly easy!
- Engineering Change & Release Process
  - Revision Rules & Collector Preferences
  - Pre Release Checks – *"Easy to do right. Easy to do wrong. Hard to clean up."*
- Operational Definitions are Essential
- Existing Enhancements
  - Regression Testing
  - Adjust to New Objects, Rules & Processes
  - *Identify & Close New Gaps*
    - *Configurations*
    - *Reports*
    - *Automations & Workflows*



Key Lessons Learned (continued)

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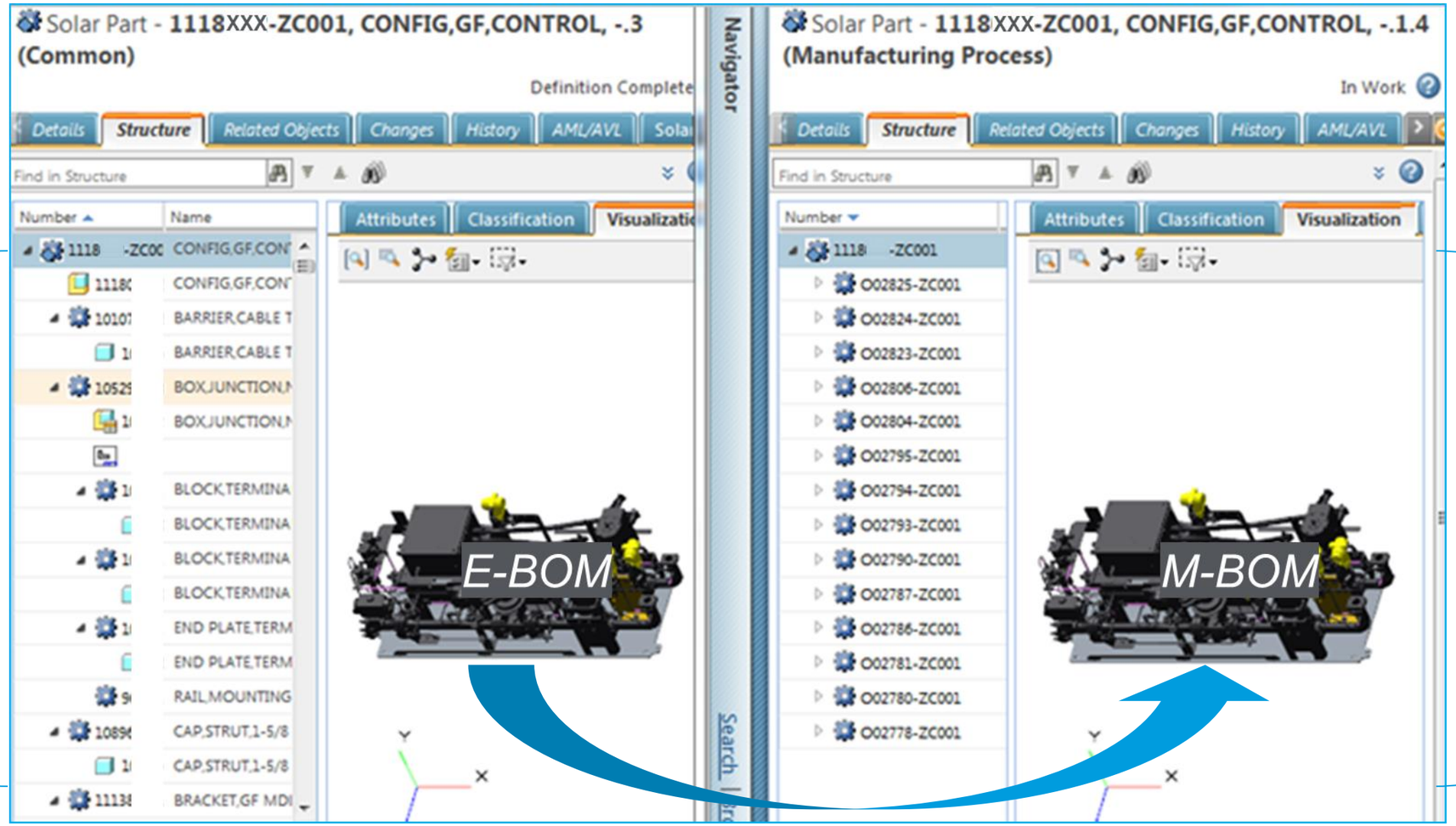
Linked Data with Options & Variants and MPMLink

- PTC Creo View Publishing Rules – “Publish as Positioning Assembly by Default.”

1118XXX-ZC001 (Design View)

Publishing epmDocument Assembly Viewable to wtPart as ***Positioning Assembly*** in E-BOM

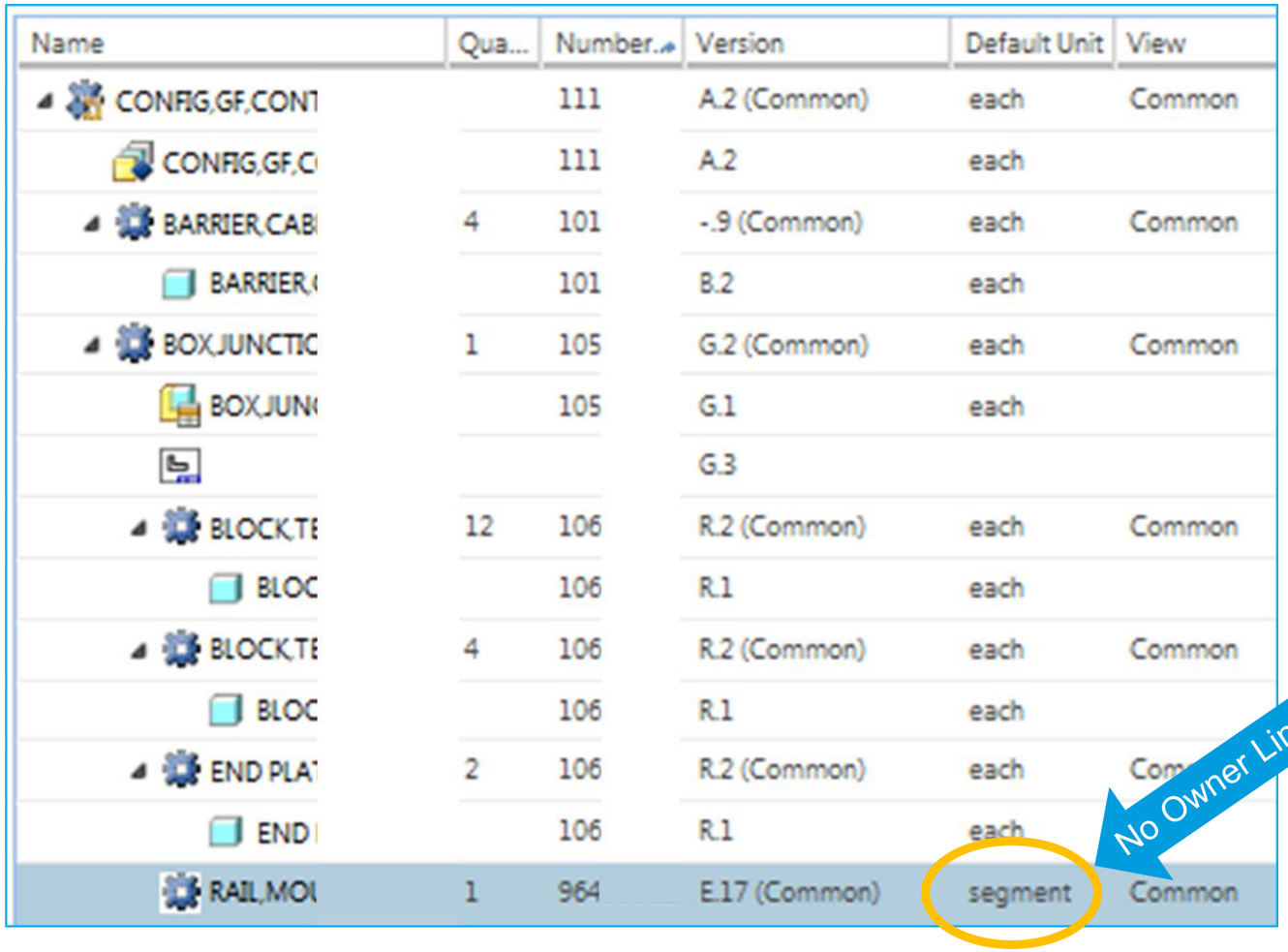


1118XXX-ZC001 (Manufacturing View)

Allows virtual reorganization of wtPart in M-BOM

Key Lessons Learned (continued)

Linked Data with Options & Variants and MPMLink



Name	Qua...	Number	Version	Default Unit	View
CONFIG,GF,CONT		111	A.2 (Common)	each	Common
CONFIG,GF,C		111	A.2	each	
BARRIER,CAB	4	101	-.9 (Common)	each	Common
BARRIER,(		101	B.2	each	
BOX,JUNCTIC	1	105	G.2 (Common)	each	Common
BOX,JUN(		105	G.1	each	
			G.3		
BLOCK,TE	12	106	R.2 (Common)	each	Common
BLOC		106	R.1	each	
BLOCK,TE	4	106	R.2 (Common)	each	Common
BLOC		106	R.1	each	
END PLA	2	106	R.2 (Common)	each	Com
END		106	R.1	each	
RAIL,MOI	1	964	E.17 (Common)	segment	Common

- PTC Creo View Publishing Rules – “Publish as Positioning Assembly by Default.”
- “Raw Stock” Modeling for Non-Each UOM
  - “Each” units of measure work well with “Assigned Choices” in Options & Variants and Options Modeler, but non-Each units of measure do not.
  - CAD “Owner Links” to non-each units of measure (raw stock) disrupt the E-BOM and M-BOM visualization.
  - Objects with a Unit of Measure other than Each cannot be added to a “Collapsible” parent.

Key Lessons Learned (continued)

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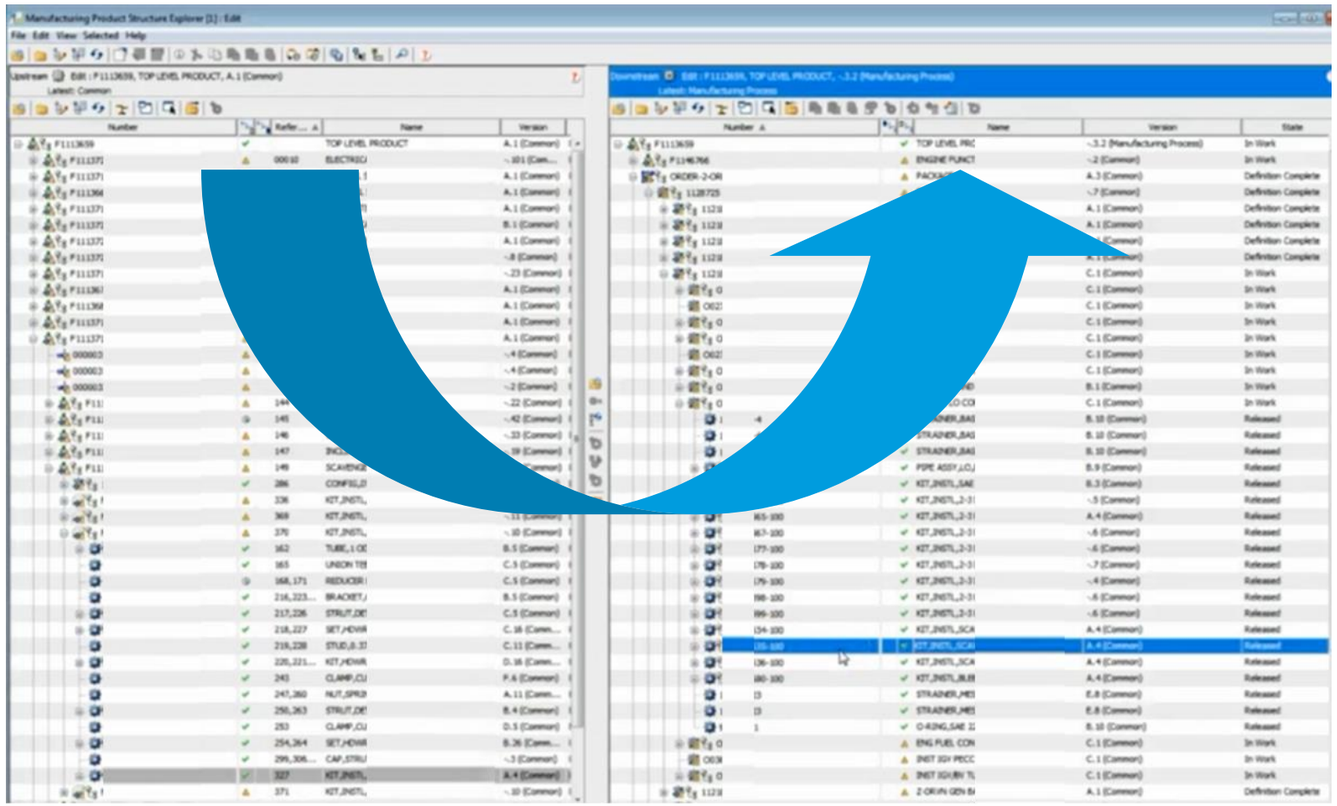
MPSE

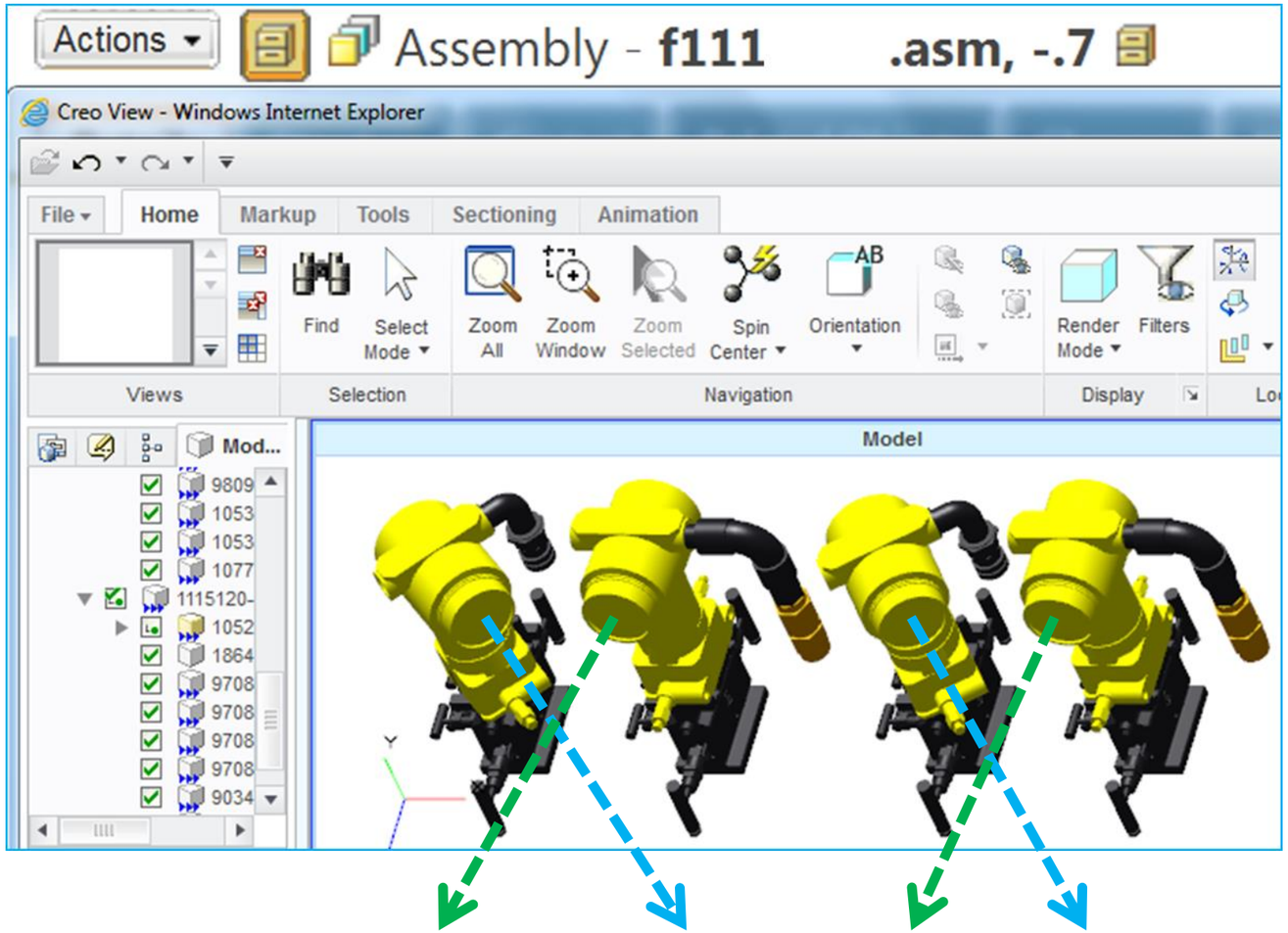
E-BOM *M-BOM*



Linked Data with Options & Variants and MPMLink

- PTC Creo View Publishing Rules – “Publish as Positioning Assembly by Default.”
- “Raw Stock” Modeling for Non-Each UOM
- Learning to work with Part Path Occurrences & Equivalency Links
  - Comparing large E-BOM and M-BOM assemblies
  - Synchronizing Position & Assigned Choices
  - More Configurable Subassemblies!

Key Lessons Learned (continued)



Linked Data with Options & Variants and MPMLink

- PTC Creo View Publishing Rules – “Publish as Positioning Assembly by Default.”
- “Raw Stock” Modeling for Non-Each UOM
- Learning to work with Part Path Occurrences & Equivalency Links
- Use “Mechanism” in PTC Creo Parametric instead of “Flexible Feature” for use in PTC Creo Options Modeler Collapsible “Modules”

- Your feedback is valuable
- Don’t miss out on the chance to provide your feedback
- Gain a chance to win an instant prize!
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