

SESSION ID: PL1122B

# IMPLEMENTING PROCESS PLANNING IN A HOLISTIC WAY

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Sr Manager, Product Management ESI

# EVERY PRODUCT LAUNCH MUST BE FLAWLESS

**Intel shares hit by hints of new product delays**

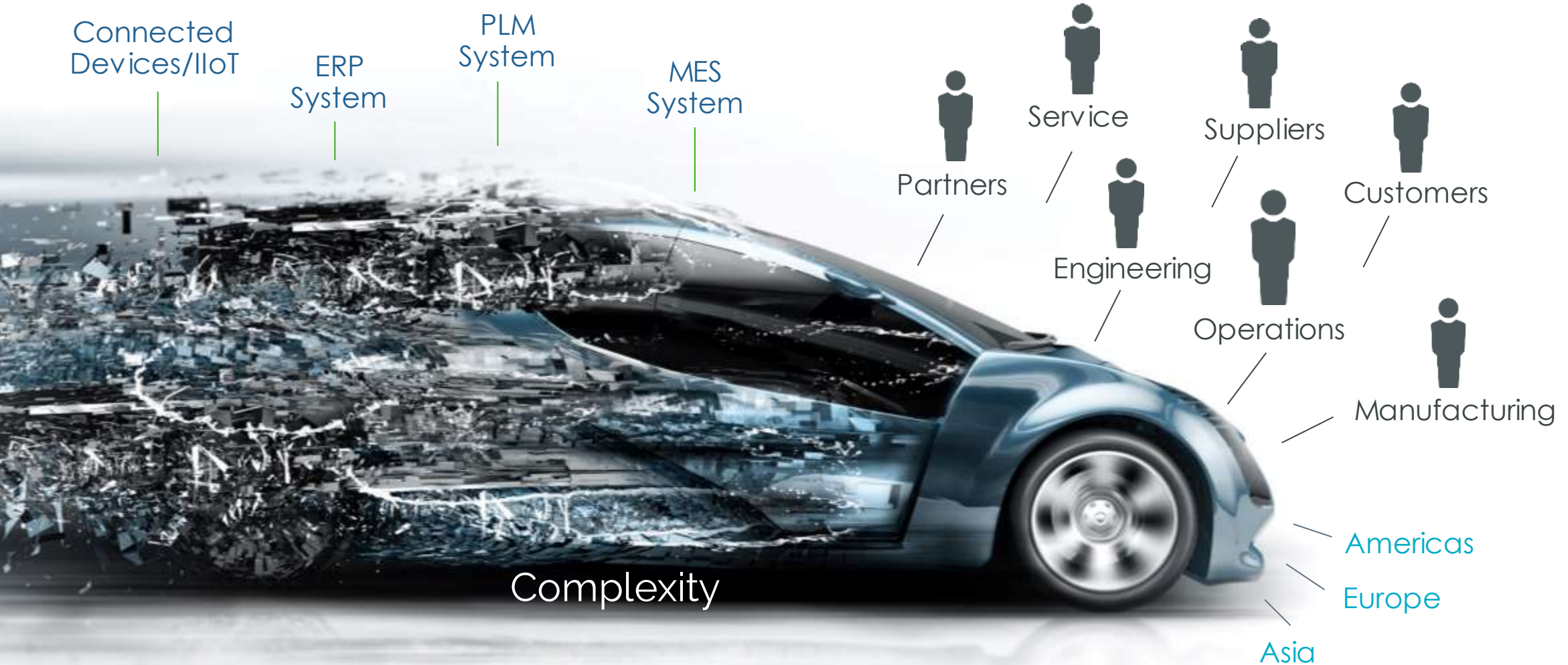
**Cadillac pushes back flagship launch**

**Tim Cook Stumbles at His Specialty, Shipping Apple Products on Time**

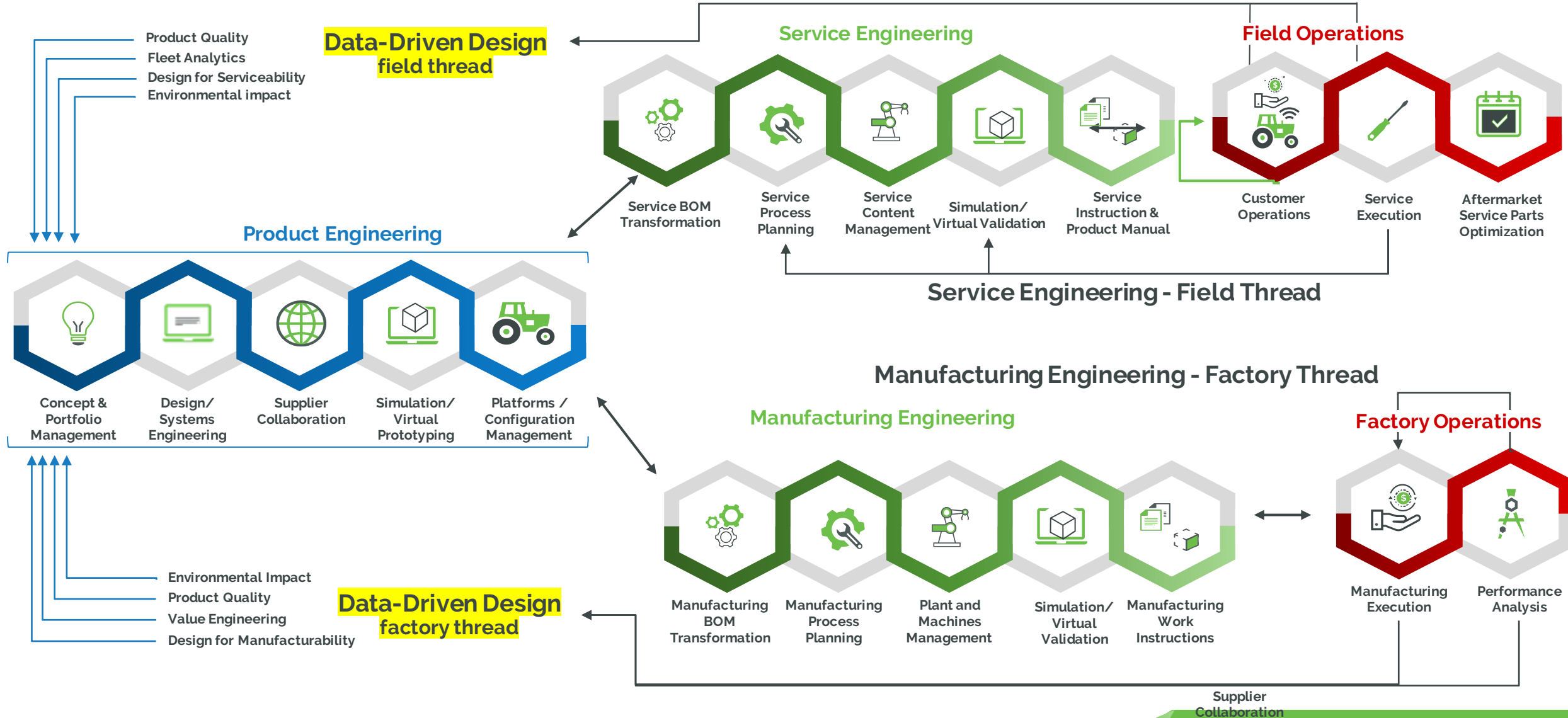
*There were 112 Galaxy Note 7 fires reported worldwide within a month of the phone's launch.*

**Northrop Grumman refuses to pay \$800M in cost overruns**

# PRODUCTION RAMP UP CHALLENGES

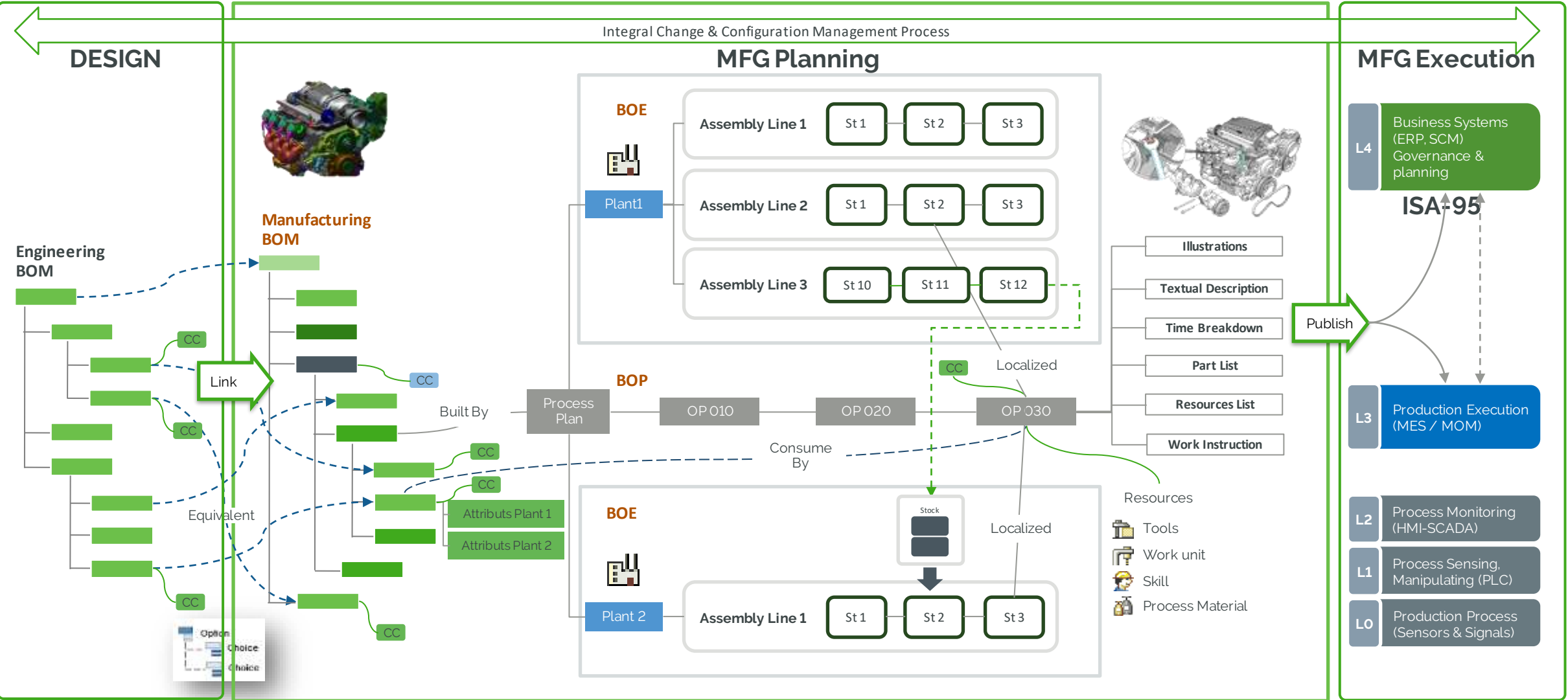


# HOW PTC ENABLES THE DIGITAL THREAD





# DIGITAL CONTINUITY & COLLABORATION ARE KEY



## BENEFITS

Flexible Process Management

Associative mBOM, Resources and Process

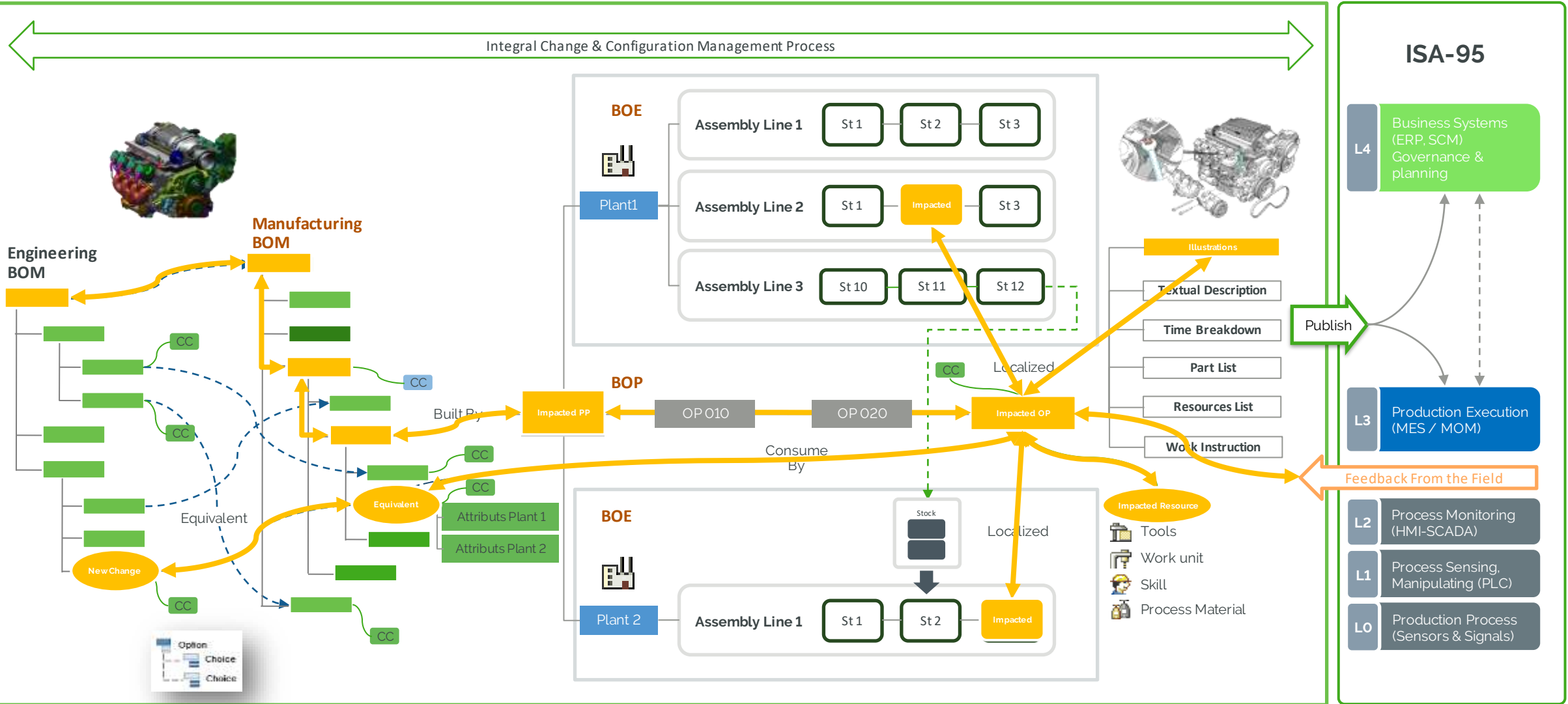
Control Characteristic Management

Leverage 3D for definition and Process validation

Leverage Options & rules

Integrated change Management

# DIGITAL CONTINUITY & COLLABORATION ARE KEY



## BENEFITS

Associative eBOM to mBOM management

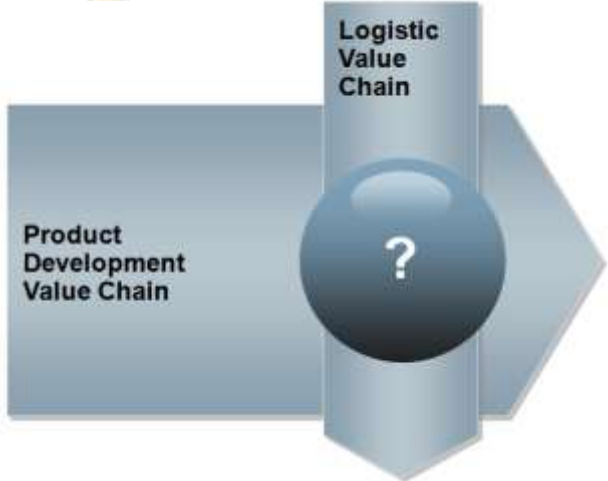
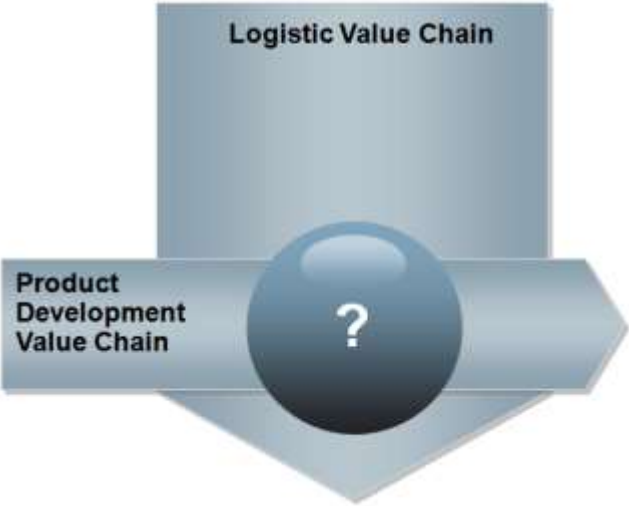
Digital definition and management of process plans

Control Characteristic Management

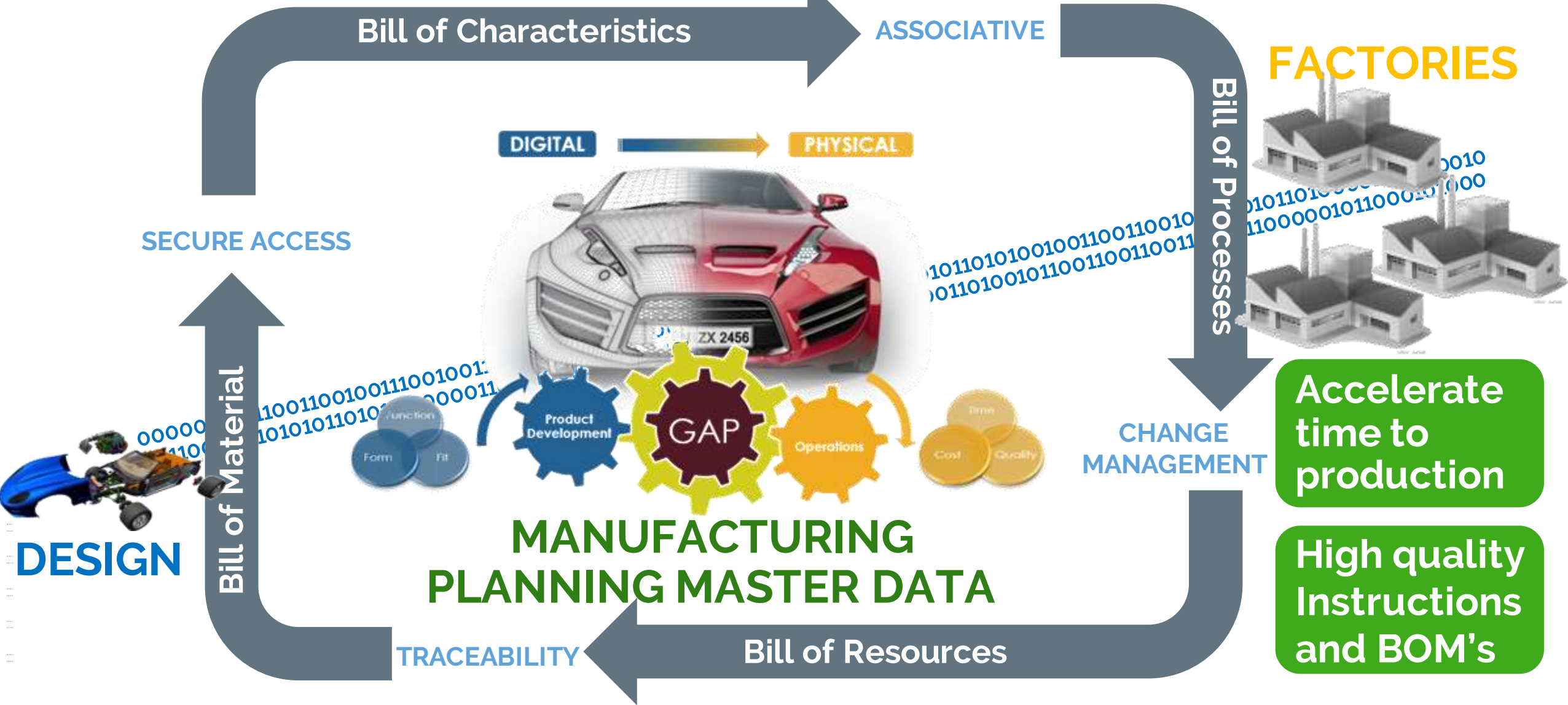
Streamline release to Manufacturing

Integral Multi disciplines Change and Configuration Management Process

# COMPLEXITY MAKES A DIFFERENCE

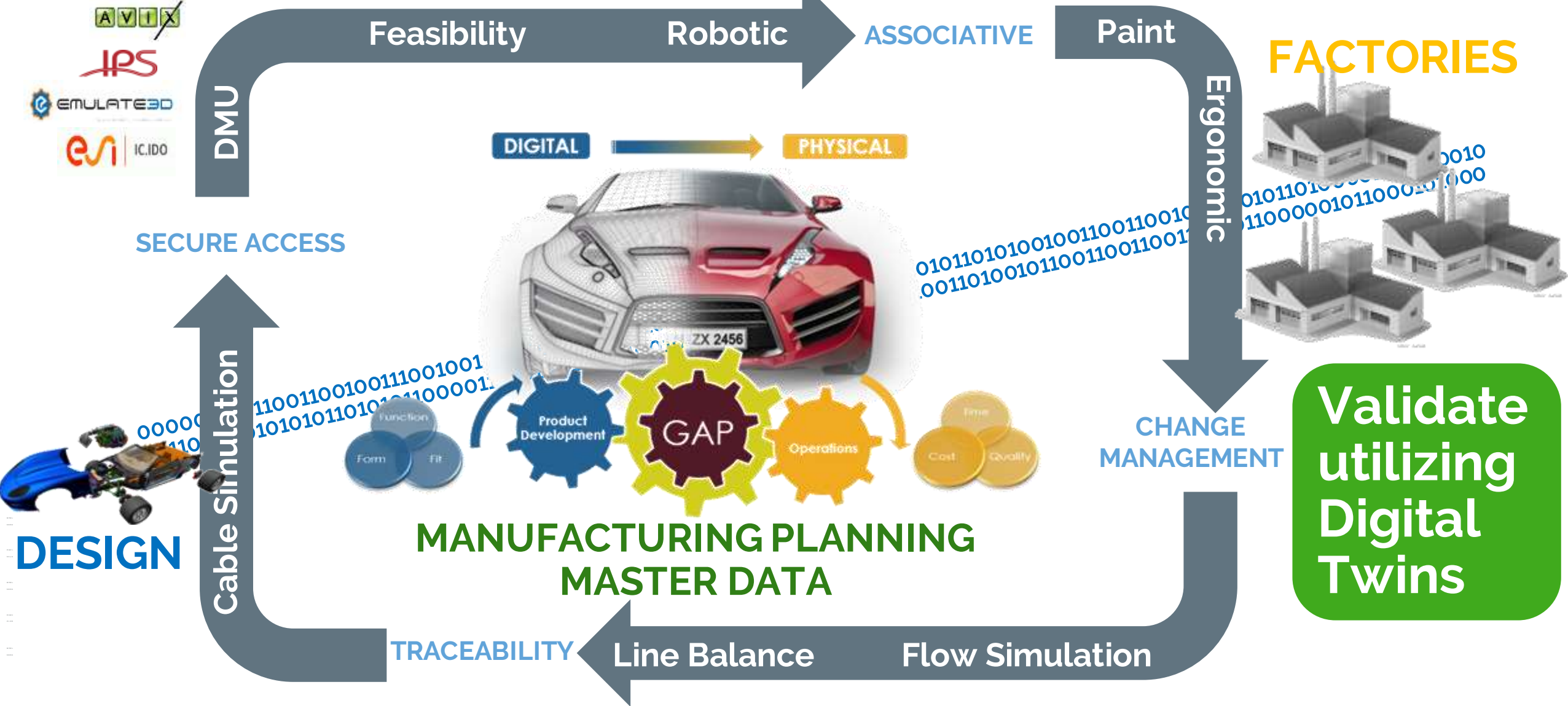


# ENABLE HIGH QUALITY DIGITAL THREAD





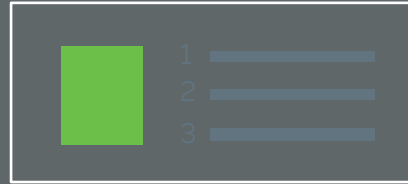
# ENABLE DIGITAL VALIDATION OF MFG PROCESSES



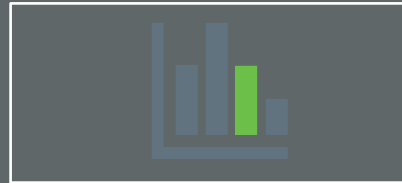
## Manage the Complexity in the Digital Infrastructure



EBOM/MBOM transformation  
and mfg process planning



Mfg work instruction and  
sequencing, HSE procedures in  
a digital thread



Continuous  
improvement with  
Digital Lean



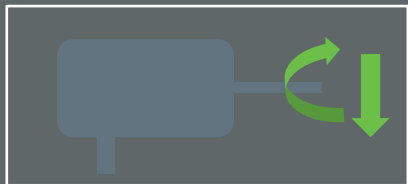
Make / Buy, Insource  
/ outsource planning



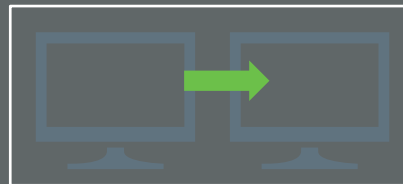
Industrialized Additive  
Manufacturing and service



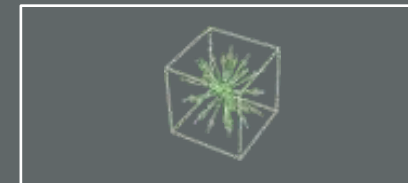
Full factory digital twin



CAE for mfg, e.g. NC Toolpath  
Tooling/fixture design



Manage and share MFG  
engineering data, e.g. for  
ERP/MES

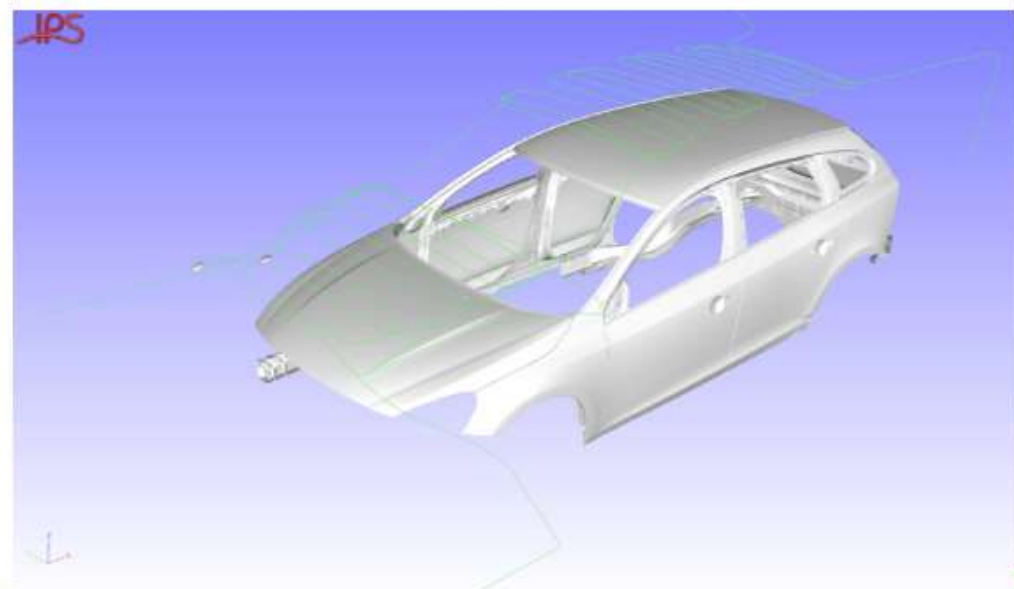
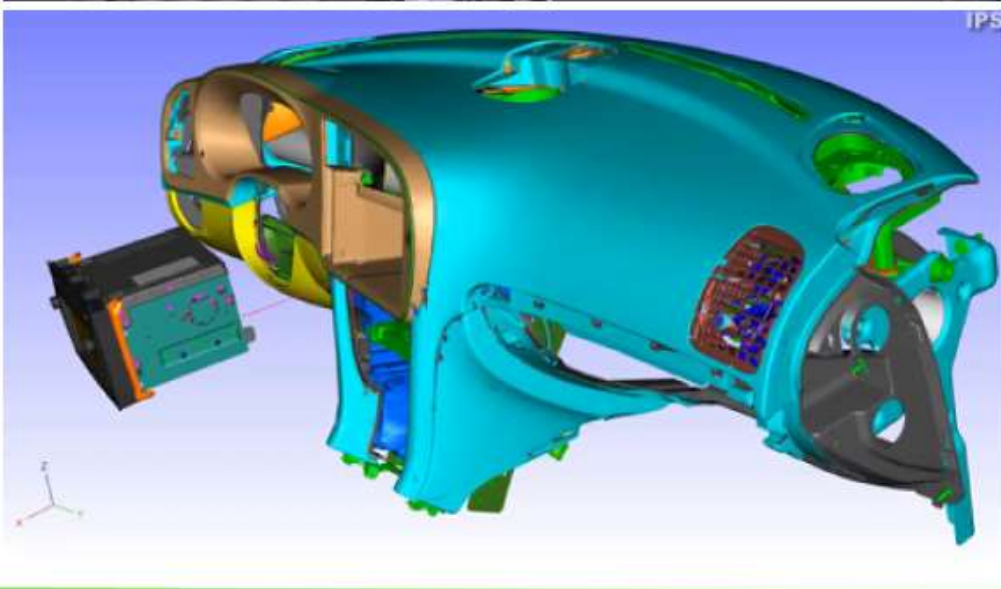
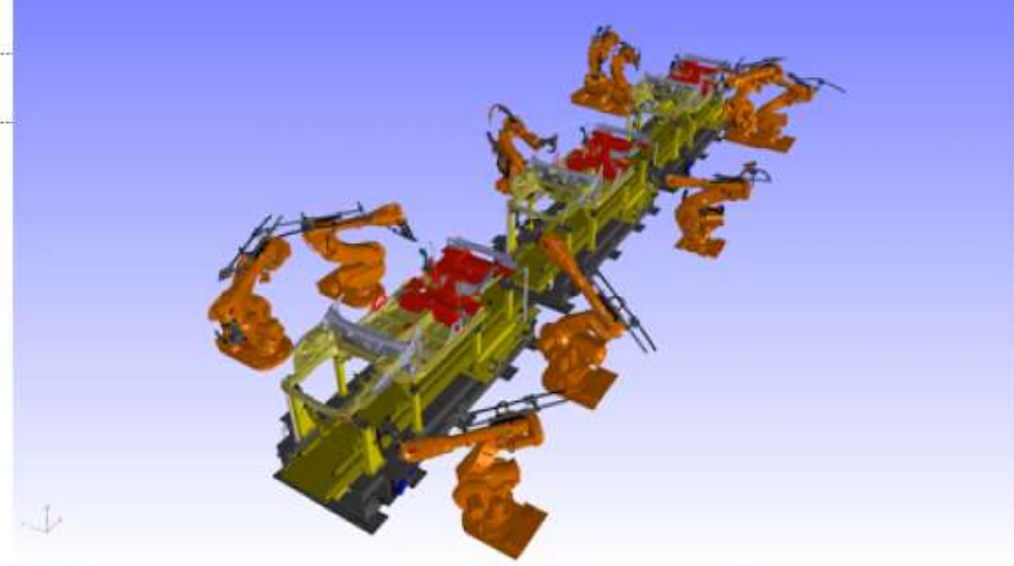


FEA Simulation / Virtual  
Commissioning



Digital Quality

# VIRTUAL MPMLINK VALIDATION



# WINDCHILL MPM BRINGS VALUE

Keeps Engineering and Manufacturing in sync

Collaborative Design for Manufacturability



Reduces cost of poor quality

Improves traceability and facilitates change orchestration



Eliminate manual handoffs and redundant work

Accelerates time to industrialization





# Concurrent Manufacturing = Time & Cost Savings

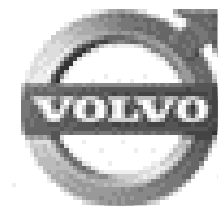
53%

Improvement in first pass yield



60%

Reduction in training time



25%

Improvement in time to implement changes



40%

Reduction in the cost of poor quality





# WINDCHILL 11 TO 12.0.2

# MPMLINK KEY INVESTMENTS IN 12.0 SERIES

12.0.0  
End 2021

12.0.1  
Mid 2022

12.0.2  
End 2022

PLANT DATA MANAGEMENT

AUTOMATIC BOM TRANSFORMATION

BOM RECONCILIATION

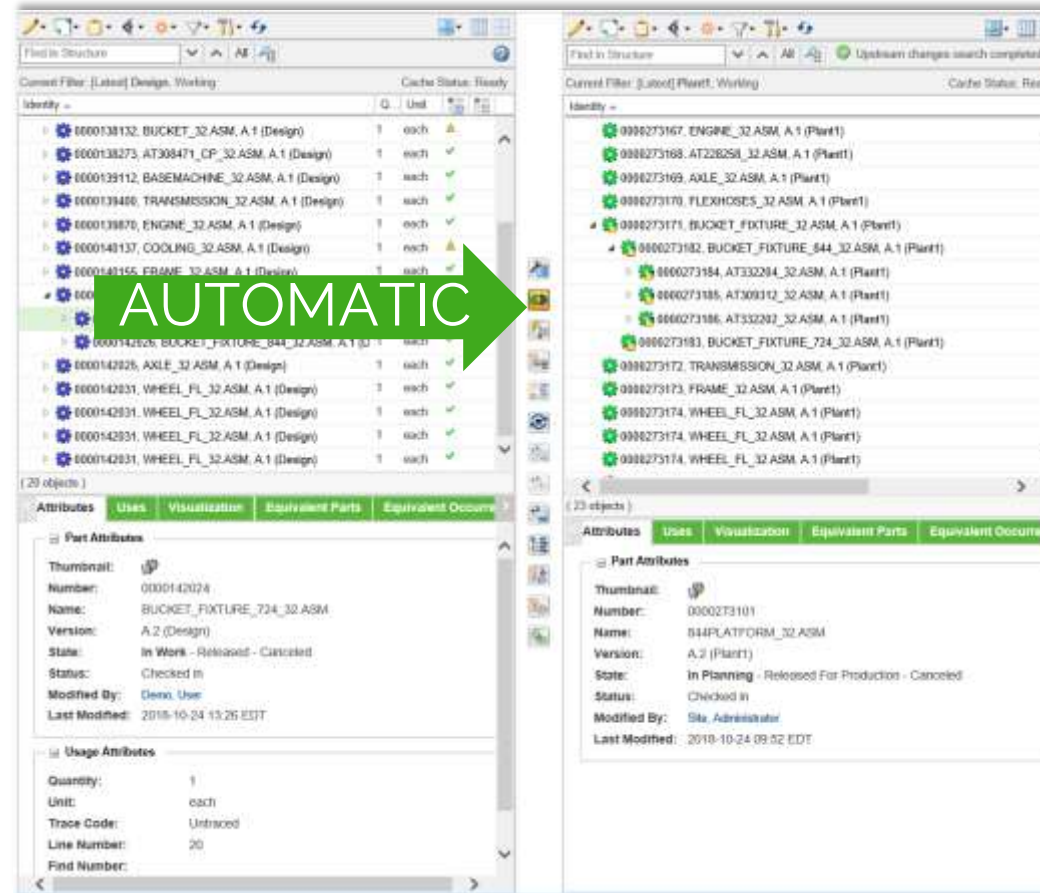
MULTIPLE BOM TRANSFORMATION

PERFORMANCE

# AUTOMATIC BOM TRANSFORMATION

## Capabilities

- Framework to define customer transformation rules
- OOTB basic customer rules or examples that easily can be tailored to each customer needs
- BOM transformation can be trigger by Workflow



## Benefits

Improve Manufacturing Planning Efficiency

Improve Product Data quality with improved associative BOM generation

Reduce NPI time with better configuration & change management



# ENHANCE BOM RECONCILIATION

- Ability to reconcile upstream and downstream in context on a change
- Ability to reconcile upstream and downstream BOM by a click on action
- Ability to implement rules to drive reconciliation automatically

The screenshot displays the BOM Transformer application interface. The left pane shows the 'eBOM' (Engineering Bill of Materials) for a design, listing various assembly components like 'BASEMACHINE.ASM.A.2', 'TRANSMISSION.ASM.A.2', and 'ENGINE.ASM.A.2'. The right pane shows the 'mBOM' (Manufacturing Bill of Materials) for the same assembly, listing manufacturing parts like 'FRAME.A.2', 'BUCKET.A.1', and 'LIGHTS.A.1'. A central 3D model of a yellow wheel loader is shown in a semi-transparent view, revealing its internal assembly structure. The bottom right pane displays 'Part Attributes' for the selected assembly, including fields for Number, Name, Version, State, Status, Modified By, and Last Modified.

## Benefits

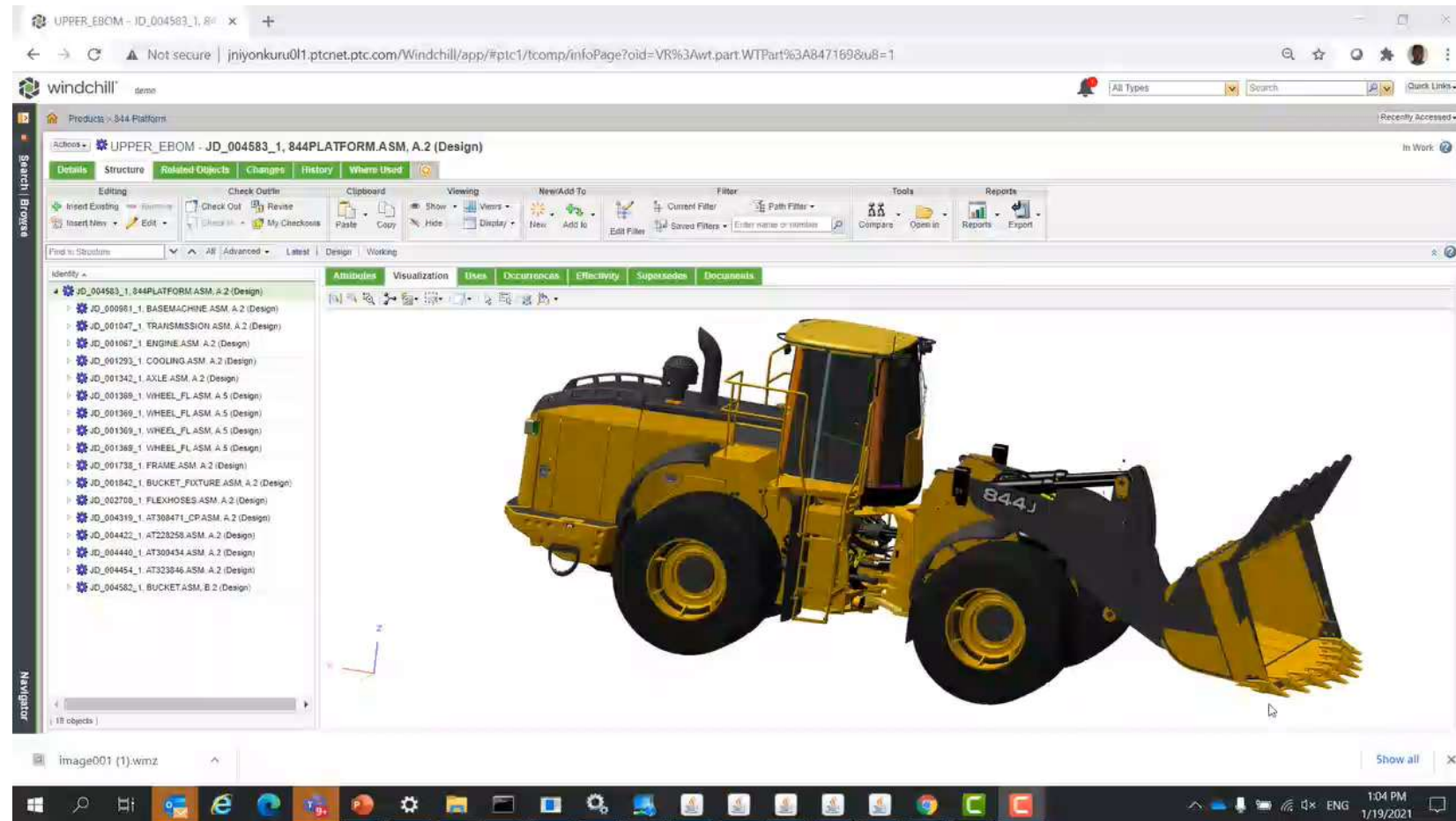
Ability to define Plant Data early in the process

Improve Product Data quality

Reduce NPI time with better collaboration

# SMART COLLECTION

- Ability to define collections of eBOM and Related mBOM paths from a huge structures and save the collection in Windchill
- Ability to use the Smart collection to access a portion of the products for scalability and performance reasons
- Ability to update Smart Collections
- Ability to use smart collection during BOM reconciliation



## Benefits

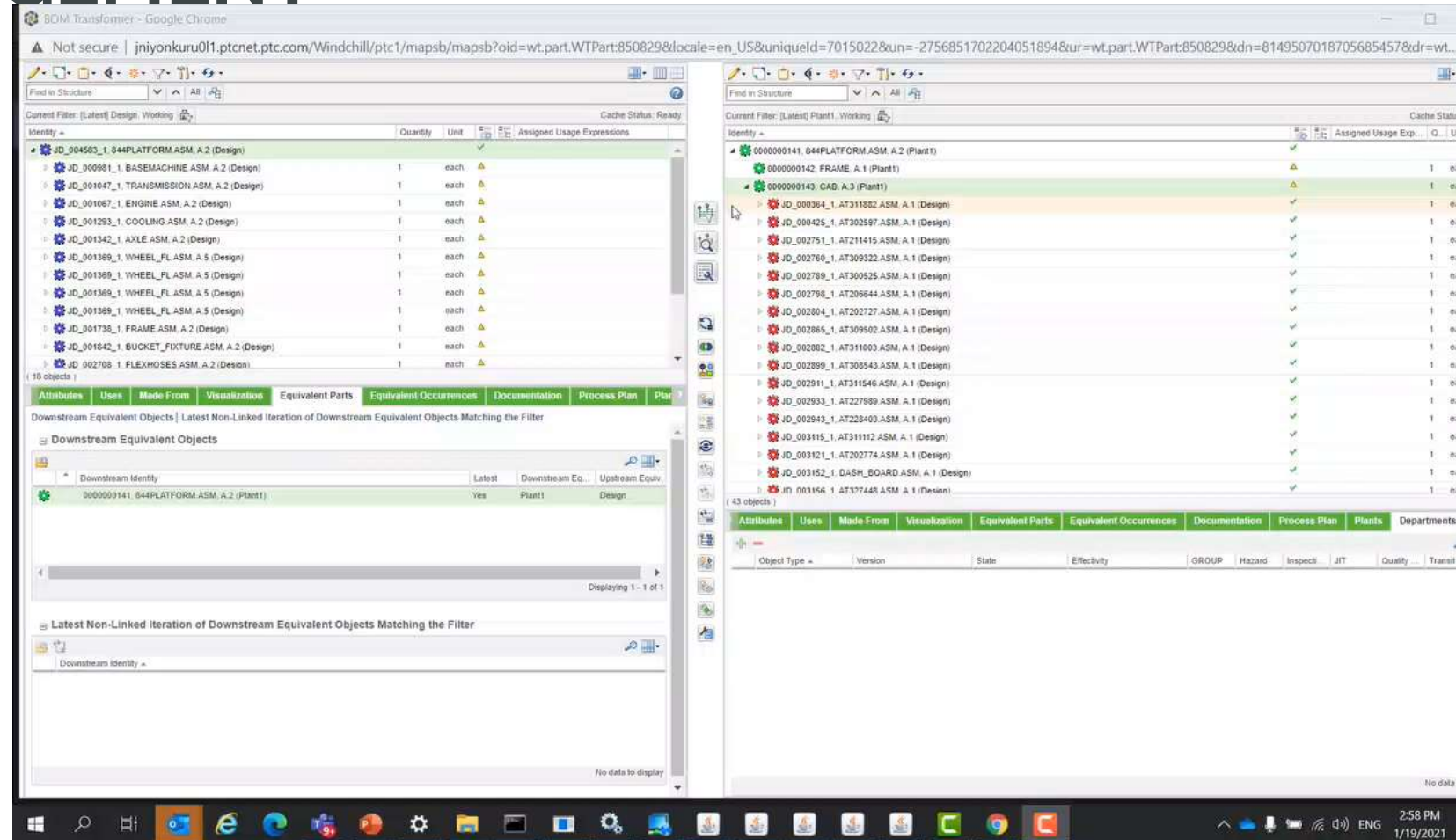
Ability to define Plant Data early in the process

Improve Product Data quality

Reduce NPI time with better collaboration

# PLANT DATA MANAGEMENT

- Ability to collaborate with more mfg preparation roles like Supplier, Logistics, etc..
- Ability to define Plant attributes without iterating the design part
- Ability for each plant department to manage their own attributes
- Ability to define change management and effectivity on those attributes
- OOTB integration to ERP and MES



## Benefits

Ability to define Plant Data early in the process

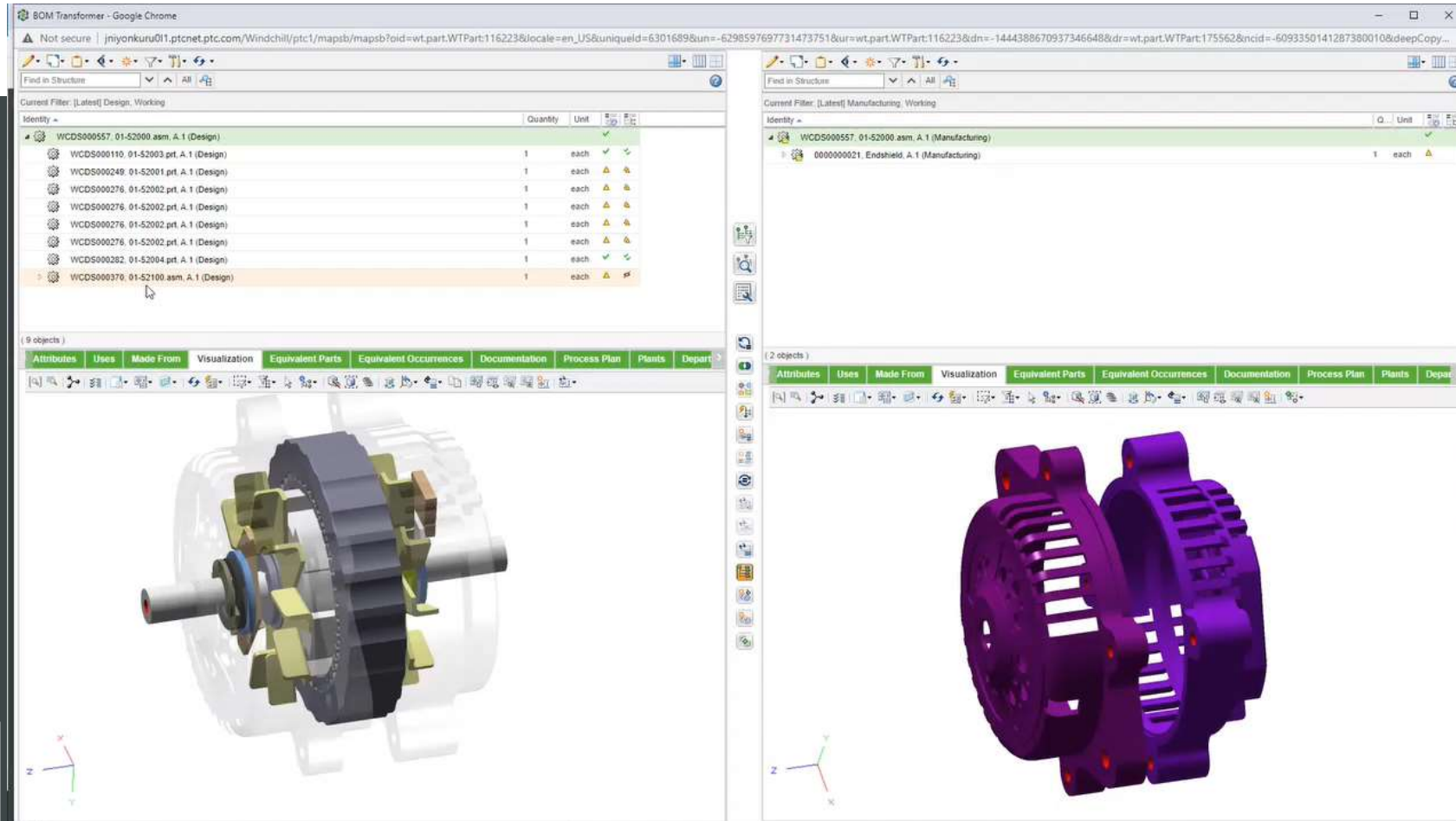
Improve Product Data quality

Reduce NPI time with better collaboration



# SPLIT IN BOM TRANSFORMATION

- Split assemblies during BOM transformation
- Ensure conformity of quantities during the split
- Support the split on the occurrence from 3D
- Reconciliation for split assemblies



## Benefits

Ability to define Plant Data early in the process

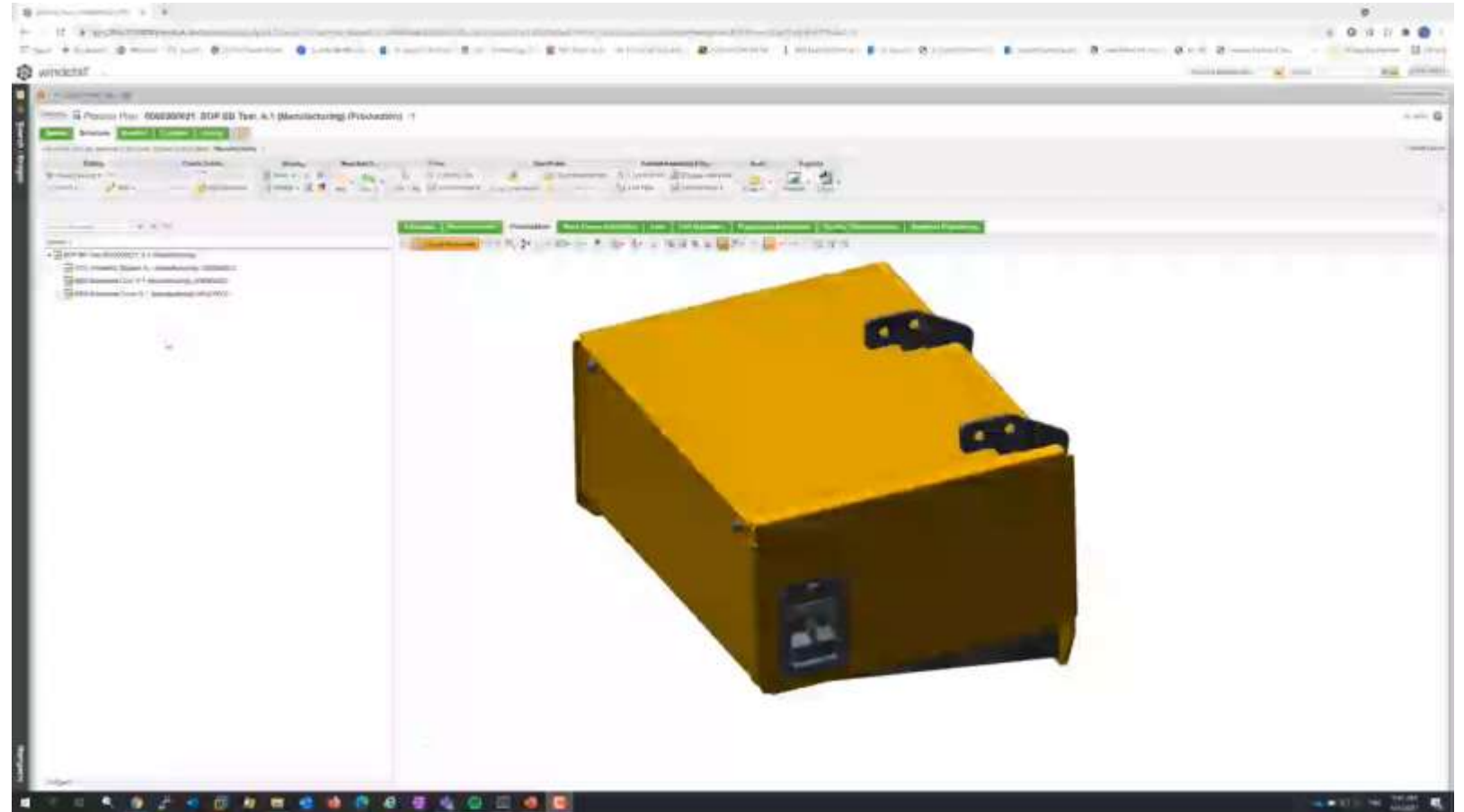
Improve Product Data quality

Reduce NPI time with better collaboration



# ENHANCE PROCESS PLAN

- Ability to reposition resources and operated on parts directly in process plan browser in playback mode, without going to Creo View client for doing it
- Preference to control if save dialog should appear



## Benefits

Ability to define Plant Data early in the process

Improve Product Data quality

Reduce NPI time with better collaboration

# MPMLINK KEY INVESTMENTS IN 12.1 SERIES

12.1.0  
End 2021

12.1.1  
Mid 2022

12.1.2  
End 2022

WRS

SEMI-FINISH & COPRODUCE

MISCELLANEOUS: IMAGE LINKS, MRB, .....

SIMULATION

PERFORMANCE

## WRS MPMLink Enhancements

- Ability to create Downstream parts using WRS API's :
  - New Downstream Part
  - New Downstream Branch
- Ability to reconcile the upstream and downstream BOM using WRS API



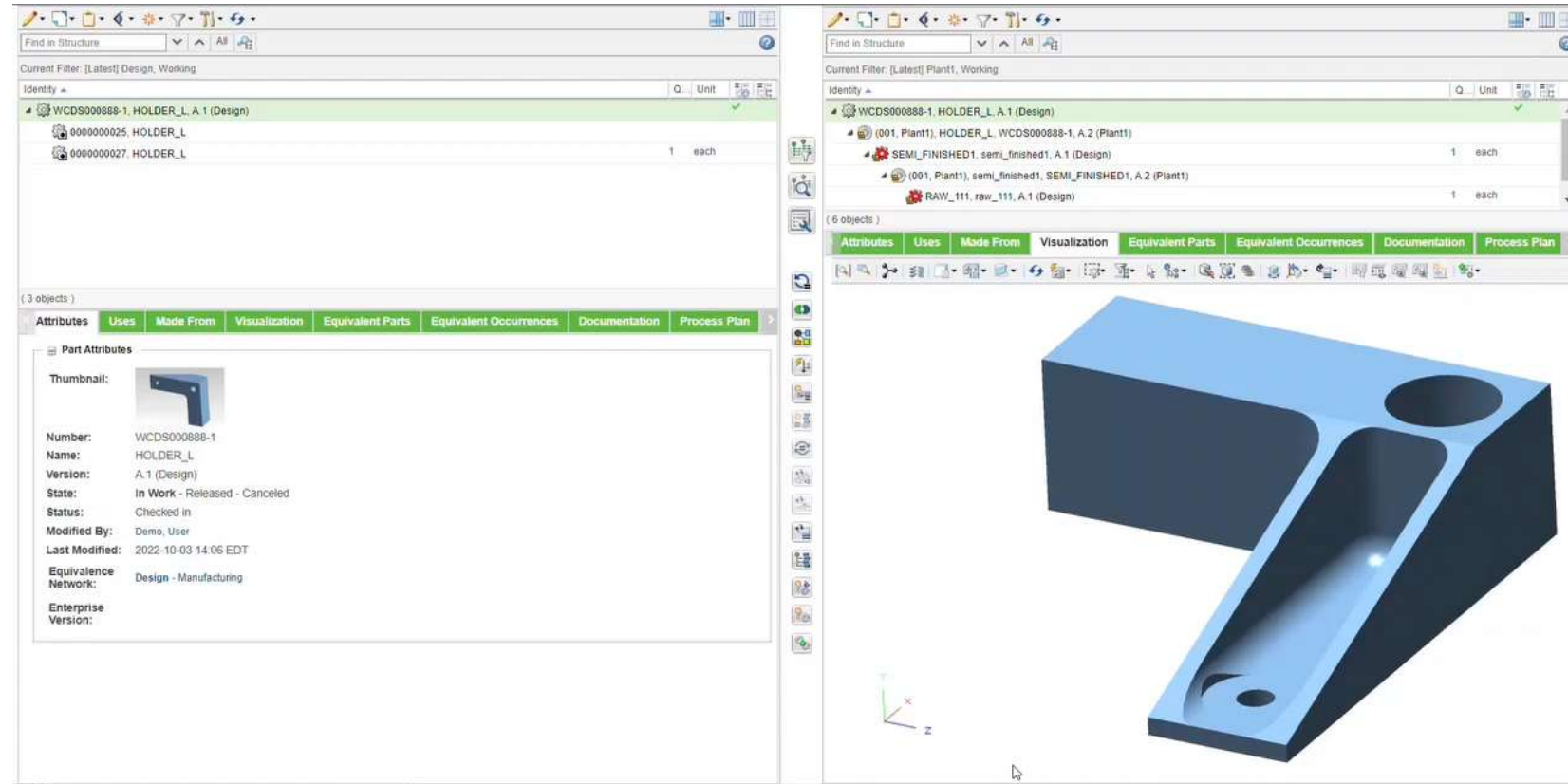
## Benefits

Allow a better integration of MPMLink in customer ecosystems

Allow easy development of custom APP (Customer or Partners) that deal with MPMLink data

# SEMI FINISHED IN PROCESS PLANNING

- Ability to define Process Plan for the intermediate manufacturing steps
- Leverage the 3D when defining the intermediate manufacturing steps
- Ability to manage Scrap and Mounting Parts for Semi Finished



Tighter Design & Manufacturing Planning  
Collaboration on Semi-Finished parts

Improve Product Data quality with improved associative Semi-Finished parts

Reduce NPI time with better configuration & change management Semi-Finished parts

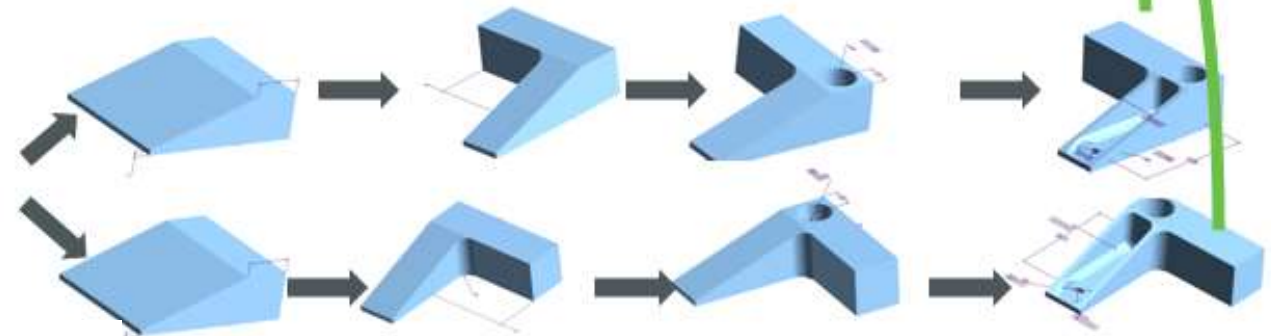


# CO-PRODUCED PLANING

- Ability to fully define the material requirements of Raw and Semi-Finished for fabricated parts
- Ability to define co-produced of Parts that are being machined simultaneously
- Ability to define alternatives for semi-finished or coproduced BOM in a specific plant
- Ability to manage co-produced items for scrap and mounting parts
- Publish the Semi-Finished and Co-Produced data to ERP



## SAME PROCESS PLAN for 2 DIFFERENT PARTS



### Benefits

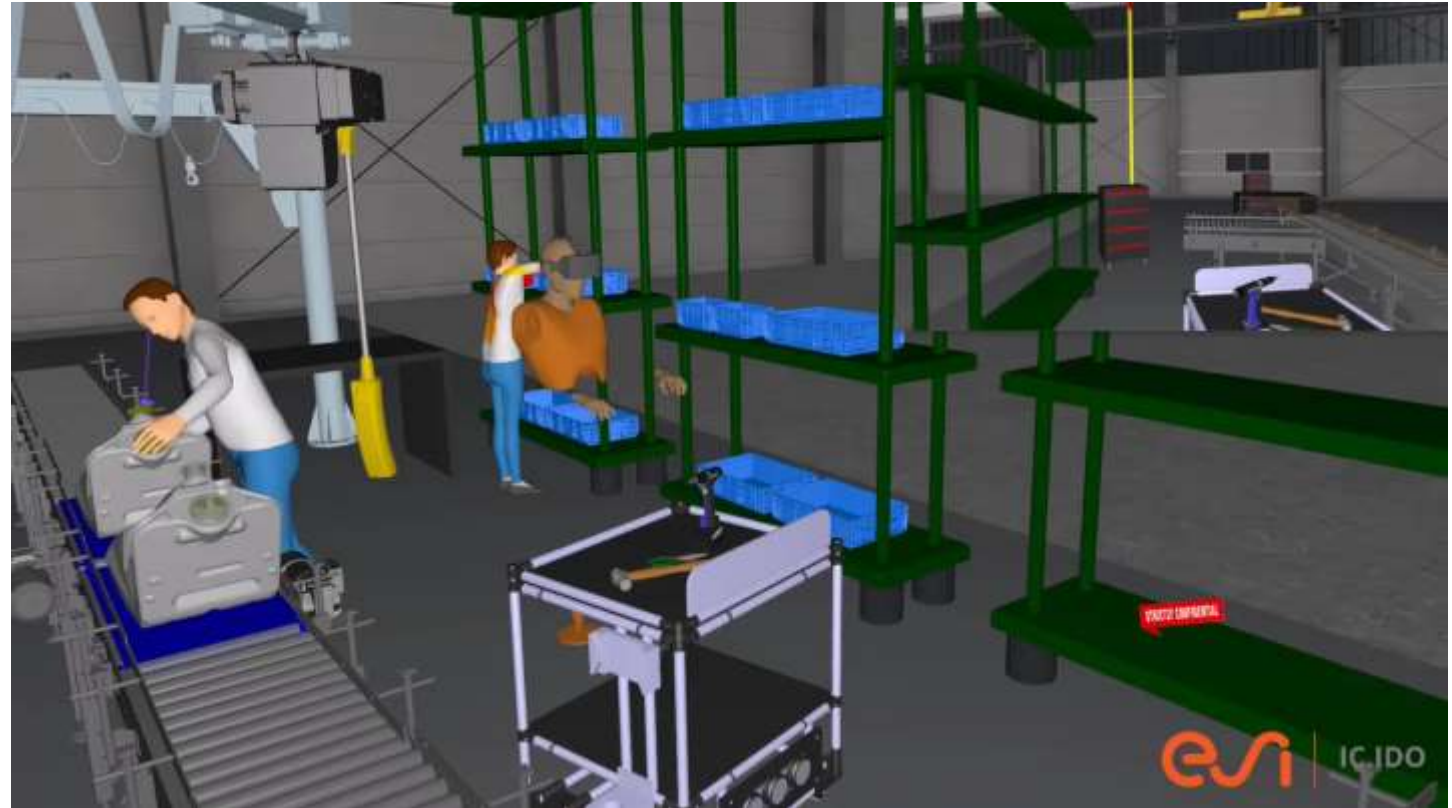
Tighter Design & Manufacturing Planning  
Collaboration on Semi-Finished parts

Improve Product Data quality with improved associative Semi-Finished parts

Reduce NPI time with better configuration & change management Semi-Finished parts

# SIMULATION

- Improve validation and optimization of virtually defined Process Plans in MPMLink
- MPMLink Virtual Reality full scale trial out
- Ergonomic trial out
- Feasibility Trial out



## Benefits

**Virtually validate Process Plan**  
in order to reduce time and  
cost production ramp up

**Tighter Design &  
Manufacturing Planning  
Collaboration** on Semi-  
Finished parts

**Improved management of  
manufacturing resources**  
results in reduce new product  
introduction time



## A Credible Software Partner for Industry Digital Transformation

Using predictive, real time, immersive physics-powered simulations, and the talent and IP from ESI, our clients can replace physical testing with virtual - and be safe, clean, and productive like never before.



18

COUNTRIES



1,000

EMPLOYEES



50

YEARS IN BUSINESS



€130M

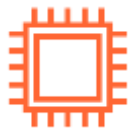
REVENUE IN 2022

## A long-term perspective anchored on three pillars

Like never before Industry is adopting digital practices, moving large part of processes and decisions to virtual. ESI envisions a world with inspiring improvements in clean, safe and productive industry.

To get there, everything should be simulated, exploring alternatives sooner and involving a diverse cast of stakeholders in all decisions.

To go beyond virtual testing, ESI Group software solutions anchored on three pillars.



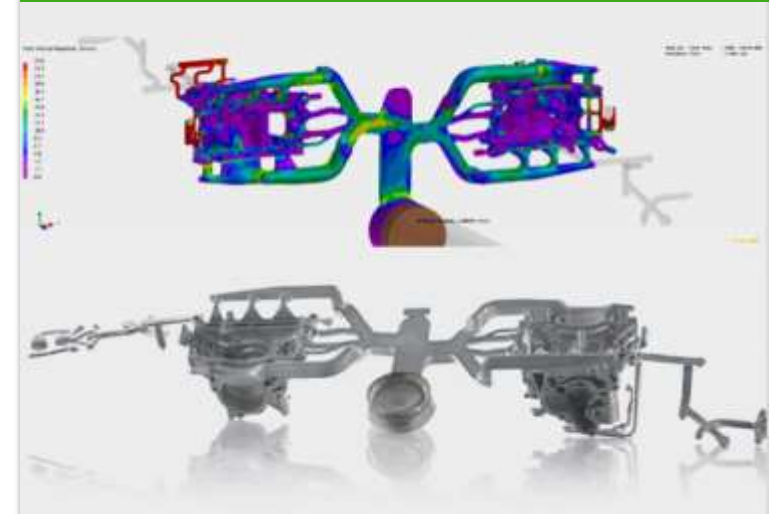
Predictive



Real-time



Immersive







A new partnership for the **digital transformation of the industry...**



...offering a concurrent manufacturing validation solution to **decrease lead time and costs...**

**DIGITAL THREAD**

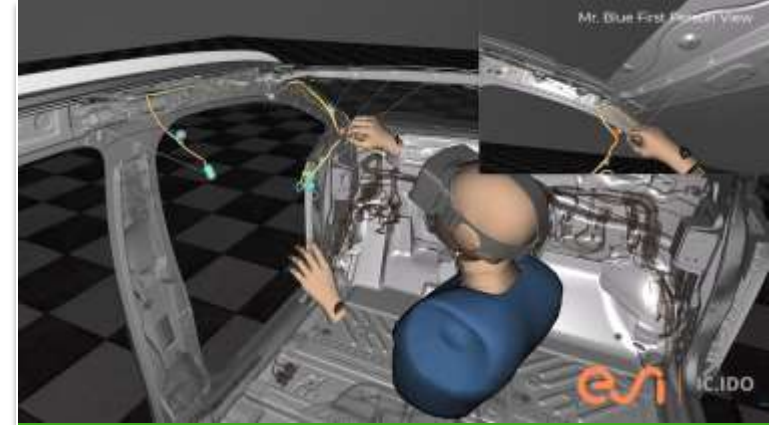
windchill®

esi | IC.IDO

- Final Assy Try out, 0000000001, A.2 (Manufacturing)
- 0010, ST 3001, A.2 (Manufacturing), 0000000002
- 0020, ST 3002, A.2 (Manufacturing), 0000000001
- 0030, ST 3003, A.2 (Manufacturing), 0000000006
- 0040, ST 3004, A.2 (Manufacturing), 0000000004
- 0050, ST 3005, A.2 (Manufacturing), 0000000003

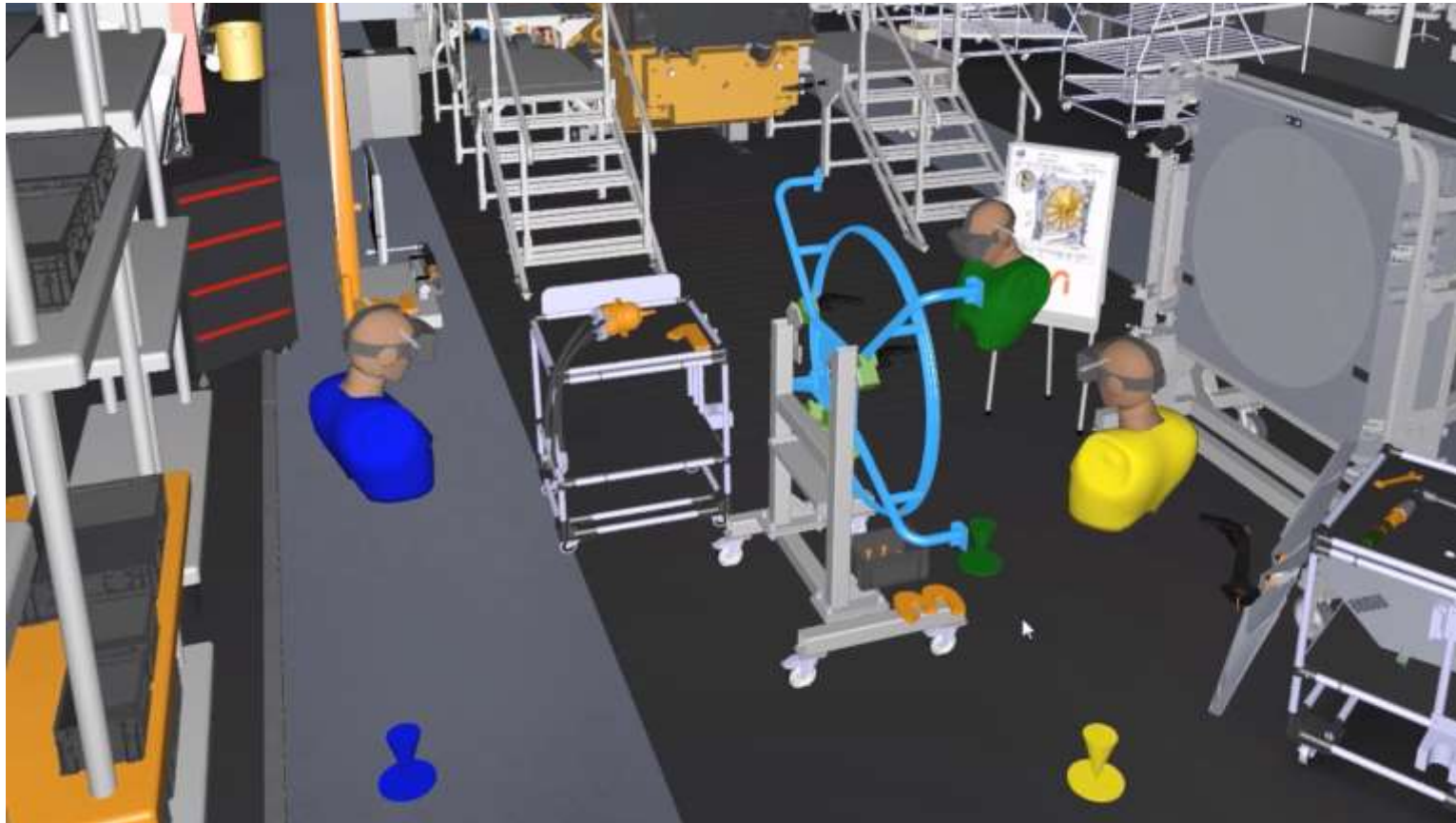
Upstream

Downstream





...powered by **Human Centric Digital Manufacturing**  
**Validation Capabilities.**



ACCELERATE YOUR TIME  
TO MARKET



LOWER YOUR  
OPERATIONAL COSTS



REDUCE RISK &  
IMPROVE QUALITY





# FORWARD LOOKING

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# FORWARD LOOKING

ESI ENHANCEMENTS

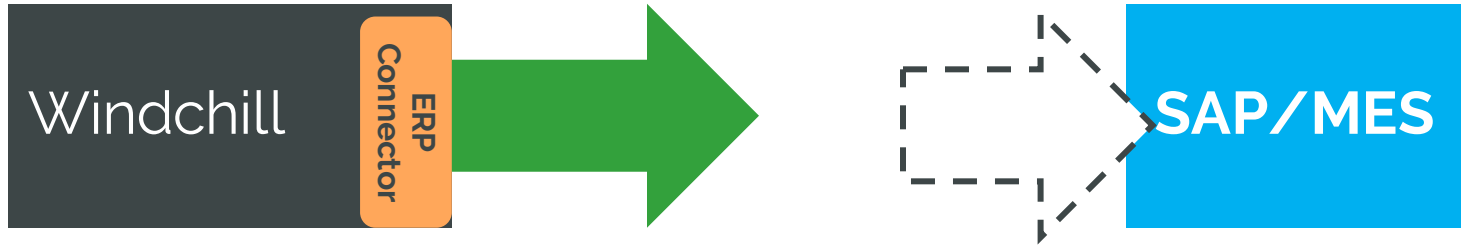
CONFIGURED BASED WORK INSTRUCTIONS

MBDE

SIMULATION

USABILITY

# FORWARD LOOKING



- Customer needs to do customization to hit the ERP
- TCO is high



- OOTB turnkey is not always the case
- Customization in Tibco
- TCO is high (Need some expertise)
- Mostly one way integration

From Data push to better Process integration



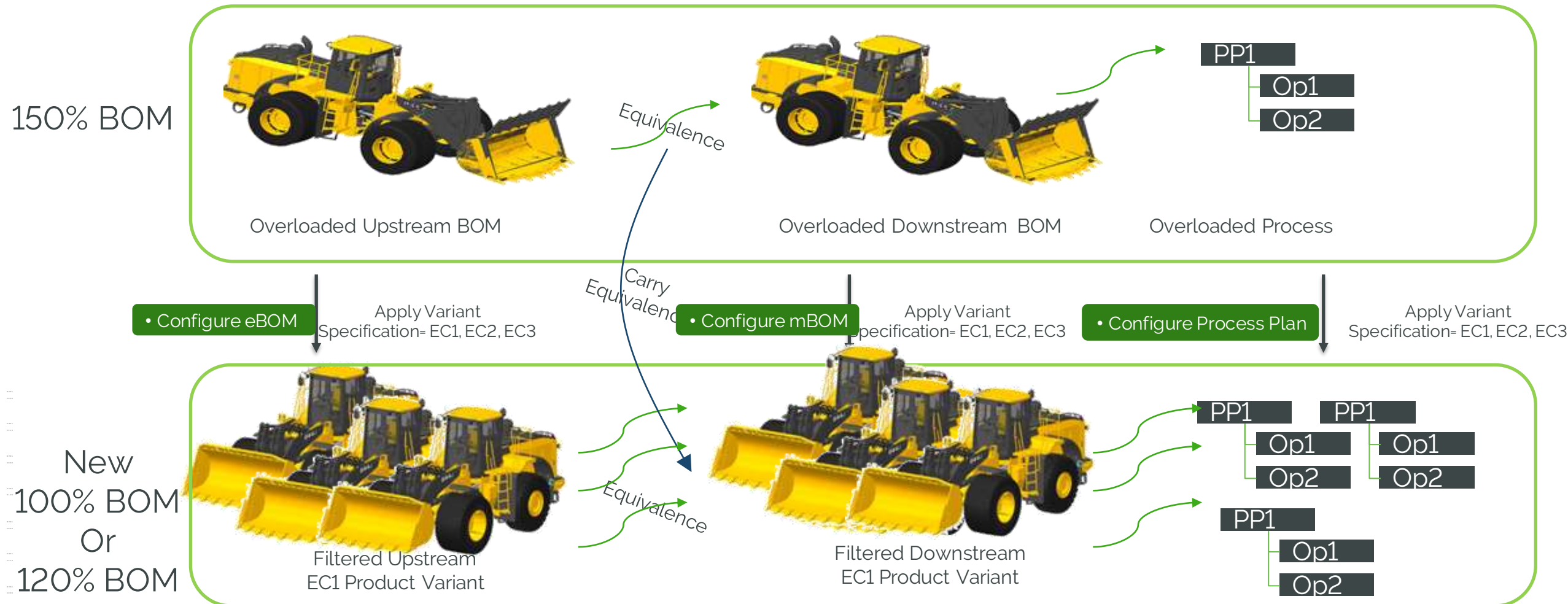
- Event based **Bi-directional** integration and better cross system process support (Change, Part Numbering, BOM Update, attributes define from either syst, ..)
- Less **expertise** and Less **TCO**
- Use of modern API (Odata) from SAP
- Use of modern API from Windchill (WRS, 3D/PMI Instructions)

# BUSINESS STRATEGIES TO SELL PRODUCTS



# BUSINESS SENARIOS

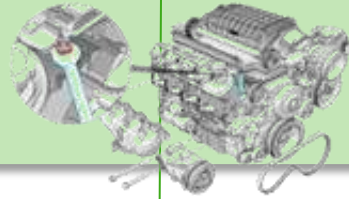
- Maintain overloaded upstream, downstream BOM and Process Plan; New part and new Process Plan created for end product variant





# EVOLUTION OF INSTRUCTIONS OF HOW TO GO FROM A TO B

**Work Instructions**



3D  
2D  
Text  
Video

AR  
Voice  
Error monitoring  
Mobile  
AI

Most Customers

Current MPMLink

**Orientation Instructions**



Print

HTML

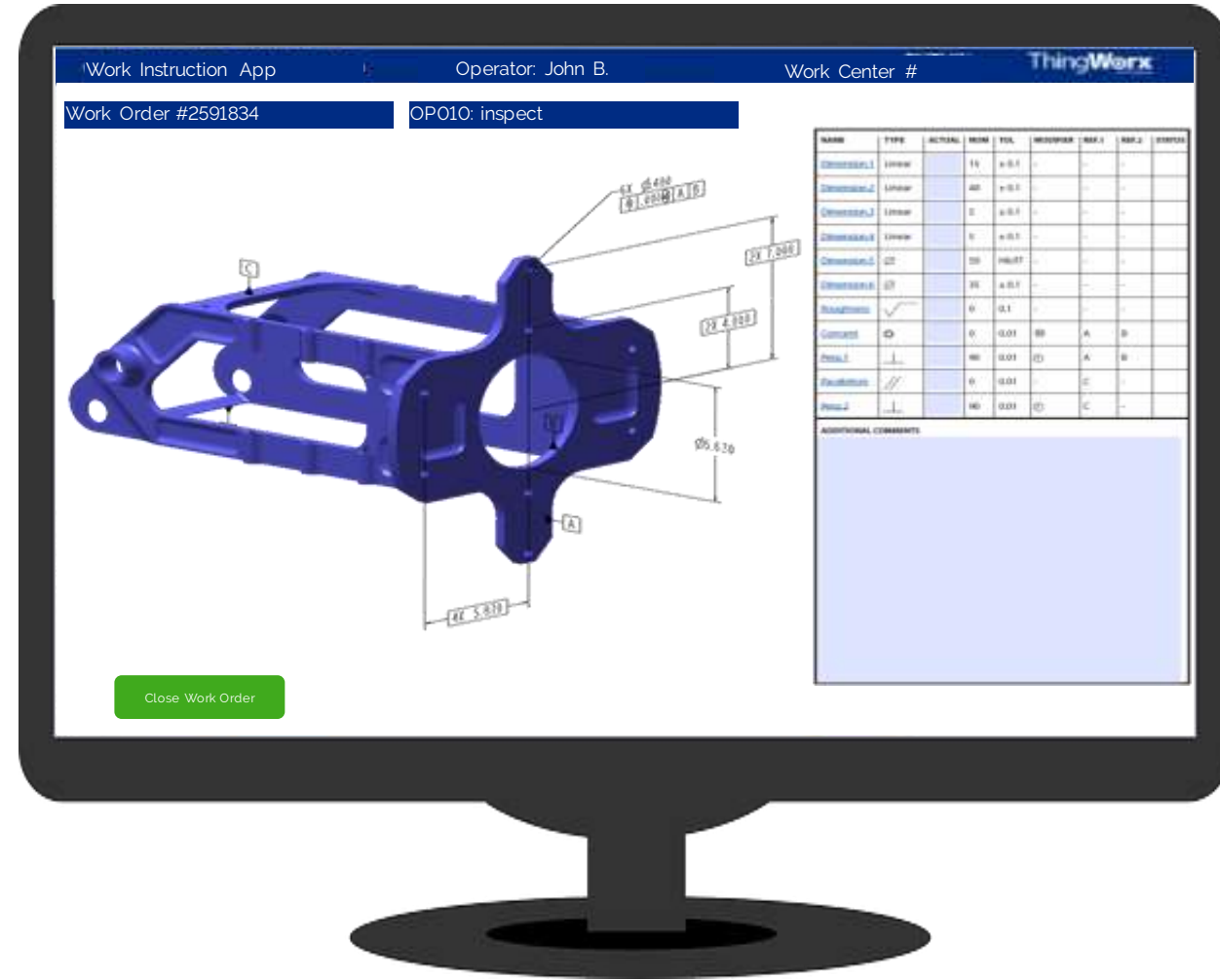
Guided

Autonomus



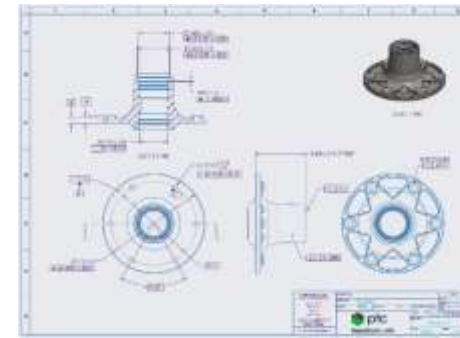
# AUTHORING

- Enhance the data collection definition in Windchill
- Enhance the capturing re-use of 3D in many operations
- Simplify the WI definition with a WYSIWYG
- Generate AR from MPMLink Instructions

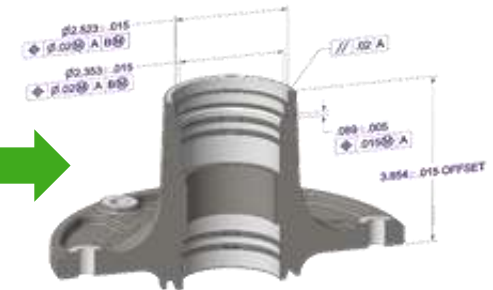


# ENHANCED MBE

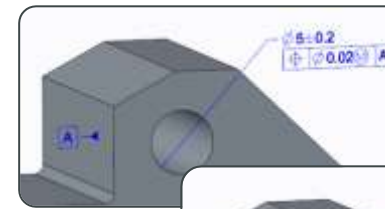
- QIF (Supplier Integration, metrology)
- CC stuck up
- Define CC outside CAD
- NC Integration
- Weld
- Composite
- Additive Manufacturing
- Machine Integration
- Better AR and Work Instruction integration



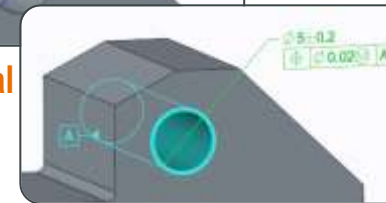
Fully annotated drawing



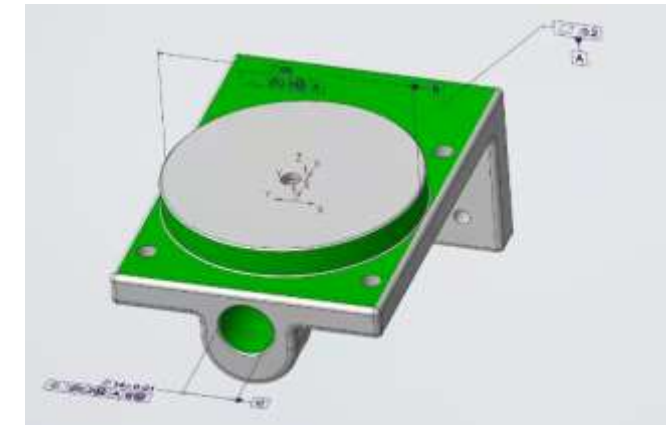
Minimally annotated model



Graphical PMI



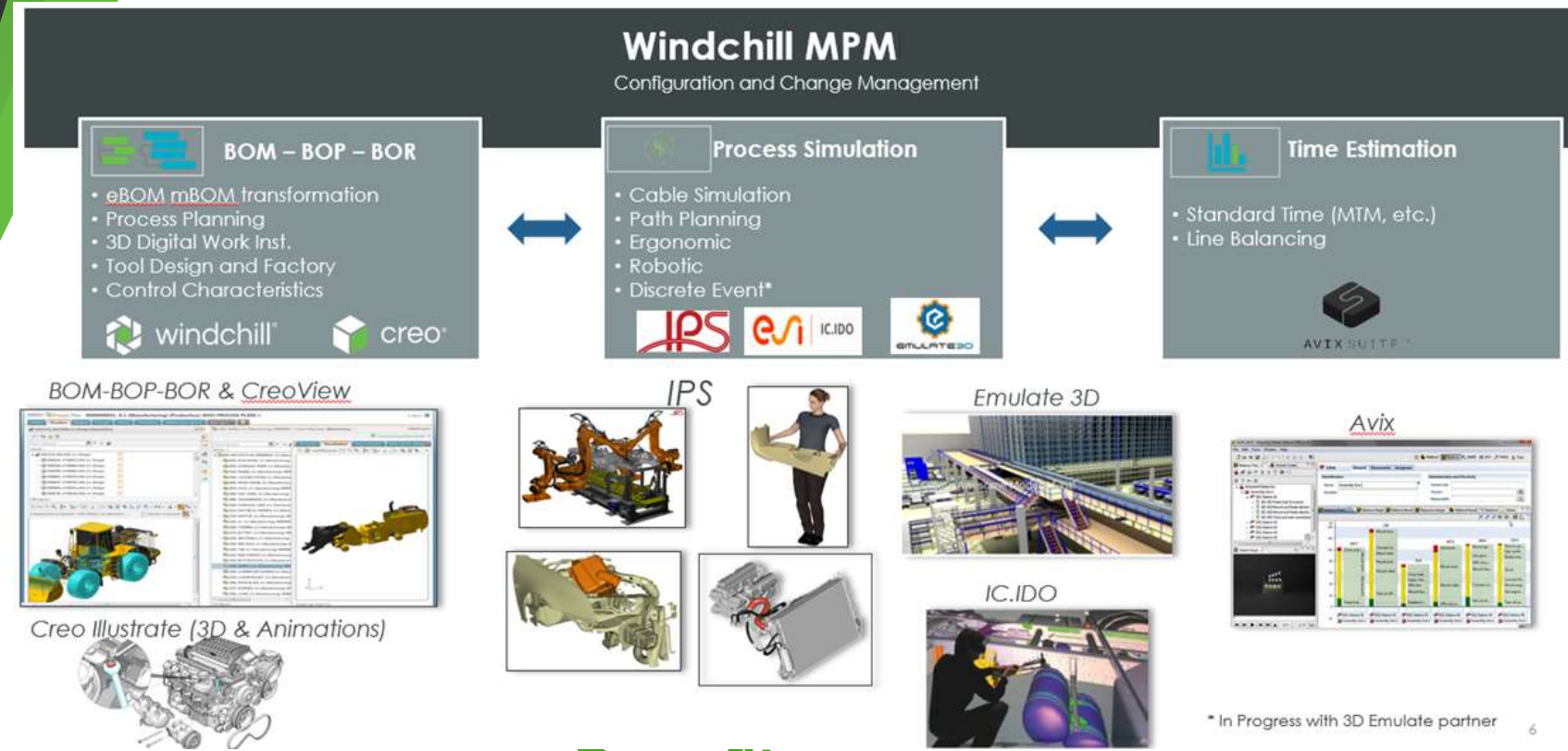
Semantic PMI



# DIGITAL SIMULATION AND TIME OPTIMIZATION

## Capabilities

- Time estimation and line balancing (Partner: Avix)
- Cable, robotic, path planning and ergonomic (Partner: IPS)
- Virtual reality and immersive manufacturing process validations (Partner: IC.IDO)
- 3D based discrete event simulation & virtual commissioning (Partner: Rockwell Automation)



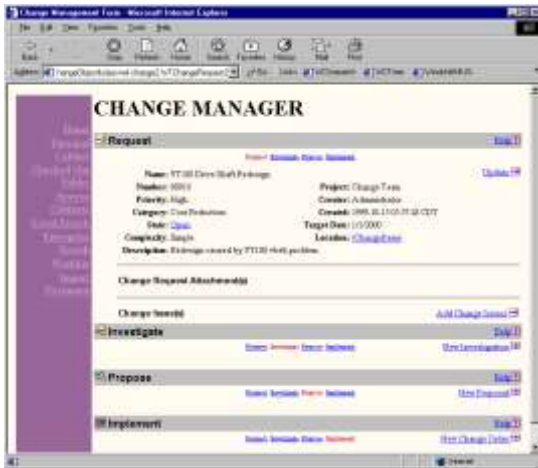
## Benefits

**Enable** collaboration between product and process design

**Deliver** higher quality products with feedback on manufacturability

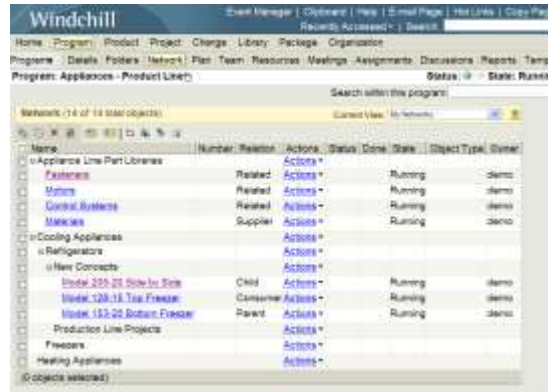
**Design** optimal flows that improve efficiency

# WINDCHILL USER INTERFACE EVOLUTION



## Version 1-6.2

First generation HTML UI with Java applets for interactive needs.



## Version 6.2-9.1

Solution based UI framework.  
Improved navigation and task focus



## Version 10-12+

Modernized Javascript frameworks  
More scalable web solutions  
Configurable UI



## Next Gen UI

Framework evolution  
Role & Task focused  
Modern Experience

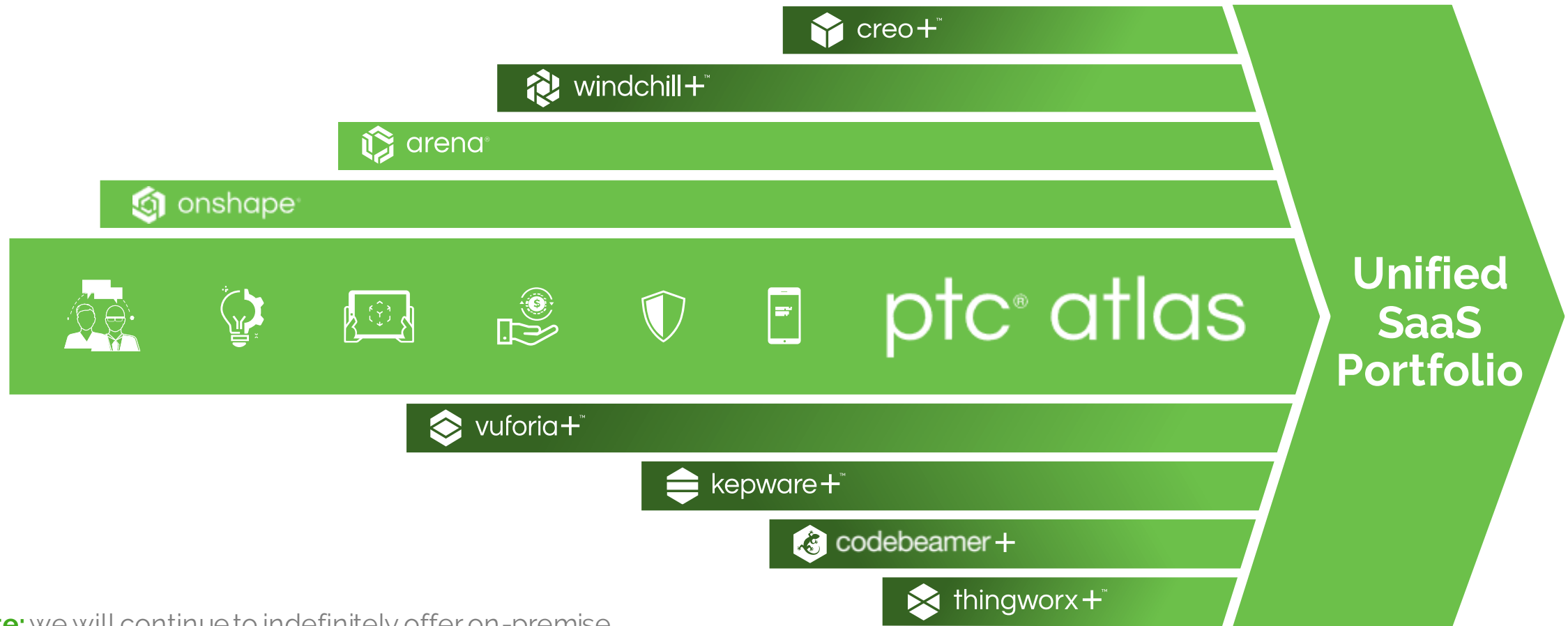


# NEXT STEPS

- PTC will continue to refine the Next Gen UI vision heavily in the next year
  - Discussions with customers & PTC/USER Windchill TC members
  - Focus on
    - Home page & navigation
    - Workspace
    - BOM structure
    - Process flows – eg Change, Issues
- Windchill Orca
  - PTC Convergence visual language
  - Next Gen UI infrastructure
- Opportunities to Collaborate
  - User Experience
    - Liveworx UX Labs
    - Onsite UX Labs
      - May/June- Boston area
      - August / Sept - TBD
    - Onsite user observations
    - Virtual UX Labs
      - June/July
  - Customer interviews and discussions
- How can I get involved?
  - Reach out to [kmoroni@ptc.com](mailto:kmoroni@ptc.com)

# ROADMAP TO PTC'S SaaS FUTURE

TODAY FUTURE



**Note:** we will continue to indefinitely offer on-premise offerings for Creo, Windchill, Integrity/Codebeamer, ThingWorx and Vuforia built from same code base.

## Accelerating Value beyond a traditional customized On-Premises solution

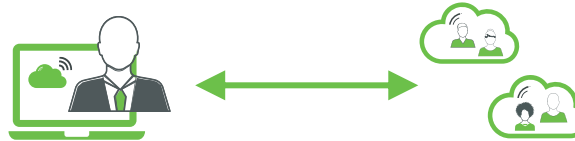
### Unified PTC+ Portfolio With Exclusive Value- Added Services on Atlas



Seamless interoperability with  
PTC+ offerings

Exclusive SaaS features to  
improve collaboration, drive  
business insights, and  
accelerate time to value

### Industry Best Practice SaaS Application Experience



Simplified admin & end user  
experience

Streamlined provisioning and  
frictionless expansion

### Optimized Tailoring & Upgrade Experience



Flexible & safe configuration  
management

Regular & frequent upgrades and  
updates



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Your feedback provides us with valuable information on how to shape future content strategy for the event!

**PROVIDE SESSION FEEDBACK**



# LIVEWORX

A NEW ERA IN PRODUCT LIFECYCLE INNOVATION

# THANK YOU

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[ptc.com](http://ptc.com)

